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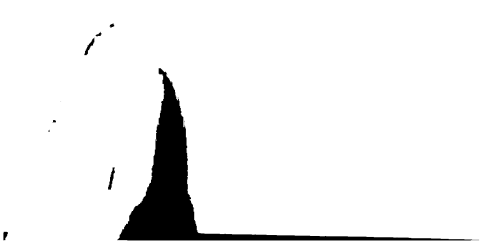

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LIMITATIONS OF LOW-GRADE FUELS

Cheap fuels, and especially waste material used as fuel, may often be shown to evaporate water much more cheaply than coal of a higher grade at a considerably higher price per ton. Yet in the end it is quite possible that such conditions may result in a net loss owing to the indirect charges which enter into the economics of steam generation. As low-grade fuel invariably runs high in ash, the removal of refuse as well as the necessity for frequent cleaning of fires often amounts in the smaller plants to an item of no small cost, and this, together with the other incidental and perhaps somewhat obscure handling charges, may turn an apparent profit into a very decided loss. Any tests made to determine relative fuel values are far better when they are carried out under the simple but thoroughly practical plan of making a run extending over several weeks with each grade and then counting in the total cost of boiler-room operation.

YERKES' WORTHLESS BOND ISSUE

The recent decision in Chicago declaring worthless the $6,750,000 of old bonds of the Consolidated Traction Company has succeeded in establishing after long litigation the exact liability of the Chicago Railways as regards this issue. The contention of the Chicago Railways that it could not, by any express or implied contract, be held responsible for these bonds has been sustained on the ground that the merger for whose formation they were issued was *ultra vires* and against public policy. Consequently the bonds are worthless. Of the $4,494,000 originally held by the Yerkes estate, the Chicago Railways had bought in $4,464,000 at 30, and now all of the total authorized issue of $6,750,000 has been recovered except $254,000, par value. This amount includes $17,000 never issued and $30,000 still held by the estate, so that the amount held by the public at the present time is $207,000, or less than 4 per cent of the total issue. It may be that the present holders will not suffer total loss, however, for it would appear that inasmuch as Mr. Yerkes overstepped legal bounds and the dictates of public policy in bringing about the enormous bond issue to form the merger, his estate may be compelled to make restitution of the moneys paid for the bonds, and such a step would seem to be a perfectly just one, even should it render the estate insolvent. At any rate, the elimination of the liability from the Chicago Railways will serve to relieve it of a menacing and depressing factor in its security market. The decision comes as a fitting climax to an example of the old-time financiering methods of which Yerkes was one, but only one, exponent. Fortunately those days and methods have passed, thanks to the code of modern financial ethics, which public service commissioners have done a great deal to bring about. Promoters and capitalists can no longer brazenly manipulate stock and bond issues as if the public utilities concerned were their individual properties. Unfortunately, however, we still have the heritage of these evil practices. Many of the present transit problems in our large cities can undoubtedly be traced back directly to the financial mismanagement, to use no stronger term, of the early days.

PUBLICITY BY THE ASSOCIATION

At the banquet of the New York Electric Railway Association held last week C. Loomis Allen referred to the fact that the American Electric Railway Association had recently begun the distribution to the member companies of sheets for newspaper use to help in counteracting popular erroneous impressions in regard to the condition of electric railway companies. He added that the method would be to send once a month to the member companies extracts from articles published in the official organ of the association. This is work which is much needed. The time has gone by when anyone can expect that the public as a whole will take the time to learn the real situation of the railway companies unless the companies themselves take the trouble to state their position and do something to help themselves. There are many ways in which this can be done, and the distribution of sheets for newspaper use is one method and should be adopted. But to confine the information to what is selected from a single publication is to reduce the effectiveness of the method to a minimum. It is much like using a tack-hammer where a sledge-hammer is needed. If the association is to do this work, the sheets which it sends out should contain the best matter, the most telling arguments and most cogent facts available. In his speech Mr. Allen said: "No man need fear the verdict of the American people if that people has before it all the facts in the case." To this sentiment we cordially subscribe. There are

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hundreds of sources from which the facts may be obtained, such as judicial decisions, interstate commerce commission and other commission reports, interviews with prominent railway men, and the technical papers. But as a rule this matter is not in daily newspaper style. The information could be rewritten in a manner that would be acceptable to the newspapers. The facts are there, and in such shape that they can be readily appreciated by those who understand the value of news. Again, several public service commissioners individually have recently expressed themselves strongly in regard to the benefits which electric transportation provides and the underlying justice of the companies' contentions. These gentlemen occupy a quasi-judicial position, and their favorable opinions should be more widely circulated. In this batttle against ignorance every means of help should be utilized, and each day, if possible, instead of once a month, some data, culled from every available source and so prepared that they can be easily used, should be put in the hands of the member companies.

THE HUMAN ELEMENT AND ACCIDENT CLAIMS

E. F. Schneider, general manager Cleveland, Columbus & Southwestern Railway, has been so prominent a leader and pioneer in the matter of safety talks to employees and to the public that special interest attaches to his paper on the claim department read at the last meeting of the Central Electric Railway Association. To many Mr. Schneider will appear an iconoclast when he classes as "bosh" such subjects as instruction for trainmen, the book of rules, card indexes for discovering fraudulent claims, expert testimony in accident suits, etc. We do not believe that Mr. Schneider means that these matters are useless and unworthy of consideration. He simply means that in the past too many managers have regarded them as marking the limit of their responsibility, and when an accident has occurred and they have added a few rules to guard against its repetition they have felt that they have done their full duty. It is absolutely necessary, of course, to instruct trainmen in their duties, to have a rule book kept up to date, to watch the payment for claims, and to do whatever else the usual best practice recommends to keep down accidents and the expenses from accidents. But the careful manager will not make a fetich of these purely mechanical or routine matters. Nor should he or his employees consider that if the road has a low damage expense account that fact marks the limit of their duty in regard to the safety of the public. Too much emphasis upon the size of the damage expense account means an attempt to express the extent of human suffering in dollars and cents. Translation of one of these matters into terms of the other is absolutely impossible. The paramount thought for both the manager and the trainmen to have in mind is the sacredness of human life. If they feel this, they will realize that one of the highest privileges which can be granted to any one is that of saving the life of another and that by their environment and position they can take advantage of this privilege to a greater extent and to a greater degree than those in most other employments and other walks of life. If this is their underlying thought in transportation, the accident question on electric railways is solved.

HOT JOURNALS AND BRAKESHOE PRESSURES

At the Master Car Builders' convention at Atlantic City the standing committee on car trucks took under consideration a query regarding the tendency of passenger car journals to roll out of their bearings under heavy applications of pressure from the brakeshoes. The question is of live interest to high-speed electric railways. Hot-journal-box troubles have by no means decreased in the proportion which might be expected from the comparatively recent improvements made in methods of applying and maintaining lubrication. Indeed, on many railways the problem of eliminating delays due to hot boxes has reached an importance by no means warranted by the apparent simplicity of the factors involved, and it is generally magnified by the exasperating fact that no remedy seems to be thoroughly effective.

The influence of the enormously high brakeshoe pressures used with modern equipment is apparently a factor which is almost invariably overlooked. On the Interborough Rapid Transit Company's subway lines, for instance, the difficulties with hot journal boxes were at one time a serious handicap to satisfactory operation. The trouble was finally traced to the frequent and necessarily heavy applications of brakeshoe pressure which were found actually to crush the babbitt lining at the edges of the standard M. C. B. journal brasses, and a new form of journal brass with a rectangular outside contour and a full semi-circular bearing on the journal was developed. This design was described in the Electric Railway Journal for July 27, 1912, page 121. As the new form of brass replaced the original standard, the hot-box trouble rapidly decreased until at the present time delays from this cause are practically unknown.

In the New York subway conditions, of course, are extreme, yet the standard automatic air-brake system is used without the high-presssure air and blow-down for brake cylinders introduced on a number of steam roads. Indeed, it is quite possible that crushed brasses are responsible in a modified degree for many of the inexplicable epidemics of hot journals on railroads whose traffic requirements involve but a moderate number and limited severity of brake applications.

Since the M.C.B. committee reported that it had discovered a tendency for journals to roll out of the brasses in steam railroad passenger coaches but not in freight cars, there is good reason to believe that it is present in all electric railway cars and it would be manifest wisdom to consider the factor as an important one. The only remedies suggested by the committee were the use of clasp brakes and lowering the position of the brakeshoe on the wheel.

The latter suggestion was based upon the theory that the trouble would be reduced if the resultant of the two forces imposed on the journal by the weight of the car and by the brakeshoe pressure was kept at least 10 deg. inside of a line through the center of the axle and the edge of the journal brass. The direction of this resultant would be obviously made more nearly vertical as the shoe was moved below the horizontal center line of the wheel, yet this in turn has been demonstrated in the past to increase the

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tendency toward sliding on rough track by locking the wheel against vertical play. New journal brasses such as were forced by numerous hot journals upon the New York subway would undoubtedly be an expensive remedy, yet not so much so as the introduction of the clasp brake with one shoe on each side of the wheel, and it is certain that a full semi-circular cross-section for a brass would strike at the root of trouble once it was established as the prime reason for hot journals on any particular railway.

GAS-ELECTRIC CARS VERSUS BATTERY CARS IN CITY SERVICE

In its desire to eradicate horse traction completely, the London County Council Tramways is faced by a condition quite similar to that on the cross-town and ferry lines of New York. The East End of London has a number of horse-car routes for which conduit construction would not be justified but which the local authorities will not permit to be electrified with the overhead trolley. In New York the problem has been solved so satisfactorily by means of storage battery cars that the Third Avenue Railway will soon have a total of 160 in operation, while the New York Railways is making a beginning with forty-five equipments on stepless cars. For some reason or other, no storage battery car seems to have been offered to the London management. Yet the tests of both types of cars made by the Third Avenue Railway showed that the accumulator car was cheaper for low-speed city conditions, as set forth in detail in the article entitled "The Log of a Gasoline-Electric Car," published in the ELECTRIC RAILWAY JOURNAL for Sept. 23, 1911. The gas-electric car under test weighed 857 lb. per passenger compared with 557 lb. per passenger for the storage battery car, this difference being due largely to the fact that the stresses set up in operation required a heavy body despite the fact that the engine was carried on the truck. This car was in operation from November, 1909, to September, 1910, and during this time its cost of gasoline per revenue mile at 12 cents per gallon averaged 4.61 cents, or about four times the cost of electrical energy at 2 cents per kw-hr. The guaranteed cost of battery maintenance plus the cost of energy was practically equal to that for gasoline alone, aside from the fact that the first cost of the gas-electric car was much greater.

Like the first battery cars of the Third Avenue Railway, the three experimental gas-electric cars in London are reconstructed horse cars. It is clear, however, from the description published in this issue that the conversion called for more radical changes than was the case in New York, particularly as the greater part of the equipment is mounted on the platforms. In the Third Avenue battery cars the cells are placed under the seats, and the chain-driven motors are installed on the trucks, so that no platform space is required except for small standard railway controllers. On the other hand, the London double-deck cars have a platform space of 12 ft. 6 in., although the closed lower deck is only 14 ft. 6 in. long. This disproportionate platform space is accounted for in part by the stairways to the upper deck, but, in any event, it is not to the advantage of the car body or to the comfort of the passengers to place gas-electric equipment on the platforms instead of the truck. Since the operating conditions for which these cars are designed are quite analogous to those in New York, it certainly will be a pity if a carefully designed storage battery car is not placed in competition with them for the proposed service.

A LARGER ARBITRATION BOARD

We are glad to notice that the act to enlarge the board of arbitration authorized under the Erdman act will probably pass Congress. On the initiative of the National Civic Federation, a number of representative railway presidents and labor leaders and the officials in charge of the administration of the Erdman law united in the support of the several proposed amendments. Among them one of the most important authorizes the appointment of six arbitrators instead of three, unless the parties to the dispute prefer the smaller number. Of these six arbitrators, two are to be appointed by each of the parties to the dispute, and two are to be chosen by these four, or, in case of their failure to agree, by the board of mediation and conciliation. This board, which is to be created by the proposed law, is to be composed of a commissioner and assistant commissioner and not more than two other officials to be appointed by the president. It is not asserted even by the advocates of these proposed amendments that they will make the law ideal. President Low on this point says that while, in the opinion of the signatories, three is a desirable number of arbitrators for a dispute involving a single railroad, the proposed measure represents a compromise on certain points, and it was imposssible to secure unanimous consent to a larger number than six for a dispute affecting the interests of a whole section of the country. But it is interesting to note that the plan of six arbitrators in cases of this kind carries the indorsement of seven railroad presidents, the presidents of five brotherhoods, Judge Martin A. Knapp and ex-Commissioner of Labor Charles P. Neill.

Electric railways are only a little less concerned than the steam roads in securing the right solution of the problem of settling labor disputes equitably, and we hope that indorsement of the larger board under the Erdman act by those who have signed the petition mentioned will popularize the plan of having a larger board in electric railway disputes. As we have frequently pointed out, the so-called arbitration that is carried out by two partisans and one umpire is not arbitration; that is, it is impossible by this means to secure judicial adjustments of labor controversies, and for this reason such proceedings ought to be resisted to the last ditch. Only a few days ago the offer of the Jamestown Street Railway and the Chautauqua Traction Company to submit a labor dispute to a large representative board was rejected by the union for the reason that it was "unalterably opposed to a large number of members on a board of arbitration."

The reason for this is obvious. As a rule, the settlement of a dispute by a board of three arbitrators, formed as it usually is, is no arbitration in the sense that it is an impartial award on the merits of the case. The decision is merely a splitting of the difference between the extreme demands of the employees and the previous conditions of employment. The presence of six arbitrators, or two to represent each side, has another advantage than that of

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merely bringing more minds to bear upon the question in dispute. It provides two men for each of the three interests represented, and one of these can give moral support to the other in justifying a conclusion which is based upon the evidence and yet is unfavorable to the side of which he is a representative.

ASSESSED DAMAGES IN ACCIDENT CASES

We believe that a very fruitful topic for discussion by the Claims Association at its next convention would be the amounts assessed as damages against railway companies for different kinds of personal injuries. No one can read the reports of such cases, as decided in different parts of the country, without being impressed with the great differences in amounts of damages awarded by the courts for similar injuries. In some sections precedents have been set for high payments, and these precedents are being used as arguments for even larger assessed damages. In other parts of the country the payments are more like those which generally have prevailed in the past, and it is well known that verdicts for personal injuries always have been much higher in this country than in the countries of Europe. An instance came to our attention recently where a claimant, a bartender, secured $12,000 from an electric railway company because of an accident which resulted in three stiff fingers. We should hardly believe that such an accident would seriously impair his efficiency for his work, but in the part of the country where this case was tried large damages are not unusual, and it is not surprising to find that the company which was defendant in this case paid for its injuries and damages account last year 22 per cent of its gross receipts.

It is easier to suggest than to secure a remedy in a situation of this kind. Nevertheless, some things may be said. For instance, many states now have employers' liability acts which specify the amount to be paid in the case of certain accidents, and these amounts might fairly be used as a basis for the determination of railway damages. Certainly the railway company ought not to be held to a higher accountability than the state requires of others who cause accidents. The fact should also be generally recognized that no money payment for damages, no matter how large, can ever be full compensation for the accident. At least most victims of an accident, if they had their choice, would not undergo the pain and permanent injury which they suffer for any sum at all near the damages which they can collect on account of the accident. No ordinary amount of money, for instance, could, in the opinion of most of us, make up for the loss of a leg or an arm. Unfortunately, however, accidents do happen. They are one of the penalties paid by the community for the civilization which all of us enjoy. Partly to recompense those individuals who do meet with accidents custom has recognized a certain scale of payment for their misfortune, but at best this scale must be arbitrary. It is essentially a compromise between too large a sum, which would discourage all industrial effort by others for the benefit of the community, and too low a sum, which would make the individual victim the only person to suffer by the accident.

If this viewpoint is accepted, and it seems the only logical one, the question of the scale of damage payments for injuries where liability is admitted becomes simpler. The amounts assessed should be proportioned according to some generally recognized scale not too great to discourage people from building factories and railways, and in no case should the impossible object be sought of fully recompensing the victim. Judged by these standards, an individual payment of $12,000 for the accident mentioned above and an annual expense for damages of 22 per cent of a railway's gross income seem excessive.

PROPOSED BRITISH RULES FOR PLATFORM MEN

The Tramways & Light Railways Association of Great Britain has recently drawn up a collection of rules and regulations to aid in standardizing this feature of English tramway operation. While this work is admittedly a skeleton which can be clothed to meet local conditions of private or municipal systems, the rules are worth study as models of brevity and clearness. They apply only to city conditions, of course, as there are no interurban railways in the United Kingdom. The rules differ from those of the American Electric Railway Transportation & Traffic Association in quite a number of interesting particulars. In the first place, the British book is prefaced by an "agreement of employment" which sets forth the conditions of service, such as medical examinations, conformity to the rules, notice before quitting work, right of suspension and dismissal, liability for negligent damage to equipment, weekly payments of wages with one week's wages in hand, non-guarantee of continuous work, rates of wages, title of responsible governing officer, etc. The wording of the rules is notable for the use of the term "must" throughout. Bell signals, which have caused so much discussion in the preparation of the American code, are disposed of by the simple phrase: "Bell signals between conductors and motormen must be set out in accordance with the accepted practice of each company or corporation." Uniform bell signals are wanted in this country because of the operation of interurban cars on city tracks, whereas in England the operation of the cars of one system over that of another is much less frequent.

A remarkable omission from the English code is that of all reference to the responsibilities of the motorman and conductor except that they are equally responsible for replacing the trolley on the wire. The code also has no carhouse rules except those which instruct the motorman and conductor how to take the car in and out of the building. Furthermore, the crews are not instructed to warn passengers against danger in boarding or leaving cars, a condition which would indicate that the English passenger is not quite so reckless as the American and that the street pavements are kept in better condition. Among the instructions addressed only to motormen are those on the maintenance of a certain distance between cars, prohibition of passengers riding on the front platform, starting a car up a grade, operating a car through flooded track, proper operation of each class of brake and methods for minimizing the use of electrical energy. The rules for conductors differ very materially from the American code owing to the use of zone and ticket systems of fare collection. The conductor is not permitted to run the car in case the motor-

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man is disabled, but is ordered simply to knock out the canopy switch and wait until help arrives. The rules, which comprise 103 in all, are supplemented by several appendices on how to deal with offenders against the by-laws or public ordinances, how to report street accidents, how to handle overhead line troubles, how to resuscitate people suffering from shock and, finally, how the trainmen are to deal with defective cars.

The last appendix gives a number of short practicable rules on what to do when the automatic switch blows, when the car will not start with lighted, unlighted or dim lamps respectively, when the controller is giving trouble, etc. On the whole, the English rules do not attempt to cover so many features of operation as our own, but they appear to embody some features in wording and practice which could profitably be studied in connection with their possible application to the American code.

MULTIPLE-UNIT TESTS IN NEWARK

In ordinary city service the short duration of the peak loads involves the establishment of a force of men and of an equipment of rolling stock which can be employed for only a few hours a day. The result, in many cases, is that the rush-hour traffic is the least profitable part of the business. Indeed, some managers estimate that it is conducted at an actual loss. This condition is being continually aggravated by the growing tendency for all labor to demand and receive an eight-hour workday, making office workers, artisans and laborers require transportation to and from their places of employment at practically the same times. It is even now not extraordinary for extra cars to be used for only one trip in the afternoon rush, and if the platform men have to be paid a minimum wage of $1.50 each for the day's work, the platform expense alone for the single trip will amount to $3—possibly more than the total receipts from the collection of fares.

Four means for meeting this condition have been suggested, namely: light, one-man cars for tripper service; double-deck cars with extra conductors at heavy loading points; trailers; and multiple-unit trains which are split up and run as single cars during the non-rush hours. The Public Service Railway of New Jersey, in considering the problem of rush-hour traffic, came to the conclusion that the last-named plan might possess more of the elements likely to produce practical success than the others. In consequence that company, during the past nine months, has been carrying on a series of elaborate tests to determine the practicability of train operation. The results are published elsewhere in this issue.

The tests have been carried out in a very thorough manner, and a vast number of observations have been made. For this reason the recorded results are of exceptional value not alone in their application to the conditions in Newark but even more through the light which has been thrown upon many of the questions arising in the consideration of the general problem. The work might be considered, in fact, supplementary to the work of the A. E. R. A. committee on train operation, and, as the cost of taking the observations has amounted to several thousand dollars, the spirit in which the tests were inaugurated and the generosity with which the company has made them public are worthy of the most sincere commendation as a material benefit to the whole industry of electric railroading.

One of the points brought out by the tests is an indication that in order to attain the best results considerable time is required to familiarize both public and train crews with the new method of operation. During the tests it was not possible to furnish complete train service over any of the lines. In consequence it was necessary to run the test trains intermingled with the single cars which formed the normal service. For this reason the railway company considers that the actual figures applying to the relative performances of the trains and single cars should be used with caution and that they should be considered as indications rather than bases for final conclusions. Indeed, the operation of trains is being regularly continued in Newark so that the public may become thoroughly familiar with them before the commencement of further tests which are to be made in the near future. These will be carried out on lines which are fully equipped with multiple-unit cars so that complete train service may be given during the rush hours. Until these are completed the company will make no definite change in its practice.

Nevertheless, we believe that the observed results will receive careful scrutiny from everyone interested in the operation of street railways, because of the care with which they were made and because they are undoubtedly the most extensive of the kind ever conducted upon congested city traffic. In all previous investigations with which we are acquainted the observations have not been recorded in sufficient detail to make it possible to eliminate the numerous variables which enter into every traffic problem. The number of stops per mile, the number and extent of external delays, the number of passengers, the time of passenger interchange, all influence to a marked degree the schedule speed and produce variations from it. If these are not known, comparisons between two cars are based largely upon luck, because the car or train which gets few passengers makes few stops and has few delays and it naturally makes good time regardless of any advantages of design or equipment. But when all factors are recorded, as in this case, it is possible to draw comparisons which have a real meaning. It is, of course, true that all variables are liable to cancel out if a sufficient number of records are made, so that reasonably reliable averages may in many cases be obtained. Yet, in addition to the time required by such a procedure, it is easily possible for inherent qualities of different equipments to continue to affect results almost regardless of the number of trial runs. Such a condition will be found in the Newark tests, where it is shown that in practically no case was it possible to get the same load per car into the trains as was customary on single cars. The reason is, of course, obvious when the condition is actually pointed out by the results. A few train units in a line of single cars, running on about the same headway, are not likely to pick up any more passengers than the normal load for the single unit. Yet this light loading of the train would work to its advantage by enabling it to hold its place in the line, and if the absence of the theoretical train load amounting to twice that of the single car had not been recorded, absolutely erroneous conclusions might be drawn from the trials.

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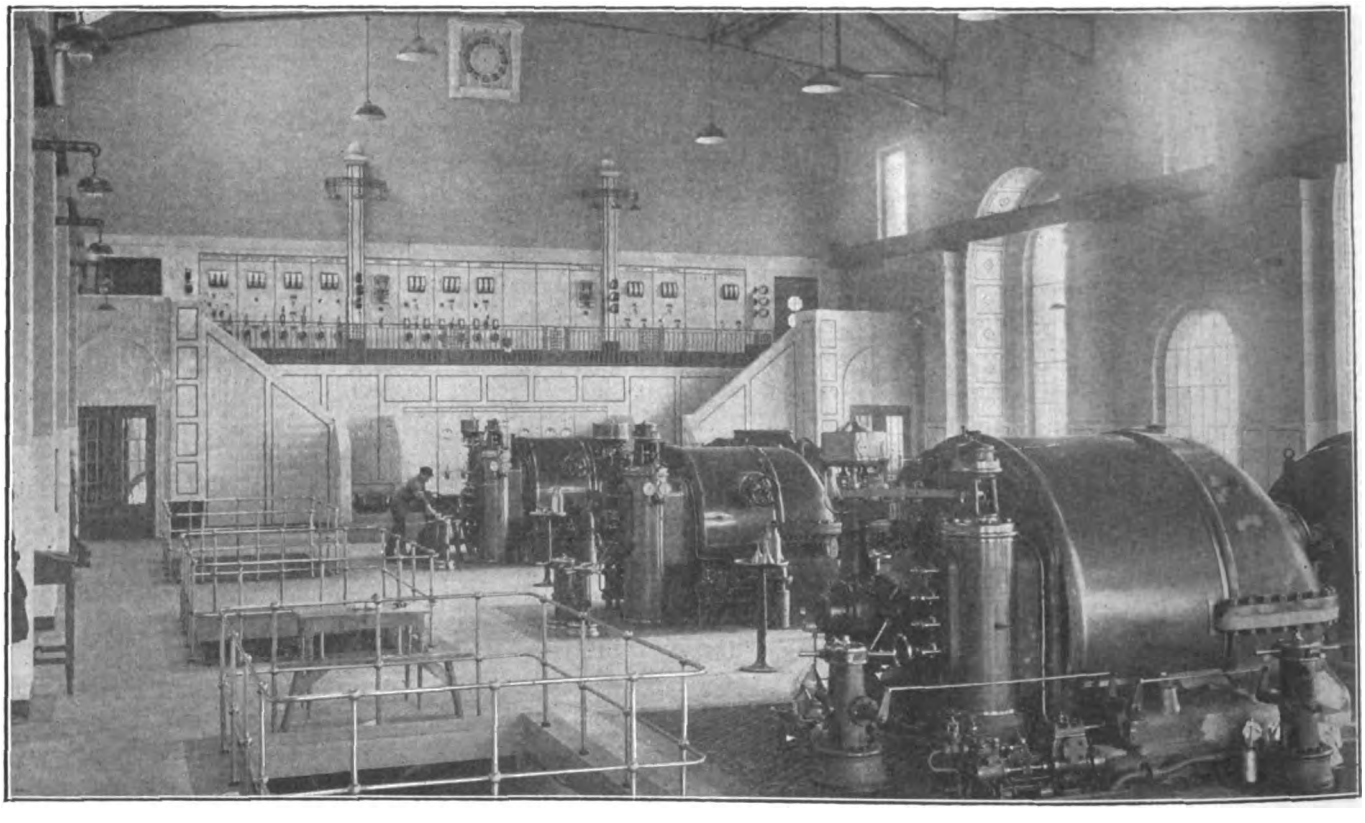
Power Equipment of the Hamburg Rapid Transit System

Power Station, Substations and Transmission for the 800-Volt Direct-Current Operation of This Elevated and Underground Railway

The power generating and distributing structures of the Hamburg Elevated & Underground Railway consist of the power station at Barmbeck, adjacent to the carhouse and shops described in the ELECTRIC RAILWAY JOURNAL for March 15, 1913, one substation at Hauptbahnhof (main steam railway station) built underground because no land was available, and a second substation near the Kellinghusenstrasse passenger station of the railway. The low-tension circuits of the right-of-way comprise the third-rail construction hereinafter described, two lighting circuits, which are independently connected to the storage batteries of the substation, as each of the two substations feeds only one lighting circuit for the whole belt line, and a two-wire circuit from the storage batteries for the operation of all safety mechanisms at 220 volts direct current.



Hamburg Power—View of Turbine Room at Barmbeck, Looking Toward the Switchboard Gallery

POWER STATION CONSTRUCTION

The power house is favorably situated in the outskirts of the city with regard to both the most economical transmission of energy and the supply of material. It is but 1.6 miles and 4 miles respectively from the substations so that it was feasible to transmit the energy at the generating potential of 6000 volts, thus dispensing with transformers at the power station. The location of the building between the Barmbeck Canal and a spur of the Prussian State Railways insures ample facilities for getting coal and other supplies.

The accompanying plan shows the general arrangements and dimensions of the Barmbeck power station. The boiler room is 157 ft. 10 in. long x 117 ft. 5 in. wide and the corresponding dimensions of the turbine room are 159 ft. 10 in. x 58 ft. 8½ in. The plan shows that the storeroom, machine shop, dining room, toilet, etc., are located in an extension of the boiler room. Many European power stations are famed for their architectural grace, but even among them the Hamburg installation is noteworthy for ornamental treatment both outside and in. The accompanying views can give only a faint idea of the attention lavished on this feature. The exterior decoration of the structure was compulsory owing to the proximity of the new Hamburg municipal park, and the operating company resolved voluntarily to make the interior of the structure equally ornate.

The building is of brick with a steel truss roof, the monotony of the outer wall surface being broken by small square figured panels and arched pilasters around the higher windows and doorways. The lower part of the stack, just above the roof line, has a temple effect brought about by the use of columns, while the remainder of this structure is made with narrow flutings interrupted by headers of brick at regular intervals. For the interior treatment tile was used in the turbine room and basement to a height of more than 6 ft., and it was also employed for the switchboard gallery and stairways. A view of the turbine room looking toward the switchboard gallery shows how the effect of the tile has been artistically enhanced by the use of decorative lines and patterns at the window arches and elsewhere. The lighting fixtures, railings and grill work on doors are also of artistic design. A leather-padded sound-proof telephone booth is installed near the switchboard to enable the operator to send and receive messages under ideal conditions of quiet and convenience.

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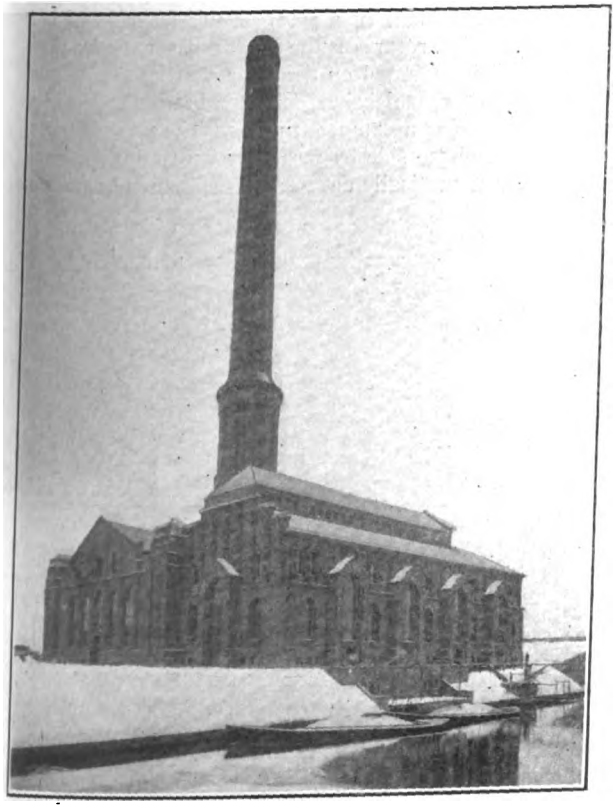
The view of the boiler room shows that little inside bunker storage has been provided as dependence is placed on the open storage yard, which is of ample capacity for the ultimate installation of twelve boilers. Coal is distributed in the yard by means of a scoop which has a travel of 260 ft. from a bridge of 180-ft. span. This scoop can take coal at the rate of 40 tons an hour from either canal boats or railroad cars as the case may be. The coal is transported from the yard to the boiler room by means of two chain conveyors which are installed in reinforced concrete runways under the coal pile. The capacity of each conveyor, 20 tons an hour, is ample for all needs.

The boiler room is laid out for an ultimate equipment of eight units. The initial installation, however, consists of five units with a heating surface of 4520 sq. ft. each, all operated at 220 lb. pressure with 350 deg. C. superheat. The grate area is 130 sq. ft. Four of the boilers have chain-grate stokers, but the fifth is provided experimentally with an overfeed stoker. The superheaters which are placed between the piping and the upper boilers have a heating surface of 1184 sq. ft. each. The feed-water heater for each boiler has a heating surface of 3229 sq. ft. Another boiler of the same size is now on order and two more will soon follow. It will be noted from the cross-section of the station that the products of combustion are led through an arched duct of brick under the feed-water heaters directly to the base of two stacks located within the boiler house. As yet, however, only one stack has been built. The full height is 261 ft. and the inside top diameter is 13 ft.

The boiler-feed pumps are of the centrifugal type. One of them is rated at 276 gal. per minute and the other at 451 gal. per minute. Only one pump is required for continuous operation. The feed-water lines are composed of

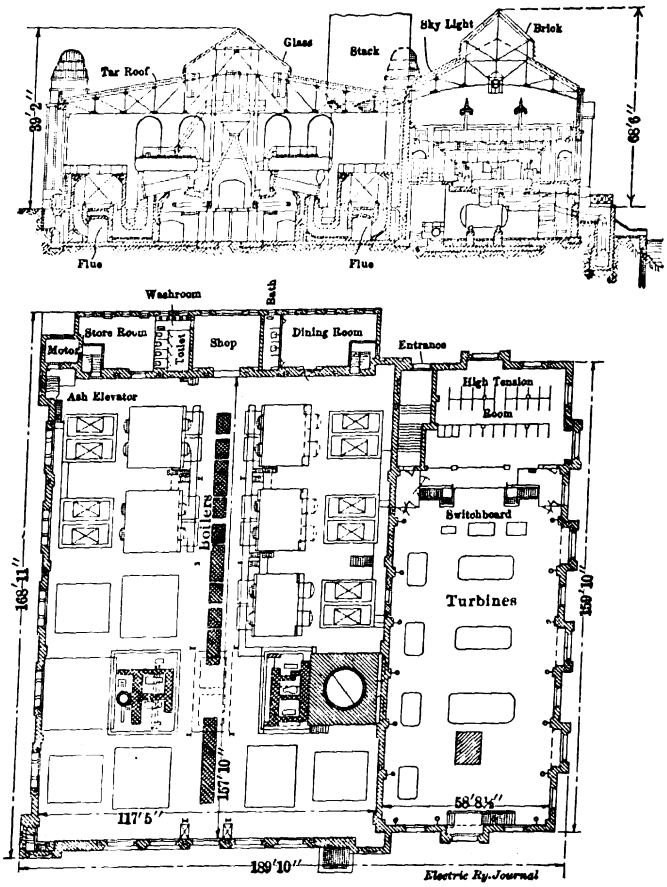


Hamburg Power—Generating Plant at Barmbeck

two complete loops which may be used with or without the feed-water heaters. The exhaust of the feed-water pumps and that of a non-condensing turbine are utilized to heat the nearby carhouses and shops. Make-up water is taken from a well by two electrically operated pumps and carried to two cisterns in the roof framing of the boiler house. Part of it is treated by a purifier having a rated capacity of 20 gal. per minute and is transmitted to make-up water tanks beneath the purifier in the basement and to the carhouse and shops for car-washing and other purposes.

The steam pressure lines run directly from each pair of facing boilers to the nearest turbine, thereby insuring minimum transmission losses. Emergency cross-connections are provided to permit any boiler to feed any turbine.

The generating equipment consists of one 400-kw turbine operated at 1500 r.p.m. and two 2000-kw turbines



Hamburg Power—Cross-Section and Plan of Generating Station

operated at 3000 r.p.m., all generating 6000-volt, fifty-cycle, three-phase current for direct transmission to the substations. As shown on the plan, provision has been made for the installation of a fourth 6000-kw turbine, which is already required on account of the increasing traffic demands. The speed regulation of the turbines is 5 per cent above or below normal. Two Tirrill regulators are installed for voltage control. The electrical end of the turbine is cooled by filtering air under a draft of 0.39 in. of water. The average winter afternoon load during the Christmas shopping season last year was 4000 kw.

The condensers are of the surface type. The pumping outfit consists of a turbo-generator set, the exhaust of which is transmitted to the second stage of the main turbine or utilized for heating the car maintenance plant as previously noted. The extension of the small turbine shaft carries the wet-air pump, which consists of a centrifugal water pump and a centrifugal air pump, and the cooling-water pump. The condenser equipments are placed in the basement between the turbine piers, as is the Allgemeine company's usual practice.

POWER STATION CONTROL EQUIPMENT

The cables from the generators are carried through the basement to the switch room, whence they are continued as bare conductors to the high-tension compartments. Circuit-breakers are installed for these conductors at the inlets in the basement, at the remote-control oil switches and at the point where the lines branch off to the duplicate busbar system. The incoming high-tension cables are also sepa-

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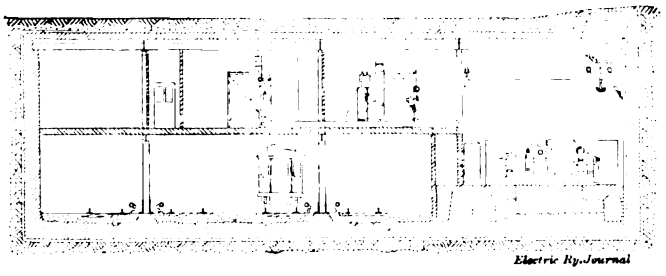
rately connected to the two sets of busbars, consequently one high-tension circuit can be operated while the other is out of service. The remote-control oil switches can be operated by hand when necessary, but ordinarily they are actuated from the main switchboard by relays on a 110-volt d.c. circuit.

The high-tension busbar compartments are placed in a two-level room behind the switchboard gallery in two rows



Hamburg Power—Cross-Section of Substation Built Along and Above Underground Railway

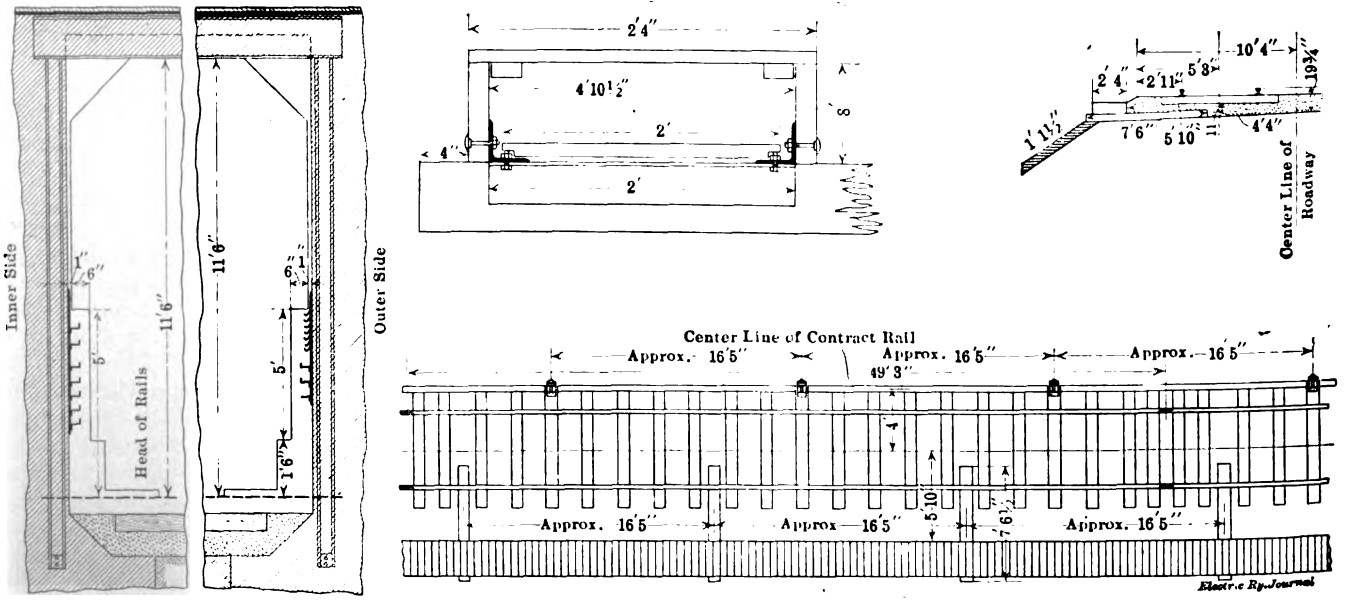
with an ample gangway between. The barriers are built up of Duro asbestos plates. A particularly interesting feature is that the base of each cell is finished in tile with a miniature dike at the front to prevent burning oil from flowing over into the aisle. The switchboard is also composed of Duro asbestos, but to give a better appearance this material is surfaced with Dutch tile.

In addition to the high-tension equipment the power station has two 40-kw synchronous motor-generator sets to generate 110 volts direct current for emergency lighting and remote-control operation. The secondaries of these sets are connected to two three-phase transformers which supply the carhouse and shops with power and lighting current at 220 volts. The d.c. supply at 110 volts is reinforced by a storage battery having 972 amp-hr. capacity on a three-hour discharge basis. A 5-kw asynchronous motor-generator set is also installed to deliver 220 volts d.c. for the block signals.

sion and battery compartments are above the subway. Ample natural illumination is received through roof lights, as is apparent from the accompanying halftone view of the interior. While the lighting, therefore, offered no particular trouble, careful attention had to be given toward obtaining ample ventilation by mechanical means. The suction and filtering ends of the ventilation ducts are placed on the tunnel side, while the tower through which the exhausted air passes leads to the street. Furthermore, the battery room can be separately exhausted so that no fumes can enter the converter room. The interior view of this station shows the same neat tiled-wall treatment as in the case of the generating station. The Heilwigstrasse station is of similar construction, but it was built somewhat like a private dwelling in order to provide living quarters for the substation operator. Both substations are equipped with a crane.

Each substation now contains three 6000-volt cascade motor-generator sets of 1000-kw capacity, with a fourth set for each substation already ordered; two Pirani sets, each consisting of a 185-hp asynchronous 6000-volt motor, a double-commutator interpole booster and a direct-current exciter with differential switching connections, and an accumulator of 386 cells with a capacity of 1258 amp-hr. on a one-hour discharge basis.

The choice of cascade sets was dictated largely by the consideration that they could be connected directly to the 6000-volt circuit. Their dimensions are smaller than equivalent motor-generators or rotary converters, because with a like number of poles one-half of the work is done by the asynchronous three-phase motor, which operates half as transformer and half as motor, and the other half of the work is done by the d.c. commutating-pole generator, which serves half as a rotary converter and half as a generator. The rotor of the motor has a twelve-phase winding and is mounted on the same shaft as the armature of the generator, which has only two bearings. The poles of the motor have a damper winding. The motor is started on the three-phase side by means of fixed rotor resistances which are automatically cut out at synchronism by means of



Hamburg Power—Cross-Section of Subway, Showing Wall Brackets for Cables, Location of Third-Rail and Walkway and Details of Conduit Trough

SUBSTATIONS

Energy is transmitted to two substations, one at Hauptbahnhof and the other at Heilwigstrasse. The first station is rather unique in that it is located below the street level alongside and also over the underground railway. The cross-section of the substation shows that the converter room is parallel to the right-of-way and that the high-ten-

a centrifugal switch and are then short-circuited by hand.

The load on the motor-generator sets is greatly equalized by the use of Pirani battery control so that the variations in voltage, even under the worst peak conditions, are very small. During the day the batteries are used merely to equalize loads but during the late night and early morning hours they are capable of handling the entire traction

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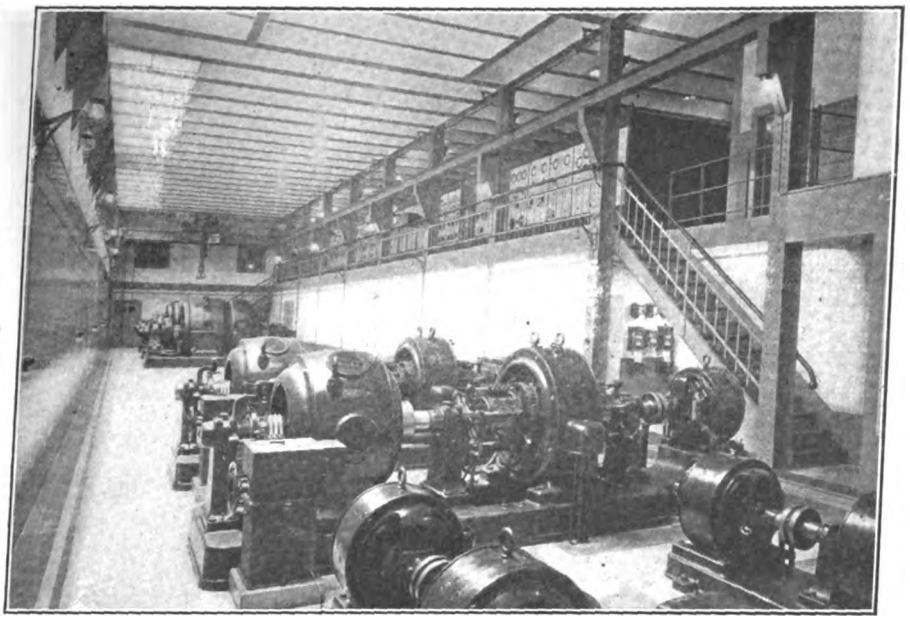
oad and of furnishing the necessary additional lighting. It is very simple to change to these different purposes merely by changing the regulation of the Pirani machines. Owing to their importance the Pirani sets were installed in duplicate.

The control gear of all high-tension equipments is mounted on trucks which are separated by concrete walls so that all apparatus can be safely inspected by moving the truck away from its fixed connections. Automatic oil switches are used both for the cascade sets and for the incoming high-tension lines.

A second battery with a capacity of 199 amp-hr. on the seven-hour discharge basis furnishes current at 220 volts for block signals, remote-control and emergency lighting. A novel feature of the battery equipments is the use of a portable charging equipment. This consists of a 220-volt, 4.5-volt motor-generator set with accompanying switching panel. At present all substation circuit-breakers are set for a maximum of 2500 amp.

The Hauptbahnhof substation is furnished with a portable air compressor and the Heilwigstrasse station with a stationary air compressor for blowing out machines, switches, etc. The Hauptbahnhof substation has room for three and the Heilwigstrasse station for two additional motor-generator sets.



Hamburg Power—Subterranean Substation Built Alongside and Over the Railway

Hamburg Power—Boiler Room at Barmbeck

LOW-TENSION TRANSMISSION AND CURRENT COLLECTION

The locations for the low-tension d.c. cable runs from the substations to the third-rail were planned with great care. On viaducts and bridges particularly ample space was reserved under the walkways for the feeder cables, and in some cases the cables are carried in a boxlike structure. On stone viaducts the granite deck has been continued with metal to form a cable trench. The return circuit lines consist of bare copper cables.

The third-rail is of the under-contact type similar to the Sprague-Wilgus design. It is carried from porcelain insulators at intervals of about 16 ft. and is protected with wooden boards. A leather washer is installed between the porcelain insulator and the rail to minimize vibrations. The contactor rail in the tunnel sections is about 2 in. lower than in the open sections, so that light is automatically cut in by the downward movement of the collector shoes. The rail consists of cast iron with 0.3 per cent manganese and 0.1 per cent carbon with a cross-section of 280 sq. in.

MOTOR INSPECTION AT MEMPHIS, TENN.

The Memphis Street Railway Company, Memphis, Tenn., has made an exceptional armature-winding record for the past four years. The company operates approximately 300 cars and found it necessary to wind only seventeen armatures in 1910, twenty-five in 1911, twenty-two in 1912 and none to June 1, 1913. In explanation of this record, A. B. McWhorter, master mechanic, states that it is due to cooperation between the mechanical department and the motormen, careful daily inspection and care in winding.

The company winds its own coils, dips and bakes them. After they are baked they are not allowed to harden before being used, but are placed in the armature core when the insulating paint is soft and pliable. After an armature is wound it is painted but not baked. Inspections of motors are made daily because the company's repair shop contains only two pits and it is not considered practicable to make inspections on a mileage basis. In consequence all cars are run over these two pits every night, and in case a defect is found which might result in armature trouble at any time, the car is taken out of service and repairs made immediately.

All inspections at the repair shops and the division carhouses are made by trained inspectors. These men are taken from the regular car crews, the transfer being in the form of a promotion. After a two weeks' course in the shops in armature inspection and repair, the student inspectors receive a written examination, and those passing the test are put to work as regular inspectors.

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Train Operation for City Service

The Public Service Railway of New Jersey Has Been Conducting a Series of Tests for the Purpose of Determining Whether the Operation of Two-Car Trains in City Service Is Practicable and Desirable, and a Number of the Recorded Observations Are Published

As is well known, the conditions in the city of Newark are peculiarly severe in the limitations which they impose upon the local transportation system. They have, in fact, become so difficult to meet on account of the rapid growth of the surrounding communities that the rush-hour traffic upon some of the lines approaches the point where congestion prevents the operation of sufficient cars to meet the requirements, and as the use of two-car trains offered a possible solution to a part of this problem, the Public Service Railway has conducted during the past nine months a series of tests to determine the possibilities in this method of operation.

EQUIPMENT TESTED

The following table shows the principal dimensions and equipment of the four-motor cars which were used in the test:

	Motor Cars	Trailer
Length over bumpers	46 ft. 4 in.	44 ft. 4 in.
Width over all	8 ft. 7 in.	8 ft. 1 in.
Seating capacity	44	35
Type of motors	West. 307 C-A	.....
Motor rating	40-50 hp.	.....
Gear ratio	18:66	.....
Type of control	West. H.L.	.....
Type of trucks	Stand. C-50-P	Peck'm 14 B-3
Total weight	48,700	32,800

All of the cars under test were of the double-end prepayment type and equipped with hand-operated doors on all platforms and Tomlinson radial couplers. The motors were of the interpole type, with multiple-unit control. The air-brake equipment on all cars was of the General Electric straight-air type with emergency feature and quick service valves.

LINES ON WHICH TEST WAS CONDUCTED

The tests were carried out on the Central, Orange, South Orange, Bloomfield, Springfield and Broad Street lines.

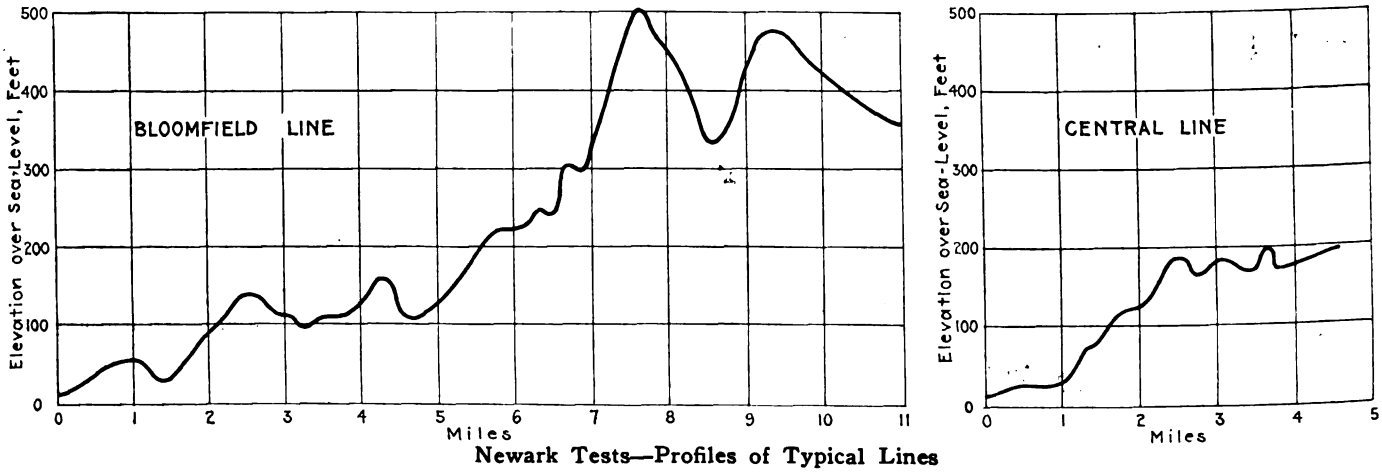
Table I—Characteristics of Lines

Line	From	To	Miles	Average Grade per Cent	Maximum Elevation: Feet	Maximum Elevation: Location	Miles From Starting Point	*Average Stops per Mile	*Average Ride: Per Cent	*Average Ride: Miles	*Average Schedule Speed, Miles per Hr.	**Present Minimum Headway, Min.	**Headway at 11 A.M., Min.
Central	Penn. R. R.	East Orange	4.27	0.78	192	Munn Ave	3.37	11.53	44.3	1.89	7.36	2	5
Orange	Penn. R. R.	West Orange	6.57	0.68	250	Harrison Ave.	6.57	10.76	31.2	2.05	7.91	2	4
South Orange	Penn. R. R.	City Line	4.01	0.93	229	Seventh St.	1.88	14.40	51.2	2.05	7.20		
	E. Ferry St.	South Orange	6.72	0.41	245	Center St.	5.72	11.17	29.1	1.96	7.46	1	4
	Magazine St.	South Orange	7.39	0.37	245	Center St.	6.39	11.35	29.1	2.15	7.78		
	E. Ferry St.	Maplewood	8.82	0.19	245	Center St.	5.72	10.11	24.1	2.12	7.90		
Bloomfield	Penn. R. R.	Montclair	7.00	0.83	320	Montclair C. H.	7.00	9.03	44.0	3.08	8.45	2	4
	Penn. R. R.	Caldwell	10.73	0.67	510	Sunset Ave.	7.55	7.69	38.4	4.12	9.20		
Springfield	South St.	Forty-third St.	5.90	0.61	215	Forty-second St.	5.63	10.45	31.9	1.88	7.43	1.5	5
	South St.	Maplewood	7.75	0.22	215	Forty-second St.	5.63	9.77	32.9	2.55	8.20		
Broad	Irvington (In)	Big Tree	9.43	−0.14	201	Nineteenth St.	1.23	8.23	28.9	2.73	9.38	1	2.5
	Big Tree (Out)	Irvington	9.20	0.17	201	Nineteenth St.	8.12	8.65	24.6	2.26	8.89		

*Rush hour. **Includes cars to all terminals.

For the benefit of those not familiar with these routes, a brief discussion of their characteristics is given in the following paragraphs:

The Central, Orange, South Orange and Springfield lines are more or less similar in that they all have rather heavy grades soon after leaving the business center of Newark, while beyond the city line the rise is gradual and is broken by down grades. The Bloomfield line has heavy up grades a large portion of the way to the Montclair carhouse and steep up grades and down grades from that point to the end of the line in Caldwell. The Broad Street line differs from the others in that it is a through route running beyond the city limits in both directions. The grades on the southerly end are more gradual than those on the other lines, while the north end is comparatively level. The short portions of the South Orange and Springfield lines east of the business district do not alter the character of these lines so much. Approximate profiles



Newark Tests—Profiles of Typical Lines

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of the Central and Bloomfield lines are shown in the accompanying cuts.

The Central line, after leaving the business section of Newark, passes through a small factory district and then runs through a good residential section, well built up all of the way to the end of the line. The Orange line is similar to the Central line in the city of Newark, but in addition to serving a residential section, it passes through the business centers of East Orange and Orange. There are three transfer points on this line in Orange and West Orange. These factors tend to increase the number of short riders.

The Springfield and South Orange lines operate at their eastern ends through a level factory section. After leaving the business district of Market Street, both lines run through a mixed business and residential district to the western city line and through a less thickly settled territory beyond. The Bloomfield line, after leaving Newark, passes through the business centers and residential sections of Bloomfield and Montclair with transfer points in each. It also serves the small towns of Glen Ridge, Verona and Caldwell and has more or less free running territory between towns. The Broad Street line runs through good residential sections at both end and passes few stores outside of the center of Newark.

The passenger counts made on some of the heavier afternoon trips have been plotted in Tables II to VII, which will give an idea of the distribution of traffic on the different lines. The length, average grade and other characteristics of the lines under rush-hour conditions, which were calculated from the data of the test, are shown in Table I.

TABLE II—CENTRAL LINE

Trip	Mileage	Delays in Minutes	Net Time Gained (+) or Lost (−) in Minutes	Passengers Boarding: Terminal	Passengers Boarding: Along Line	Total Time Stopped in Seconds (Exc. of Delays)	Stops per Mile	Power Consumption Kw-hr per Car Mile	Power Consumption Kw-hr per Ton Mile	Remarks
Single Car:										
Out	4.27	2.00	3.00	5	82	368	12.65	4.45	0.163	Oct. 22, 1912
In	4.15	0.67	+4.66	7	34	193	8.68	5.06	0.197	Weather—Cloudy
Out	4.27	0.00	—4.00	6	80	409	13.12	6.09	0.224	Rail—Good
Out	4.27	0.97	—2.03	9	78	344	12.88	4.22	0.155	
In	4.15	0.95	—2.05	10	111	378	12.77	3.85	0.136	
Out	4.27	0.00	—1.50	9	129	414	11.95	5.39	0.186	
In	4.15	0.20	—0.80	12	92	360	14.45	4.58	0.165	
In	4.15	0.75	+0.75	7	39	212	10.12	2.65	0.102	
In	4.15	0.25	+1.25	7	36	210	8.68	2.65	0.103	Oct. 23, 1912
Out	4.27	2.68	+2.69	3	44	247	10.30	3.98	0.154	Weather—Rain
Out	4.27	2.75	+0.75	6	37	229	10.77	4.45	0.172	Rail—Wet
In	4.15	0.32	+3.32	6	40	164	9.40	3.62	0.140	
Out	4.27	2.92	—1.09	14	60	262	10.54	4.21	0.157	
Out	4.27	3.48	—5.02	8	52	268	11.24	3.98	0.151	
In	4.15	0.20	—3.30	7	105	362	13.74	6.27	0.223	
Out	4.27	1.07	+5.07	9	86	325	10.54	5.85	0.213	Oct. 24, 1912
In	4.15	0.40	—1.60	4	78	325	13.49	4.10	0.152	Weather—
In	4.15	0.40	+4.40	7	37	181	9.64	3.62	0.140	A. M.—Showers
In	4.15	0.00	0.00	5	40	236	9.88	4.34	0.168	P. M.—Light showers
Out	4.27	0.17	+1.16	7	47	272	9.61	4.69	0.179	Rail—
Out	4.27	1.27	+1.26	8	64	288	11.01	5.62	0.210	A. M.—Fair
Out	4.27	1.72	—3.29	10	33	221	10.07	4.22	0.163	P. M.—Bad
In	4.15	0.00	+4.00	11	38	176	9.16	3.62	0.139	
Out	4.27	0.68	—3.32	11	56	282	10.77	4.92	0.185	
Out	4.27	3.37	—8.03	7	63	286	11.95	4.92	0.185	
Multiple-Unit Train:										
In	4.15	2.72	—1.78	14	102	390	13.26	4.10	0.157	Oct. 22, 1912
Out	4.27	0.17	—3.83	31	149	481	13.59	5.85	0.214	Weather—A. M.—Fair. P. M.—Cloudy. Rail—Good
Out	4.27	1.90	+0.40	21	79	352	13.12	7.15	0.275	
In	4.15	0.68	—2.82	16	162	449	13.25	5.66	0.207	Oct. 23, 1912
Out	4.27	0.30	—2.20	10	129	434	13.12	5.73	0.216	Weather—A. M.—Rain
										P. M.—Rain
										Rail—Wet
In	4.15	0.18	—1.32	15	143	401	14.45	5.66	0.210	Oct. 24, 1912
In	4.15	0.18	—1.82	6	77	325	13.25	5.18	0.202	Weather—A. M.—Showers
Out	4.27	0.15	—4.85	32	122	461	12.65	6.44	0.240	P. M.—Cloudy, light showers
Out	4.27	6.20	—4.55	16	115	375	12.18	5.74	0.217	Rail—A. M.—Fair. P. M.—Bad

TABLE III—ORANGE LINE

Trip	Mileage	Delays in Minutes	Net Time Gained (+) or Lost (−) in Minutes	Passengers Boarding: Terminal	Passengers Boarding: Along Line	Total Time Stopped in Seconds (Exc. of Delays)	Stops per Mile	Power Consumption Kw-hr per Car Mile	Power Consumption Kw-hr per Ton Mile	Remarks
Single Car:										
In	6.45	0.25	+0.50	8	54	264	9.46			Nov. 6, 1912
Out	6.57	2.02	+2.28	6	36	167	6.55			Weather—
In	6.45	0.38	+0.38	3	76	327	8.38			A. M.—Cloudy
In	6.45	1.20	+0.70	4	47	249	7.91			P. M.—Fair
Out	6.57	0.49	—3.52	8	144	512	10.50	5.48	0.196	Rail—
In	6.45	0.00	—1.00	8	66	295	8.22	3.57	0.137	A. M.—Sanded
Out	6.57	5.03	—5.97	9	90	387	9.59	5.03	0.189	P. M.—Good
In	6.45	0.00	—2.00	4	123	405	10.70	4.66	0.171	
Out	6.57	1.77	+2.77	3	55	243	8.06	3.65	0.142	Nov. 7, 1912
In	6.45	0.57	+0.57	2	75	344	8.99	1.71	0.065	Weather—
Out	6.57	0.17	—0.33	4	58	294	8.53	4.57	0.177	Rain
In	6.45	0.13	—0.87	4	66	322	9.14	2.95	0.113	Rail—
Out	6.57	0.97	—1.03	13	171	552	11.25	6.09	0.213	A. M.—Sanded
In	6.45	2.97	—1.03	7	119	412	9.14	3.26	0.119	P. M.—Wet, good
Out	6.57	4.63	—7.37	31	109	443	10.95	5.63	0.204	
Multiple-Unit Train:										
In	6.45	0.17	—2.83	9	195	591	11.32	4.88	0.183	Nov. 6, 1912
Out	6.45	0.37	+0.37	5	117	502	9.45	4.34	0.168	Weather—A. M.—Cloudy
In	6.57	1.08	—1.42	20	160	639	11.42	5.85	0.222	P. M.—Fair
Out	6.45	0.87	+1.62	15	81	395	8.84	2.95	0.116	Rail—A. M.—Sanded
In	6.57	1.17	—1.35	7	76	342	8.52	4.26	0.168	P. M.—Good
In	6.45	0.13	—1.62	9	131	466	9.93	3.18	0.122	Nov. 7, 1912
In	6.45	1.28	+0.03	6	106	486	10.70	4.19	0.163	Weather—A. M.—Light rain
Out	6.45	0.22	+0.22	6	89	424	9.77	3.96	0.155	P. M.—Rain
In	6.57	1.46	+2.27	10	89	429	9.28	4.57	0.179	Rail—A. M.—Sanded
Out	6.45	0 63	—1.37	20	159	570	10.85	4.43	0.169	P. M.—Good
Out	6.57	1.68	—2.32	18	159	617	11.10	5.71	0.216	

DATA OBTAINED

As it was desired to investigate the performances of the trains under the most severe conditions, most of the ob-

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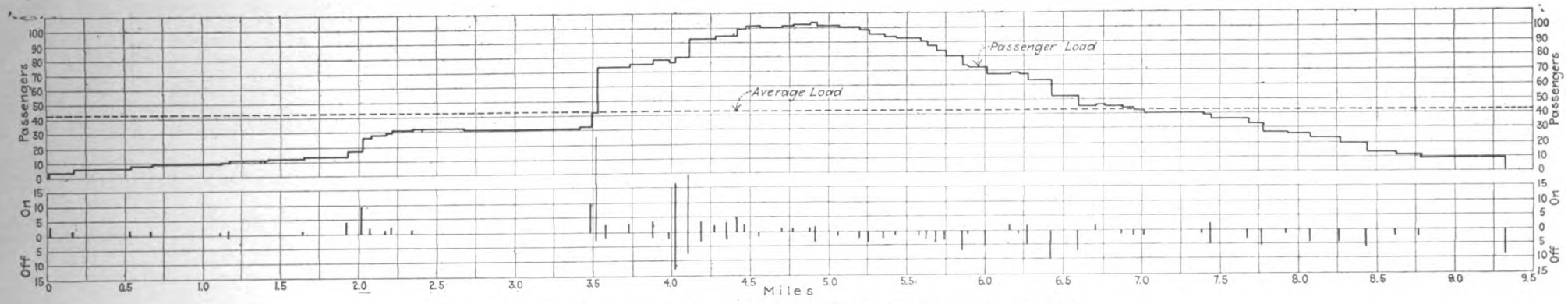
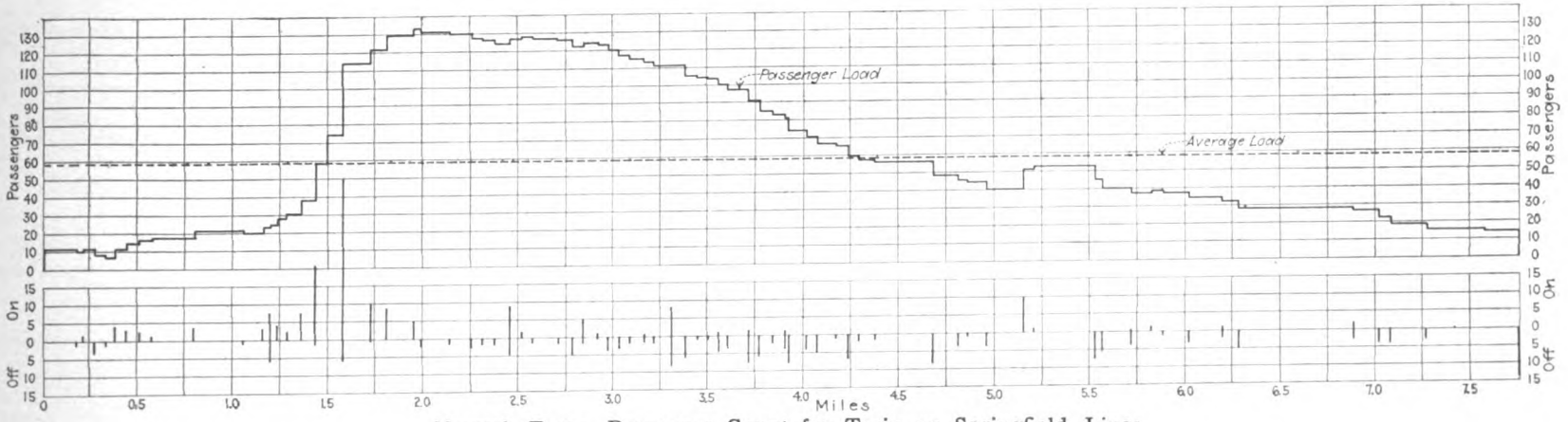
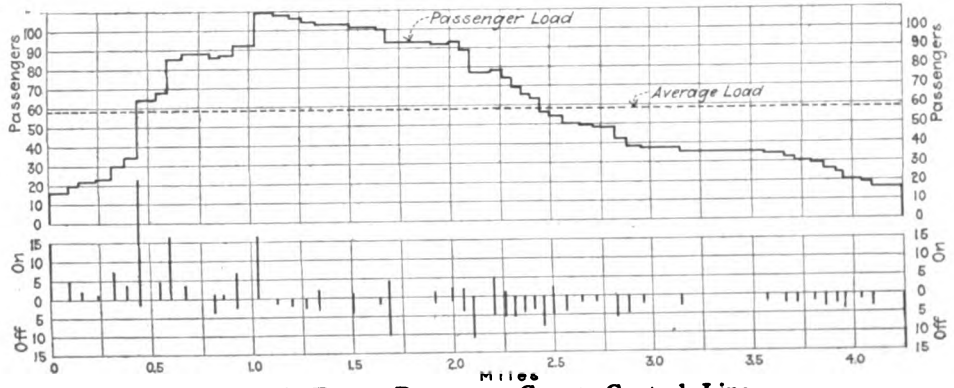


Newark Tests—Passenger Count for Train on Broad Street Line



Newark Tests—Passenger Count for Train on Springfield Lines



Newark Tests—Passenger Count, Central Line

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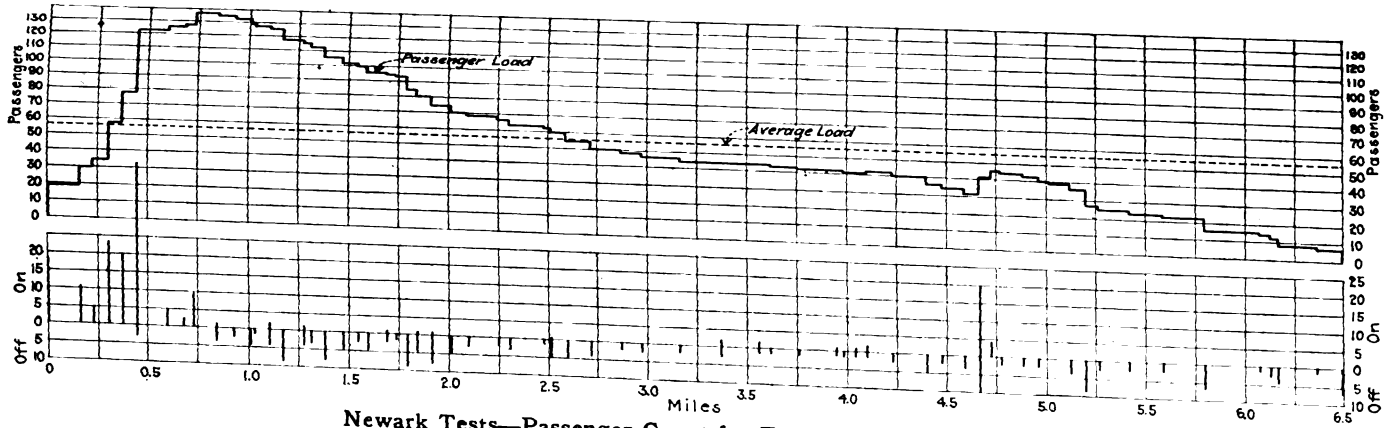
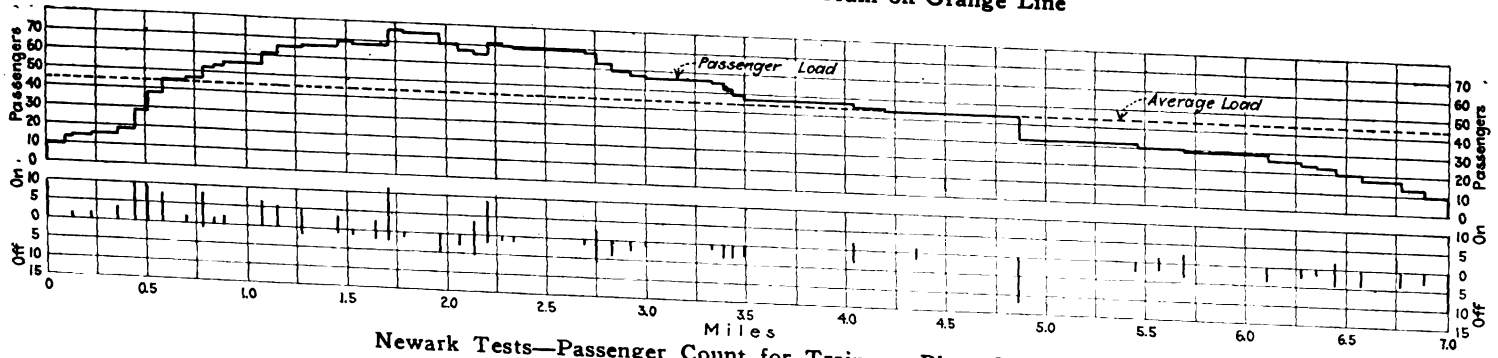
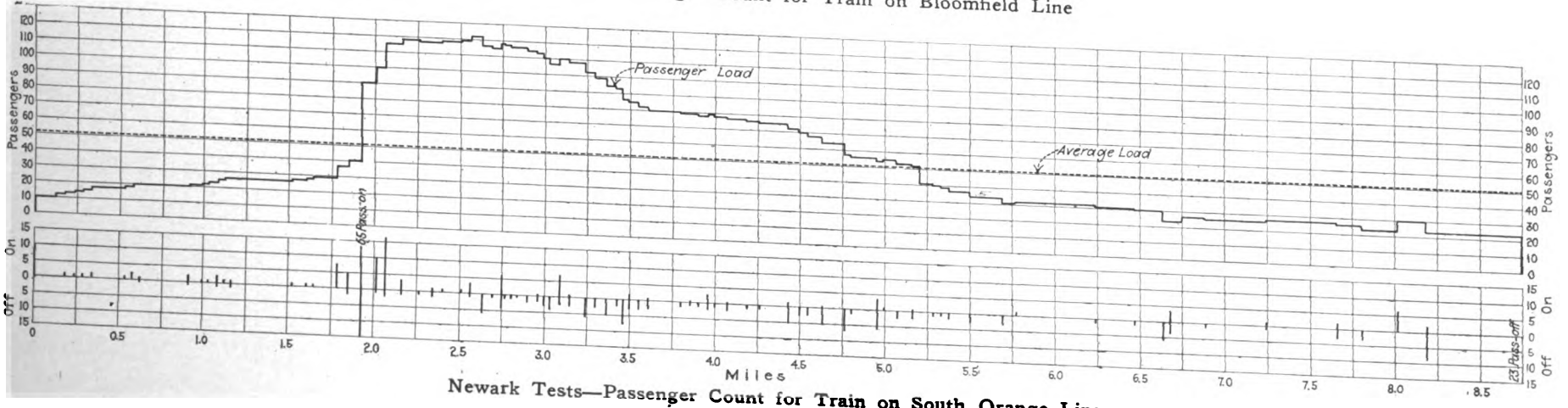


Newark Tests—Passenger Count for Train on Orange Line



Newark Tests—Passenger Count for Train on Bloomfield Line



Newark Tests—Passenger Count for Train on South Orange Line

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servations were made during the morning and evening rush hours. The average time of observation was two days for each combination of equipment per line. The largest number of observations was made on the Central line, as this line appeared to present the best field for purposes of comparison.

the rush hours. Considerable difficulty existed in filling the trains owing to their comparative novelty, and for this reason the summaries include only those trips where the loads were in excess of forty passengers per car.

RUNNING TIME

One of the first questions in the consideration of train

TABLE IV—SOUTH ORANGE LINE

Trip	Mileage	Delays in Minutes	Net Time Gained (+) or Lost (−) in Minutes	Passengers Boarding: Terminal	Passengers Boarding: Along Line	Total Time Stopped in Seconds (Exc. of Delays)	Stops per Mile	Power Consumption: Kw-hr per Car Mile	Power Consumption: Kw-hr per Ton Mile	Remarks
Single Car:										
In	5.46	0.25	−1.75	9	110	442	13.36	..	..	
Out	8.82	6.30	+7.30	4	48	235	6.58	3.63	0.143	Nov. 15, 1912
In	8.78	3.45	+5.45	4	44	305	7.52	2.85	0.113	Weather—Clear
Out	7.39	1.03	−10.47	3	111	482	11.76	4.74	0.176	Rail—O. K.
In	6.72	0.70	+5.20	6	43	251	7.44	3.28	0.129	
In	5.03	0.22	+0.72	7	64	216	10.93	4.57	0.172	
Out	5.48	0.29	−5.72	9	119	481	15.15	5.65	0.203	Nov. 16, 1912
In	5.46	0.08	−0.42	4	62	352	11.17	3.66	0.140	Weather—Clear
Out	5.48	0.73	−4.52	17	101	452	13.14	5.47	0.198	Rail—Good
Multiple-Unit Train:										
In	6.13	0.38	+0.38	11	84	304	9.63	3.42	0.133	
Out	6.72	0.22	−7.78	12	144	582	12.49	5.43	0.208	Nov. 12, 1912
In	6.66	0.70	−3.30	12	87	422	10.05	3.98	0.157	Weather—Clear
Out	6.66	1.25	−5.75	34	97	483	11.11	4.73	0.182	Rail—O. K.
In	6.13	0.93	−1.07	5	84	368	10.76	3.67	0.143	
In	7.39	1.40	−3.60	9	147	527	10.01	3.92	0.150	Nov. 13, 1912
Out	7.39	1.01	−3.98	11	194	592	11.63	5.42	0.204	Weather—Fair. Rail—A. M.—Sanded, fair. P. M.—O. K.
Out	8.82	4.60	−7.60	10	200	791	11.34	4.48	0.170	Nov. 14, 1912
In	8.78	1.80	−3.20	21	135	606	9.11	3.76	0.146	Weather—A. M.—Cloudy. P. M.—Cloudy, rain. Rail—A. M.—Wet sanded. P. M.—Bad.
Motor Car and Trailer:										
Out	4.01	0.37	−12.13	12	92	490	13.20	5.35	0.239	Nov. 15, 1912
Out	4.01	0.43	−15.07	27	176	530	15.70	6.35	0.261	Weather—Clear. Rail—O. K.

Among the observations taken, the term "external delays" covers the time stopped because of interference of other cars and vehicles and other unusual conditions. The time required for passenger movement at each platform was taken from the time the car came to a dead stop and the door was open until the last passenger boarding or

operation is whether trains will require a longer running time than single cars. In the tables will be found a column devoted to schedule adherence. For the sake of comparison all trips on these tables were checked against the normal running time outside of the rush hours, and the difference gave the time gained or lost on the trip as com-

TABLE V—BLOOMFIELD LINE

Trip	Mileage	Delays in Minutes	Net Time Gained (+) or Lost (−) in Minutes	Passengers Boarding: Terminal	Passengers Boarding: Along Line	Total Time Stopped in Seconds (Exc. of Delays)	Stops per Mile	Power Consumption: Kw-hr per Car Mile	Power Consumption: Kw-hr per Ton Mile	Remarks
Single Car:										
										Nov. 18, 1912
Out	7.00	0.33	−3.66	2	106	598	9.00	5.71	0.205	Weather—Clear
In	6.88	0.60	−3.65	17	110	508	10.90	3.93	0.138	Rail—O. K.
Out	7.00	0.70	+0.20	3	45	251	7.29	4.29	0.165	
In	6.88	0.00	+0.75	4	79	402	7.27	2.47	0.091	Nov. 19, 1912
Out	7.00	1.28	−5.22	8	117	604	9.57	5.14	0.181	Weather—Clear
In	6.88	0.93	−1.32	10	71	322	9.59	3.78	0.140	Rail—O. K.
										Nov. 20, 1912
Out	7.00	0.00	−1.25	7	78	339	9.00	4.85	0.179	Weather—Clear
Out	7.00	0.00	−2.75	8	82	431	9.29	5.00	0.183	Rail—O. K.
In	6.88	0.49	−2.76	19	75	330	7.56	2.62	0.096	
Out	10.73	1.25	−7.00	28	94	659	6.71	5.50	0.198	
Out	10.73	0.88	+1.39	13	125	437	6.52	4.57	0.161	
In	10.68	0.00	−1.00	7	90	410	7.30	3.18	0.117	
Out	10.73	0.17	+1.90	6	45	385	6.24	3.73	0.144	
Out	10.73	4.70	−11.80	18	121	625	8.39	3.08	0.109	
Multiple-Unit Train:										
										Nov. 19, 1912
Out	7.00	1.32	−4.20	11	146	640	9.14	6.15	0.228	Weather—Clear
										Rail—O. K.
In	6.88	0.66	+1.65	5	125	545	9.59	3.93	0.148	
In	6.88	0.27	+3.30	10	75	424	7.85	3.85	0.149	Nov. 20, 1912
Out	7.00	0.49	−7.01	13	122	740	9.00	5.21	0.196	Weather—Clear
Out	7.00	2.32	−6.70	9	91	506	9.14	4.79	0.184	Rail—O. K.
In	10.68	1.10	+1.10	7	52	430	5.78	4.19	0.166	
Out	10.73	0.00	−14.50	23	229	1009	8.11	5.30	0.190	
Multiple Car and Trailer:										
										Nov. 22, 1912
In	6.88	2.73	−8.30	11	146	642	8.87	3.05	0.133	Weather—Clear
Out	7.00	0.35	−25.15	54	176	825	10.00	5.07	0.210	Rail—O. K.
In	6.88	0.00	+0.50	20	75	276	8.28	....	....	Dec. 4, 1912
Out	7.00	0.00	−4.50	10	83	348	8.29	3.64	0.166	Weather—Clear
										Rail—O. K.
Out	7.00	2.69	−9.30	20	160	644	9.00	4.93	0.211	Jan. 7, 1913
										Weather—Rain
										Rail—Good
Out	7.00	1.05	−3.70	43	38	...	6.86	3.65	0.168	Dec. 5, 1912
In	6.88	1.05	−0.95	52	32	...	7.56	2.47	0.114	Weather—Clear
										Rail—O. K.

alighting was clear of the step. The word "trip" is used throughout to mean the run from one end of the line to the other, not a round trip. The total number of observations was in the neighborhood of 225,000, but, as before mentioned, only part of these are published, including, however, all data bearing directly upon train operation during

pared with this uniform running time. The time lost in extra stops or delays in starting, due to interference of wagons or other cars or other causes external to the regular operation of the car or train, was subtracted from time lost or added to time gained, and the final result for each trip appears under the heading "Net Time Gained or Lost."

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RESULTS AT CONGESTED CORNERS

A number of observations were made at the corner of Broad and Market Streets, Newark, and these showed that the average time required for a train to pass across was twenty seconds, (i. e., from the time the front of the first car reached the crosswalk on the near side until the rear of the second car cleared the cross-walk on the far side). Similar observations for two single cars crossing one after the other showed an average of 27.1 seconds, or a difference of 7.1 seconds. If this represented the time interval between two cars, and the same interval was allowed ahead of the first car in each case, the time for the trains would be 27.1 seconds, against 34.2 seconds for two single cars, or a saving of 20.8 per cent.

TABLE VII—BROAD STREET LINE

Trip	Mileage	Delays in Minutes	Net Time Gained (+) or Lost (—) in Minutes	Passengers Boarding—Terminal	Passengers Boarding—Along Line	Total Time Stopped in Seconds (Exc. of Delays)	Stops per Mile	Power Consumption Kw-hr per Car Mile	Power Consumption Kw-hr per Ton Mile	Remarks
Single Car:										
In	5.74	0.00	—4.60	3	136	673	11.32	3.36	0.137	Nov. 25, 1912
Out	5.90	0.85	—0.90	..	42	372	8.65	4.75	0.186	Weather—A. M.—Clear
Out	5.90	0.00	—7.00	..	114	573	11.18	...	....	P. M.—Cloudy
Out	4.77	0.00	—7.00	10	62	356	9.02	4.61	0.172	Rail—A. M.—Good. P. M.—Fair.
In	5.74	0.00	0.00	4	134	518	10.97	2.27	0.082	Nov. 26, 1912
Out	5.90	1.48	—5.52	..	101	516	10.68	5.43	0.202	Weather—Clear
Out	4.77	0.23	—3.27	7	54	310	11.11	5.66	0.215	Rail—O. K.
Multiple-Unit Train:										
In	7.53	0.00	—5.25	14	138	421	10.08	...	....	Nov. 25, 1912
Out	7.75	1.19	—3.32	..	103	412	9.55	...	....	Weather—Clear
Out	6.62	1.11	—8.13	6	131	478	11.17	4.83	0.181	Rail—A. M.—O. K.
In	7.53	1.30	—0.20	41	52	294	7.44	2.93	0.115	P. M.—Fair
Out	7.75	1.08	—0.92	..	177	612	11.09	4.32	0.162	
In	7.53	0.00	—1.00	6	216	601	10.88	3.99	0.147	Nov. 26, 1912
Out	6.62	0.35	—6.40	4	104	661	10.57	4.39	0.164	Weather—Clear
In	7.53	1.02	—2.48	48	47	393	8.10	3.39	0.133	Track—O. K.
Motor Car and Trailer:										
Out	4.77	0.47	—3.53	6	118	425	11.90	3.88	0.173	Jan. 4, 1913 Weather—Clear. Rail—Fair.
Out	4.77	0.62	—5.13	6	73	329	10.07	4.61	0.213	Jan. 6, 1913
Out	4.77	0.27	—8.48	6	133	440	10.90	4.83	0.212	Weather—Cloudy Rail—Not good, sanded

In computing the power consumption per ton mile the passenger load was taken into account as follows: For each line a heavy trip was selected and the passenger load plotted. From this plot the average load for the trip was determined and expressed in per cent of the total number of passengers carried. This factor was then used to calculate the average load for all trips between the same terminals, the average weight per passenger being taken as 150 lb.

TABLE VII—BROAD STREET LINE

Trip	Mileage	Delays in Minutes	Net Time Gained (+) or Lost (—) in Minutes	Passengers Boarding—Terminal	Passengers Boarding—Along Line	Total Time Stopped in Seconds (Exc. of Delays)	Stops per Mile	Power Consumption Kw-hr per Car Mile	Power Consumption Kw-hr per Ton Mile	Remarks
Single Car:										
Out	9.20	0.33	+0.33	4	86	326	8.26	4.46	0.171	Dec. 4, 1912
In	9.43	0.50	+5.00	6	83	294	7.00	3.82	0.146	Weather—A. M.—Cloudy
Out	9.20	0.02	+1.52	3	47	245	5.98	3.48	0.137	P. M.—Clear
Out	9.20	0.00	—1.50	3	126	562	9.24	4.56	0.170	Rail—A. M.—Fair
In	9.43	0.33	—0.66	4	107	475	8.91	4.68	0.176	P. M.—O. K.
Out	9.83	0.57	—7.43	5	144	525	8.14	4.38	0.160	
In	10.15	1.33	—0.66	6	179	552	9.65	4.63	0.165	Dec. 5, 1912
Out	9.20	0.85	+2.85	5	36	221	5.98	3.91	0.156	Weather—A. M.—Cloudy
Out	7.36	0.00	+2.50	2	44	244	7.06	4.35	0.171	P. M.—Clear
In	11.95	0.00	—1.00	2	121	512	7.03	3.76	0.140	Rail—(?)
Out	12.39	1.50	—3.00	6	163	623	7.42	4.28	0.154	
Multiple-Unit Train:										
In	9.43	0.00	+2.00	12	110	489	7.96	3.87	0.151	Nov. 27, 1912
In	9.43	0.42	—3.08	8	104	529	7.21	3.93	0.154	Weather—Clear
Out	9.83	0.23	—14.27	4	146	732	8.34	—	—	Rail—O. K.
Out	9.20	0.00	—2.00	7	153	606	9.68	5.43	0.209	Nov. 29, 1912
In	9.43	0.00	+1.75	4	77	374	6.47	3.77	0.150	Weather—Clear
In	9.43	0.00	—4.25	4	143	644	7.64	3.34	0.129	Rail—O. K.
Out	9.83	1.20	—12.80	3	325	1109	9.97	4.83	0.175	
In	8.25	0.00	—4.00	5	132	435	8.85	4.12	0.159	
Out	7.99	0.58	+3.58	3	83	275	7.39	4.00	0.158	Nov. 30, 1912
Out	9.20	1.15	+1.12	6	142	546	8.16	4.68	0.181	Weather—Clear
In	9.43	1.25	+1.25	4	85	406	6.36	4.03	0.160	Rail—Good
Out	9.83	0.05	—2.45	5	163	636	7.94	3.87	0.148	
Motor Car and Trailer:										
In	9.43	4.40	—20.60	6	264	858	9.54	3.39	0.147	Dec. 7, 1912
Out	9.83	1.48	—3.02	6	127	586	8.04	3.67	0.169	Weather—Clear. Rail—O. K.
In	9.43	1.17	—2.83	6	114	454	7.74	3.24	0.150	Jan. 4, 1913
Out	9.83	1.55	+0.05	6	78	351	6.10	2.90	0.137	Weather—Clear. Rail—O. K.
Out	9.20	1.58	—0.42	6	92	489	7.94	4.07	0.191	Jan. 8, 1913
Out	9.83	0.22	—12.28	6	208	765	9.05	4.17	0.185	Weather—Rain. Rail—Fair. Wet

POWER CONSUMPTION

For comparison of the power consumption of the different equipments, wattmeters were placed on the cars and readings taken at each terminal. The smallest division on the scale of the wattmeter dial was 5 kw-hr., while the difference between readings on some trips was little more than this. Hence a mistake in estimating parts of a division meant a large percentage error in the result. The readings were necessarily hurried in many cases so as not to inconvenience passengers. It should also be remembered that the number of stops is a very large factor in the power consumption, while it depends a great deal also on the motorman. These factors all help to explain the wide variation in some of the results.

COUPLING OF TRAINS

The present method of coupling includes the following operations: removing fender, interlocking couplers, opening cut-out cocks in air pipes, pulling down trolleys, inserting cable jumpers, replacing trolley and fastening safety

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chains. This was found to require as much as two minutes, but with practice and careful assignment of duties to each man it could probably be done in a shorter time, and if the necessity for removing fenders could be obviated by the use of wheel guards or some other device, this time would be materially reduced. If trains are to be made up on the road, however, a definite allowance for coupling must be made in the timetable.

DEMONSTRATED RESULTS

The results show that, aside from any question of operating cost, the use of trains is entirely practicable in congested city service such as obtains in Newark. That is to say, the tests demonstrated that the riding public accepted the arrangement at once without objection, and no difficulties were experienced through interference of the long two-car units with vehicular traffic. The observations as taken indicate that the train carrying a large number of passengers makes a greater number of stops per trip than a single car. For a given total number of passengers the number of stops is practically the same whether the load is carried by one car or two. This might be expected, as people will board and alight at the same points regardless of the method by which they are transported. The rate of increase in the number of stops is, however, by no means directly proportional to the number of passengers. Instead, it falls off rapidly as the loads become heavy. In other words the number of stops per trip tends to become constant or independent of the number of passengers provided the total number carried is sufficiently great. On none of the test lines in Newark is this point reached within the capacity of the two-car train, but the tendency was so strongly marked when both cars of the train were comfortably filled that the train made only about one more stop per mile than each car would have made had they been run singly.

The loading time per passenger will be found to be approximately the same on the train and on the single car, indicating that the time lost through the transmission of bell signals, through the unequal distribution of passengers between the two cars and through the necessity for the single exit of the rear car was just about offset by the fact that the train provided two entrances for the total number of passengers boarding as against the single entrance of the single car.

It is, however, a fact except on two of the lines tested, namely, Central and Orange, that both the public and train crews were unfamiliar with train operation. This, it is believed, influenced adversely the running time of the trains as compared with single cars.

Based upon equivalent passenger loads the observations show that the use of trailers causes a serious slowing down of schedule speeds—much more than enough, in fact, to offset the inherent savings. This is undoubtedly due to the fact that the four 40-50-hp motors geared 18:66 were not sufficient to haul a trailer weighing 32,800 lb. when both cars in the train were heavily loaded.

FRANK HEDLEY DISCUSSES NEW YORK TRANSPORTATION PROBLEMS

At a meeting of the Electric Club of Chicago on June 26, 1913, Frank Hedley, vice-president and general manager of the Interborough Rapid Transit Company, New York City, discussed problems of transportation as found in New York. Before reading his paper Mr. Hedley said that between the attacks of the daily newspapers on public utilities and the efforts of politicians to regulate them street railway development in recent years has been stifled. Now, however, a turning point has been reached, for in New York by the aid of the Public Service Commission, which understands the problems, the city and the transportation lines have been brought into partnership. As a solution of similar questions in other cities, the owners of the properties and the city officials should get together and deal fairly and frankly with each other, with the result that public utilities would obtain a fairer treatment.

In his paper Mr. Hedley reviewed the development of transportation in New York, making special reference to the New York Railways' street car parade, which gave publicity to the rapid advance in modes of transportation since 1860. He also briefly described the low-step, center-entrance car now in use in New York and made special mention of the fact that it had practically eliminated boarding and alighting accidents. In discussing the effect of the peculiar physical formation of Manhattan Island upon transportation thereon, he said that the New York Railways' lines carry about 1,200,000 passengers daily, the great majority of whom, particularly on weekdays, move in a southerly direction in the morning and in a northerly direction at night, and in each instance in about two hours time, which causes great congestion in lower Manhattan during these hours. Even with such congestion, however, his company has a record for the year ended June 30, 1912, of one collision to 7000 car miles operated. These figures include collisions of every character, and the total amount of money paid in claims represents approximately 3 per cent of the gross income. This excellent record is attributed to watchfulness on the part of the trainmen. Mr. Hedley emphasized the fact that the management of 21,000 employees required in the operation of the surface, subway and elevated lines, as well as properly maintaining 4500 cars, was no small task in itself.

The latter portion of Mr. Hedley's address dealt with facts concerning the elevated and subway lines of New York City. At the time the subway was opened in 1904 the interval run was two and one-half minutes with eight-car express trains, and now ten-car express trains are run on a minimum interval of a minute and forty-eight seconds, at a speed of 25 m.p.h., including stops, thus increasing the capacity over the initial operation about 72 per cent.

The movement to the outlying districts has greatly enhanced the value of real estate there. As an example Mr. Hedley cited Staten Island and the Bronx, one 5 miles and the other 15 miles from the lower business section of New York City. Since 1903, when the assessed valuation of real estate in the Bronx was $226,596,647, there has been a gradual increase until in 1912 the realty was assessed at $616,521,378. Realty values on Staten Island, however, have remained stationary for more than 100 years, owing to the fact that it has only ferry-boat transportation means, while the other has surface, elevated and subway lines.

In conclusion Mr. Hedley said that in many communities ill-advised legislation has done much to direct capital into other channels, and the public cannot expect public utilities to develop as they should until such time as they can be made attractive for the investment of private capital. In his eyes, one of the most important duties of railroad managers and owners to-day was to see to it that their side of the question is brought to the public's attention and to establish the fact in the public mind that investors who put their money in public service corporations are entitled to the same fair treatment that the investors in other legitimate business should and do receive.

On the subject of the Public Service Commission, First District, Mr. Hedley made this interesting comment: "I have to admit that they have entertained me for the last six years, but in my opinion they have done a great deal in New York to bring about the solution of our rapid transit problem. After about six years of experience with the Public Service Commission in New York, I do not hesitate in stating my firm belief in a commission that has power to regulate in a manner to provide adequate, reasonable and proper operation, together with the control of issuing necessary and proper securities."

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Proceedings of C. E. R. A. Convention

A Full Account of the Technical Sessions Held on the Steamer "St. Ignace" Last Week by the Central Electric Railway Association and the Central Electric Railway Accountants' Association

The meeting and trip of the Central Electric Railway Association on board the steamer *St. Ignace,* of the Detroit & Cleveland Navigation Company, were mentioned briefly in the telegraphic report published in last week's issue of the ELECTRIC RAILWAY JOURNAL. A more extended account of the proceedings of the two sessions of the Central Electric Railway Association and of the meeting of the Central Railway Accountants' Association, which were held on the steamer, is published herewith.

President Arthur W. Brady called the meeting of the Railway Association to order in the main cabin at 9:30 o'clock on the morning of June 26. A. L. Neereamer, the secretary, read the minutes of the previous meeting, which were approved.

R. N. Hemming, Union Traction Company of Indiana, chairman of the standardization committee, presented the report of that committee, an abstract of which is published on another page in this issue.

After Mr. Hemming finished President Brady asked if the members had received blueprints of the designs recommended by the committee.

Mr. Hemming thought the members might like to vote separately on the questions considered in the report, particularly as the committee recommended controlling dimensions for trolley wheels as standard.

President Brady said that the report was a valuable one and he assumed that it would be wise to have it receive the careful consideration of the members with a view to definite action at a subsequent meeting.

E. F. Schneider, general manager Cleveland, Southwestern & Columbus Railway, moved that the report be accepted and a copy of the recommendations be sent to individual members for final action at the next meeting. This motion was adopted.

F. E. Wynne, engineering department Westinghouse Electric & Manufacturing Company, then read a paper on "Recent Development in Car Control." An abstract of this paper is published elsewhere in this issue.

Mr. Hemming said that the paper was a complete discussion of the subject and voiced the consensus of opinion of almost every man in the operating department concerning the desired effect.

Answering a question, Mr. Wynne said that at times it was possible to obtain lighter and cheaper equipment with field control because the next smaller size of motors could be used than the size that would be needed without field control.

DISCUSSION ON VALUATIONS

Robert B. Rifenberick, consulting engineer Detroit United Railway, then read a paper on "Something Along the Line of Physical and Intangible Valuation as Covered by Recent Legislation." An abstract of this paper was published in last week's issue, page 1163.

President Brady, in opening the discussion, said that the paper was very valuable and interesting.

Charles L. Henry, president Indianapolis & Cincinnati Traction Company, said he had been delighted with the paper and the treatment of the subject. How were the companies to meet the question before them? There was nothing more mysterious and troublesome to Mr. Henry's mind than this topic. There was more mud around the subject of valuation than any other thing that was ever seen. Referring to the Indiana bill, Mr. Henry said that he felt that the clause about the cost of bringing the properties to a state of efficiency was very important. The companies felt, as Mr. Rifenberick did, that that furnished an opportunity for means for determination of the actual values of properties. No limitation was imposed on the powers of the commission excepting the additional statement that that part of the valuation was to be taken into consideration.

Mr. Henry added that he had been disturbed on the question of depreciation, but the paper gave a good idea of that subject. If depreciation was to be taken into account on one side of the balance sheet, the causes of depreciation should be taken into account on the other side. The most important feature of the question of valuation to-day was that the companies must make up their minds that they had to face it. They might as well get ready to meet it. He regretted that the recent decision of the United States Supreme Court did not bear out the views of the author of the paper in all details, but if depreciation was considered as a factor the whole of the question must also be considered. Mr. Henry felt a little more favorable toward the bill passed by Congress than did the author of the paper. As the bill was passed by the House it contained provisions for physical valuation only. As amended in the Senate the bill provided for the determination of values other than physical and the title of the bill also had been changed. When the bill was taken as an entirety it was an admission, fact or argument that all these factors must be taken into consideration. When a valuation was made what was to be done with it? Some declared that in rate-making the question would be as to what rate would be low enough merely to avoid confiscation. It was not a question of how close it was possible to come to stealing and still not steal; there ought to be a reasonable compensation. This statement should be taken broadly. How could the country secure the construction of its needed utilities unless it did grant a reasonable compensation? Did it expect to induce men to put capital into the properties and then make the rate so low that it would just avoid confiscation? The money would never be forthcoming if the country forbade any margin above a confiscatory rate of return. People talked about the gifts of government land when the great transcontinental railroads were built. These great enterprises involved large risks in their inception and the public got more, tenfold, than was given away in land.

F. D. Carpenter, vice-president and general manager Western Ohio Railway, said that the companies should face the question of valuation. The paper had given more light on the subject than he had ever had before.

President Brady said that by reason of the action of Congress under the La Follette bill valuation was compulsory. It was important that provision was made in the bill for the consideration of various factors or elements of value.

Mr. Rifenberick said he thought that the decision of the United States Supreme Court in the Minnesota rate cases threw the burden of the entire subject on Congress rather than on the Interstate Commerce Commission.

Mr. Brady said that the subject was in such a misty and shadowy form that it was difficult to tell just what the courts would finally decide. There was still a hope in the situation. The subject was one of the live topics before the industry and one of the lines of work in which the Central Electric Railway Association could be of immense value to its members from time to time.

PAPER ON "THE CLAIMS DEPARTMENT"

E. F. Schneider, general manager Cleveland, Southwestern & Columbus Railway, then read a paper on "The

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Claims Department." An abstract of this paper is published elsewhere in this issue.

Mr. Henry said that he had great faith in both attorneys and physicians. He though that no class of business men in the country ranked higher in character than members of the legal profession. He felt that the physicians relieved suffering.

The meeting was then adjourned until the following morning.

CONCLUDING SESSION

E. F. Schneider, the vice-president, acted as chairman of the session held on the morning of June 27. President Brady expressed his regret that an unavoidable engagement made it imperative for him to return to his home before the conclusion of the trip.

James H. Drew, president of the Drew Electric & Manufacturing Company, of Indianapolis, Ind., read a paper on "The Manufacturer's Duty in the Electric Railway Field." An abstract of this paper is published elsewhere in this issue.

Mr. Schneider said that the railway men should recognize the work of the manufacturers and their representatives and the broad spirit which they held toward the industry.

CAR VENTILATION

H. E. Lavelle, Automatic Ventilator Company, presented a paper entitled "Ventilation of Electric Cars" along similar lines to one presented by William J. Fleming of the same company before the Scranton meeting of the Keystone Railway Club, Sept. 10, 1912, and published in the Electric Railway Journal for Sept. 14, 1912. Mr. Lavelle mentioned the ventilation requirements specified by various individuals and organizations and described the deck sash, exhaust ventilators, hot-air intake ventilation, floor-line intake roof exhaust and natural intake-and-exhaust ventilation. Referring to the last he said that the volume of air handled by this device depended largely on the speed of the car. At a speed of 5 m.p.h. to 15 m.p.h., anemometer tests had shown from 25 cu. ft. to 100 cu. ft. per minute (intake and exhaust) per ventilator. At high speeds readings of 300 cu. ft. per minute had been taken. In a car of 1800 cu. ft. capacity six sets of ventilators averaging 50 cu. ft. per minute per ventilator would be changing the car air every six minutes, or ten times per hour. In a high-speed car of, say, 2400 cu. ft. capacity, six sets averaging 100 cu. ft. per minute would be renewing the air about every four minutes. This could be, and had been, accomplished under severe winter conditions, without drafts and without reducing the car temperature below 50 deg. Fahr. In conclusion Mr. Lavelle referred to the necessity of proper ventilation for arch-roof cars.

Mr. Schneider said that one of the things to which the country was looking forward was the matter of having ideal ventilation of cars without drafts.

Mr. Carpenter said the problem of ventilation was important and the companies should face it. He had started the use of ventilators and they had proved satisfactory. He found that the air was very much improved by their use. For his personal satisfaction he tested the ventilators in a smoking compartment, filling this compartment with smoke and then opening two ventilators. In three minutes afterward the air was nice and clear. The paper was very interesting to the railway managers.

Mr. Rifenberick mentioned the use of old-type open cars in Cleveland during the receivership. The cars were labeled "fresh-air cars" and were operated as trailers when there was great need for equipment and service in Cleveland.

Mr. Hemming said that the great problem was to introduce fresh air, to be able to keep out the exhaust and to keep out rain. Sometimes during rainstorms ventilators leaked so badly that water fell into the interior of the car. Types of ventilators with which this difficulty arose were in use on some of the steam railroads. It was manifest that steam railroad companies would not continue the use of these ventilators if they experienced the same trouble that had developed on interurban cars. It seemed, therefore, that there was a difference in the exhaust created by a single car operated on an interurban line and the exhaust created by a number of units operated in a train on a steam railroad. Perhaps the additional cars of the steam railroad train broke up the vacuum in such a way that moisture was not forced into the cars in case of rain, as he had found in the interurban cars. He thought that ventilator manufacturers had not gone into the subject deeply enough to meet the problem of ventilation of interurban cars.

Mr. Lavelle said that the problem had been a difficult one owing to the differences in car construction between interurban and steam cars. He said that there were great differences of opinion on the subject as evidenced by the views of Mr. Carpenter and Mr. Hemming.

Mr. Hemming said he was afraid that the plan to introduce air under the seats would bring too much cold air into the car.

Mr. Hemming said that he had raised the same question that Mr. Carpenter brought up in regard to the fresh-air intake. He was assured that there would not be too much air. He still feared, however, that too much cold air would be admitted.

TUNGSTEN LAMPS

Mr. Hemming then brought up for the consideration of the association the subject of tungsten lamps without commercial value. He said that everybody appreciated that tungsten lamps were becoming more valuable as illuminating factors in railway service. A number of different styles of lamps were in use on the various interurban roads. The number of wattages and voltages was enormous. The lamps had commercial value because they could be removed and used or sold. For that reason it had occurred to Mr. Hemming that a lamp of odd voltage not usable on any other circuit than an interurban car would be a great improvement. The association should produce some standard voltage lamps. This would make a reduction in the cost of lamps as every road now suited its own whims in the selection of types. There was also the problem of interchange in connection with lamps. One manager had put on special lamp sockets and these had been broken off in some cases. Fifty-watt lamps had been introduced on one road. It was a question whether that was what all of the companies wanted. At any rate what should be done was to develop and introduce a lamp without commercial value so far as the voltage was concerned.

Mr. Carpenter said that it seemed as if this condition could be overcome by an arrangement with the manufacturers to supply an odd-size thread on the socket so that the lamp could not be used in any other place than on the interurban cars.

Mr. Schneider said that the association had a splendid standardization committee, and he thought the subject should be taken up by that committee. A motion was offered and carried referring the matter to the standardization committee for action.

SUCCESS OF THE MEETING

Mr. Carpenter then said that he had been connected with the association since its inception and had witnesssed its development to its present flourishing condition. There never had been a meeting in which the addresses were of more interest than at the present one, and never a meeting in which so much rest, comfort and pleasure had been afforded. He offered the following resolution, which was adopted:

"Whereas the members of the General Electric Railway Association, feeling that they have had one of the most

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profitable and valuable meetings in their history, desire to place on their permanent records an appreciation of the untiring efforts of their representatives who were charged with the duty of carrying out the wish expressed by the executive committee to take this trip, therefore be it

"Resolved, that this association by formal vote express its sincere thanks to the members of the supply men's committee for their part in this successful meeting."

The next meeting will be held in Indianapolis on Nov. 20, provided satisfactory arrangements can be made there.

ROUTE OF TRIP AND SPECIAL CARS

The route of the steamer *City of St. Ignace,* the meeting place of the two associations, was from Toledo, past Put-in-Bay and across Lake Erie to the Detroit River and Detroit, where a stop was made late in the evening of June 26. The route then was up the Detroit River and through Lake St. Clair and the St. Clair River to Lake Huron. A stop was made at Harbor Beach, Mich., where the United States government life-saving corps gave an exhibition for the members. From this point the steamer went north and into Lake Huron to a point about opposite the middle of Saginaw Bay, where the return trip was begun. The same route was followed except that the only stop made on the way back to Toledo was at Detroit. Toledo was reached about 3 p. m. on June 27.

A special car was operated by the Union Traction Company of Indiana from Indianapolis to Toledo in connection with the trip of the Central Electric Railway Association.

MEETING OF THE ACCOUNTANTS' ASSOCIATION

Members of the Central Electric Railway Accountants' Association held their meeting on June 26. The president, E. L. Kasemeier, presided.

In the absence of any members of the standing freight committee the report prepared by this committee was read by the secretary, F. T. Loftus, auditor Indianapolis & Cincinnati Traction Company. An abstract of this report is published elsewhere in this issue. In the discussion on the report Mr. Kasemeier said that he had found it useful to use different colored inks in his records of cars. The report was accepted by the association and will be considered in detail at the next meeting.

The association instructed the secretary to confer with the secretary of the Central Electric Railway Association in reference to the question of the minimum charge per car. It was also recommended that a postal-card notice be sent to the auditor of a line owning a car when the car reached a foreign line.

Secretary Loftus read the report of the query box committee, which was published in last week's issue. Definite action on the report was deferred until the next meeting.

The question of forms in use by different members of the association was brought up, and it was decided that in order to be accessible for easy reference the forms kept by the association should be held in the office of A. L. Neereamer, secretary of the Central Electric Railway Association, at Indianapolis. The secretary will ask some of the members to assist this fall in the solicitation and classification of new forms that may have been introduced by members since the last collection was made up.

Mr. Loftus read the paper prepared by George L. Ford, auditor Evansville Railways, on "Voucher Indexing Simplified." This paper was published in last week's issue.

Mr. Kasemeier described his use of loose-leaf ledgers for indices of vouchers. He said the books were 14 in. x 14 in. and were indexed minutely. Three books were used having an aggregate of 1200 to 1500 pages. The records showed the month in which the voucher was recorded, the number and the amount. Vouchers were kept in boxes and it was possible to refer to them quickly.

P. E. Schilling, chief clerk Toledo Railways & Light Company, said the company had adopted the separate check instead of the voucher check. He thought that this was easier to handle. When the check was returned from the bank it was pasted on the voucher.

J. N. Tabb, treasurer Parkersburg, Marietta & Interurban Railway, said that when he became connected with his company he found that a card index of vouchers had been maintained since the time the road started operation, but he did not find this entirely satisfactory.

Mr. Kasemeier, answering a question as to whether it was necessary to show the amount in the index record, said he found it a great advantage.

Walter Shroyer, auditor Union Traction Company of Indiana, advocated the use of a book index.

A. J. White, traveling auditor Ohio Electric Railway, read a paper on "Nuts to Crack." An abstract of this paper is published elsewhere in this issue.

Mr. Kasemeier said that on account of the danger of misunderstanding on the part of agents he was preparing a book of instructions to agents.

Walter Shroyer, chairman of the standing committee on passenger accounts, presented the report of that committee. An abstract of this report is published elsewhere in this issue. During the discussion the members present agreed with the committee in reference to the form for ticket orders. The practice outlined in regard to ticket requisitions was a regular practice. The form of the ticket stock ledger was approved except that in some cases it was shown that this record was kept directly by the auditor. All the members had about the same form for agents' daily records of sales. The report of the committee on agents' daily summaries of sales showed that nearly all the companies received the information mentioned, but they did not all use the same form. One member present said he had discontinued the compilation of daily earnings by operating divisions. All of the companies used practically the same form of agent's cash book. In the compilation of monthly reports of local sales practically all the roads required the same information, but followed forms differing a little. The monthly report of interline sales followed the practice of companies generally except that the Union Traction Company of Indiana showed the junction point at which tickets were sold. The forms of agent's balance sheet, auditor's corrections and auditor's credit advice were found to be about the same on all roads. Some of the roads did not have a regular printed form for the auditor's record of distribution of sales. All of the roads used the auditor's report of daily earnings, although one company did not compile earnings by operating divisions. A number of the companies reported that they did not use prepaid ticket orders because these did not amount to enough to pay for the trouble.

In the discussion on the subject of checking reports in the office of the auditor it was stated that the commencing and closing numbers on each page were added and the difference was the total number in the sold column. A tariff was compiled especially for clerks who audited reports. This gave both one-way and round-trip passenger rates, baggage rates and mileage from each station to every other station on the road, arranged alphabetically. Mention was also made of the book tickets which did not have the destination printed. The destination was filled in by the agent in ink. The books were checked against the tickets lifted by conductors.

The redemption of tickets was handled by the different companies in the manner outlined by the committee. The only road that used a form for tickets lifted was the Union Traction Company of Indiana. Mr. Shroyer submitted a form and said that it was an excellent one to use if the work could be done with a minimum of expense. Auditor's accounts were handled in about the same manner by the different roads. A grand recapitulation was made of all the monthly ticket reports of agents and these were then entered in the journal.

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Central Electric Railway Convention Papers

Abstracts of Papers Not Published in the Last Issue Are Presented, Together with the Reports of Several Committees

RECENT DEVELOPMENTS IN RAILWAY CONTROL

BY F. E. WYNNE, WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY

During the last few years there has been a growing appreciation of the remote control and train control of cars in city service. The equipments for the first lot of the New York Railways stepless cars have been provided with a form of remote automatic train control which is one of the simplest and lightest yet devised. This system has been named the "PK" control, because practically all the main circuit connections are made in a pneumatically operated "K" controller. In designing this control the aim was to produce apparatus with the following features: Remote control, train control, simplicity, smoothness of operation, minimum weight and space, automatic or hand acceleration as desired, close adherence to existing standards and manual operation of single car in emergency.

APPARATUS

The principal pieces in a "PK" equipment are the line switch, commutating switch, master controller, control rheostat and limit switch.

The line switch is of the standard electro-pneumatically operated type. It is connected in the main circuit next to the line. Besides taking all the breaking of main circuit current, whenever power is cut off the car, it also acts as a circuit breaker in case of heavy overload or short circuit in the equipment. The New York stepless car equipments have one line switch in each side of the circuit, since both sides of the line are insulated from ground.

The commutating switch is essentially the same as a "K" controller, containing a drum-type reverser and a main drum for cutting out the resistances in the motor circuit and for changing the motor connections from series to parallel. It has a "PK" operating head mounted on a base casting which replaces the ordinary controller top. This operating head is the novel feature of "PK" control. Both the main and reverse drums are pneumatically operated. The off position of the commutating switch corresponds to the first notch of a "K" controller, so that no circuits are opened by the commutating switch. Whenever, for any reason, power is shut off, the current break is taken by the line switch.

In appearance the master controller is a miniature platform controller. It is provided with a notch for each main circuit position so that manual acceleration is secured. In addition to making the usual connections of the control circuits for operating the reverser and commutating switch, it includes the dead man's feature. The control rheostat is built up of heating elements such as are used in electric irons. It is connected across the line and taps are brought out at suitable points for operating the main control circuits, the compressor governor, signals and other auxiliary circuits. This permits the use of line current for the control and auxiliary circuits and provides a low voltage for the train line and control wiring.

The limit switch is of the standard type and is so connected in the control and main circuits that automatic acceleration is secured when the master controller is thrown more than one notch at a time. The rate of progression of the commutating switch is governed by the limit switch. When the master controller is in the off position the commutating switch is held positively in its off position.

OPERATION

In operation, starting with the master controller in the off position and the reverser in the forward position, the first notch on the master controller closes the line switch and thus applies power through the commutating switch and resistance to the motors in series. The remaining notches cut out the resistance, change the motors from series to parallel, and cut out portions of the motor fields. An eight-notch master controller, therefore, gives series-parallel control with four resistance notches and four running positions, two of each being in series and two of each in parallel. Since every position of the commutating switch has a corresponding notch on the master controller, the control may be brought in one notch at a time, just as with an ordinary platform controller, and may be stopped at any notch. On the other hand, the limit switch provides for automatic acceleration.

All of the apparatus is arranged to permit the operation of two-car trains. Double-end control is secured with only one commutating switch. Most of the parts requiring repairs and renewal are already well known by the average carhouse force.

FIELD CONTROL

The New York stepless car control is used in connection with field-control motors. It may, therefore, be advantageous briefly to review this development also. In construction, the field-control motor differs from the ordinary commutating-pole motor only in having the main field coils wound in two parts with a change in the wiring around frame and in having one more lead brought from the motor. The larger portions of all main field coils are connected in series to give normal field. The smaller portions also are all connected in series and form the extra field which is connected in series with the normal field winding to give full field in starting. The additional lead is brought out from the motor between the normal and full field windings and forms a point common to both. The smaller portion of the field coils, being in circuit only a part of the time, namely, when running on full field, is wound with a smaller section of copper than that used in the normal field, which is in circuit all the time that the motors are taking current. Fig. 1 shows the arrangement of motor leads for use with field-control motors.

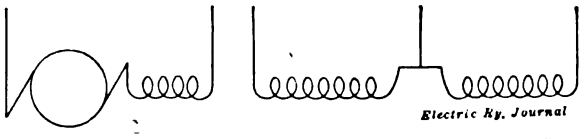

Fig. 1—Arrangement of Motor Leads in Field-Control Motors

Field-control motors are in service in connection with both unit-switch and drum-type controllers. With drum-type controllers modification of the contacts is required for field control. With unit-switch control a portion of the field may be cut out either by the use of a field change-over switch of the drum type, similar to an ordinary reverser, or it may be effected by using additional unit switches. In some instances the standard number of resistance notches for a given equipment capacity has been used and an additional notch provided for normal field in series and in parallel. In other cases the normal field point has taken the place of the last resistance step in series and in parallel. The latter scheme (cutting out one resistance notch in series and one in parallel) is possible because the speed of the motor on full field is much less than that of the corresponding motor without field control when developing the same tractive effort. The speed on normal field is somewhat higher than that of the corresponding motor without field control when

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developing the same tractive effort. However, the manipulation of the controller by the motorman is the same as without field control.

The characteristic curves of typical 50-hp, 600-volt motors built on the same frame and geared the same are shown in comparison, with and without field control, in Fig. 2. Without field control the speed curve lies between the normal and full field speed curves with field control, and the tractive effort without field control is between the tractive effort curves on full and normal field with field control. The curves show that the field-control motor will develop a large tractive effort in starting on full field at a current much below that required without field control, because the corresponding speed with full field is lower. This produces economy in starting, and the more frequently stops are made the greater will be the benefit derived therefrom. At light loads also the field-control motor on normal field will develop a given tractive effort at a higher speed than without field control. This, of course, requires an increased current with normal field. However, it gives the field-control motor a greater opportunity for making up lost time.

The characteristic curves of typical 90-hp, 600-volt motors built on the same frame, with and without field control, and geared to operate a 35-ton car at the same free running

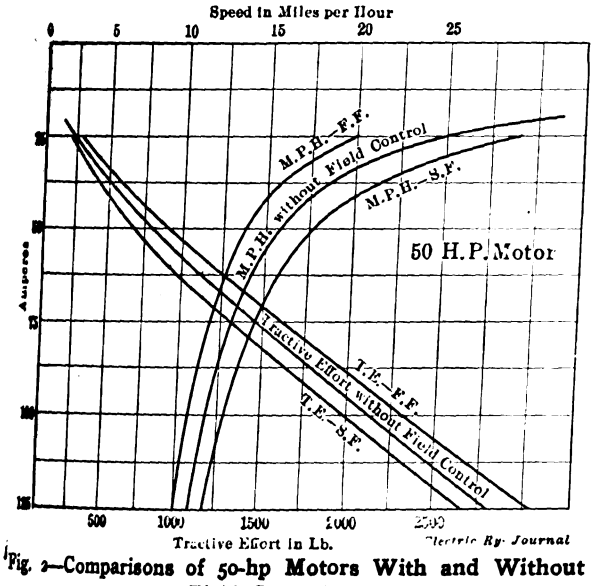

Fig. 2—Comparisons of 50-hp Motors With and Without Field Control

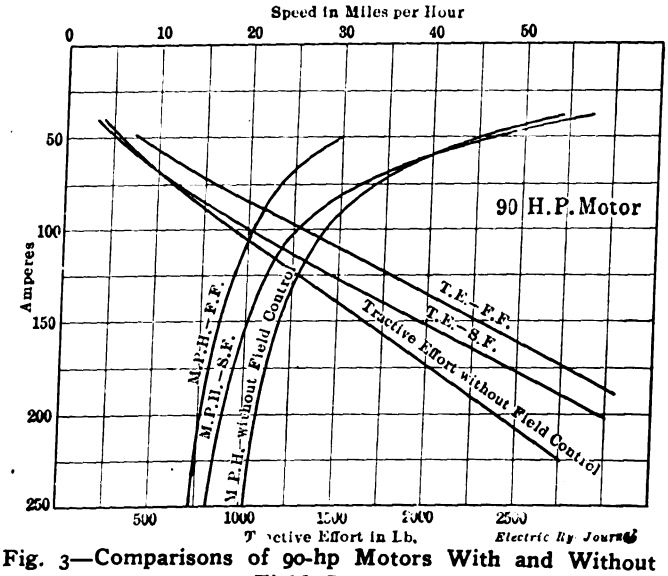

Fig. 3—Comparisons of 90-hp Motors With and Without Field Control

speed on 1.25 per cent grade, are presented in Fig. 3. These curves show that at all loads to which the motor is subjected in starting and getting up to the maximum speed a motor without field control takes as great a current, or a greater one, to produce a given tractive effort as does the field-control motor on either full or normal field. This indicates that a very great economy may be attained from the use of a field-control motor in frequent-stop service. At the same time, as the field-control motor is geared for the same or higher balancing speed on grades of 1.25 per cent or less, its suitability for maintaining fast limited schedules is at least equal to that of the motor without field control.

An alternate method of securing a part of the advantages accruing to equipments making use of the foregoing motor with fields wound in two parts is to use an ordinary commutating-pole motor and secure higher speed by weakening the field by connecting an inductive shunt in parallel with it. Several installations of this sort are now being made. While this scheme has an advantage in avoiding modification of existing commutating-pole motor field windings and wiring, yet it suffers from the disadvantage of extra weight (approximately 300 lb. for a 400-hp equipment) and, as will be shown later, loses a large part of the benefit of field control because it provides no means of securing speeds lower than with the same motor not shunted.

FIELD-CONTROL OPERATION

In operation series-parallel control with resistance is used. Starting from rest with the motors in series, the resistance is gradually cut out of circuit until the motors are running on full field without resistance. Then a portion of the field turns is cut out of circuit at a single step, thus weakening the field and increasing the car speed. The next point on the control connects the motors in parallel with full field and resistance. The resistance is gradually cut out until full voltage is applied to the motors with full field. Then a portion of the field turns is again cut out and the car runs on normal field. A portion of the field is cut out by disconnecting the lead at one end of the full field and connecting in the lead from the point common to the full and normal fields. That portion of the field which is to be cut out is temporarily short-circuited in passing from full to normal field.

The number of turns used on the motor field is for full field greater and for normal field less than is the case with the corresponding motor without field control. Therefore the field-control motor has on full field the lower and on normal field the higher speed. The result of the lower speed and higher tractive effort on full field is that the field-control equipment wastes less energy in heating the grids than does the ordinary equipment, and this is accomplished by a reduction in both the amount and duration of peak currents. The result of the higher speed on normal field is that the field-control equipment may use a greater gear reduction with the same car speed and get the full benefit of field-control economy, or, with the same gear reduction, may attain a higher car speed and thus give up a portion of the field-control economy for the sake of more speed margin. It is also often feasible for a field-control equipment to perform a service which would require the next size larger equipment without field control.

Field control has been applied to many different sizes of equipments from the smallest railway motors to those used on the Pennsylvania Terminal locomotives. The limitations of space in a car truck largely determine the motor revolutions per minute for a desired horse-power and the gear-center distance. The minimum pinion is determined by considerations of mechanical strength. The maximum gear is fixed by the wheel diameter and the clearance which may safely be allowed between the gear case and the roadbed. In most cities the local schedules can be maintained with motors without field control having the minimum armature speed and the maximum gear reduction. For such applications field control offers the opportunity to give the same service with decreased energy consumption, an equal or greater mar-

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gin of speed for making up lost time, and frequently a smaller and lighter equipment.

In combined city and interurban service motors worked at the proper load for the entire service may be overloaded on the city section and underloaded in the suburbs. Field control applied to such cases, without increasing the capacity of the equipment, often eliminates the overload in the city section, and at the same time, on account of the high speed on normal field, permits a faster suburban schedule to be inaugurated without overloading the equipment on that portion of the run.

In interurban service the use of field control is equivalent to providing two gear ratios on the same car. The full field connection corresponds to the low-speed gearing with its high tractive effort for starting with small current. The normal field corresponds to the high-speed gearing with its greater free running speed. Hence an equipment with field control is better adapted to operating interchangeably in local and limited service than is an equipment without field control. The high tractive effort on full field at starting improves the equipment for local service with frequent stops, and the high speed on normal field makes it more adaptable for limited service than it would be without field control if properly geared for local service.

The full field also gives efficient running points both in series and in multiple for hill climbing and operating interurban cars on the streets of towns and cities. This feature should be found particularly beneficial where severe grades occur on a road which is limited in capacity of substation and amount of trolley feeder and for high-speed interurban cars following slow-speed city cars through the streets.

To summarize, field-control equipments possess the following advantages: lower energy consumption, equal or greater ability to make up lost time, reduced peak loads, improved line-voltage regulation, better load factor, greater suitability for combined city and suburban service, wider range of local and limited schedules maintained with the same gearing, additional running speeds for use in towns and on grades, and smaller, lighter and cheaper equipment (at times).

All of these advantages may not be secured simultaneously in each individual application, but their variety shows that there is a wide field for the proper application of field-control equipments

THE CLAIMS DEPARTMENT

BY E. F. SCHNEIDER, GENERAL MANAGER CLEVELAND, SOUTHWESTERN & COLUMBUS RAILWAY

Among the Chinese there were those who plucked out their two eyes in order that they might have a thousand eyes of wisdom. We have greater need than the Chinese in the claims department for the thousand eyes of wisdom, so that we may solve the many problems encountered, which are so diversified and so difficult. We must not only analyze our immediate problems but we must have a clear insight into the future to be able to conduct our part of this thankless job understandingly and eventually do away with the enormous sacrifice of human life and human limb. We also need the thousand eyes of wisdom in the adjudication of claims in personal injury cases. No sentiment should be allowed to bias our judgment, but a purely scientific business principle should govern, and this principle at the outset can be practically summed up in the one word "settle."

We have frequently stood in our own light by allowing our judgment to be swayed by the effect our actions in the claims department might have upon the public. Theoretically, we ought to figure upon this, but practically there is no direct benefit resulting from a liberal policy. In recent years steam railroads have changed from the old policy of fighting all cases to the limit to that of settling all cases, but the settlements they make, from my viewpoint, are entirely out of proportion to the injuries received. The public, instead of appreciating the fact that steam railroads invariably settle passenger cases, use that fact to obtain large sums in settlement, so that to-day the prices paid in the adjustment of passenger cases are practically any sum that the injured party may ask. However, the other proposition stares you in the face, that if you do not settle the jury will undoubtedly "soak" you.

No general policy can be outlined in the claims department. Each case is its own problem, and the solution, so far as the company is concerned, is merely the question of getting rid of a most troublesome matter with the least amount of money and time.

If there is a question regarding the liability or of mixed liability, there is almost always a chance to cut down the figure to a comparatively reasonable amount.

A stock or other property damage can almost always be adjusted by dividing the appraisal value.

If there is no liability, then it is a question of paying approximately the amount of money it would cost to try the case, it being better to swallow the injustice in order to get the case off your books and off your mind; there is also always a chance of your case going wrong somewhere if you try it. Every one thinks his own method is the best, but the adjuster who actually does settle and keeps his company out of the courthouse is, in my estimation, the competent man.

WASTE IN THE CLAIMS DEPARTMENT

The average claims department is an expensive, inefficient, cumbersome, unscientific and much neglected and less understood department of railroad work.

You will all admit without much argument that the claims department is an expensive luxury. It is inefficient because time is not given to the close study of individual cases; hence the prices of settlements and adjustments are continuously on a higher basis. It is unscientific because the operating department does not give the same thought and study toward reducing the cost here which it does in the mechanical or power department. It is neglected because the management does not take the time to analyze the causes or the results of accidents, and it is not understood because it is looked upon as a necessary evil.

When a management does try to study the conditions it resolves itself into more rules for the rule book and recommendations for more safety devices and appliances.

We are being continuously dosed with such all-important questions as instruction for trainmen, a car fitted up in order to show the trainmen the mechanical and electrical arrangement of the car he operates so that he may understand the machinery and electrical appliances he is handling, examination on the book of rules, card indexes for discovering fraudulent claims, the subject of expert medical testimony and of expert electrical testimony, the ethical relation of the company surgeon, the ethical relation of the company to the attorney, the ethical relation of these two branches to each other, the duty we owe the public (never the duty the public owes us)!

To me this stuff is all bosh. I do not believe in trying to make mechanics, machinists or electricians out of trainmen. An intelligent motorman is a grand man, and he has all he can do, and it is all you ought to ask of him, to operate his car properly. The handling of a car is a science of itself. If your car doesn't run, it is up to your master mechanic and your shop force. If a lead should burn off or a controller finger get stuck or a trolley wheel need changing, your trainman can easily do that. But don't try to load him up with all the intricacies of the

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machinery he is operating, because he will only get confused. Let him absorb what he naturally will, but be in position to change his car for him when he feels it is not acting right. You are filling this trainman's head with so much extraneous matter that he will be speculating upon how the current, after leaving the trolley wire, goes through the controller to the motor, and how the energy is used, instead of having his mind upon the operation of his car, which is his primary and only business.

BOOK OF RULES

How many accidents have happened upon your road because the trainman did not know the rules of the company? I am sure they are few and far between. Rules, of course, should be drilled into men, but men, thinking railroad men, naturally know what is the right thing to do, and if you have their actual co-operation from a humanitarian standpoint, you will have very few accidents traceable to the lack of knowledge regarding the book of rules.

You can find instances where card indexes on fraudulent cases have been of value, but in a comparative sense they are so relatively few, especially on interurban roads, that they are not worth the time, money or consideration which this matter is receiving.

SURGEONS AND ATTORNEYS

The question of surgeons is one that has had a great deal of thought and study from the claims department. I have simplified the matter a great deal on our road. Whenever an appointed surgeon dies or moves away from the town he is in, I do not reappoint one in that town, so that at the present time, out of twenty towns and villages, I have only six regularly appointed surgeons. I would abolish them were it not for the fact that it would undoubtedly react against us. I find I can do better to let the cases get into the hands of the regular surgeons or family physicians, and by then employing some surgeon who is friendly to, or acquainted with, the family physician or surgeon to make an examination for the company, I can get even better results than to have a regularly appointed surgeon who advertises himself as the company surgeon and displays the transportation he rides upon with a certain gratified superiority over his less fortunate colleagues.

The same is true of attorneys. We have the same policy regarding them. We do not reappoint when they drop out, and as a result we have, outside of our general counsel, only a very few attorneys whom we retain.

SELECTION OF TRAINMEN

The selection of trainmen is one of the most important items governing safety in railroad operation and one which at times receives very little consideration, while at other times great difficulty is experienced in obtaining good men at the established rate of wages. One of my superintendents employs only men as motormen who have had railroad experience, preferably steam railroad experience. There is a drawback in this method, however, and that is the liability of employing a man who is a "floater" or one who has been discharged from some other road on account of being careless. When impossible to find experienced men, he selects conductors who in his judgment are fitted for motormen and transfers them to the front end. We have less trouble in getting conductors than we do in getting motormen.

It is impossible for me to say that his method is correct, as some of our worst accidents have happened on account of the carelessness of experienced men. One man especially whom I have in mind was the cause of a wreck costing about $75,000. His experience covered a period of over fourteen years on both steam and electric roads. He was an honest, sober and industrious man. On the other hand, some of our best trainmen are of those who never had railroad experience before we employed them.

My one idea is that a young man of from twenty-two to twenty-five years of age, if he has the right make-up, is preferable to an older man who has shifted several times and is set in his ways.

It is the opinion of some managers that the motorman should receive more money for his work than the conductor, and they believe that the promotion of conductors especially selected by the superintendent would not only be an encouragement to conductors to strive for this advancement, but would by this method produce better and more careful motormen. There is, of course, this feeling that one had better not spoil a good conductor in order to make a poor motorman. I can find no reason for this feeling, but I have myself been loath to change a conductor whom I knew to be honest and careful to the position of motorman. This is probably a narrow-minded viewpoint and one which we ought to get out of our system.

PREVENTION OF ACCIDENTS

What can railroad managers do to prevent the recurrence of disastrous accidents, such as we all know about? Are we entirely helpless? Is it right to feel that a certain percentage of the gross receipts set aside to take care of the injuries and damage account is the only method we have of conducting this branch of the business? Are we, who are individually responsible for the management of a road, compelled to shoulder the responsibility of those who err in judgment? It has been the custom to do away with the human element, the human agency, to the greatest extent possible and to rely to the greatest permissible extent upon all the safeguards which engineers and others have been able to contrive. Have you got relief from them? The experience of one road or the experience of a given road does not materially affect that road or any other road so far as the individual employee is concerned. He takes no lesson from it. This has often been illustrated by one disaster following another in rapid succession.

The greatest trouble, I think, is that railroad employees, after an accident has happened, have in mind only the commercial idea of the value to lives and limbs. This they have got largely from the management, or claims department, perhaps, who are wont to boast of the good settlements they have made, and the adjusters of these things are looked upon by the employees, and the public also, in the light of shrewd and unscrupulous shysters whose only thought is the conversion of human life and human limb and human suffering into the least possible number of dollars and cents. This conversion into dollars and cents of life and limb is naturally reflected in the percentage column, and as long as the percentage to gross receipts is kept reasonably low practically no attention is paid to the primary causes.

We do not stop long enough in our hasty search for more safety appliances and more discipline to consider the individual employee, the motorman, the conductor, the trainman, the employee. You can reach their hearts. Some naturally are harder to reach than others, but all of them are readily influenced when you appeal to the good and the true which is within them. Some have scoffed and made fun and tried hard to be smart and appear not to take the things presented to them in this line seriously, because they feared they might not appear of the old school of rough-and-ready railroad men and because they did not want to appear chicken-hearted. But their hearts are susceptible to the better things, the truer impulses, the loftier ideals of life.

Do not misunderstand me. I have not advocated doing away with discipline and safety devices but using them merely as necessary adjuncts. They do not lessen the percentage column. The main and the vital thing is so to educate and impress each employee that he will safe guard human life and human limb, not from any fear of

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punishment, not from any hope of reward, but from the natural inherent, hitherto in him undeveloped, principle that it is a prerogative, it is a privilege, it is a duty to save human life and human limb and human suffering, and he by his environment can take advantage of this privilege to a greater extent and a greater degree than those in other employments and other walks of life.

I have wasted in years gone by all the time I am going to in considering the ethical relation of the surgeon to the attorney. I have had too many passengers butchered by so-called surgeons, and I have got to a point where I am willing that the professions themselves shall take care of their own ethics, either among themselves or in relation to one another. I am going to try to find the true ethical relation between the trainman and the public, and I am going to try to have the trainman understand this relation. I am going to try to have him cultivate this relation, and I am going to try to have him a bigger man and a truer man and a better man than the public he is thrown in contact with. I am going to hope that this honorable man, this true man, this safe man, this big-hearted man, will truly represent me and my road, and so forcibly that the public will take cognizance of him and credit him with the spirit of faithfulness, intelligence and carefulness.

"NUTS TO CRACK"

BY A. J. WHITE, TRAVELING AUDITOR OHIO ELECTRIC RAILWAY

As no subject was suggested to me when I was requested to prepare a paper for this conference, I concluded to present for your consideration a few of the nuts it is necessary for a traveling auditor to crack from time to time.

THE CORRESPONDENCE NUT

It is the rule and not the exception for those outside the pale of the accounting and treasurer's offices to think (sometimes with a great deal of reason) that accounting officers are "cranks," because many of the little things they have to dwell upon in correspondence often seem to others unnecessary. But for a complete espionage over the doings of those intrusted with different kinds of work at agencies, offices and storerooms, it is absolutely necessary to watch closely all payrolls, distributions, collection vouchers and every form of report to prevent leakage and to make accuracy the rule. Hence correspondence with those who are derelict is the only means the accounting officer has in most cases to get into line the halt, the maimed and the blind. I wish it was not so, but with the proper implements, suavity and kindness on the part of the auditor, the correspondence nut becomes so soft you can break it without trouble.

CLASSIFICATION NUTS

In agency work, especially on electric lines, the traveling auditor is expected to have a thorough knowledge of official classifications and tariffs, both freight and passenger, so as to be in a position to assist agents in their peculiar difficulties. Many times questions in classification are put up to me which require no little ingenuity to answer quickly.

MARKING OF PACKAGES

At one of my visits to one of our larger agencies I found some sacked flour on the floor of the freight house with no marks on any of the packages except one. The depot foreman told me he was having all kinds of trouble on this account, the flour being delivered to wrong consignees when there were shipments on the same day to different consignees. At once instructions were issued to accept no more flour unless each sack was plainly marked. I was questioned at once as to my authority, as the agent claimed that only one in every ten had to be marked—a simple error in reading Rule 3, Section 2, providing for articles not boxed, barreled or sacked and shipped loose.

DRESSED MEAT

At one of our agencies a shipment of dressed meat was made to Fort Wayne by a farmer, but inquiry of the agent developed that the certificate required by the act of Congress of June 30, 1906, in cases of this kind had not been filled out. This certificate calls for the name of common carrier, name of shipper, name of consignee, point of shipment, destination, and a statement that the meat was uninspected, was from an animal slaughtered by a farmer on the farm and was offered for transportation as exempted from inspection, that on date of shipment meat was sound, healthful, wholesome and fit for human food and that it contained no preservative, etc., prohibited by the Secretary of Agriculture, governing meat inspection. Later I found that many of the smaller agencies had no knowledge of the requirements of the law on this point.

LIQUOR SHIPMENT NUTS

The purpose of the bill known as the Webb law (effective March 3, 1912) is to withdraw all interstate shipments of liquors from federal jurisdiction and to place them under the jurisdiction of the states to which they are consigned immediately upon arrival within the boundary of such states.

The Webb law in substance puts the jurisdiction on liquor shipments squarely up to the states, and no shipment of liquor can be delivered in any state: (1) to any person other than a bona-fide consignee; (2) to minors, drunkards, incompetents or Indians; (3) on Sunday; (4) between 6 p. m. of any day preceding an election day and 6 a. m. of the day following an election day; (5) if the nature of the contents is not marked on package; (6) if shippers order "notify"; (7) if consigned to prohibition territory and intended to be received, possessed or sold in any manner in violation of law of the state in which the agency of destination is located.

Another thing I am impressing upon agents is that no orders by consignees to draymen who haul their freight will be permitted on liquor shipments. The consignee must sign for shipment, and it does not matter who drays it.

RECEIVING FREIGHT

The question frequently arises as to what is necessary where a consignment of freight is received at the warehouse and a part of the shipment is short from the shipper. I have always instructed our agents to compel the drayman delivering to "O K" the shortage, as it is sheer folly simply to draw a line through the article short and sign the original memorandum, because at any time the question may arise as to when the erasing line was drawn, and a claim will put the burden of proof on the railroad company.

TARIFF NUTS

There is not a day that questions do not arise as to the interpretation of tariffs, and some of them are knotty to the uninitiated, especially where the rates are published in connection with steam roads, where the proper routing to protect the published rates must be observed and the use of fast freight line guides, etc., is necessary. Some of these questions arise on routing, others on percentages, others on rates, and I need not enlarge by giving specific cases. You will understand that on the Ohio Electric Railway the traveling auditor checks all tariffs twice a year and sees that they are properly filed, so that he is in touch with all new issues of tariffs and the cancellation of others.

FIRE NUTS

While a railroad company is exempt from claim for value of property destroyed in a freight warehouse after forty-eight hours have elapsed from the date and hour of proper notification, I have seen cases where freight was destroyed by fire which had been in the freight house unclaimed for weeks and no unclaimed report had been made so that shipper would have no notice of same. I therefore impress on agents the importance of reporting on proper O. S. & D. form all freight unclaimed for any unreason-

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able time so as properly to protect the company in every way.

FLOOD NUTS

We have recently experienced a flood in Ohio and elsewhere that found thousands of dollars of freight in transit and in warehouses of railroad companies, and there can be no reasonable doubt as to the liability of the companies where agents and employees, through neglect, failed to notify the consignees properly of the arrival of freight. This negligence will cost some companies considerable money.

THE MANUFACTURER'S DUTY IN THE ELECTRIC RAILWAY FIELD

BY JAMES H. DREW, PRESIDENT DREW ELECTRIC & MANUFACTURING COMPANY

By the very nature of his training and his business relations, the manufacturer has certain duties in the electric railway field. These duties embrace a twofold obligation to the electric railway: First, that definite contractual relation that is created and maintained between them as vendor and vendee; second, a broader and less defined but more binding union of sympathy and co-operation which should exist between those engaged in the same craft.

The electric railway is still in its adolescence, if not infancy. Many fields are yet untouched, and many are, for various reasons, inadequately served. Many more opportunities will come into existence with increasing density of population. The attendant problems of construction and operation concern the manufacturer as well as the operator. In design of construction and equipment he has a duty little less than the operator who directly undertakes the work, and, while it is quite probable that the operator and engineer, on account of familiarity with requirements, will solve most of the needs in construction, mechanical and transportation development, nevertheless, the manufacturer has an active part to perform. Better rails, bigger and stronger cars to be run entrained under one control, more stable line material and construction, more efficient and economical production and transmission of current, the appliances for safe operation of cars and trains—all of these and many other problems confront us now. The manufacturer should prepare to do his part in answering these questions.

Service is the test of efficiency and the measure for success. With exacting railways it must include safety, comfort and dispatch to traveler and shipper.

In his labors to serve satisfactorily and safely a more and more exacting public, the railway operator must necessarily rely on the manufacturer to furnish that design of material or equipment which at a fair price will give the best operating service. In other words, the manufacturer should deliver to his patron a truly serviceable article.

In his dealings with the electric railway, the vision of the manufacturer should extend beyond the railway to that field, the public, upon whose patronage public utilities depend. The manufacturer, by the grace of his customer, is a public servant once removed. The quality of his product should be the best he can produce and he is in duty bound to use every means and to take every precaution possible to make his product 100 per cent good.

Making allowance for possible abuse or misuse of an article by the purchaser, the responsibility of its performance rests on the head of the manufacturer. In many cases one small piece of car or line equipment, if defective or of inferior quality, may cause damages a thousand times its original cost or it may be the remote or proximate cause of loss of life. Of course the railway man has the right and usually the desire to know what he is buying, yet there comes to be in the course of continued business a feeling of trust and confidence; for this reason, in his contractual relation the manufacturer should offer no article for use that is an untried or theoretical one, nor should he attempt to sell, without due notice that it is such, an article known to him to be imperfect in design, inferior in quality or faulty in operation.

If he does not deal with his customer on the dead level of truth, he not only fails to perform his duty, but is guilty of a breach of trust. On the other hand, if the service of his organization and the quality of his product is up to the highest attainable standard, he has discharged his obligation to his customer and his customer's customer, the public.

Since the manufacturer and the railways have a common purpose and serve, ultimately, a common patronage, there is a duty on the part of the manufacturers to extend their aid and co-operation along lines not strictly technical or commercial.

The manufacturers should be on the alert to aid in removing public or political prejudice and, wherever possible, to correct unfair or hostile impressions or attitudes in their respective communities.

While the public is coming to appreciate more clearly the true worth of public utilities, it is at the same time more critical of the service of these companies.

The manufacturer, as a lay member of the profession, with a well-directed argument here, or a suggestion there, can do much toward gaining favor for, and removing prejudice against, these companies.

Being, in a general sense, a fellow servant in a common calling, the manufacturer should do his utmost to provide that which is of the highest quality and therefore the most useful and serviceable to his customer to the end that his customer may supply a better and safer service, and, after doing his contracted duty, laying aside selfishness, he should take pains to continue the advancement and improvement of the industry, bearing in mind those broader principles that make for true progress. He should be ready to embrace every opportunity to promote the interests of the industry as a whole.

REPORT OF STANDING COMMITTEE ON PASSENGER ACCOUNTS, CENTRAL ELECTRIC RAILWAY ACCOUNTANTS' ASSOCIATION

BY WALTER SHROYER, CHAIRMAN; H. B. CAVANAUGH, E. O. REED, E. J. SKEHAN AND E. D. GAULT

Your committee held a meeting at Lima, Ohio, on June 4, 1913, and submits the following report:

HANDLING PASSENGER RECORDS AND ACCOUNTS AT AGENCIES AND AUDITOR'S OFFICE

The gross revenue from transportation of electric railways in the territory embraced by this association is derived principally from the passenger business, which averages approximately 85 per cent of the total. The major portion of this revenue finds its way to the treasury in the form of cash from ticket sales. It is important, therefore, that all tickets be audited carefully and systematically from the time the order is placed for their purchase until they are finally destroyed.

It is the consensus of opinion of your committee that a system of monthly accounts is preferable to a daily system regardless of the size of the road or the number of agencies. The handling of agent's daily ticket reports, checking opening numbers, rates, extensions, etc., creates a large volume of unnecessary work in the auditor's office and greatly increases the liability for mistakes. The ticket agent is able to keep a much better record and consequently a more accurate check on his station accounts under the monthly plan than it is possible for him to keep under the daily plan. We will, therefore, outline a method of handling passenger records and accounts at agencies and the auditor's office under the monthly plan.

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FORMS NEEDED

Ticket orders on printer; ticket requisitions; ticket stock ledger; agent's daily record of ticket sales; agent's daily summary of sales; agent's cash book; agent's monthly report of local sales; agent's monthly report of interline sales; agent's balance sheet; auditor's correction on report of local sales; auditor's credit advice; auditor's record of distribution of sales; auditor's report of daily earnings; auditor's statement of interline ticket sales to foreign roads; auditor's statement of interline revenue, baggage checks to foreign roads; auditor's statement of interchangeable mileage lifted of foreign road's issue; auditor's correction on interline ticket and baggage reports; auditor's statement of interline account; auditor's form for checking tickets lifted; ticket redemptions.

TICKET ORDERS

Orders for tickets on forms furnished by printers are made by the department in whose custody the tickets are placed. This form is merely a request for certain consecutively numbered tickets, described according to stations, from and to, form, commencing number, closing number and quantity. Usually four copies are made; the original copy is sent to the purchasing agent and is subsequently forwarded by him to the printer, one copy is sent to the auditor and one is retained by the department making the order. It is the auditor's duty to check these orders against the ticket stock ledger in order to avoid duplication of tickets and against the printer's bills as rendered to make sure that the quantities ordered have been received.

TICKET REQUISITIONS

Agents are supplied with printed blank forms to be used for the purpose of ordering tickets as their requirements demand. It is the usual practice to require agents to keep at least one month's supply of each form of ticket on hand at all times. Requisitions must be made in ample time to reach the ticket stock department not later than the first and fifteenth of each month. Four copies of the requisition are made; the first three are forwarded to the ticket stock department and the fourth copy is retained by the agent as his record. In making up requisitions the agent is required to state, as provided by the blank, quantity required, commencing number on hand, closing number on hand, form and destination. The commencing and closing numbers of tickets in hands of the agent serve as a guide to the ticket stock department in supplying only such quantities as the sales of previous months indicate are needed. The tickets sent the agent, which in some cases may vary from the quantity ordered, are shown at the right-hand side of the blank in a space provided, the commencing number, closing number and number of tickets being filled in by the clerk who makes up the requisition. As the orders are filled, the tickets, accompanied by the original requisition, are forwarded to the agent by registered train mail. The second copy of the requisition is sent to the auditor's office as a notification of tickets supplied and is held on file until the original, which is receipted by the agent, has been received. The ticket stock department retains the third copy, from which postings are made to the stock ledger, and the fourth copy, as stated, is retained by the agent.

TICKET STOCK LEDGER

This record is usually loose-leaf form, so arranged that accurate account may be kept with each form of ticket according to the selling station. The account is subdivided under three heads, viz., "stock," "supplied to agent" and "sales." Under "stock" entries are made from the printer's invoices, as the tickets are received, of the date, from whom purchased, opening number, closing number and number of tickets received. As the tickets are sent out to agents on requisition, entries are made in the column headed "supplies to agent," of the date sent, opening number, closing number and number of tickets. This represents the charge against the agent at the selling station indicated in the heading of the sheet. The difference between the number of tickets in the stock column and the number supplied to the agent represents the tickets on hand in the ticket stock department. When the agent's monthly ticket reports have been examined, the sales for the month are posted to the ticket ledger in the space provided under heading of "sales." Entries are made of the date, opening number, closing number and number sold. The difference between the number of tickets shown as being supplied to the agent and the number shown as sold, represents the tickets in the hands of the agent. Book, inter-division, mileage and commuter tickets, baggage, parcel, storage checks, etc., are handled in different manner in order to maintain a consecutive record of stock. These tickets are skeleton form, not being printed for use at any particular agency. The entries for stock and tickets supplied to agents are the same as previously described, but the sales column in this instance is used for entry of the name of the station supplied. This serves as a stock record only; therefore, it is necessary to open an account with the various agencies for each form of this class of tickets, posting from the stock account the tickets supplied to the agent, followed by posting of sales at end of month. This record should be kept by the auditor, if possible to do so, but if not he should audit the same at frequent intervals.

AGENT'S DAILY RECORD OF SALES

At the close of each day's business the sales of all forms of tickets, as indicated by the highest numbers remaining on hand, are entered by the agent in a sales record. In opening this record and at the first of each month all forms of tickets in stock are entered according to form and destination. Card and other tickets having a printed destination are entered first by writing in the various destinations in station order, the form, tariff rate and commencing number. Book and miscellaneous tickets (without a printed destination), baggage checks, etc., are designated by form and are usually entered in order of their importance from a standpoint of sales. As sales are made each day, the closing numbers, number sold and the amount of sales of each form are entered under the proper date and a total made of the amount of all sales, which is used in balancing against cash on hand. Provision is made for balancing this record at the end of each week and at the end of the month, the latter figures forming a basis for the monthly report.

AGENT'S DAILY SUMMARY OF SALES

In compiling daily earnings by operating divisions from ticket sales, which is required by the majority of electric lines, it is necessary for the agent to furnish the auditor a daily summary of sales from the daily sales record. The sales of mileage and commutation tickets do not enter into the daily earnings on a sales basis, yet it is good practice to require the agent to make a full report of all sales and see that he makes his remittances accordingly. The sales of all single and round trip tickets are credited to the division on which the selling station is located, but the coupon card, interline, book and miscellaneous tickets must be reported in detail as to number sold and destination in order that each division may receive proper credit for its proportion of such sales. Distribution according to divisions is made on the face of this report and a final summary is then made of all the reports from the various agencies.

AGENT'S CASH BOOK

One entry each day in the cash book of the total amount of money taken in from the sale of tickets is all that is required of a ticket agent. Other cash items, however, such as receipts from vending machines, etc., must be written in the cash book with full explanation as to the source of such collections. If the agency handles both passenger and freight business, the cash book would show receipts from freight collections as well as ticket sales.

MONTHLY REPORT OF LOCAL SALES

Roads differ in respect to form of reports, but all require report from each station of ticket sales to all other stations on its own and foreign lines, by forms, commencing

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and closing numbers, number sold, ticket rates and extensions into money. This report is made by the agent from his daily sales record, and from the audit stubs of books and miscellaneous tickets, baggage checks, etc. Tickets having audit stubs have no printed destination and it would not be practical to attempt to show the various destinations of such tickets in the daily sales record. When the details of sales of all forms of tickets have been written in the report, the agent makes a recapitulation of the total sales of the various forms, including collections from vending machines and other miscellaneous items, of which the grand total represents the charge against the agent's account. Items other than ticket sales are handled by some companies through "debit advices;" however, this is a mere matter of choice.

MONTHLY REPORT OF INTERLINE SALES

In addition to the monthly report of local sales, agents are required to furnish a separate report of interline sales. The information required in this report is the same as that required in the local report, except that the junction point via which the ticket is sold is shown in cases of more than one junction with foreign road. This information is necessary in verifying rates as the destination of two tickets may be the same but the route traveled by the passengers may be entirely different. Statements of interline sales to foreign roads are written up from this report.

AGENT'S BALANCE SHEET

After all reports have been made for the month, the agent prepares a monthly balance sheet, taking up all debits and credits appearing on the monthly ticket report; also all debit and credit advices through which all miscellaneous items are handled. If the agency handles both passenger and freight business, all debits and credits from the monthly freight reports are included in the same balance sheet. Roads making a daily distribution of their revenue from cash receipts usually require a separate balance sheet of passenger and freight accounts and a consolidated balance is made in the auditor's office, but your committee recommends a combined balance sheet made by the agent.

AUDITOR'S CORRECTIONS

In checking agents' reports, errors are quite frequently found, and in order to facilitate adjustment, the auditor advises the agent of the errors made through a correction statement. This statement shows the items in question "as reported" and as they "should be;" also the net debit or credit to the agent's account.

AUDITOR'S CREDIT ADVICE

There are numerous occasions for giving agents special credit in connection with their freight accounts, but it is seldom necessary in connection with passenger accounts There are a few items, however, such as ticket refunds or exchange of tickets by agents, which are authorized in isolated cases, also government orders when accepted in large numbers, thereby eliminating the possibility of listing them in detail on the balance sheet, that can be most conveniently handled through the credit advice. These advices are numbered consecutively by the auditor as issued; a record is kept of the same and at the end of the month a journal is made covering all of those taken up by agents, debiting the general ledger accounts affected and crediting the agent's account.

AUDITOR'S RECORD OF DISTRIBUTION OF SALES

In order to arrive at a total of sales of all stations, the distribution appearing on the face of the daily summary is posted to a sales record which has all stations on the road printed on the left-hand side of the page and the various operating divisions across the top. Postings are made under the proper divisions opposite the selling station and the total sales are credited accordingly in compiling the daily earnings.

AUDITOR'S REPORT OF DAILY EARNINGS

It is the practice of electric railways to prepare daily comparative statements of earnings, in order that the directors, managers and others may keep constantly informed of the volume of traffic. This report is more particularly a source of valuable information for those directly in charge of operation, as it often happens that a certain line will show a marked decrease in earnings for a given period, due to some disturbance of business conditions. This decrease, appearing daily, attracts attention of the manager, consequently the service is reduced and a saving in operating expenses effected. The earnings are made up of conductors' cash collections, agents' ticket sales, except mileage and commuter tickets, which are valued as lifted, the proportion of ticket sales on foreign lines, the proportion of tickets lifted sold by foreign lines and freight and express earnings computed from the auditor's copies of way bills. Comparisons are made of the earnings of the same day of the week last year, and the same number of days of the month and year. Increases and decreases are shown for each line or division, percentage of increase or decrease, cars in service, weather conditions, temperature and special events affecting traffic.

AUDITOR'S REPORTS TO FOREIGN ROADS

The association forms indicated under the heading of "Forms Needed" were adopted at the meeting of this association held in Toledo, Ohio, on Dec. 16, 1911. [Published in the ELECTRIC RAILWAY JOURNAL of Dec. 23, 1911.—ED.]

PREPAID TICKET ORDERS

Agents are supplied with prepaid ticket orders for the accommodation of anyone who wishes to buy a ticket for another at a distance. The money is paid to ticket agent of Road A, the ticket order with full specifications on the ticket agent of Road B is given to the payee, who sends it to the person at a distance proposing to make the journey. When the order is presented to the ticket agent of Road B, he issues an interline ticket to the person named in the order and takes a receipt therefor in the space provided. Settlement between the roads is made as follows: Road A reports in the interline ticket report to Road B the full amount of money received, and Road B, the actual seller of the ticket, apportions in its interline reports to the roads over which the ticket is sold their proportion of its value. Road A credits "passenger earnings" with the entire amount received by its agent and charges that account with the same amount reported to B in interline account. Road A afterwards receives and credits to "pasenger earnings" its share of the through rate by way of the interline report of Road B. Road B credits "passenger earnings" with the entire amount received through A's interline report, and charges thereto all the other lines' proportions reported to them in the interline account, leaving in passenger earnings exactly its own share of the through rate. Prepaid orders are equally serviceable between local agents of the same line, in which case the agent issuing the order reports the same at the amount received and remits to the treasurer, but the agent issuing the ticket reports it without value, as issued on account of such a station's prepaid order.

CHECKING REPORTS IN AUDITOR'S OFFICE

The monthly report, accompanied by audit stubs of book and miscellaneous tickets, is usually received in the auditor's office on the second or third of the month following that in which the sales are made. A record is made of their receipt in order that missing reports may be traced for. The first operation in verifying the report is that of checking the commencing numbers against the closing numbers reported in the previous month. One road in particular checks against the closing numbers entered in the ticket ledger, which entries have been made from the previous month's report. The latter plan not only verifies the sales entries but it has a strong tendency toward keeping the sales record up to date. The checking of commencing and closing numbers is followed by verification of the number sold, rates and extensions into money. A further check

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than that of making separate substractions of the commencing from the closing numbers of each form in verifying the number sold can be had by adding the commencing and closing numbers of all forms and arriving at the difference, which will represent the total number sold. In checking rates it has been found advantageous in many respects to compile a tariff for the use of clerks, naming passenger rates, both one-way and round trip, baggage rate and mileage from each station to every other station on the road, arranged alphabetically, separate sheets being provided for each selling station. Book and miscellaneous tickets reported by the agent are checked as to destination by comparison with tickets lifted of the same number. This has proved to be the most reliable method of auditing this class of tickets as any attempt at manipulation can be readily detected. Too much stress cannot be placed upon the importance of accurate checking of agents' ticket reports, as it is through these reports that a large volume of revenue is accounted for. Reports of sales of foreign roads are checked against coupons of interline tickets and baggage checks lifted.

REDEMPTION OF TICKETS

It frequently occurs that the purchaser of a ticket is unable to use it as expected and wishes it redeemed. Agents are supplied with a printed form for this purpose, which the purchaser is required to fill out, certifying as to the genuineness of his claim and that he has received no service either in transportation or checking of baggage. This certificate, with the ticket, is forwarded to the general passenger agent for approval and he in turn forwards it to the auditor, who approves for the amount of the refund. A special form of check, printed so that its indorsement constitutes a receipt for the ticket in question, is then drawn by the treasurer upon his petty cash fund. A blanket voucher, reimbursing the treasurer for the amounts so expended, is drawn at the end of each month, charging the passenger revenue with the amount of redemptions of card and other tickets whose value has been included in the earnings account on a sales basis. The redemption value of unused mileage and commutation tickets is charged to their respective liability accounts.

TICKETS LIFTED

If it is desired to ascertain with what regularity tickets are sold by agents and lifted by conductors, it is necessary to keep a record of tickets lifted. A form has been tried out by the chairman of your committee and it is recommended to anyone who may desire to take up this phase of ticket auditing. The form is printed with ticket description at the top and with as many parallel columns of the numbers 1 to 50 as the width of the sheet will accommodate. Space is provided at the top of each column for entering the first number. For example, if the agent at Chester is at present selling tickets to York numbered 5000 to 6000 the first number will be entered at the top of the column and that column will then represent all the tickets numbered from 5000 to 5049 inclusive, and so on. Tickets must be sorted first according to form and selling station, then according to destination. It is not necessary, however, to sort tickets numerically, as the ticket numbers can be checked very readily without that extra work. The tickets being sorted, the record can now be made by entering the date opposite the various numbers lifted, in the column headed "G," indicating going portion, if a single trip or going portion of a round-trip ticket, and in column headed "R" if return portion of round trip. The result of the check is apparent at once. If a large number of tickets are found missing you will reach the conclusion that the agent is selling out of order or that some conductor is holding out from his collections for the purpose of manipulation. An unexpected visit of the traveling auditor to the agency in question and a secret inspection of train collections would naturally follow.

AUDITOR'S ACCOUNTS

As soon as the agent's monthly ticket reports are checked a grand recapitulation is made of all reports, which is journalized, as shown in the accompanying table:

Recapitulation of Auditor's Accounts

Debiting	*Crediting*
Agents and conductors.	Revenue accounts.
Foreign roads (balance due this company).	Ticket liability accounts.
United States government (account transportation orders).	Foreign roads (balance due them).

Following the closing of accounts the compilation of statistics is taken up.

REPORT OF THE STANDING FREIGHT COMMITTEE, CENTRAL ELECTRIC RAILWAY ACCOUNTANTS' ASSOCIATION

BY L. T. HIXSON, CHAIRMAN; H. W. BRANDTMILLER, H. E. VORDERMARK, G. L. FORD AND C. B. BAKER

The committee recommends the following additions to the interline freight agreement:

BILLING AND REPORTING FREIGHT FOUND OVER WHICH IS MARKED TO STATION ON FOREIGN ROAD

Freight found astray in cars or warehouses of one road, showing destination marks to a point on the line of another company, will be billed out to the marked destination on an interline free-astray way bill and reported in the regular manner. The agent at destination, before delivering the shipment, will require the surrender of the bill of lading or original paid expense bill covering the bill on which the shortage is due, as evidence of ownership, and in case the shipment has been covered by a regular way bill, the destination agent will issue corrections, making the free-astray way bill void, and referring on the correction to revenue billing. In the absence of a revenue way bill, freight charges must be assessed on proper weight, based on published tariffs from point of origin to destination, a request being made on the originating agent for a way bill to cover, and after that is received, a correction will be issued to void the free-astray way bill, or if it is impossible to get a revenue way bill from the originating point, a correction should be made to change the free-astray way bill to a revenue bill.

We also desire to recommend the following plans and forms in connection with interchange of equipment and per diem accounts, inasmuch as several member companies now have use for a system to take care of this class of business.

REPORT MADE BY CONDUCTOR COVERING ALL CARS HANDLED

If the patented "Betz system" is used, it will be necessary for this form to be made in duplicate.

REPORT MADE BY JUNCTION AGENT COVERING CARS DELIVERED TO CONNECTING LINE

If the patented "Betz system" is used, five copies of the report must be made. One copy of each form will be furnished to the auditor of each line and the agent will retain the last copy for his file. If there are two agents (not joint agency), it will be necessary to make an additional copy in order that each agent may retain a copy for his file.

In the case of roads handling a great many cars, the patented system is very desirable for the reason that the short forms may be cut with a machine paper cutter along the heavy horizontal ruling and assorted in road order so that the ledger clerks may handle the posting with greater facility. Each clerk will have only such cars as he is required to look after.

The large sheets are filed in date order so as to furnish a chronological record of cars handled by conductors and delivered to and received from connecting lines. Small roads may use these sheets for posting directly to the ledger.

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LEDGER RECORD OF MOVEMENT OF LOCAL CARS

This form is so arranged that each page will show a complete record of fifty cars. In posting, the reference used is the last two figures or "two terminals," and the figures 0 to 9 are printed on the outside margin, five times to the page to provide for the fifty numbers. The sheets are cut on the margin and indexed, showing the series. For example, 300 would indicate that cars 300 to 349 would be found on that page. Two sheets are required to make one page, or what is sometimes called a "double page." Days of the month are printed at both top and bottom of one portion of the page. On the other part of the page the initials of roads whose cars are handled are shown in the same manner and in the same relative position as the date figures.

The entries to this form are made from the assorted slips or from the large sheets. For convenience, all records may be made in pencil, using black only. All stations and sidings should be numbered. Junctions should have a distinguishing series when recording an exchange between the local road and a connecting line; also an odd number should be used to show "received from" and an even number for "delivered to" in connection with interchange reports from and to a foreign line. For example, local stations (including junction points for local business) should be numbered 1 to 500, and junction stations, in connection with interchange with foreign lines, 501 to 600. If there are two or more foreign line connections at one junction, use separate numbers to designate each road. By using separate series of numbers it is not necessary to use various colored inks or key letters. Empty cars are designated by a dash after station number. New books should be opened the first of each month.

At the close of each month, on the right side of the double sheet under the column "total days on line" a record of the total number of days on the local line is shown. The column opposite the car number is double-ruled for a portion of this space and just above the faint ruling is given the record under each foreign road initial of the number of days on that line during the current month. Discrepancies are recorded at the extreme right of the sheet. Such discrepancies are taken care of by a tracer.

A form is used for keeping a record of the movement of various foreign cars on a local line. In case there are a great many foreign cars on the line, it will be necessary to allot a number of sheets to a line and show the car numbers, using the last two figures, or indexing by terminals in the same manner as for local cars. However, if the business is light, a sheet may be shown for each road and cars entered as received. At the left of the sheet under a column "transferred" the location on this company's line and the date of the last movement will be shown as transferred from the last month's record. At the end of the month the per diem days will be shown under that heading in the column at the left. In entering the movement of the cars under the proper date, empty cars are designated by a dash after the station number. Entry should be made at the right under the heading "mileage," showing the mileage of loaded and empty cars.

From these records three forms are made and may be either carried into an analysis journal, showing the name of the company on the left and the various heads, subdivisions, etc., at the top, so as to get the total footings, or the various classes may be posted directly to the ledger. In the same manner, a record on these forms rendered by foreign lines for per diem and mileage to be paid to the local company will be set forth. It is well to have a journal form, showing headings and various roads to provide a summary of the monthly business of the various classes.

A postal card notice is mailed to private line companies and to roads not in the per diem agreement, showing the amount to which a company is entitled for the use of its cars.

In connection with accounting for local freight business, we desire to recommend that the association go on record as favoring the monthly plan in all reports except cash statements and such skeleton daily reports as may be necessary for compiling daily earning statements. Therefore, we would suggest that the report of this committee previously adopted be revised so as to eliminate daily report plan forms.

Two new loose-leaf forms were submitted for summarizing reports. These forms would take the place of some of the forms mentioned in the report of June 13, 1912.

RECAPITULATION OF ABSTRACTS—AGENCY ACCOUNTS

The totals as shown by agency abstracts are summarized on this form. The form is balanced as follows:

The total received, added to the total interline forwarded by a company, plus unadjusted or transit accounts, must equal the total forwarded, as shown by agency abstracts plus the interline received.

After this balance is proved the interline settlement sheet may be made up.

INTERLINE SETTLEMENT SHEET

All freight accounts from the various sources are entered on this sheet and the balances for all agents, as well as each company, are shown. The "unadjusted accounts" totals for the previous month are deducted and totals for the current month are added. If the proper figures have been taken into account the advances received and forwarded will also balance. The amount of the foreign roads' proportion of revenue deducted from the total revenue freight column will give the net freight earnings of the company, and this amount carried to the credit in the "balance" column will make the debit and credit footings equal.

There are several forms, among them balance sheet and debit or credit advice, which are used for both passenger and freight business. Therefore, it was thought advisable that such forms be submitted as the joint recommendation of the passenger and freight committees. These are set forth in the report submitted by the passenger committee and are concurred in by this committee.

REPORT OF STANDARDIZATION COMMITTEE

PRESENTED BY R. N. HEMMING, CHAIRMAN

A meeting of the standardization committee was held in the office of the secretary on May 31, 1913, the following members being present: R. N. Hemming, H. H. Buckman and L. M. Clark. There were also present the following representatives of manufacturers: H. S. Williams, Peter Smith Heater Company; B. M. Hartsock, Westinghouse Traction Brake Company; H. E. Lavelle, Automatic Ventilator Company.

CONTROLLING DIMENSIONS OF TROLLEY WHEELS

The first subject taken up was that of the controlling dimensions of trolley wheels. It was voted to recommend to the association that the dimensions shown on a diagram submitted by the committee be adopted as recommended practice.

STANDARD TRAIN SIGNAL SYSTEM

The next subject taken up was that of the standard train signal system, which was discussed at length, both the pneumatic and electro-pneumatic and the present hand-bell systems being considered.

In view of the added complications of the pneumatic system, the discussion was confined chiefly to the electro-pneumatic system, which appears to possess the necessary qualification to meet satisfactorily the requirements of interurban train operation.

As a result of the discussion, your committee submits the arrangement of the electro-pneumatic signal system shown in the accompanying illustration (Fig. 1). This arrangement does not go into detail regarding the location of certain accessory apparatus, which will necessarily have to

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be determined by the local conditions, but does define the location of the signal whistles proper, which should be such that all signals can be readily heard by trainmen from any part of the car.

In accordance with the foregoing it was considered advisable to utilize a connector between cars for the signal line, which would not inter-couple with the trailer light connector; and, furthermore, as the present standard trailer light connector has been found of insufficient current-carrying capacity, especially when electric heaters are employed, it is recommended that the present standard trailer light connector, as shown in the Electric Railway Journal, page 32, July 1, 1911, be adopted as a standard signal line connector, and that the connector, of which the details are illustrated in Fig. 2, be adopted as a standard trailer light connector.

The committee further recommends the adoption of the revision of the location of the signal line connector, as shown in Fig. 3, the illustration reproduced below giving the standard locations of signal, lighting circuit, and main motor control connectors at the ends of interurban cars.

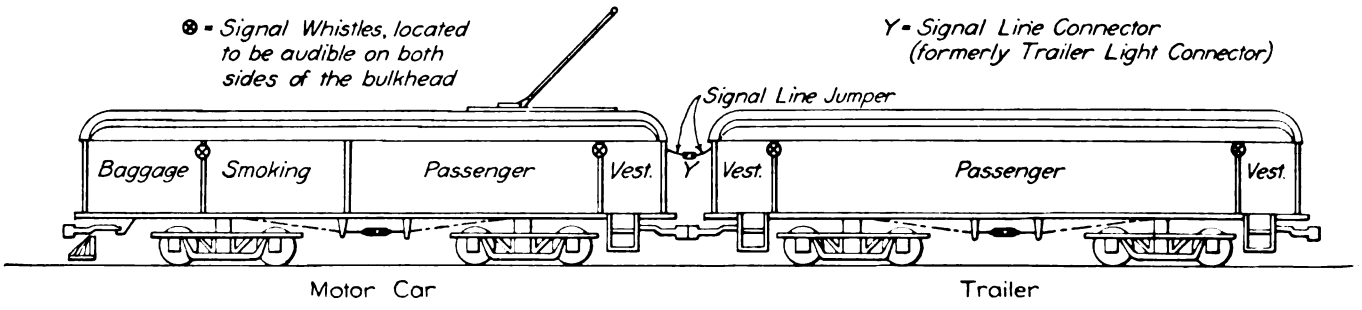

Fig. 1—C. E. R. A. Standards—Location of Signal Whistles

Heating and Ventilating of Cars

The next subject taken up was that of the heating and ventilating of cars. Following a lengthy discussion of this subject, your committee feels that the question of the heating and ventilating of cars involves car construction, radiating systems, heating units, fuels, etc., in connection with which some tangible data should be collected in order to formulate a report, and therefore recommends that the subject be continued.

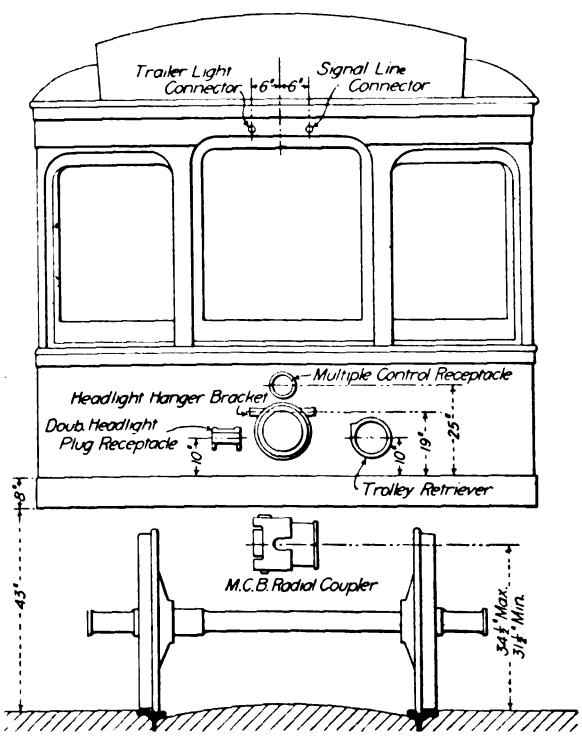

Fig. 3—C. E. R. A. Standards—Location of Signal, Light and Control Connectors

Mounting of Radial Couplers

The last subject taken up was that of the paper entitled "Mounting of Radial Couplers," by A. L. Price, of the Ohio Brass Company, which was read before the association at a meeting held in Indianapolis Feb. 28, 1913, and was referred for consideration to the standardization committee of the association.

The discussion of the subject which followed brought to light the fact that not only should the present standard specifications for radial couplers be modified, but also the necessity of establishing certain limitations for the controlling dimensions of cars, such as over-all lengths, truck centers, widths, steps, etc.

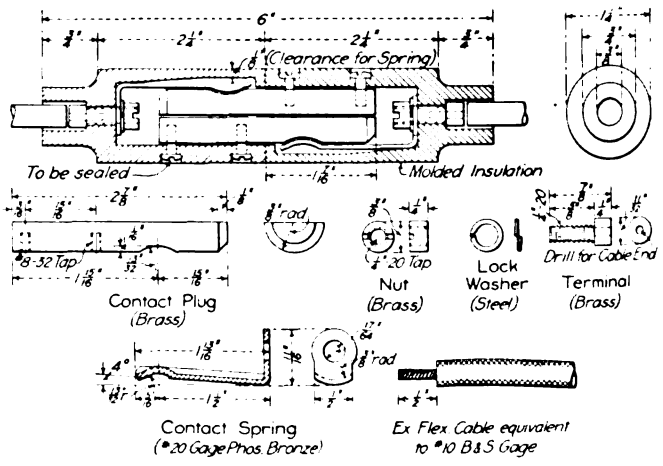

Fig. 2—C. E. R. A. Standards—Details of Construction of Standard Connector for Trailer Lights

Your committee therefore recommends that the subject be continued to the end of revising the present coupler specifications and formulating limiting controlling dimensions for cars so as to permit of the satisfactory operation of radial couplers.

NAPLES ELEVATED AND UNDERGROUND RAILWAY

The concession for the proposed Naples underground and elevated system was granted early this year to a company starting with a capital of $3,200,000. This project covers a city line with fifteen stations and a suburban line. The main suburban line will follow the coast to Camaldoli, and a second line will follow the Milano Agnano Road to the Agnano baths. All sections will be double-track. The line will be operated with trains of three cars each, the first and last motor cars and second-class, while the trailer will be a first-class car. The electric equipment of the motor cars will consist of four motors with multiple-unit control. Current is to be used at 1000 volts or more. The total outlay, not including administration expenses, directors, etc., is expected to reach a sum between five and six million dollars.

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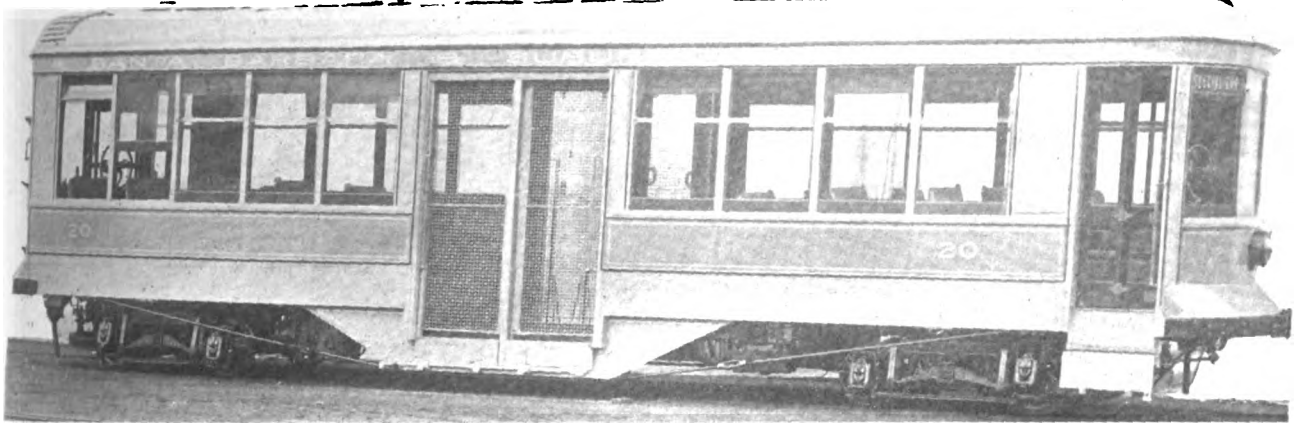
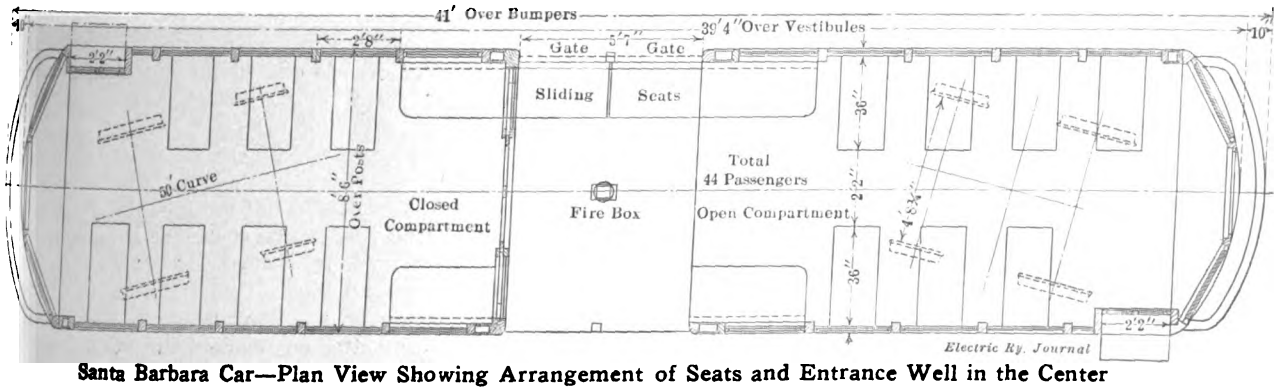
LOW-STEP, CENTER-ENTRANCE CARS FOR SANTA BARBARA, CAL.

The Santa Barbara & Suburban Railway has just been furnished by The J. G. Brill Company with five center-entrance cars of low-step design. This type has been adapted for the mild California climate by installing swing gates instead of doors at the center, while sliding doors are provided to close one compartment. The car seats a total of forty-four passengers, cross seats being used except at doorways and sliding seats opposite the center door. The



Santa Barbara Car—View Showing Low Center Entrance and Exit Door at End



Santa Barbara Car—Plan View Showing Arrangement of Seats and Entrance Well in the Center

accompanying plan shows that the car is 41 ft. long and 8 ft. 6 in. wide over the posts. The center platform is 5 ft. 7 in. wide. The cross seats are 36 in. wide, thus leaving a 26-in. aisle. There are no cabs or curved end seats.

The body is mounted on No. 62-E trucks with 30-in. driving wheels and 19-in. pony wheels. These wheel diameters and the ramps permit the following easy gradations: 9-in. rise from ground to folding step, 8-in. rise from step to edge of well, 2-in. ramp to center of well, 8-in. step to aisle of either compartment and 6-in. ramp from edge of well to bolster center line. The gates at the center platform are hinged to one stanchion and swing inwardly back to back when opened to form an exit and entrance. The gates are kept open by means of door locks. An additional exit for passengers is provided by a 26-in. door and folding step at diagonally opposite ends of the car. These doors, which are operated by the motorman, fold against the vestibule windows. All side doors operate in conjunction with the steps.

Each compartment has a 3⅞-in. x 7¾-in. side sill, extending from the center platform to the end of the car body. At a point about 3 ft. from the center vestibule there is attached to the inner side of these side sills a 6-in. channel which extends across the center platform. It is reinforced with a 10-in. x ⅜-in. steel plate which is gusseted to the 15-in. x ⅜-in. side sill plate at each end. The side sill plates extend the length of each compartment. Two center stringers of 3-in. I-beams extend the full length of the car from bumper to bumper, to which they are fastened. The 2½-in. x 10⅛-in. end sills, the 3-in. x 3-in. diagonal braces and the 1¾-in. x 3-in. and 4½-in. x 4½-in. crossings are of oak.

Each compartment has five windows on one side and four windows and a folding door on the other. The windows are of the double-sash type arranged to be raised into the roof. They have cherry sash with brass stiles. The seats are made of cherry slats. Special seats are also provided for the motorman and the conductor.

EXTENT OF APPROVED STADTBAHN ELECTRIFICATION

Following fourteen years' agitation, both houses of the Prussian Diet finally approved on April 22 and May 5 the electrification of the Berlin city and several suburban lines of the Prussian State Railways. The original project of the railway administration called also for the electrification of some of the longer suburban lines, which would have involved 268 miles of route or 592 miles of single track. The cost of way changes was placed at $12,500,000 and of rolling stock (electric locomotives and modified steam trailers) at $1,825,000. Power was to be purchased from a private plant. The electrification now approved covers 126 miles of route or 293 miles of single track. The initial appropriation of $6,250,000 is accompanied by a request from the Diet for data on the results of future tests with different kinds of current and rolling stock, an estimate as to whether the electrification of additional lines would be profitable, and the preparation of a schedule of increased fares to cover fixed charges and amortization of the Berlin city, belt and suburban lines. The question of public or private ownership of power plants has been left in abeyance.

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ANNUAL MEETING OF AMERICAN SOCIETY FOR TESTING MATERIALS

The sixteenth annual meeting of the American Society for Testing Materials was held on June 24-28 at Atlantic City. During the meeting several reports of committees on specifications of special interest to electric railways were presented, and these are given in abstract in the following paragraphs.

The specifications for splice bars were elaborated to cover three grades, namely low, medium and high carbon steel. The former grade makes the use of Bessemer or open-hearth steel optional with the purchaser, the carbon content with Bessemer steel being limited to 0.10 per cent and that with open-hearth steel to 0.05 per cent. Open-hearth steel only is permitted for both medium-carbon and high-carbon bars, the carbon content for the former being specified to be not under 0.30 per cent and the phosphorus content not over 0.04 per cent. For high-carbon bars the carbon must be at least 0.45 per cent and the phosphorus not over 0.04 per cent.

In manufacture, the medium-carbon bars are required to be annealed in case they are shaped when cold, but high-carbon bars must be worked at a temperature not less than 750 deg. C. In all cases analyses made from finished bars representing each melt are permitted to show phosphorus 25 per cent in excess of the limits specified for the test ingot. Variations of 1/32 in. from the specified size and location of holes and of ⅛ in. from the specified length are also permitted in all cases. The maximum camber must not exceed 1/16 in. in 24 in., and any variation from a straight line in the vertical plane must make the bars high in the center. Cold bending tests on the low-carbon splice bar require that the test specimen shall bend flat upon itself without fracture on the outside of the bent portion. The medium-carbon and high-carbon bars are required when cold to bend without cracking on the outside through 90 deg. around pins the diameters of which are respectively two and three times the thickness of the test specimen. Optional bend tests of less severity were included.

The specifications for carbon-steel car axles were changed in a number of instances, among which were the requirements as to chemical composition. These involved contents of carbon from 0.35 to 0.55 per cent, manganese not over 0.70 per cent, phosphorus not over 0.05 per cent and sulphur not over 0.06 per cent. The paragraph relating to tensile strength was omitted complete and the list of drop tests was expanded to include axles of 6 7/16-in. diameter.

The specifications for steel tires were changed to require that analyses made by the purchaser from the finished material should agree with the limits of 0.05 for phosphorus and 0.05 for sulphur as specified for the manufacturers' test, and not, as in the original specifications, be permitted to be 25 per cent in excess of those figures.

New specifications for cold-rolled steel axles were adopted which included the use of a process optional with the purchaser and cold-rolling to finished size from hot-rolled bars. The chemical composition limited carbon to 0.40 per cent and phosphorus and sulphur to not over 0.05 per cent. Manganese was called for to a percentage between 0.40 and 0.80. A tensile strength of 70,000 lb. per square inch and an elastic limit of 60,000 lb. per square inch were specified, together with an elongation of 18 per cent and a reduction of area of 35 per cent. Cold bending of a ½-in. square test specimen around a 1-in. pin was required. The allowable variation in finished size was limited to 0.002 in.

New specifications for wrought solid carbon-steel wheels for electric railway service were adopted substantially in accord with the recommendations of the American Electric Railway Engineering Association committee on equipment, presented at the 1912 convention and published in the Electric Railway Journal for Oct. 12, 1912, page 851, but with the exceptions noted below.

The chemical composition involved the following requirements:

	Acid, per Cent	Basic, per Cent
Carbon	0.60—0.80	0.65—0.85
Manganese	0.55—0.80	0.55—0.80
Phosphorus	Not over 0.05	Not over 0.05
Sulphur	Not over 0.05	Not over 0.05
Silicon	0.15—0.35	0.10—0.30

Analyses by the manufacturer were required to be made on a test ingot from each melt, and a check analysis made by the purchaser was permitted from one wheel representing each melt, the sample to be taken from any point or from two diametrically opposite points in the plate but bored parallel to the axis completely through the sample in such a manner as not to impair the usefulness of the wheel.

The thickness of plate was permitted to vary not more than ¼ in. over or not more than ⅛ in. under the thickness specified in the purchaser's drawing. The hub diameter was permitted to be ⅝ in. more than that specified, but not less, with a minimum wall thickness of 1 in. for bores 6 in. or less and 1¼ in. for bores over 6 in., the thickness of wall to vary not more than ⅜ in. on any one wheel. The variation found with the ring gage was limited to 1/16 in. with rolled and 1/32 in. with machined wheels. Mating was specified for size only and not for carbon. No consideration was given to weight. The matter of free replacement of delivered wheels which proved defective by reason of cracks, breaking or defective material or workmanship was replaced by a clause to the effect that the wheels should be free from injurious seams, cracks, laminations or other defects detrimental to their strength or service, and that wheels offered for inspection should not be painted or rusted or covered with any substance to such an extent as to hide defects.

During the discussion on splice bars Norman Litchfield presented the objections to the specifications which had been raised by the members of the American Electric Railway Engineering Association committee on way matters in regard to tolerances and camber. In the discussion it was brought out, however, that no objections had been received to the specifications in a canvass of the members of the A. S. T. M. committee on standard specifications for steel, and in the judgment of the convention the objections to the specifications were not vital enough to prevent it going forward. The resolution was therefore passed that the specifications should be submitted to letter ballot to the members of the American Society for Testing Materials.

Mr. Litchfield also presented the objections made by the committee on equipment of the A. E. R. A. to the proposed specifications for wrought-steel wheels for electric railway service, and to these very much the same objections were brought up by the members of A. S. T. M. committee as in the case of splice bars. It was stated that the matters which the A. E. R. A. committee on equipment wished to have put into the specifications were somewhat experimental and were being investigated at the present time by the committee of the A. S. T. M., and it was thought that it was desirable to adopt the specifications which would harmonize the existing discrepancies in the various specifications now in use. Mr. Litchfield pointed out that the American Electric Railway Engineering Association was not ready to adopt any specifications for wheels, as it had not approved those which were presented at its last convention. With a view to further investigation, more especially in connection with the A. S. T. M., he therefore requested that the proposed specifications be held up for another year. The matter was put to vote, and it was decided to submit the specifications to letter ballot of the members of the A. S. T. M.

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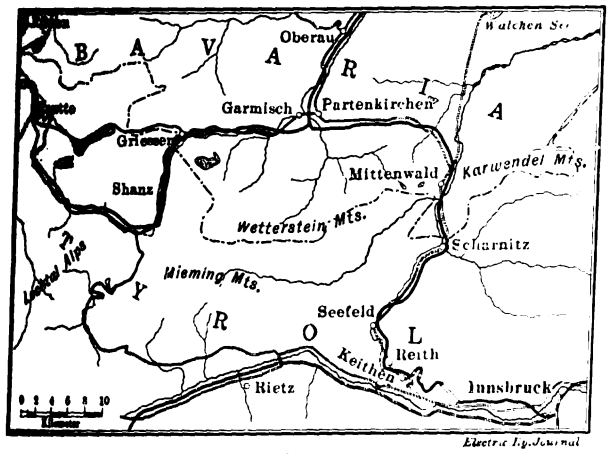
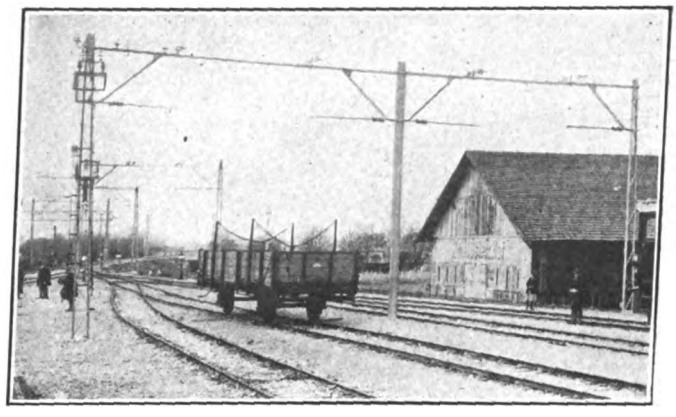
The Mittenwald Railway

A 15,000-Volt, Single-Phase Railway with a 50,000-Volt Transmission System from Hydroelectric Stations

Dr. E. E. Seefehlner has described in two recent issues of the *A. E. G. Journal* the Mittenwald Railway, a new line in the Austro-Bavarian Tyrol mountain region which was opened on Oct. 28, 1912. Under the collective name "Mittenwald Railway" all the railway connections between Innsbruck, Scharnitz, Garmisch, Partenkirchen, Griessen and Reutte are included, although this railway is subdivided into four lines. As shown in the accompanying map, the eastern line from Innsbruck to Scharnitz, which is 21 miles long, and the western line from Reutte to Griessen, which is 20½ miles long, pass through Austrian territory. The intermediate Scharnitz-Garmisch-Partenkirchen-Griessen section, which runs through Bavaria, is about 25 miles long.

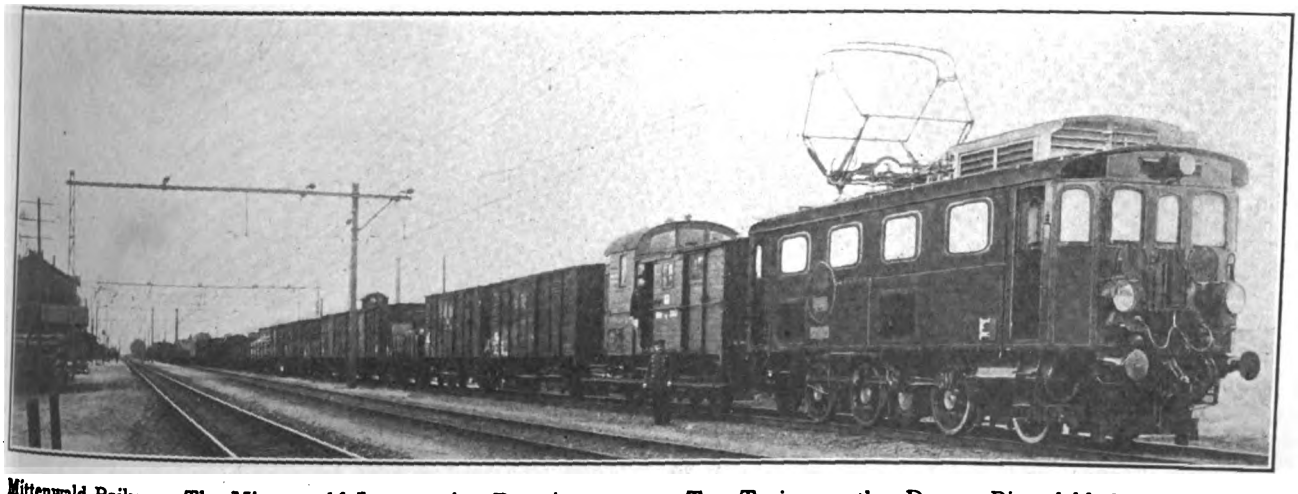


Mittenwald Railway—Map



Mittenwald Railway—Light Bridge Construction

The Alpine character of the territory is indicated by the fact that on the two Austrian sections there are eighteen tunnels with a length of 1412 ft., in addition to many bridges and viaducts. The difficulties offered by the nature of the ground formed one reason for selecting electric traction because it permitted the most economical ruling grade, namely, 3.64 per cent. The railway reaches a height of 3786 ft. above sea level at Seefeld, a difference in level of 1968 ft. being overcome within 13.1 miles. The ~~saving~~ effected against steam by ~~shortening~~ the constructional length at least ~~2~~½ miles at the most difficult part, without ~~losing~~ possible traffic, amounts alone to more than the total cost of the electrical equipment.



Mittenwald Railway—The Mittenwald Locomotive Drawing an 1100-Ton Train on the Dessau-Bitterfeld Section of the Prussian State Railways

POWER SUPPLY

Part of the energy for operation is obtained from the Sill hydroelectric development at Innsbruck. This plant enjoys a peculiar record inasmuch as it also supplies the 2500-volt, forty-two-cycle Stubaital Railway, opened in 1904 as the first of single-phase lines, and the Innsbruck-Hall 1100-volt interurban railway, the first Austrian railway system to use high-tension direct current. The same station further supplies energy to the 600-volt d.c. city lines of Innsbruck.

The Mittenwald Railway also has a power station of its own situated about 3.8 miles to the south of Innsbruck in the vicinity of the Sill works. This station contains two 3000-volt, single-phase, fifteen-cycle generators, having a continuous rating of 3000 kva and a maximum output of 4500 kva each. The energy from each generator is led to a 50,000-volt oil-and-water-cooled transformer which forms an inseparable unit with its generator. No 3000-volt busbars or switches are therefore needed, thus insuring extreme simplicity in all switching operations. The two transformer stations, which will also supply current to the Bavarian lines until the completion of the Walchensee plant, are located at Reith, 12 miles from the eastern, and at Schanz, 2 miles from the western boundary of Austria.

TRANSMISSION LINE

The 50,000-volt transmission line is carried principally on the poles of the overhead contact line and consists of two wires each of 35 sq. mm (approximately No. 2 B. & S.)

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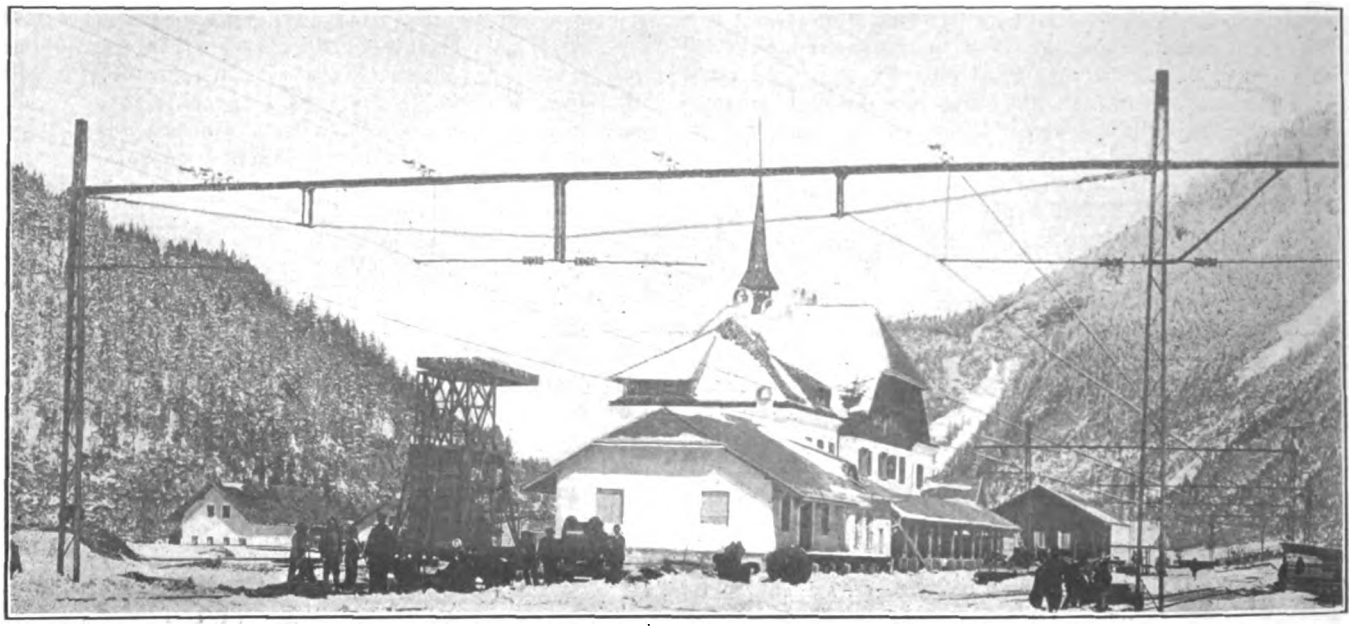
section. As part of it is in a district which is difficult of access in winter, great care was necessary in design and construction. On this account a portion of the line consists of three wires, two of which are usually in service, the third serving as a reserve. The latter can be switched in as required to replace a defective wire. As a protection against

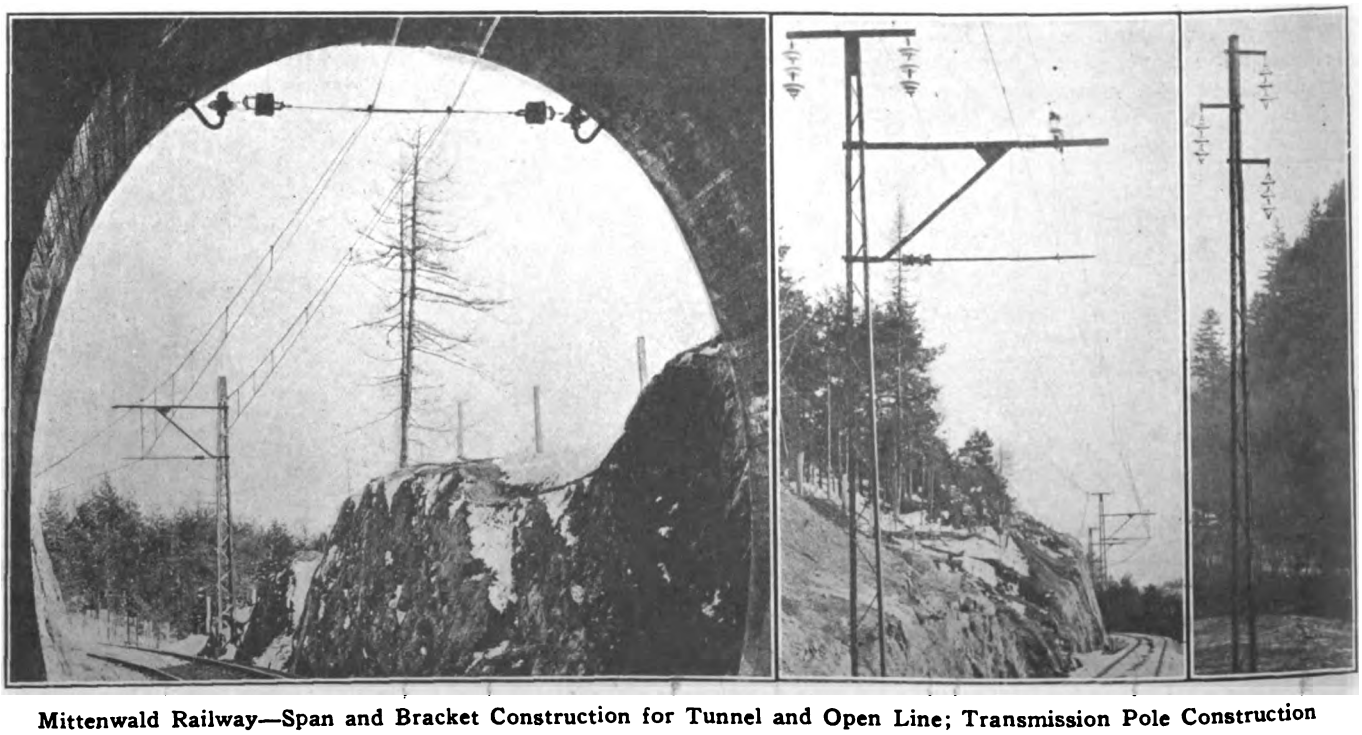


Mittenwald Railway—Plain Catenary Suspension and Bridge at the Scharnitz Station

atmospheric discharges a copper wire is mounted above the high-tension line on the tops of the poles and is grounded to the depth of ground water at each pole. The steel lattice poles employed exclusively for carrying the line are erected 262 ft. apart.

Insulators for transmission lines are as a rule subjected to comparatively little mechanical strain, since severe vibrations are no longer set up when the line is once completed, but when the transmission line is carried on railway poles the conditions are different. Then the direction of the line is determined by the situation of the railway, as in this case, it may have to follow an uninterrupted series of sharp curves. In adddition, the poles are subjected to the stresses caused by the rapid passage of the current collector. The Allgemeine company found that a special form of disk link suspension insulator was the only suitable type for these conditions. As is well known, porcelain can be regarded only as a perfect material for compression strains because it possesses little tensile strength and has no flexibility. These conditions can be met satisfactorily only by the link suspension insulator, which is not subjected to a tensile or bending strain in any part. The insulator selected is especially suitable for anchoring the contact line, and although it weighs only 6.2 lb., it possesses a breaking strength of 17,160 lb. to 17,600 lb.

A fundamental difference as compared with other suspension insulators, particularly the American types, is that the grooves have no round section; also, in place of the wire ropes which rust under exposure, steel bands, which lie with their entire surface flat on the porcelain and do not injure the glaze, are employed for attachment. When the work of erection is finished the grooves are filled up



Mittenwald Railway—Span and Bracket Construction for Tunnel and Open Line; Transmission Pole Construction

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in order to prevent the penetration of water and freezing. The insulators have jointed fittings which take up all movement and thus prevent the wear of the grooves and the injury of the glaze.

CONTACT LINE

The contact line is carried entirely on lattice poles which are placed 262 ft. apart on tangents. Catenary suspension is used but without automatic tension take-up devices, because the many sharp curves entail much friction and make it impossible for the customary tightening devices to work with reliability. Such arrangements are superfluous in this case as the poles are flexible and thus tighten the contact line themselves at the curves.

LOCOMOTIVES

The Mittenwald Railway has nine 800-hp locomotives for service on the Innsbruck-Landesgrenze and Bayern-Garmisch-Partenkirchen lines (35.3 miles). The maximum grade of 3.64 per cent occurs frequently. A locomotive can draw a gross car weight of 125 metric tons on this grade at a speed of about 18.6 m.p.h. This corresponds to a tractive effort of approximately 16,500 lb. The small train weight may give rise to the impression that large outputs do not come into question. Nevertheless, one of these locomotives was in service for trial purposes for several months on the Dessau-Bitterfeld line of the Prussian State Railroads, during which period it drew freight trains of 1100 metric tons in the regular scheduled service.

Each locomotive has a service weight of 53 tons. The current is taken from the contact line by means of two bow collectors with sliding contacts and is led through a bare high-tension conductor carried over the roof to a lightning arrester choke coil and then to the transformer compartment, where it is connected to a high-tension oil switch which is operated directly by means of a knife switch from the motorman's front cab. Between the lightning arrester choke coil and the oil switch a grounding switch is connected up to close automatically as soon as the protecting cover of the oil switch is removed. The current passes from the oil switch to the primary winding of the power transformer and flows thence through a high-tension current transformer connected in series directly to ground. The secondary winding of this current transformer feeds the maximum cut-out coil of the oil switch and two ammeters in the engineer's cab.

The traction motor is a twelve-pole single-phase commutator motor of the repulsion type, with a normal rating of 800 hp when running at a speed of 18.6 m.p.h. The motor is regulated by means of contactors which are connected to the taps of the power and exciter transformers and operated by the 300-volt control current.

Each of the two controllers has two separate drums, one to operate the contactors for the power transformer and thus regulate the output and the second to operate the exciter contactors for the control of the excitation. Each position of the output drum can be combined with all the positions of the exciter drum. Owing to this separate pressure and field regulation, the field can be adjusted for any speed with the lowest possible kva consumption of the motor. The locomotives can be run in pairs on the multiple-control system to draw train weights up to 250 tons.

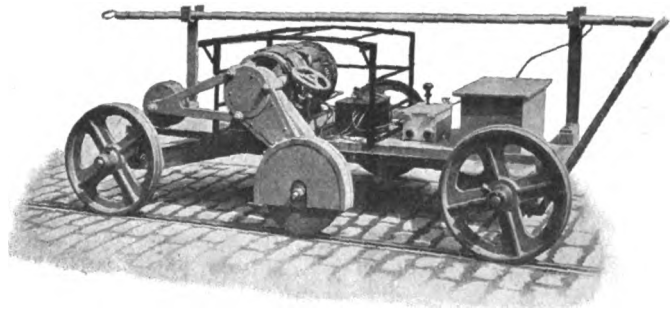
In honor of the visit made to Germany this summer by the American Society of Mechanical Engineers upon invitation of the Verein Deutscher Ingenieure, the latter organization has prepared a guide book of 171 pages. This book, which is printed in English and German on facing pages, describes the points of interest in each locality to be visited, laying particular stress, of course, on matters relating to engineering and technical education. The itinerary shows that the American delegates arrived at Hamburg on June 19 and that the official visits and receptions will terminate at Munich on July 8.

PORTABLE RAIL GRINDER WITH DRILL

The Consolidated Ascessories Company, London, England, is building the "Norwich" grinder, shown in the accompanying cut. The grinder is light enough to permit two men to remove and replace it on lines with a five-minute headway, yet its weight of 1100 lb. is so distributed that practical freedom from vibration is assured. The truck of this grinder has two flanged wheels, which run on the rail 6 ft. apart at centers, and a third wheel which has no flange. This enables the machine to be moved more easily from the track and to run around curves with but little friction.

The 4-hp, 1500 r.p.m. motor used for the drive is furnished with a sleeved shaft bearing which carries a toothed quadrant. One end of the double cantilever arm bolted to the quadrant carries the grinding wheel and the other end a counterweight. The arm is swung into and held firmly in any required position by the rotation of a hand-wheel attached to a worm which engages with the teeth in the quadrant. The lowest end of the arm carries a spindle having a sprocket wheel at its inner end and a grinding disk at its outer end. This disk is driven at motor speed by means of an adjustable endless silent-chain drive between the sprocket wheel and a similar wheel on the armature shaft.

The 14-in. diameter grinding disk has a lead-bushed center and is clamped between thick rubber washers by two



Side View of Portable Rail Grinder with Wheel in Position for Grinding

steel flanges. The inner flange is fixed to the spindle, but the outer flange is detachable so that disks are easily exchanged. Smaller disks are used for deepening grooves in the rails and other special purposes. Cutters are so installed that the disk can be trued up while running in place.

The drilling attachment enables holes to be drilled and reamed in rails, switches, etc., either when in position in the track or when lying in the yard. Holes may also be readily drilled in trucks, etc., without removing or dismantling them. Bevel gearing permits a drill speed of 775 r.p.m.

While the motor is running one operator moves the truck to and fro along the rails a distance of 6 ft. to 9 ft. at a speed not exceeding 6 ft. to 8 ft. per minute. The second operator walks by the side of the machine adjusting the feed until the surface of the rail reaches the required condition. It is not necessary to pour water on the grinding disk, but in dry weather it is considered advisable to water the rails in order to get a good ground return for the motor.

A passenger car may be allowed to approach within about 300 ft. of this grinder. The disk must then be raised, the motor stopped and the current collector pole laid in the crutches. One operator, by placing his arms under the T-handle and crossing his hands over the sloping part of it as low down as possible, can then lift the nearest flanged wheel out of the groove of the rail and slew the truck, after which it may be drawn to one side of the road in time to enable the car to pass without any interference with its schedules.

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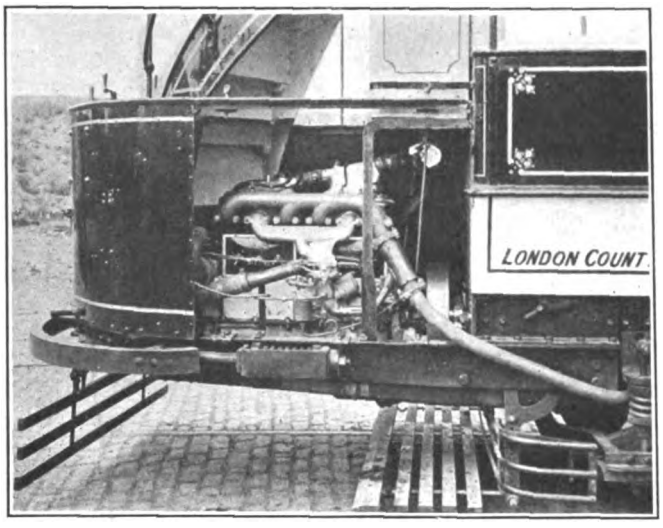
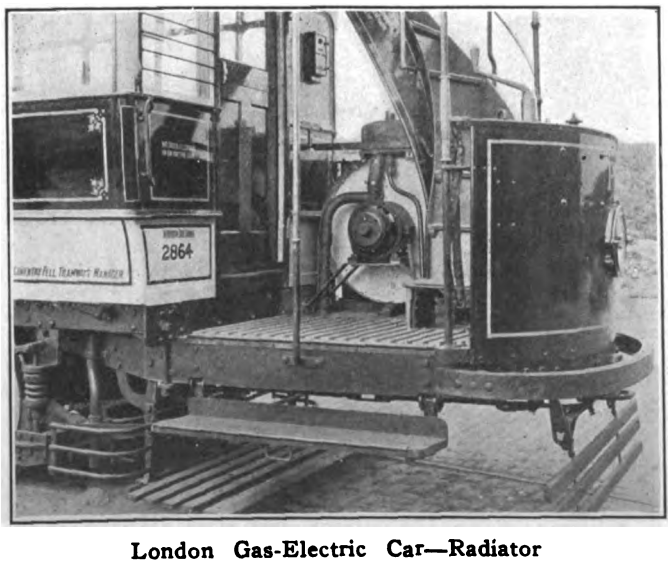
GAS-ELECTRIC CARS FOR LONDON COUNTY COUNCIL TRAMWAYS

The London County Council Tramways has recently placed in experimental operation three petrol or gas-electric double-deck cars for use on lines in the East End where overhead operation is not permitted and conduit construc-



London Gas-Electric Car—Part of Dash Removed to Show Generating Set

tion would be too costly. The car is 27 ft. long over all, the platforms alone requiring 6 ft. 3 in. each. The present equipments, according to A. L. C. Fell, chief officer of the tramways, are converted horse-car bodies which were used in order to save time. These cars were stripped to their wheels, platforms, staircases and canopies. They were mounted on new underframes and platforms, constructed of standard rail steel sections and arranged to take the engine, generator, radiator and other parts of the gas-electric equipment. The canopies were rebuilt as far as possible in line with the corporation's standard electric cars, and the upper deck seats were rearranged accordingly. The new stairways have removable bottom treads and risers to give access to the engine magneto. The car is carried



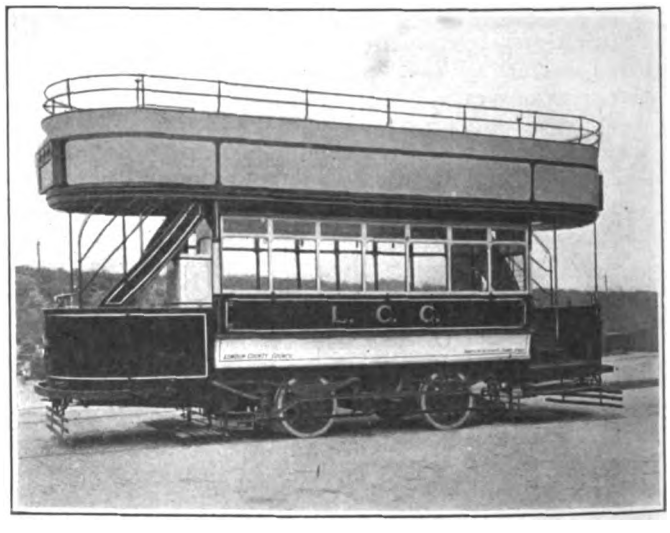
London Gas-Electric Car—Radiator

on two axles runnning in ball bearings through long laminated bearing springs which are fitted with auxiliary coil springs and rubber cushions. A light sub-truck supported directly from the journal boxes through the medium of rubber pads carries the brake rigging and other details which are required to maintain practically constant relationship with the track level. The sub-truck, however, does not support any of the weight of the car body or passengers. The platforms have spring control fenders to protect the engine and equipment from shocks arising in the event of contact with other vehicles. Each car seats twenty passengers on the lower deck and twenty-eight on the upper deck.

GAS-ELECTRIC EQUIPMENT

The electrical equipment and 40-hp engine were designed and manufactured by W. A. Stevens, Ltd., at Maidstone. The two electric motors, geared 6:1, are of the series interpole type. The maximum load on each motor is 20 brake-hp, but each is capable of developing 40 hp sparklessly for a considerable time. Either motor can run the car on level roads. The generator is of the shunt-wound interpole type, with a maximum potential of 350 volts. The engine, which has a bore of 4¾ in. and a stroke of 5½ in., develops well over 40 brake-hp at 1000 r.p.m. This speed is necessary only on the hills, and in ordinary service the average speed is about 700 r.p.m.

The engine and generator are mounted on a pressed steel frame which is suspended on the platform bearers in such a way that the power unit is easily removable for exchange in case of a breakdown. The water circulation is pump-driven. The radiator is on the end of the car opposite to the engine and generator but occupies the same relative position under the stairs. The radiator fan is



London Gas-Electric Car—Double-Deck Horse Car After Conversion

mounted directly on the shaft of a small series-wound motor, supplied from the terminals of the generator. The fan is in operation only when the generator is supplying energy to the motors, but as the engine is throttled down at all other times, the cooling is ample.

The control of the first three cars is effected by the engine throttle, a controller by which resistances are put in circuit with the shunt winding of the generator, or, alternatively, the fields of the motor can be shunted by successive resistances. In addition, a reversing switch for the motor armatures is provided. Double-end control is used.

It is possible to suppply the motors from either the overhead or conduit supply as an alternative to the self-contained generator, so that cars can be run either purely electric or gas-electric. As no electrical circuits are made or broken in running, the acceleration is very smooth and rapid. The car is lighted by means of metallic-filament lamps from accumulators automatically charged by an independent dynamo, which is driven by means of a flexible belt from a pulley secured to one end of the motor armature shaft.

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LONDON LETTER

(From Our Regular Correspondent)

The Brighton Town Council has decided to install a system of trolley omnibuses and adopt the "under-running" trolley. The first route will be from Preston village to New Road, a distance of about 2 miles. By utilizing the existing wires in London Road the cost will be £5,600, the overhead equipment costing £3,200, three cars £2,250, and miscellaneous items £150. The capital charges on this sum will be £486 a year, or 1.32d. per mile. The operating expenses are expected to be 6.50d. per car mile, making the total working cost 7.82d. per car mile. The average receipts will probably be at least 8d. per mile. Before the extension can be constructed along the main through route to the western boundary of the borough, an agreement will have to be made with the Hove authorities as to the type of equipment. If an agreement cannot be effected a Board of Trade arbitrator will specify the system to be adopted.

The question of preventing splashing by motor buses is being considered and a guard, the invention of H. V. N. Graveley, has recently been placed on a number of Messrs. Tilling's motor buses. The guard is placed at the side of the wheel near the ground. The guard itself is composed of rubber, and is supported from a central bearing in the form of a hanger block which surrounds the axle box or hub of the wheel. Side arms attached to the frame of the guard in turn support this hanger block. The hanger block is fitted with ball or roller bearings. Devices are also provided to keep the mudguard in a proper position, but allow for lateral motion.

The fifth annual congress of the Tramways & Light Railways Association was held on June 12 and 13 at Blackpool. After the usual reception by the Mayor and members of the Corporation and Boards of the Blackpool & Fleetwood and Blackpool St. Anne's Companies, a paper, "Possibilities for Increasing Profits on Interurban Lines," was read by E. H. Edwardes, general manager of the Lancashire United Tramways. This was followed by a paper, "Tramway Track, 1883 to 1913; a Résumé from a Manufacturer's Standpoint," by Fred Bland, of the firm of Edgar Allen & Company, Sheffield. After lunch, the delegates were taken to Lytham in special cars, and in the evening a banquet was tendered by the Mayor and Corporation of Blackpool. On the following day, a paper, "Railless Traction Legislation," was read by H. England, general manager of the Yorkshire (West Riding) Electric Tramways. This was followed by a paper, "Standard Rules for Motormen and Conductors," by A. V. Mason, general manager of the South Metropolitan Electric Tramways & Lighting Company. In the afternoon special cars were provided for a trip to Norbreck and Fleetwood, where a steamer was boarded for Barrow and Furness Abbey. In the evening the return was made to Blackpool, where the annual supper was served and the dance held.

The finance committee of the London County Council has reported that the surplus on the tramways undertaking as a whole for the year ended March, 1913, was £739,000, which is nearly £202,000 less than the original estimate, showing a serious falling off month by month. After the full statutory charges have been met there is a balance of only £500, to be transferred to the renewals fund instead of £150,000, the amount estimated to be necessary for this purpose. The average passenger receipts per car mile have fallen from nearly 1s. in 1901 to about 9.73d. this year, owing to the severe competition of the motor omnibuses and the underground lines.

The London County Council has been looking forward to the installation of trackless trolleys, four separate schemes being included in the recent bill in Parliament. This bill has passed its second reading, but a clause has been inserted stating that the overhead wires for the trackless trolleys can be erected only with the sanction of the borough councils in whose districts the lines are to be built. This means that the borough councils have received the power to veto, and the London County Council has decided to abandon the trackless trolley for the present.

The Council is still pursuing its experiments with petrol-electric tramcars, which will become more important than ever now that the use of the trolley omnibuses has been barred. Some solution must be found for the problem of equipping districts where it would not pay to install the underground conduit system. These petrol-electric tramcars have been specially designed and manufactured by the engineering department of the London County Council. They were equipped with petrol engines, electric generators, electric motors and controllers, by W. A. Stevens, Ltd., London and Maidstone. The engine driving the electric generator is of the same type as that used on the Tilling-Stevens petrol-electric omnibus, and the experiments as applied to tramway work have been quite successful so far.

The Liverpool tramways committee, which has been experimenting with the plan which is in operation in London of numbering certain tramway routes, has decided to apply the scheme to all the routes in Liverpool.

The experiment of collecting certain fares on the platforms of the cars on a few of the routes in Leeds is to be extended over the whole of the system for a period of six months, at the end of which time the general manager is to report on the subject.

The London Suburban Traction Company, which has been formed to amalgamate the Metropolitan Electric Tramways, Ltd., and the London United Tramways, Ltd., has acquired a controlling interest in the South Metropolitan Electric Tramways & Lighting Company. Thus, with the exception of the London County Council Tramways, all the tramway and motor bus services in the Metropolitan area are under one control.

The London & Southwestern Railway has let the contract for motors and train equipment for the first portion of its electrification scheme to the British Westinghouse Electric & Manufacturing Company, Ltd., Manchester. It is purchasing the conductor rails from Bolckow, Vaughan & Company, Middlesbrough, and these will be laid under the supervision of J. W. Jacomb Hood. The high-tension cables are being obtained from Siemens Brothers & Company, Ltd., Woolwich. The contract for the power house has not yet been let, but it is understood that 10,000-kw and 5000-kw units will be installed, generating at a pressure of 11,000 volts. The order for substation equipments has been placed with the British Thomson-Houston Company, Ltd., Rugby. The first section to be completed will comprise two lines to Hampton Court. The electrical work is being carried out by Herbert Jones, the company's electrical engineer. The work in its entirety is under the supervision of Messrs. Kennedy and Jenkin.

In connection with the electrification of the London & Northwestern Railway between London and Watford, the Maschinenfabrik Oerlikon of Zurich has obtained a contract to supply the electrical equipment, including motors and control apparatus, for forty-three trains. Tenders for the power house equipment have been invited from a selected list of British and foreign manufacturers.

Encouraged by the success which Liverpool has achieved by adopting first-class cars on certain routes, the tramways committee of the Birmingham City Council has under consideration suggestions from a deputation of Birmingham citizens who desire to see first-class cars adopted on certain routes in that city. Many members of the deputation were in favor of single-deck cars only. The committee has promised to consider the proposal to adopt first-class cars and single-deck cars. The committee is also interested at present in the question of providing the necessary links to the various tramway terminals in the center of the city, it having been agreed that these terminals should be connected so as to provide for through-running. The committee is awaiting the opinion of the city surveyor, who has had to be consulted with reference to the widenings and difficulties which might arise in regard to the streets along which these connecting links should be constructed.

The Manchester tramways committee has decided to extend its policy of reducing passenger fares. The decision of the committee was influenced by a report of J. M. McElroy, the general manager. An experimental reduction of fares on certain routes during a period of three months showed a large increase in the number of passengers carried and a small increase in the total receipts, but a slight decrease in the average fare per passenger carried and the average receipts per car mile.

A. C. S.

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News of Electric Railways

Kansas City Receivers' Report to the Court

The receivers of the Metropolitan Street Railway, Kansas City, Mo., have filed a report with Judge William C. Hook in the United States Court at Kansas City, Mo., in which they review the recent progress of the company in part as follows:

"On Jan. 2, 1912, an opinion was handed down by the court, suggesting to the receivers that they ascertain whether the cities were willing to enter into negotiations for a new franchise, and if so, whether they were authorized to act. Kansas City, Kan., has always expressed a willingness to negotiate, conceding that inasmuch as the larger portion of the property was in Kansas City, Mo., it was first necessary to make some arrangement with the latter, and that negotiations in Kansas should be suspended until some conclusion was reached in Missouri. Thereupon negotiations were begun with Kansas City, Mo., and continued without result during the administration of Mayor Brown. Upon change in the administration, negotiations were again opened with Mayor Jost.

"On Feb. 15, 1913, Bion J. Arnold filed his report, fixing a valuation of $36,800,000, of which $35,000,000 represented the value of the Metropolitan Street Railway and Kansas City Elevated Railway, and $1,800,000 that of the Kansas City & Westport Belt Railway. This valuation subdivided consisted of $23,335,034 for the cost of reproducing the physical property less depreciation, and $13,491,541 representing intangible elements, such as going concern and earning power, which are part of the actual value.

"L. R. Ash, an expert, made a valuation for Kansas City, Mo., for so much of the property as was within that State. He has since estimated the value of the entire property, tangible and intangible, at not less than $32,000,000, of which the depreciated cost of reconstruction is $22,000,000, and the intangible elements $10,000,000. However, the basis upon which this estimate proceeds is deemed to be clearly erroneous, because in calculating the present value of future earnings, there is charged interest at 6½ per cent on an assumed indebtedness of $28,700,000. The difference between the experts, as to the cost of reproducing the physical property, less depreciation, is $1,335,034. It would appear that the properties, at their lowest valuation, ought not to be estimated at a value of less than $35,000,000.

"There have been repeated meetings between the receivers and Mayor Jost and his advisers, and so far it has been impossible to reach an agreement. Finally, however, both sides conceded that the basis upon which a new contract should rest should be this: There should be an agreed capital value, to which should be added from time to time all expenditures for new capital. Upon this capital value there should be a fixed cumulative interest return. The city should have reserved the right to purchase and acquire the property when half the capital had been paid, subject to an indebtedness for the other half. Under any such plan the city should have a substantial voice in the management of the property.

"In the meantime there matured, upon May 1 and May 15, 1913, street railway bonds aggregating $12,242,000 and bondholders are demanding their money. It, therefore, has become necessary to make some kind of a contract, even if there should be a substantial loss in value. Bearing this in view and recognizing the claims of the city as to a lesser value, the receivers finally submitted two alternative propositions for a settlement, upon the basis of a 5-cent fare.

"The opinion of the receivers is that the $30,000,000 valuation and the rate of interest to be received thereon are too low. The receivers think the city has recognized this to some extent. To ameliorate this situation, the first alternative proceeds upon the idea that the right to such higher rate and valuation is to be cared for by the right of immediate participation, thus making this wholly contingent. The second alternative fixes the present valuation of this contingency, lowering the rate of interest and adding to capital the sum of $5,000,000.

"Mayor Jost, however, rejected both suggestions, and presented a substitute. The receivers are not agreed as to whether an adjustment should be made upon the basis so suggested by the Mayor, in view of the fact that the right of participation is deferred. Many of the stockholders think the Mayor's plan is destructive of their interests. Many of the bondholders have expressed a determination that under no plan will they exchange their securities, but that any plan must provide for the actual payment of their claims in cash. In view of the situation, the matter is submitted to the court for its information and for such other and further orders as may be deemed proper."

The following statement was made recently by Judge Hook after listening for more than two hours to the presentation of statements in regard to the details of the negotiations between the receivers of the Metropolitan Street Railway and Mayor Jost for an extension of the franchises of the company:

"I am inclined to favor the Mayor's position. I will consider the matter further so as to make sure in my own mind. Then I shall write to Mayor Jost, the Mayor of Kansas City, Kan., and the receivers."

On opening the proceedings Judge Hook said that he wanted it understood that he did not propose to interfere with the powers of the two cities to make their own contracts with the company, and that he would not do more than assist in solving some of the fundamental points involved.

Proposed Detroit Ordinance.

As stated briefly in the Electric Railway Journal of June 28, 1913, Mayor Oscar B. Marx of Detroit, Mich., presented a draft of his proposed street railway ordinance to the Common Council on the evening of June 24 and it was referred to the franchise committee. The ordinance provides for straight 3-cent fare, universal transfers, extensions, payment of alleged back taxes and rentals, ultimate acquisition of the lines by the city, etc. Under the conditions laid down, the ordinance need not be submitted to a vote of the people, but Mayor Marx stated that he would not oppose this step. After the company has agreed to sell the property to the city, the question of paying the price which has been fixed will be submitted to a vote of the people. If a purchase price cannot be agreed upon, Mayor Marx expects to resort to condemnation proceedings. An abstract of the ordinance, omitting two of the sections, follows:

"Section 1. Said company shall upon the terms hereinafter set forth from day to day only, and at the city's will solely, operate on the streets where its franchises have expired or upon streets where it may build additional lines.

"Section 2. The fare for a single ride over any route in Detroit shall be 3 cents or a ticket which the railway shall sell on its cars in strips of packages of five tickets for 15 cents throughout the twenty-four hours of the day. A passenger upon the presentation of a fare may demand a non-transferable transfer slip good for a continuous ride over any other route. The company may adopt rules so that no transfer shall entitle a passenger to a return trip. The 3-cent fare shall apply to Palmer Park.

"Section 3. The company shall build or construct the foundations and maintain the same underneath its track, subject to the approval of the commissioner of public works, and shall pave between the tracks and for a distance of 12 in. from the outer rails of said tracks, and keep the same in repair with such material as shall be specified by the commissioner of the department of public works.

"Section 4. The railway shall in 1913 on streets to be designated by the Common Council construct, maintain and operate a crosstown line in the western part of the city on or near Junction Avenue and a line between Bagg and High Streets. The company shall construct, maintain and operate such lines of railway on other streets and such extensions as the Common Council shall on a two-thirds vote thereof

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demand, provided the demand in miles shall not beyond the above named extensions exceed an average of 5 per cent per annum of the then and thereafter existing city street railway system excluding curves and switches. If the company fails to build such extensions within the time specified the city may build the same, and the company agree to operate thereon and pay the city a reasonable rental for the use of the extensions. For the recovery of such reasonable rentals in case the parties are not able to agree thereon suit may be instituted by the city in the Wayne Circuit Court. In the construction of lines and extensions the city shall appoint agents to supervise the work of construction and purchases of materials, and to audit all accounts and expenditures for materials and labor, and have the right to inspect and audit the books and accounts of the railway in connection with the cost of such works.

"Section 5. No permanent or continuous rights are given to the railway, but in case the city shall hereafter not elect to purchase and shall order the removal of the railway from the streets where franchises have expired or where no term franchises have been given, the city agrees that reasonable compensation shall be made for such new construction or extensions as are herein provided for and shall hereafter be made upon the order of the city, such compensation to be fixed by the Wayne Circuit Court in chancery before or after the removal of the railway at the option and will of the city; but in fixing such compensation due regard shall be had and due allowance made for depreciation and profits already received by the railway out or such extensions or new construction. Under no circumstances shall the construction of such cross-town lines or extension be construed or deemed to come under any existing or term franchise whatsoever, but only under this day to day arrangement.

"Section 6. It is agreed that all the franchises and all the franchise rights heretofore granted by the city or any other municipality to the company, where the streets are within the limits of the city, shall be revocable at the will and upon the option of said city, provided such franchises shall not be revoked (unless they expire by limitation) until the city is prepared by law to purchase and take over the said railway system as herein specified.

"Section 7. The chief purpose of the city in passing this ordinance (in addition to lower fares) is to enable the city to own and operate its own street railway system. To that end the company agrees to sell to the city at the option of the city, to be exercised at any time within ——— after this ordinance takes effect, all the railway property, etc., constituting its system at a fair and reasonable price. In case the company shall fail or neglect or refuse to sell said property at the option and on demand of the city, the sale may be specifically enforced in the Circuit Court for the County of Wayne, in chancery, in which the court may fix and establish the fair and reasonable price to be paid for said property and shall enforce the transfer and conveyance of said property free and clear as the court may determine. Before such option shall be exercised by the city, a referendum to the people as to the plan of purchase shall be taken on submission by the Common Council. This provision shall not be construed to bar the city from taking condemnation proceedings to acquire the street railway system or to take other steps to municipal ownership if it so elect.

"Section 8. The right is hereby reserved to the Common Council to make by ordinances such rules as may be deemed necessary in running cars.

"Section 9. All differences between the company and its employees shall be settled by arbitration, wherein the said railway selects one arbitrator, the employees another arbitrator, which two arbitrators shall choose a third arbitrator, and upon the failure of said two arbitrators to select a third, the Mayor of the city shall appoint such third member of said board of arbitrators.

"Section 10. As a condition precedent to this ordinance going into operation, it is hereby provided that the company shall pay to the treasurer of the city $200 per day from July 24, 1910, up to and including the date when this shall become effective for rights and privileges exercised by it in the streets of Detroit heretofore without the consent of the city of Detroit, and also the city taxes on the property of the Detroit railway for the years 1910, 1911 and 1912, as shown by the books in the city treasurer's office.

"Section 12. This ordinance shall not affect the liability of company and its property for future taxes, including all city, State and county taxes assessed during 1913.

"Section 13. All ordinances or parts of ordinances or resolutions contravening the provisions of this ordinance are hereby repealed and revoked.

"Section 15. This ordinance shall take effect five days after written acceptance thereof shall be filed by the company with the city clerk. And while this ordinance shall be in force, the enforcement of the decree in the case of the City of Detroit against the Detroit United Railway, No. 37,446, in the Circuit Court of the County of Wayne, in chancery, known as the Fort Street rental case, shall be suspended."

In a message which accompanied the ordinance, the Mayor said in part:

"In the preparation of this ordinance, extreme care has been exercised to guard against the insertion of language that might grant a new lease of life to the company or in any way impede the city's progress toward municipal ownership. I am firmly convinced that a just rate of fare, extensions necessary for the welfare of the city or comfortable and adequate service will never be obtained until the city owns and operates the system. Instead of retarding the progress of municipal ownership I believe the ordinance will hasten the day when the city will be possessor of the street railway property.

"The city, not the company, is the one to dictate on what terms the company shall occupy our streets, and I recommend, in case the company refuses to accept the terms of this ordinance with what changes your honorable body may deem advisable, that it shall be ordered from our streets."

At the regular monthly meeting of the board of directors of the Detroit United Railway, held on June 25, the ordinance presented to the Common Council by Mayor Marx was discussed, but no statement was made public as to what transpired at the meeting.

It is probable that the demand of the motormen and conductors for an increase in wages will be submitted to arbitration. The present scale is 25 cents for the first six months, 28 cents for the next five years and 30 cents thereafter. The men ask for 28 cents, 30 cents and 35 cents respectively, and also request that the time they shall be on call be reduced from thirteen hours to twelve hours. They further stipulate that they shall not work less than eight hours nor more than ten hours.

The Michigan Supreme Court has adjourned until October. The adjournment has the practical effect of delaying further steps toward municipal ownership until fall. When the Circuit Court declared illegal the $250,000 appropriation for a motor bus line, the street railway commission was left dependent on its power to issue bonds for funds to proceed under the charter.

Rapid Transit Matters Acted Upon by the Massachusetts Legislature

The work of the Legislature of Massachusetts has been followed from week to week in the ELECTRIC RAILWAY JOURNAL since the opening of the session of 1913 in January, and the progress of the various measures through the houses has been noted. A feature of the work of the session was the passage of measures in regard to rapid transit in the Boston metropolitan district. Nothing has accomplished in regard to the electrification of the steam lines out of Boston, but a number of other measures were passed of considerable interest. One of the acts passed provides for the construction of a double-tracked subway in place of the authorized elevated railway contemplated for Malden and Everett, with a bridge and rapid transit connection between the Mystic River and Sullivan Square terminal station.

Another act provides for the removal of the existing elevated structure in Charlestown and the construction by the Boston Transit Commission of a subway for tunnel trains between the northerly end of the Washington Street tun-

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nel, or City Square, Charlestown, and Sullivan Square. Upon acceptance of the act by the Boston Elevated Railway the subway is to be built upon the proceeds of bonds of not more than 4 per cent interest or fifty years' term, and a rental of 4½ per cent upon the net cost is to be paid by the leasing company. The existing elevated structure is to be removed as a part of the cost of the subway. In the case of the Everett-Malden subway, a provision is inserted for purchase by each city of that portion of the line within its boundaries, at any time after twenty years from opening, or before, on agreement with the railway, as in the case of the present Cambridge subway.

The Boston Transit Commission is ordered in another act to investigate the cost of locating the easterly terminus of the Boylston Street subway at Post Office Square instead of at Park Street, with detailed route recommendations to the next Legislature. The act provides for the temporary connection of the subway with the existing Tremont Street subway in a new incline near the Public Garden.

An act was passed designed to eliminate the penny toll collected by the city of Boston through the Boston Elevated Railway from each passenger in the East Boston tunnel, with a referendum to the voters at the next city election. The act provides that the city may appropriate from the tax levy annually until June 10, 1922, the sum of $125,000 to be added to the rental received from the railway company, provided that the holders of the bonds issued to pay for the construction of the tunnel consent to a waiver of the pledge expressed on their face to the effect that the whole amount of tolls collected from passengers through the tunnel shall be used to meet the principal and interest of the bonds.

A resolve was also passed directing the Boston Transit Commission to estimate the cost of constructing a double-tracked tunnel under Boston Harbor for the use of electric railway cars operating on the Boston-Chelsea route, with a recommendation as to terminating on the Boston end at Haymarket Square or Scollay Square. The commission is to report to the next Legislature. A resolve also orders the commission to report upon the cost of removing the existing elevated structure from Washington Street, Boston, between the southerly end of the Washington Street tunnel and Dudley Street and to hand its findings to the next Legislature. Another report is required by the commission to the next General Court upon the advisability of connecting the Dorchester tunnel authorized by the acts of 1911 with the South Station. The commission and the Railroad Commission, sitting as a joint board, are required to investigate the service rendered by the Boston Elevated Railway and the Bay State Street Railway in the Boston metropolitan district and to report their recommendations, if any, to the next Legislature.

Acts were also passed authorizing the construction of the Boston & Western Electric Railroad, and extending the time for the compliance of the Boston & Eastern Electric Railroad and the Boston & Providence Electric Railroad with the statutes under which they were organized.

The Roanoke Strike

In commenting editorially in its issue of June 27 on the strike of the employees of the Roanoke Railway & Electric Company, Roanoke, Va., and its lessons the Roanoke *Times* said in part:

"Probably the departure of Organizer Colgan marks the end of the street railway strike in Roanoke. There is reason to believe that some of the most loyal of the strikers, after standing out fifty-seven days, have offered to return to work. We may regard the strike as ended and engage in some moralizing and thought over it. In the first place, the strike and its management and pretext were wrong. The one possible pretext was the discrimination in punishment between union and non-union employees offending against rules of discipline understood by everybody to be necessary for the conduct of every public service corporation or any concern dealing with the public. Everybody knows that certain standards of discipline must be maintained and that somebody must be the final and deciding judge. In matters of law and property rights we go before a judge or jury or both. When we accept employment with a corporation or person, we accept the rules and make ourselves subject to somebody's decision. It is entirely right that we organize to protect ourselves against oppression, overwork, under-wages or manifest injustice. Making trivial points on doubtful issues is a different thing.

"The average union man does not attend a meeting of his union once in three months. He leaves a few professional union men to run the meetings. Half the time when he attends he is so afraid of being accused of being weak-kneed or of lacking backbone—two sins the average American man most earnestly hates and the two taunts he most bitterly fears—that he sits silent or votes with the man his sense tells him is talking flub-dub and hot air, just because he is afraid of being called a coward."

Subway Plans in Chicago

Mayor Harrison of Chicago sent to the City Council on June 30 the drafts of two subway ordinances which he wants to submit to the people for vote in April, 1914. He also sent a special message on the subject. One of the proposed ordinances relates to the subway in the central business district for the elevated lines and the other provides for an independent system of subways throughout the city, to be built by private capital and operated without reference to existing transportation lines.

The two ordinances and the message of Mayor Harrison were referred to the local transportation committee. Mayor Harrison said in part in his statement to the Council:

"There is serious and continuing criticism on the part of the public of the failure of the City Council and the administration to proceed constructively toward developing a policy of rapid transportation which may be made effective at an early date and thus bring relief to the public, now subjected to intolerable delays, inconveniences and discomforts because of the outgrown transportation facilities of the community."

The ordinance relating to the general system of subways outlines the routes recommended by the Harbor and Subway Commission. It provides for a board of control with jurisdiction over physical and financial matters. An amortization fund is to be created to amortize the entire capitalization during the life of the grant, or the city may acquire the system at any time on payment of the fair value.

Mayor Harrison proposed that bids be requested from private corporations and that the decision on the question of development by means of an independent subway or by a terminal subway for the elevated lines be left to the voters.

The committee on local transportation failed to reach a conclusion on the proposed terminal subway ordinances for the elevated lines which it has had under consideration in time to make a report to the City Council on June 30. In their negotiations with the sub-committee the elevated companies agreed to pay the city an average of 5 per cent on the actual cost of construction on a downtown subway for a period of twenty years, provided the cost should not exceed $17,000,000. The scale of compensation offered was as follows: 1 per cent for the first five years; 2 per cent for the next two years; 3 per cent for the next two years; 5 per cent for the next two years; 7½ per cent for the next three years; 8½ per cent for the next three years, and 9 per cent for the last three years. If any arrangement is made to continue the lease until 1944, when the last of the present ordinances expires, the companies will pay 5 per cent for the remaining years.

The offer of the companies is based on the removal of the union loop, provided that change is ordered by the city, as soon as the terminal subway is ready for operation.

Conference on Standards in Indiana

The Public Service Commission of Indiana has instituted a series of important conferences with experts in the lines of the various public utilities which exist in Indiana, to obtain information on which to establish a set of standards of quality of service of these companies. The first of this series of conferences was held on June 25, 1913, and related to gas. Three scientists, R. S. McBride, assistant chemist of the Bureau of Standards, Washington, D. C.; Prof. F. C. Mathers, of Indiana University, and Prof. John

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White of Rose Polytechnic Institute, Terre Haute, Ind., were present, and explained to the Public Service Commission the technical and scientific side of the gas question. Similar conferences will be held in regard to street railway, interurban railways, express companies, electricity, water, telephone, telegraph and heating. The dates for these conferences have not yet been fixed by the commission.

It is explained by the commission that whenever a complaint is made to it—that the service furnished by any utility is inadequate, that the quality of the product which it serves is poor—the commission will send an inspector to make an investigation as to the justness of the charges made against the company. In order that the inspectors may have a basis on which to work the commission proposes to establish a set of standards of service which the public service corporations will be required to meet.

List of Questions Sent to Indiana Companies by Commission

The Public Service Commission of Indiana has asked the companies which come under its jurisdiction to answer the following list of questions before July 18, 1913:

What is the exact name of the utility? If a corporation, give the name and address of each officer of the corporation, including its board of directors.

To whom and what address should mail be sent when intended for such utility?

What is the actual value of all property of such utility?

State the amount of stocks issued by said utility and now outstanding.

If the utility is bonded, state for what amount; when such bonds were issued; when they mature and what rate of interest such bonds bear.

What is the actual value of all property of such utility which property is in the State of Indiana and is used and useful for the convenience of the public?

In the answer you make to the last question, how much have you estimated for "going value"?

For what amount was the property of such utility assessed for taxation in the year 1912?

In the production of what service or product is such utility engaged?

Is such utility engaged in the production of any by-product? If so, what?

What was the gross revenue of such utility in the year 1912, or the last fiscal year of such utility?

What were the operating expenses of such utility during the period mentioned in the last question?

Have you established a depreciation fund for such utility?

If so, what per cent do you set aside for such fund?

If you have established no depreciation fund, what per cent of the fair value of the property of such utility used and useful for the convenience of the public do you think ought to be set aside for a depreciation fund?

What was the net income or "deficit" of such utility for its last fiscal year?

What is the date of the franchise under which you are operating and for what number of years was it granted?

If your franchise fixes any rate or rates which you may charge for the service or product produced by such utility, give the particulars thereof in full.

What was the total production of such utility for its last fiscal year?

What was the cost per unit of service for the production for the last fiscal year of such utility?

What amount does such utility pay its officers in salaries? State the amount received by each officer as salary.

The Cleveland Operating Fund for May.

It was shown at the regular monthly meeting of the board of directors of the Cleveland (Ohio) Railway on June 28 that $245.35 remained in the operating fund for May under the new allowance of 12.1 cents per car mile. This is the first time in the last eighteen months that the company has been able to operate the road within the allowance. Since March 1, when the new allowance became effective under the direction of the board of arbitration, there has been an operating overdraft of $29,000. In a letter which the directors decided to send to the City Council, the company will say that it hopes to make up this deficit, but that the Council will be informed of the fact if this is impossible. The May report, however, showed a maintenance overdraft of $61,586. While the book surplus was shown to be $46,029, the large amount of money spent for repairs during the month caused an actual deficit of $15,311. The directors have decided to sell the $189,000 of stock held by Horace E. Andrews as trustee and use the funds for improvements. This will dispose of one of the questions that were before the board of arbitration.

In an interview Mayor Baker said that the city would assume the ownership of the property just as soon as the company refused to abide by the award or desired to sell the property.

Although the award of the arbitrators did not make it impossible for the company to create necessary deficits in the allowances, the management has a difficult problem on its hands. The public expects good service, but the city has placed a rigid limitation upon the amount that may be expended to furnish the service. The company can go no further in the direction of good service than its funds will allow and the service will depend upon the attitude of the administration and not upon the company or its officials.

Henry J. Davies, secretary of the Cleveland Railway, and Frank J. Kilfoyl, auditor, appeared before the State Tax Commission on June 27 and argued against a tax value of $22,000,000 which has been fixed on the property. They asserted that the commission should adhere to the valuation placed upon the property by the appraisers when the Tayler franchise was drawn. While additional money has been put into the property, it was largely for the purpose of keeping it up to the standard fixed at that time. The company paid taxes on a value of $19,854,850 last year.

Rapid Transit Construction Progress in New York

Counting in the Steinway tunnel, title for which will soon be transferred to the city for a consideration of $3,000,000, and the contract for Section No. 4 of the Broadway subway, which will probably be awarded soon at a figure between $2,500,000 and $3,000,000, the city of New York will have under construction shortly new subway and elevated lines for the dual system of rapid transit to cost upward of $81,000,000. The report of the division engineers of the Public Service Commission for the First District for the month ended June 15, 1913, shows that this work covers about 27 miles of new rapid transit railroad with probably nearly 100 miles of single track, as almost all of the work now under way is four-track construction.

Of the total mileage under construction about 21 miles are underground and 6 miles elevated railroad. About 9 miles of subway and all of the elevated railroad is for operation by the Interborough Rapid Transit Company, and about 12 miles, all subway, for operation by the New York Municipal Railway Corporation (Brooklyn Rapid Transit). The Interborough Company work includes nearly 6 miles of subway on the Lexington Avenue line between Fifty-third Street and 157th Street, four tracks from Fifty-third to 135th Street, just north of the Harlem River, and three tracks from that point to 157th Street; about 1½ miles of three-track subway in 138th Street and Southern Boulevard on the Pelham Bay Park branch of the Lexington Avenue line between Alexander Avenue and 117th Street; about 6 miles of elevated railroad on the Queens rapid transit lines, of which the line to Astoria takes about 2 miles and the line to Corona about 4 miles, and about 1½ miles of subway in the Steinway Tunnel between Park Avenue and Forty-second Street, Manhattan, and Jackson Avenue and Van Alst Avenue, in Long Island City, all two-track construction. While the Queens lines are being built for operation by the Interborough Rapid Transit Company, the Brooklyn company also will have trackage rights over them.

The 12 miles under construction for operation by the New York Municipal Railway Corporation include 4 miles of four and six-track subway on the Fourth Avenue line, running from the Brooklyn end of the Manhattan Bridge through Flatbush Avenue Extension, Fulton Street, Ashland

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Place and Fourth Avenue to Forty-third Street; 2½ miles of subway on extensions of the Fourth Avenue line between Forty-third and Eighty-ninth Streets, which will be four-tracked from Forty-third to Sixty-fifth Street and two-tracked from Sixty-fifth to Eighty-ninth Street. The first part of the work, namely, from the Manhattan Bridge to Forty-third Street, is about completed, and the extension from Forty-third to Eighty-ninth Street should be completed by a year from next January. The Brooklyn work also includes about 1½ miles of four-track subway in the Centre Street Loop line, running from the Brooklyn Bridge to the Williamsburg Bridge, with a two-track spur to the Manhattan Bridge, now completed and about ready for temporary operation; also a little more than 2 miles of subway on the Broadway line in Manhattan, running from Trinity Place and Morris Street north through Trinity Place and Church Street and thence through Vesey Street and Broadway as far as Fourteenth Street, four tracks north of Park Place and two tracks south of there.

The work is being done by fourteen different contracting firms, who employed during the month a daily average of about 6400 men.

The commission opened bids on June 24 for the construction of Section No. 4 of the Broadway subway in Manhattan. This section lies in Broadway between Bleecker Street and Fourteenth Street. It will embrace a local station at Eighth Street and half of the express station at Union Square. Eleven bids were received, ranging from about $2,600,000 to $3,300,000. The commission has not yet awarded the contract.

Illinois Utility Bill Signed

Governor Dunne of Illinois has signed the public utilities bill. Under the provisions of the bill any city can construct, acquire and operate any public utility within its borders, use the product or service of utilities, or sell them to private citizens or corporations. "Public utility" means and includes any plant, equipment or property, and any franchise, license or permit used or to be used for or in connection with the transportation of persons or property or messages or the production, storage, transmission, sales, delivery or furnishing of cold, heat, light and power, the conveyance of oil and gas by pipe line, or the storage or warehousing of goods, or wharfing.

To Abolish Commerce Court.—The House rules committee agreed on June 27 on a rule by which the deficiency appropriation bill, to be reported early in July, will carry a specific provision to abolish the Commerce Court and vest its jurisdiction in the United States District Courts.

Terms of Purchase of Toronto Companies Submitted.—The terms of purchase of the property of the Toronto Railway and the Toronto Electric Light Company have been given to the Mayor of Toronto by Sir William MacKenzie, president of the companies, but are not yet public.

Ornamenting Trolley Poles in Chicago.—The Chicago Association of Commerce, through its committee on downtown streets, has undertaken the adornment of the streets in the Loop and has utilized trolley poles in carrying out its plan. It is proposed to make these poles a means of beautifying the city by hanging gardens from them. A pole at South State Street and Jackson Boulevard is the first one to be used in the beautification plan.

Merchants' Association of New York Opposed to New York Central Re-location.—The plan proposed by a committee of the Board of Estimate and Apportionment of New York City for the re-location of the tracks of the New York Central & Hudson River Railroad on the west side of Manhattan has been disapproved by the special committee appointed by the Merchants' Association of New York to consider the proposals.

Electrification of Spanish Road Proposed.—The Valencia Economic Tramway & Railroad Company, Valencia, Spain, is preparing to change the motive power from steam to electricity on its 12-mile narrow-gage line from Valencia to Betera. The contract to be awarded will probably embrace car equipment, line material, electrical supplies and such auxiliary power equipment as may be required in connection with purchased power.

Pennsylvania Full Crew Law Valid.—The Supreme Court of Pennsylvania in an opinion by Justice Brown affirms the decision of the Dauphin County Court upholding the constitutionality of the act of June 19, 1911, known as the full crew law. The law is similar to those of Arkansas and Indiana which have been passed upon by the United States Supreme Court. It requires an extra brakeman on all passenger trains of more than three cars and on all freight trains with more than thirty cars.

Iowa Interurban Roads Report for 1912.—The fourteen interurban electric railways in Iowa which reported their earnings to the State for 1912, showed gross revenue of $2,255,163, as compared with $1,991,331 the year before. Expenses were $1,486,503, and a year previous, $1,409,764. The net profits aggregated $768,659, while for the year 1911 the profits totaled $581,567. Only one road, the Charles City Western Railway, reported net loss on business, and this was $1,111.

Power Contracts of the Utah Securities Corporation.—The properties acquired by the Utah Securities Corporation have been merged into the Utah Power & Light Company. The territory served covers southeastern Idaho, northern Utah and a section of western Colorado. The company has closed long-term contracts with many of the large power consumers in the territory, including the Utah Copper Company, Salt Lake & Ogden Railway and the Utah Light & Railway Company. By the end of 1914 the installed capacity of the Utah Power & Light Company will probably be 131,000 hp.

Governor Eberhart on Utility Commission Appointments.—In his first public expression in regard to public utility regulation since he sent his veto message to the Legislature on the Nolan and Minnette bills Governor Eberhart of Minnesota said at Austin on June 18: "Minnesota had a railroad commission, a board of control, a tax commission and a highway commission long before Wisconsin did. If Minnesota cannot find as good men at home as the Wisconsin commissioners, it can go abroad and get them. If I appoint unworthy men, I should be one of the first to be recalled."

Amendments to Erdman Act Approved by Senate.—The Senate on June 26 approved the passage of amendments to the Erdman mediation act, sought by the railways and the railway employees, as affording suitable machinery for the settlement of disagreements. The amendments enlarge the board of arbitration provided under the Erdman act from three to six. The railways have declined to submit the present disputes to a board of only three. The appointment by the President of an official mediator, independent of all government bureaus, at a salary of $7,500, is also provided for.

Projected Subway for Genoa.—The Superior Council of Public Works of Italy has approved the project for a 6 1-3 mile subway for Genoa from Sampierdarena to Genoa, and thence to Quarto dei Mille along the coast. Estimates of cost of the work and materials have not been definitely adopted, but the original estimate contemplated expending at least $3,667,000, which will no doubt be increased. The subway will have fourteen stations, four above and ten underground, three of these latter having two or three passenger elevators each. Continuous current, third-rail electric traction, will be used. About twenty-two cars with motors and twenty-two trail cars will be required.

Referendum Petition on Maine Utility Act.—More than 10,000 names have been secured asking for a referendum on the Maine public utilities act, which is to go into effect on July 12. Opposition to the act developed soon after the Legislature adjourned. One of the principal grievances of those who oppose the measure is that Governor Haines appointed three lawyers to the board, instead of at least one engineer. It is said that the petition for the referendum will be filed with the Secretary of State on July 12, the day that the Governor and Council meet to arrange to put the act into effect. If the petition is presented the next legal step will be for the Governor to name a date for a special election to decide on the matter, which cannot be sooner than four months after the notification, or November. A digest of the provisions of the new act was published in the Electric Railway Journal of April 12, 1913.

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Financial and Corporate

Stock and Money Markets

July 1, 1913.

Summer dullness prevailed in the New York Stock Exchange to-day, business being marked by listlessness. Many important variations in prices took place, however, and the closing figures ranged materially above the final figures of the day before. Most importance was attached to Union Pacific tradings, and other active railroad issues followed the declines and advances in this. Rates on the money market to-day were: Call, 1¾@2 per cent; sixty days, 3¼@3½ per cent; ninety days, 3¾@4¼ per cent; four months, 4½@5 per cent; five months, 4¾@5¼ per cent.

Influenced by New York, the Philadelphia market to-day was stronger. Philadelphia Electric was quoted at 21½@21⅝ and Rapid Transit 21½@21¾.

Business was very small in the Chicago Stock Exchange to-day, but the tone was fairly steady. Bonds were dull the entire day.

The tone in the Boston stock market to-day was strong, but the transactions were small.

The stock market in Baltimore to-day was concerned mostly with small transactions.

Quotations of traction and manufacturing securities as compared with last week follow:

	June 25	July 1
American Brake Shoe & Foundry (common)	87½	90
American Brake Shoe & Foundry (preferred)	126½	126¼
American Cities Company (common)	36¾	33¼
American Cities Company (preferred)	69¼	63
American Light & Traction Company (common)	*365	*365
American Light & Traction Company (preferred)	*106	*106
American Railways Company	38	38
Aurora, Elgin & Chicago Railroad (common)	42	40
Aurora, Elgin & Chicago Railroad (preferred)	*82	83
Boston Elevated Railway	86¼	84
Boston Suburban Electric Companies (common)	7½	7¼
Boston Suburban Electric Companies (preferred)	*66	*66
Boston & Worcester Electric Companies (common)	a8	a8
Boston & Worcester Electric Companies (preferred)	42	42
Brooklyn Rapid Transit Company	87¼	87
Capital Traction Company, Washington	117	115¾
Chicago City Railway	*150	*150
Chicago Elevated Railways (common)	*24½	*24½
Chicago Elevated Railways (preferred)	*75	*75
Chicago Railways, ptcptg., ctf. 1	100¼	*100
Chicago Railways, ptcptg., ctf. 2	22¾	24¼
Chicago Railways, ptcptg., ctf. 3	6¾	7½
Chicago Railways, ptcptg., ctf. 4	2¾	*2¾
Cincinnati Street Railway	106	110
Cleveland Railway	102¾	102½
Cleveland, Southwestern & Columbus Ry. (common)	6	*6
Cleveland, Southwestern & Columbus Ry. (preferred)	29	*29
Columbus Railway & Light Company	18	18
Columbus Railway (common)	69½	69½
Columbus Railway (preferred)	88	88
Denver & Northwestern Railway	*107	*107
Detroit United Railway	70¼	70
General Electric Company	136½	135½
Georgia Railway & Electric Company (common)	115¾	115
Georgia Railway & Electric Company (preferred)	83¾	84
Interborough Metropolitan Company (common)	15¼	15
Interborough Metropolitan Company (preferred)	55⅝	55¾
International Traction Company (common)	30	*30
International Traction Company (preferred)	95	*95
Kansas City Railway & Light Company (common)	18	*18
Kansas City Railway & Light Company (preferred)	36	*36
Lake Shore Electric Railway (common)	6	*6
Lake Shore Electric Railway (1st preferred)	92	*92
Lake Shore Electric Railway (2d preferred)	25	*25
Manhattan Railway	127	125
Massachusetts Electric Companies (common)	12⅞	13
Massachusetts Electric Companies (preferred)	67	66
Milwaukee Electric Railway & Light Co. (preferred)	100	*100
Norfolk Railway & Light Company	25	25
North American Company	66	65
Northern Ohio Light & Traction Company (common)	80	80
Northern Ohio Light & Traction Company (preferred)	105	105
Philadelphia Company, Pittsburgh (common)	40⅝	40½
Philadelphia Company, Pittsburgh (preferred)	39	39
Philadelphia Rapid Transit Company	22¼	21½
Portland Railway, Light & Power Company	62	*62
Public Service Corporation	111	110
Third Avenue Railway, New York	31½	31¼
Toledo Railways & Light Company	2	2
Twin City Rapid Transit Co., Minneapolis (common)	102¾	102
Union Traction Company of Indiana (common)	4½	*4½
Union Traction Company of Indiana (1st preferred)	80	*80
Union Traction Company of Indiana (2d preferred)	30	*30
United Rys. & Electric Company (Baltimore)	25⅞	26
United Rys. Inv. Company (common)	20½	19
United Rys. Inv. Company (preferred)	34	34
Virginia Railway & Power Company (common)	56	52
Virginia Railway & Power Company (preferred)	87½	87½
Washington Ry. & Electric Company (common)	90¼	89½
Washington Ry. & Electric Company (preferred)	88⅜	87¾
West End Street Railway, Boston (common)	71	71
West End Street Railway, Boston (preferred)	87½	87
Westinghouse Elec. & Mfg. Company	59½	58¼
Westinghouse Elec. & Mfg. Company (1st preferred)	106	105

*Last sale. a Asked.

Questions and Answers Under Uniform System of Accounts

Another series of tentative answers to questions raised in connection with the uniform system of accounts established by the Interstate Commerce Commission is published below. Agreement on these answers, as on those published in the issues of May 17, 1913, and June 7, 1913, has been reached by members of the committee on a standard classification of accounts of the American Electric Railway Accountants' Association and representatives of the commission. As these answers have not yet received the formal approval of the commission, however, it should be understood that the decisions do not represent its final conclusions and that they are subject to such revision as may be thought proper before final promulgation in the accounting bulletins of the commission.

Q. What account should be charged with the cost of new copper trolley wire stolen from the storehouse, but recovered after being cut into short lengths?

A. The cost of the wire, less the value of scrap recovered, should be charged to Operating Expense Account No. 89, "Store Expenses."

Q. What account should be charged with the cost of repairs and replacements of watchmen's portable clocks used in a carhouse and the cost of paper dials used in them?

A. The cost of repairs and replacements of such clocks should be included in Operating Expense Account No. 67, "Carhouse Expenses," and the cost of the paper dials in account No. 84, "Stationery and Printing."

Q. To what account should be charged the amount assessed against an electric railway company for dredging a stream so as to drain towns and lands along said stream?

A. Road and Equipment Account No. 2, "Right of Way." (See case 161 of Accounting Bulletin No. 7.)

Q. What account is chargeable with the amount of donations to charitable organizations or institutions?

A. Account No. 79, "Miscellaneous General Expenses," in the classification of Operating Expenses.

Q. What account should be charged with the cost of oil cans and such devices for use by employees of various departments?

A. The cost of oil cans and such devices should be charged to Operating Expense Account No. 54, "Miscellaneous Power Plant Expenses"; No. 55, "Substation Expenses"; No. 67, "Carhouse Expenses"; No. 39, "Shop Expenses"; No. 24, "Miscellaneous Electric Line Expenses"; No. 63, "Miscellaneous Car-Service Expenses," or No. 65, "Station Expenses," according to the use for which they are intended.

Q. What accounts should be charged with the first cost and the cost of repairs and renewals of trolley retrievers and catchers?

A. The first cost should be charged to Road and Equipment Account No. 35, "Cars"; No. 36, "Locomotives," or No. 38, "Other Rail Equipment," according to the equipment fitted with the devices. The cost of repairs and renewals should be charged to Operating Expense Account No. 32, "Passenger and Combination Cars"; No. 33, "Freight, Express and Mail Cars"; No. 34, "Locomotives," or No. 35, "Service Cars."

Q. To what account should the cost of transformer oil for use in power stations or substations be charged?

A. The first cost should be charged to Road and Equipment Account No. 30, "Power Plant Equipment," if the oil is for use in a power plant, or to Account No. 31, "Substation Equipment," if for use in a substation. The cost of renewals should be charged to the corresponding maintenance account in operating expenses.

Q. What account should be charged with the cost of mowing lawns about carhouses, power plants, substations or stations?

A. Operating Expense Account No. 25, "Buildings and Structures," unless the amounts involved are small and the work is done by employees of the company as incidental to their regular duties, in which case it will not be necessary to subdivide their time.

Q. What account should be charged with the cost of flowers and shrubs and the labor of planting them about various buildings?

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A. Operating Expense Account No. 25, "Buildings and Structures."

Q. To what account should a license fee paid in accordance with the State law relating to inspection be charged?

A. Operating Expense Account No. 79, "Miscellaneous General Expenses."

Q. To what account should be charged the cost of renewals of lamp cord, sockets, lamps and switches used in carhouses, shops, power plants, substations and freight and passenger stations?

A. Operating Expense Account No. 67, "Carhouse Expenses"; No. 30, "Shop Expenses"; No. 54, "Miscellaneous Power Plant Supplies and Expenses"; No. 55, "Substation Supplies and Expenses," or No. 65, "Station Supplies and Expenses," according to where the articles are used.

Q. Is it proper to charge the various operating expense accounts for the transportation of employees of the different operating departments?

A. No charge should be made against a company's operating expenses on account of the free transportation over its own lines of men (on or off duty) employed in maintenance or operation. (See case 201, Accounting Bulletin No. 7.)

Decision in Chicago Consolidated Traction Case

Chief Justice Harry Olson of the Municipal Court at Chicago has declared void and illegal the bond issue of $6,750,000 of the Chicago Consolidated Traction Company. These bonds were issued during the régime of Charles T. Yerkes in 1899, and while the suit involved only $149,000 worth of them, the issue now outstanding is affected by the decision. The suit was brought by a New York committee composed of Rafael R. Govin, George W. Young and Archibald White against the Chicago Railways and was taken under advisement by Chief Justice Olson eighteen months ago. The bonds were issued in return for the stock of the eight underlying companies which formed the Consolidated Traction Company, so as to give Mr. Yerkes control of all the companies through voting their stock. This prevented the underlying companies from becoming competitors of the Union Traction Company. Justice Olson held it was contrary to the law and to public policy for a corporation to buy the stock of competing corporations for the purpose of acquiring a monopoly. An appeal will be taken by the committee of Consolidated bondholders. Aside from the $149,000 worth of bonds held by the Govin committee there are still $105,000 of bonds authorized, all of which are outstanding except $17,000 and $30,000 of which are in the hands of the Yerkes estate. The Chicago Railways bought all the rest, paying 30 cents on the dollar for about $4,450,000 held by the Yerkes estate.

In commenting on the decision, W. W. Gurley, chief counsel for the Chicago Railways, said:

"The management of the Chicago Railways is naturally much pleased with Judge Olson's decision. It sustains in full the contention always made in behalf of the company that it was in no wise liable for the debts or obligations of the Chicago Union Traction Company or the predecessor companies, beyond the extent specified in the modified plan of reorganization of Oct. 15, 1907. The decision means that the claims asserted against the company, which, if well founded, menaced its very existence, and which at all times depressed the market value of all its securities, have received their quietus. The counsel for the company is confident that no court will disturb the findings and conclusion of Judge Olson, and the management feels that it can devote its time and attention to the operation of the property for the benefit of the public and the participation certificate holders, free from the continual apprehension of a calamitous court decision impairing their usefulness, if not ruining the property."

Buffalo, Lockport & Rochester Railway, Rochester, N. Y.—It is reported that the Buffalo, Lockport & Rochester Railway may be included in a merger with the International Railway and the Buffalo & Lake Erie Traction Company, the plan being to provide a through trunk line between Rochester, Buffalo and Erie. Clifford D. Beebe, president of the Buffalo, Lockport & Rochester Railway, is quoted as follows in this connection: "There is nothing definite to the plans. In fact, no plans worthy of the name have been made."

Chicago (Ill.) Railways.—Back dividends due on the Chicago Railways Series 1 participation certificates on Aug. 1, 1912, aggregated 24 per cent, dividends having been suspended since Aug. 1, 1910. The company paid 6 per cent on Oct. 1, 1912, 6 per cent on Feb. 1, 1913, and 6 per cent on March 15, 1913. The 6 per cent to be paid on July 1 will leave no accumulated dividends unpaid, but the payment of 4 per cent on Aug. 1 will leave one-half of the full dividend of 8 per cent for this year unpaid.

Cincinnati, Dayton & Toledo Traction Company, Hamilton, Ohio.—At the special meeting of stockholders of the Cincinnati, Dayton & Toledo Traction Company on June 23, 1913, the lease of that company to the Ohio Electric Railway was modified in accordance with the recommendations of the board of directors, noted at length in the Electric Railway Journal of June 7, 1913, page 1038. The new agreement fixed the rent of the Cincinnati, Dayton & Toledo Traction Company at $200,500 a year for 1913 and 1914, and thereafter it is increased at the rate of $10,000 a year, making the rental for 1912 and thereafter $360,500 a year. Under the amended lease the common stock of the Cincinnati, Dayton & Toledo Traction Company, on which 2 per cent a year has been paid, will be reduced from $5,000,000 to $2,000,000 and no dividends will be paid on this stock until the year beginning July 1, 1915, when one-half of 1 per cent will be paid, and this will be increased each year until 1922, when 5 per cent will be paid. The preferred stock will be increased from $250,000 to $1,250,000, the new stock to be sold from time to time to provide funds for betterments and extensions. The Ohio Electric Railway will provide the financing for maturing bonds and other obligations of the leased road.

Eastern Texas Electric Company, Beaumont, Tex.—Stone & Webster, Boston, Mass., are offering for subscription at 98½ and interest $500,000 of three-year 6 per cent gold notes of the Eastern Texas Electric Company, which owns all the stocks and bonds of the companies which do the entire electric light and power business at Port Arthur, Tex., and the company constructing an interurban electric railway between Beaumont and Port Arthur, a distance of about 20 miles. It is also about to acquire all the stock and $200,000 of the $600,000 bonds of the Beaumont Traction Company, which does the entire electric railway business in Beaumont. The notes are dated July 1, 1913, and are due July 1, 1916. They are in the denominations of $500 and $1,000 and are callable as a whole at 100 and accrued interest on thirty days' notice. The interest is payable at the office of the State Street Trust Company, Boston, trustee of the issue.

Hudson & Manhattan Railroad, New York, N. Y.—The Public Service Commission of the First District of New York has approved the plan for the readjustment of the finances of the Hudson & Manhattan Railroad in accordance with the proposal made by the syndicate composed of Kuhn, Loeb & Company, Robert Fleming & Company and Harvey Fisk & Sons. References to the proposed refinancing were made in the Electric Railway Journal of Jan. 18, March 1, May 17 and June 21, 1913.

Indianapolis & Louisville Traction Company, Scottsburg, Ind.—The Indianapolis & Louisville Traction Company has elected new officers, as follows: John E. Greeley, Scottsburg, Ind., president and general manager; Mark Storen, Scottsburg, vice-president; Earl S. Gwin, New Albany, treasurer, and Walter A. Gadient, New Albany, secretary; E. H. Jennings, James C. Chaplin and Jerome Hill, Pittsburgh, Pa.; Samuel D. Miller, Indianapolis, Ind.; Mark Storen, Earl S. Gwin and John E. Greeley, directors.

Loramie & Minster Electric Railroad, Minster, Ohio.—Julius Boesel, president of the First National Bank, Minster, and W. J. Sheriden, president of the Loramie Banking Company, Loramie, have been appointed receivers of the Loramie & Minster Railroad, as a result of a suit on a note instituted by the First National Bank. The road was built in 1910 and the liabilities are placed at $50,000. It is said that the Western Ohio Railway may take over the line, which is a short one.

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Omaha, Lincoln & Beatrice Railway, Omaha, Neb.—The Nebraska State Railway Commission has modified its former order so as to allow the Omaha, Lincoln & Beatrice Railway to issue $2,250,000 of bonds and $850,000 of stock upon the completion of its interurban line between Lincoln and Omaha. The Lincoln terminals of the company and the line eastward into Bethany Heights, a suburb, have been in operation for some time. The Northern Construction Company, Detroit, Mich., is completing the line from Lincoln to Omaha.

Nevada County Narrow-Gage Railroad, Grass Valley, Cal.—The Nevada County Narrow-Gage Railroad has been authorized by the Railroad Commission of California to issue $500,000 of 5 per cent. bonds. The proceeds will be used to retire existing bonds and to standardize the present narrow-gage line from Colfax to Nevada City.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—The Oakland, Antioch & Eastern Railway has applied to the Railroad Commission of California for authority to issue $1,000,000 of 5 per cent bonds to provide funds to complete its road from Bay Point to Sacramento.

Ohio Traction Company, Cincinnati, Ohio.—The directors of the Ohio Traction Company, at a meeting on June 27, decided to pass the dividend on the common stock due on July 1, 1913. The last disbursement was made on April 1, 1913, at the rate of 4 per cent for the year. The dividend was passed on account of the damage done to the property of the company by the recent floods.

Philadelphia & West Chester Traction Company, Upper Darby, Pa.—John P. Crozier, Upland, Pa., has been elected a director of the Philadelphia & West Chester Traction Company to fill a vacancy in the board.

South Bend & Logansport Traction Company, South Bend, Ind.—The property and franchises of the South Bend & Logansport Traction Company will be offered for sale by the receiver of the company at South Bend on July 5. The company was promoted originally in 1908 as the South Bend & Logansport Railway and offices were established in the American Trust Building, South Bend. It was proposed to obtain power from the Indiana & Michigan Electric Company.

United Railways & Electric Company, Baltimore, Md.—At the regular meeting of the directors of the United Railways & Electric Company the payment of dividends on the stock of the company was changed from semi-annually to quarterly, a quarterly dividend of 1 per cent being declared on the common stock, payable on July 15 to stock of record of July 7.

United Railways, St. Louis, Mo.—The United Railways arranged to extend for ten years the $1,000,000 of 6 per cent bonds of the Compton Heights, Union Depot & Merchants' Terminal Railroad due on July 1, 1913.

Dividends Declared

Athens Railway & Electric Company, Athens, Ga., quarterly, 1¼ per cent, preferred.

Bay State Street Railway, Boston, Mass., 3 per cent, first preferred.

Boston (Mass.) Suburban Electric Companies, quarterly, 1¼ per cent, preferred.

Cincinnati, Dayton & Toledo Traction Company, Hamilton, Ohio, 2½ per cent, preferred.

Cincinnati, Newport & Covington Light & Traction Company, Covington, Ky., quarterly, 1⅛ per cent, preferred; quarterly, 1½ per cent, common.

Citizens' Traction Company, Oil City, Pa., $1, preferred.

City Railway, Dayton, Ohio, quarterly, 1½ per cent, preferred; quarterly, 2 per cent, common.

Columbus, Newark & Zanesville Electric Railway, Newark, Ohio, quarterly, 1½ per cent, preferred.

Denver & Northwestern Railway, Denver, Col., quarterly, 2 per cent.

Holyoke (Mass.) Street Railway, 4 per cent.

International Traction Company, Buffalo, N. Y., 2 per cent, preferred.

Manchester Traction, Light & Power Company, Manchester, N. H., quarterly, 2 per cent.

Memphis (Tenn.) Street Railway, quarterly, 1½ per cent, preferred.

Metropolitan West Side Elevated Railway, Chicago, Ill., 1¼ per cent.

Monongahela Valley Traction Company, Fairmont, W. Va., 1½ per cent, common.

Montreal (Que.) Tramways, 2½ per cent.

Nashville Railway & Light Company, Nashville, Tenn., quarterly, 1¼ per cent, preferred.

Ottawa (Que.) Electric Railway, quarterly, 3 per cent.

Public Service Investment Company, Boston, Mass., quarterly, $1.50, preferred; $2, common.

Rome Railway & Light Company, Rome, Ga., quarterly, 1¼ per cent.

South Side Elevated Railroad, Chicago, Ill., 1½ per cent.

Springfield & Xenia Railway, Springfield, Ohio, quarterly, 1½ per cent, preferred.

Thirteenth & Fifteenth Streets Passenger Railway, Philadelphia, Pa., $6.

United Railways & Electric Company, Baltimore, Md., quarterly, 50 cents, common.

Winnipeg (Man.) Electric Railway, quarterly, $3.

ELECTRIC RAILWAY MONTHLY EARNINGS

FEDERAL LIGHT & TRACTION COMPANY, NEW YORK, N. Y.

Period			Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m.,	May,	'13	$184,051	$108,728	$75,323	.....	.....
1 "	"	'12	164,534	99,487	65,047	.....	.....
5 "	"	'13	1,000,597	566,905	433,692	.....	.....
5 "	"	'12	875,445	503,615	371,830	.....	.....

GALVESTON-HOUSTON ELECTRIC COMPANY, HOUSTON, TEX.

1m.,	April,	'13	$185,508	*$109,574	$75,934	$34,755	$41,179
1 "	"	'12	151,604	*94,102	57,502	33,815	23,687
12 "	"	'13	2,147,047	*1,242,851	904,197	408,752	495,445
12 "	"	'12	1,658,113	*1,032,171	625,942	288,566	337,376

HOUGHTON (MICH.) COUNTY TRACTION COMPANY

1m.,	April,	'13	$25,699	*$14,764	$10,934	$5,464	$5,470
1 "	"	'12	24,567	*13,416	11,151	5,112	6,038
12 "	"	'13	312,187	*177,340	134,847	69,040	65,807
12 "	"	'12	300,688	*177,996	122,692	62,605	60,087

JACKSONVILLE (FLA.) TRACTION COMPANY

1m.,	April,	'13	$56,364	*$36,633	$19,731	$11,118	$8,613
1 "	"	'12	51,284	*32,382	18,901	9,643	9,258
12 "	"	'13	579,168	*391,136	188,032	124,948	63,084
12 "	"	'12	568,075	*353,074	215,001	109,025	105,976

JOPLIN & PITTSBURG RAILWAY, PITTSBURG, KAN.

1m.,	May,	'13	$49,466	*$29,018	$20,448	$12,542	$7,906
1 "	"	'12	44,156	*27,835	16,321	12,924	3,397
12 "	"	'13	557,467	*326,096	231,372	150,881	80,491
12 "	"	'12	491,924	*291,675	200,249	154,611	45,638

LEHIGH VALLEY TRANSIT COMPANY, ALLENTOWN, PA.

1m.,	May,	'13	$147,652	$64,652	$83,129	$45,889	$37,240
1 "	"	'12	123,326	55,538	67,788	42,513	25,275
12 "	"	'13	1,643,722	701,093	942,629	530,281	412,348
12 "	"	'12	1,423,763	628,411	795,352	478,137	317,215

NORTHERN TEXAS ELECTRIC COMPANY, FORT WORTH, TEX.

1m.,	April,	'13	$164,684	*$91,341	$73,342	$24,551	$48,791
1 "	"	'12	134,936	*73,200	61,736	20,846	40,890
12 "	"	'13	1,939,862	*1,028,051	911,811	281,683	630,128
12 "	"	'12	1,622,470	*888,282	734,188	251,441	482,747

PENSACOLA (FLA.) ELECTRIC COMPANY.

1m.,	April,	'13	$21,156	*$15,328	$5,828	$6,404	$575
1 "	"	'12	22,491	*14,759	7,732	6,377	1,355
12 "	"	'13	287,099	*178,445	108,655	76,427	32,228
12 "	"	'12	286,528	*180,738	105,789	66,831	38,958

*Includes taxes.

Jamestown Strike Collapses

The strike of the employees of the Jamestown (N. Y.) Street Railway and the Chautauqua Traction Company, which was begun on May 1, 1913, has collapsed and was formally declared off on June 29 at a meeting of the men who were out on strike. The company has decided to take back into its employ about twenty-five of the men who were out and reinstate them at their former rate of wages but at the bottom of the extra list. The men who remained faithful to the company and all the men who were engaged by the company during the strike will be retained in their positions. The strike was productive of considerable disorder and twenty-five former employees of the company and their sympathizers are under indictment for cutting wires and rioting in the city. The proposition of A. N. Broadhead, president of the companies, for a settlement of the differences between the officers of the companies and the employees was summarized in the ELECTRIC RAILWAY JOURNAL of June 14, 1913, page 1081. This proposition the employees rejected through their representatives. They characterized it as annihilation, not arbitration.

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Traffic and Transportation

New Rules Governing Conduct of Passengers in Hamilton, Ont.

The Dominion Power & Transmission Company, Hamilton, Ont., has amended its by-law regulating travel on its cars by adding a clause prohibiting the drinking of intoxicating liquors. The by-law, as amended and approved by the Board of Railway Commissioners and the Ontario Railway & Municipal Board, follows:

"1. (a) Smoking tobacco or carrying a lighted pipe, cigar or cigarette, except while in smoking compartments provided for that purpose or except on the three rear seats of open cars only, or expectorating, except in proper receptacles, or the commission of any nuisance in or upon the trains or cars, passenger stations or other premises used or occupied by the company, is hereby forbidden and declared unlawful, and any person found guilty of a violation of this rule shall be liable to a penalty not exceeding $5.

"(b) Drinking intoxicating liquors or offering intoxicating liquors to others in or upon the trains or cars of this company is hereby forbidden and declared unlawful, and any person found guilty of a violation of this rule shall be liable to a penalty not exceeding $10.

"2. Passengers other than policemen in uniform, city detectives and company officials shall not be allowed to ride on the front platform of any closed car nor to ride on the rear platform of any closed car when there is room or space which may be occupied by them inside the car, and women or children shall not ride on the front platform or seat of any open car, and passengers refusing to comply with this rule shall be considered disorderly persons and subject to a penalty for the violation of this rule not exceeding $10, and may also, on such refusal, be ejected from or put off the car.

"3. The conductor must politely call the attention of passengers violating, or who appear to intend to violate, the last two rules herein set forth to the provisions of the said rules and firmly request observance thereof before taking any further or other action."

Free Transportation for Harrisburg Employees.—The Harrisburg (Pa.) Railways has granted free transportation to employees while off duty. They will wear a badge inscribed "Employee of the Harrisburg Railways Company."

Opinion in Regard to Passes on Electric Railways in Pennsylvania.—In answer to the inquiry of the Gettysburg (Pa.) Railway the Railroad Commission of Pennsylvania says that it knows of no law prohibiting the granting of free passes by electric railways.

Increase in Wages in Grand Rapids.—On July 1, 1913, the Grand Rapids (Mich.) Street Railway increased the wages of the motormen and conductors in its employ. The new scale of wages follows: First six months, 23 cents an hour; second six months, 24 cents an hour; second year, 25 cents an hour; third year and thereafter, 26 cents an hour.

Special Cars for Miners Not Justified.—The State Railroad Commission of Pennsylvania has dismissed the complaint filed by J. G. Eckert, Drifton, against the Lehigh Valley Traction Company, asking that cars exclusively for miners be operated between Hazleton and Freeland. The commission holds that the traffic does not justify special cars as the men quit work at different hours.

Increase in Wages in Saginaw.—The Saginaw-Bay City Railway, Saginaw, Mich., posted a notice recently in the car house at Saginaw of a voluntary increase of wages of 1 cent an hour for the motormen and conductors of the local and interurban lines and from 1 cent to 2 cents on the Saginaw and Flint line. The increase, affecting about 350 men, went into effect on July 1.

Traffic Agreement Between the Illinois Traction System and East St. Louis System.—An agreement has been entered into whereby special passenger movements from any point on the Illinois Traction System or the East St. Louis & Suburban Railway, East St. Louis, Ill., will be handled in the equipment of the company with which the movements originate, but by the operating force of each company over its own lines.

Jamaica Bay Trestle Damaged by Fire.—Normal train service to Rockaway Beach, Long Island, via the Jamaica Bay trestle was resumed on June 30 by the Long Island Railroad following the fire which interrupted traffic Sunday night, June 29. The company issued a statement saying that 80 ft. of the trestle had been destroyed. It gave the cause of the fire as a short-circuit, which communicated flames to a wooden trailer car.

Successful Outing of Employees at Washington.—A very successful outing of the employees of the Washington Railway & Electric Company, Washington, D. C., was held at Chesapeake Beach on June 26. The attendance was very large and a great deal of interest was manifested in the athletic contests which had been arranged by the special committee of the outing having the games in charge. One of the features of the athletic program was a foot race for the directors.

Reduction in Fare Ordered Out of Syracuse.—The Public Service Commission has authorized the Syracuse & South Bay Railway, Syracuse, N. Y., to reduce its fare between Syracuse and South Bay, 5 cents each way. The low fare went into effect immediately and will continue until Sept. 1. In the future when coupon ticket books are used for transportation five 5-cent coupons will be detached for one fare. Four coupons will be detached if the trip starts or ends at the Syracuse city line.

Decision in Regard to Responsibility for Shipments.—The Northwestern Pennsylvania Railways, Meadville, Pa., has been informed by the Railroad Commission of Pennsylvania that it is not justified in requiring an insurance fee in order to make the company responsible for safe transportation of packages confided to its care. The commission says that the company is required to deliver packages according to contract and the responsibility for the shipment cannot be avoided by any insurance requirement.

Question of Abolishing Strip Tickets in Trenton Under Consideration.—City Clerk Thompson, of Trenton, N. J., has received a letter from Rankin Johnson, vice-president of the Trenton & Mercer County Traction Corporation, to the effect that the directors of the company had taken no action to abolish the selling of strip tickets in Trenton and that whenever the company decided to eliminate the selling of tickets the officers of the company would convey that information formally to the city commission direct.

Service Order in Washington, D. C., Suspended During Summer.—The Public Utilities Commission of Washington, D. C., has directed that all orders relating to schedules issued by that body or the District Electric Railway Commission, which the utilities commission succeeded, be suspended from July 1 to Sept. 15. The action of the utilities commission was taken at the request of the Capital Traction Company and is revokable at any time the commission deems advisable. The company stated that a service sufficient to meet traffic demands during the period the schedules are suspended will be maintained.

Chicago Near-Side Car Accident Record.—A reduction of approximately 91 per cent in platform accidents and 37 per cent in all classes of accidents on the Cottage Grove line of the Chicago City Railway is attributed to the operation of the 125 near-side cars that are now running on this line. These percentages are computed in a comparison of all accidents for April, 1912, and April, 1913, and this reduction in accidents is shown in spite of the fact that the total passenger business increased approximately 6 per cent. During April the platform accidents represented 53.7 per cent of all accidents, and in April, 1913, this class of accidents was only 7.1 per cent of all accidents.

Strike Threatened in Boston.—On July 3 a strike was threatened on the Boston (Mass.) Elevated Railway. Up to that day the carmen's union had refused to select the third arbitrator in accordance with the agreement of last summer. The company was willing that the third arbitrator should be named by the chief justice of the Supreme Court or the Superior Court of Massachusetts. The men demand a large increase in wages, namely, $2.70 per day for the first year and $3.15 thereafter. The present maximum wage is $2.61 a day. The company has appealed to the officers of the union not to violate the agreement. At

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noon on Thursday, July 3, voting on the question of a strike was in progress.

St. Louis Ventilation Ordinance Reported Unfavorably.—The committee on sanitary affairs of the City Council of St. Louis, Mo., has decided to report unfavorably the bill to regulate the heating and ventilation of street cars operated in the city. The bill was drafted by officers of the board of health. Robert McCulloch, president and general manager of the United Railways, in opposing the ordinance said: "The company is spending all the money it possibly can for the convenience and accommodation of passengers. If you pass this bill you will be handicapping us with a lot of technical provisions. You will tie us down in our effort to heat and ventilate all our cars properly. We must ask that the bill be not passed."

Standing on Rear Platforms in New York City.—On June 26 the Public Service Commission of the First District of New York conducted a hearing in regard to passengers standing on the rear platforms of the cars of the companies which operate the subway and elevated lines in Greater New York. Evidence submitted tended to show that the practice originated on the old steam lines and with the riding of newspaper carriers there. Now loading efficiency at Brooklyn Bridge, which has become of even more importance since the capacity of the terminal has been cut 12 per cent by the reduction of speed on the bridge to 15 m.p.h., demands the use of both ends of the rear car during rush hours and the use of the back platform is practicably unavoidable.

Near-Side Stop in Detroit.—On June 29 the Detroit (Mich.) United Railway began stopping its cars on the near side in accordance with the following resolution passed recently by the City Council: "All cars carrying passengers operated upon any line of street railway in the city of Detroit shall come to a full stop immediately before crossing any street or avenue in said city whenever signaled to stop by any person desiring to take passage thereon or to alight therefrom; and all cars operated on any such line or lines shall be brought to a full stop before crossing any street or avenue at which any two lines of street railway intersect." To avoid confusion the new regulation has been extended to all the lines including Woodward Avenue as far as Palmer Park.

Conference in Regard to Akron Agreement.—At a meeting of the committee on bridges and railroads of the City Council of Akron on June 28, representatives of the Northern Ohio Traction & Light Company objected to the method of determining gain or loss on extended lines, as proposed in the agreement drawn by A. B. du Pont for the settlement of disputed points between the city and the company. Charles Currie, general manager; James T. Ross, consulting engineer, and A. J. Rowley, attorney, represented the company at the meeting. The committee will report this objection to Council, as well as the question as to whether the city can legally enter into such a contract as is proposed. The proposed franchise agreement as presented to the company was published in full in the ELECTRIC RAILWAY JOURNAL of June 21, 1913, page 1117. It is in the nature of a guarantee to the company.

Further Reduction in Running Time Between Allentown and Philadelphia.—Fifteen minutes, it is expected, will be cut from the running time of the Lehigh Valley Transit Company's limited car service between Allentown and Philadelphia beginning next October, when 9 miles of cut-offs and the new high-level reinforced concrete bridge in Allentown will be completed. The Quakertown cut-off will run from Zion Hill to Quakertown, a distance of practically 4 miles, being a straight track and cutting out twenty-one curves and several grades. The Sellersville cut-off is about 1 mile long and will eliminate four curves and two bad grades. The Hatfield cut-off is about 4 miles long and will eliminate twenty-two curves and one heavy grade, placing this section of the road on private right-of-way. The new cut-offs are rock-ballasted, standard steam railroad construction, and wide enough for double tracks. The large reinforced concrete bridge between Allentown and South Allentown is nearing completion. This bridge is about one-half mile in length. It is owned by the Lehigh Valley Transit Company, and will eliminate two heavy grades and several grade crossings.

Personal Mention

Mr. Leo Sartwell has been appointed assistant carhouse foreman of the Detroit (Mich.) United Lines at Flint to succeed Mr. J. H. Raby, promoted.

Mr. J. E. Meddaugh has been appointed roadmaster of the Pontiac division of the Detroit (Mich.) United Lines, vice Mr. J. C. Bourke, resigned.

Mr. Thomas Green has resigned from the operating engineering department of the Illinois Traction System, Peoria, Ill., to accept a position in the Chicago office of the Westinghouse Electric & Manufacturing Company.

Mr. T. E. Leland, for several years connected with the Metropolitan Street Railway, Kansas City, Mo., in the capacity of chief clerk in the auditing department, has resigned to accept a position with the Bay State Railway Company, Boston.

Mr. A. J. Ostendorf, at present assistant general superintendent of the Cincinnati (Ohio) Traction Company, has been appointed superintendent of transportation of the company to succeed Mr. Robert E. Lee, general superintendent of the company.

Mr. Robert E. Lee resigned as general superintendent of the Cincinnati (Ohio) Traction Company, to take effect on July 15. He will become identified with the Firestone Rubber Tire Company, Akron, Ohio. Mr. Lee's connection with the Cincinnati Traction Company dates back twelve years to the time when the Schoepf interests took over the local lines in Cincinnati under lease.

Mr. Martin S. Decker has been designated as chairman of the Public Service Commission of the Second District of New York by Governor Sulzer. Mr. Decker is a Republican and has been a member of the commission since the law creating that body was enacted under Governor Hughes. As chairman Mr. Decker succeeds Mr. Frank W. Stevens, Jamestown, who resigned recently.

Dean W. F. M. Goss, of the College of Engineering, University of Illinois, has been elected chief engineer of the committee on smoke abatement and electrification of railway terminals of the Chicago Association of Commerce. Dean Goss was elected unanimously and will succeed Horace G. Burt, who died recently. In order that Dean Goss may take up the work without interruption, he has had granted to him by the University of Illinois a leave of absence for a year.

Mr. J. C. McPherson, who has been division superintendent of the Pacific Electric Railway at Pasadena, Cal., has resigned that office to accept the position of general superintendent of the Oakland, Alameda and Berkeley Electric lines of the Southern Pacific Company. Prior to his departure for the north Mr. McPherson had a farewell reception tendered to him by about 150 employees of the Pacific Electric Railway at Los Angeles and a similar number of the employees in Pasadena.

Mr. John F. Wallace, president of Westinghouse, Church, Kerr & Company, New York, N. Y., was selected as the expert adviser of the committee on railway terminals of the City Council of Chicago on July 1. Mr. Wallace said it would require from sixty to ninety days to prepare a report on the terminal situation. For that reason no action will be taken on the Pennsylvania ordinances until the report is presented. The sub-committee decided to appoint a single engineer rather than a board of three engineers as suggested at first.

Mr. W. O. Holton, formerly assistant claims agent of the Chicago (Ill.) City Railway, has been appointed claims agent of litigated cases to succeed Mr. B. M. Troxell, whose death was announced in the ELECTRIC RAILWAY JOURNAL for Jan. 27, 1913. Mr. Holton was born in Mason County, Kentucky, in 1867. After attending public school and night school he studied law and in 1898 entered the service of the Chicago City Railway as a conductor. He served in this position for two years, after which he entered the claims department of the company as an investigator. In 1902 he was made assistant to the claims attorney in which position he had charge of all investigations. In 1909 he was appointed assistant claims agent, which position he has held until his recent promotion to claims agent of litigated cases.

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Mr. B. S. Josselyn, who retired as president of the Portland Railway, Light & Power Company, Portland, Ore., on July 1, 1913, had a farewell banquet tendered to him at the Arlington Club in Portland recently by the other officers of the company and a number of his business associates outside of the company. Mr. Josselyn expressed his regret at leaving the company and commended the qualifications of his successor, Mr. Franklin T. Griffith. Eleven pieces of silver, comprising a Paul Revere set, were presented to Mr. Josselyn by the officers and employees of the company, Mr. F. I. Fuller making the presentation speech. The set consists of one very large tray upon which was engraved, "Presented to B. S. Josselyn, president of the Portland Railway, Light & Power Company, by the officers and employees upon his resignation as president, July 1, 1913." The other pieces consisted of a creamer, two sugar bowls, coffee and tea urns, meat platter, a meat fork and fish spoon. Upon each of the large pieces is engraved the letter "J."

Mr. J. W. Brown, who has been assistant superintendent of transportation of the Public Service Railway, Newark, N. J., has been appointed assistant general superintendent of the company, a newly created position. Mr. Brown has been connected with the Public Service Railway since April, 1911. Before that he was with the Aurora, Elgin & Chicago Railroad and prior to that time was superintendent of transportation of the West Penn Railways, Connellsville, Pa. He entered the service of the McKeesport, Wilmerding & Duquesne Railway, McKeesport, Pa., about fourteen years ago as night car dispatcher. He also served as electrician and later as power station engineer of this company. When the Pittsburgh, McKeesport & Connellsville Railway was formed Mr. Brown was made master mechanic of the McKeesport division of that road and later was promoted to division superintendent. When the transportation department of the company was organized in 1903 he was appointed superintendent of transportation of the company. He resigned from the West Penn Railways, Connellsville, in August, 1910, to become connected with the Aurora, Elgin & Chicago Railroad.

Mr. Newton W. Bolen, superintendent of transportation of the Public Service Railway, Newark, N. J., has been appointed general superintendent of the company, a newly created office. Mr. Bolen has been connected with the railway department of the Public Service Corporation of New Jersey, of which the Public Service Railway is a subsidiary, continuously since 1903 except for a short term of service with the Mexico City Tramway. The first few months of his service with the company were devoted to a study of the traffic problems of the separate systems then recently consolidated, with a view to the operation of the lines as a unit. He was subsequently made district superintendent of the lines of the company in Hudson, Bergen and Passaic Counties, and when the scheme of organization of the company was changed and the position of superintendent of transportation was created Mr. Bolen was appointed to that post. All the lines in the State owned by the company were thus brought under his jurisdiction and all the division superintendents report to him. Before becoming connected with the Public Service Railway Mr. Bolen was in the employ of the Brooklyn (N. Y.) Rapid Transit Company, the service of which he entered when a boy. He was advanced in Brooklyn until at the time of his leaving the company to become connected with the Public Service Corporation he was superintendent of the Flatbush and the Bergen Street divisions of the company, two of the most important on the system. Mr. Bolen is a member of the American Electric Railway Transportation & Traffic Association.

OBITUARY

George Townsend, president of the Wyandotte Construction Company, Kansas City, Mo., which built the Kansas City, Clay County & St. Joseph Railway, is dead. It is supposed that Mr. Townsend, who was a victim of melancholia, committed suicide. Mr. Townsend disappeared from the Hotel Baltimore, Kansas City, on June 24 and on June 29 his body was discovered in the Missouri River 6 miles west of Kansas City, Kan. Mr. Townsend was sixty-two years old. He was well known in the West, particularly in Chicago. He is survived by a widow and two sons.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

Rome & Gadsden Railroad, Gadsden, Ala.—Application for a charter will be made by this company to build a 60-mile line between Rome, Cave Springs, Center, Forney Key, Rock Run and Gadsden. Capital stock authorized, $5,000 to $5,000,000. J. B. Wadsworth, Gadsden, president. [E. R. J., June 7, '13.]

***Circuit Terminal Railroad, Indianapolis, Ind.**—Application for a charter has been made by this company to take over the rights and franchises of the old Circuit Terminal Railway, sold under order of the Marion Circuit Court, to C. E. Worth and John W. Trotter, and to build electric railways and other public utilities between Greenfield, Noblesville, Lebanon, Danville, Martinsville, Franklin, Shelbyville and other intermediate points. Capital stock, $10,000. Directors: C. Eugene Worth, Indianapolis; John W. Trotter, Danville, and Oliver W. Johnson, Cleveland, Ohio.

FRANCHISES

Sylacauga, Ala.—M. B. Lewis and T. B. Perry, Sylacauga, have received a franchise from the Council to build an electric railway in Sylacauga. The terms of the franchise state that this line must be in operation within three years. The proposed line will extend from the new Eva Jane Mills just north of Sylacauga to Gantt's quarry, 2 miles from the town south. Later it is stated that other lines will be built in the residential section of Sylacauga. It is stated that the new company will be organized with a capital stock of $150,000.

Little Rock, Ark.—The Little Rock & Hot Springs Electric Railway has accepted the franchise granted it by the Council in Little Rock.

Los Angeles, Cal.—The Pacific Electric Railway has received authority to build at grade across fourteen public highways in Orange County for the purpose of double-tracking a portion of its Santa Ana line.

Belleville, Ill.—The Southern Traction Company of Illinois has asked the City Council for a franchise in Belleville. The line will be a part of a railway to Freeburg, which is a continuation of the East St. Louis-Bellevue line.

Morris, Ill.—The Fox & Illinois Union Railway, Aurora, has received an extension of ninety days on its franchise in which to complete its entrance into Morris. This 20-mile railway will connect Yorkville, Morris, Dwight and Sandwich. H. H. Evans, president. [E. R. J., April 26, '13.]

Springfield, Ill.—The Springfield & Central Illinois Railway has received a twenty-year franchise from the City Council to build a line from Springfield to Duquoin to connect with a line between St. Louis and Terre Haute. Voters will ratify the proposition July 15. [E. R. J., June 14, '13.]

Terre Haute, Ind.—The Springfield & Central Illinois Traction Company, which was recently granted a franchise by the County Commissioners to extend its lines from the Illinois State line to the west bank of the river, has notified the commissioners of the acceptance of the franchise. Work is scheduled to begin in a short time. The company will ask the City Board of Public Works to grant a like franchise through the city to a terminal station yet to be selected. The company will probably change its corporate name to the Springfield, Central Illinois & Terre Haute Traction Company. [E. R. J., June 28, '13.]

Portland, Maine.—The Portland Railroad has received a franchise to double-track its lines from a point near Martyr Street to a point near Kennebec Street in Portland.

Baltimore, Md.—The United Railways & Electric Company has asked the Council for a franchise to extend its lines on Callow Avenue to Park Terrace and the west side of Park Avenue in Baltimore.

Melita, Man.—R. E. Denny & Company, 32 Ninth Street, Brandon, have received a franchise to build an electric railway and install waterworks in Melita.

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Jefferson City, Mo.—The Jefferson City Bridge & Transit Company has received a twenty-five-year franchise from the Council in Jefferson City. The company plans to build a 1-mile extension and double-track some of its lines.

Grand Rapids, Mich.—The Grand Rapids Street Railway has asked for a franchise to extend its tracks on Campau Avenue to Louis Street in Grand Rapids.

Summit, N. J.—The Tri-County Power & Traction Company has asked for a fifty-year franchise from the Council to operate a trackless trolley line in Summit.

Morrisburg, Ont.—The ratepayers of Morrisburg have indorsed a by-law for the granting of right-of-way over certain streets to the Ottawa & St. Lawrence Electric Railway. The franchise is for a period of twenty-five years, and to be effective the company must practically complete its line by the fall of 1914.

York, Ont.—The first draft of the proposed agreement between the township of York and the Forest Hill Electric Railway was submitted to the Council recently. The agreement provides for a single-track railway from a point on Forest Hill Road near the north limit of York to a point 2½ miles north of Eglinton Avenue. It is stipulated that no work shall be done until plans have been submitted to the township, also that the company will commence construction at once and during the year will spend not less than $50,000.

York, Pa.—The York Railways will ask the Council for a franchise to extend its lines on Jackson Street in York. The company plans to build a loop going out George Street and circling the Country Club.

Seattle, Wash.—At the request of Mayor George F. Cotterill, Assistant Corporation Counsel Howard M. Findley and Assistant City Engineer D. W. McMorris, a bill has been introduced in the Council to repeal the franchise of the Seattle, Renton & Southern Railway.

Wenatchee, Wash.—The request of the Wenatchee Valley Electric Railway that it be allowed a four months' extension of the time limit of the franchise for an electric railway in Wenatchee, has been denied by the City Council.

Madison, Wis.—The Chicago & Wisconsin Valley Railway, Madison, has asked the Common Council for a franchise over certain streets in Madison. This line will connect Portage, Prairie du Sac, Madison, Merrill, Janesville, Friendship and Easton. J. E. Jones, Portage, general manager. [E. R. J., May 31, '13.]

TRACK AND ROADWAY

Los Angeles (Cal.) Railway.—Plans are being made by this company to double-track its Western Avenue line west of Hobart Boulevard at once. The company is asked to extend its lines to Hollywood and other sections of the northwestern part of Los Angeles. The work includes the extension of the Vermont Avenue crosstown line as far north as Los Feliz road, and the extension of the Western Avenue line to Hollywood Boulevard and into Hollywood. The proposal to install a third "L" rail on Hollywood Boulevard is also made to connect the Vermont Avenue lines and the Western Avenue lines in Los Angeles.

Pacific Electric Railway, Los Angeles, Cal.—Work will be begun at once by this company on its line between San Bernardino and Rialto. The steel for the concrete culverts and bridges has been received and bridge construction will be begun at once.

Geary Street Municipal Railway, San Francisco, Cal.—This company has placed in operation its line to the ocean beach in San Francisco.

Northwestern Elevated Railway, Chicago, Ill.—This company, through its president, B. I. Budd, has agreed to submit the question of extending the line into Wilmette, a suburb to the north of Chicago, to a referendum vote. The village board has been authorized to draft an ordinance subject to the approval of the railway company, and it will be submitted in the referendum.

Iowa Railway & Light Company, Cedar Rapids, Ia.—This company, which has announced plans for the construction of an interurban railway between Muscatine and Iowa City, is now promoting an electric line to be extended from Cedar Rapids to Davenport, via Tipton.

Kansas City, Kaw Valley & Western Railway, Bonner Springs, Kan.—This company, which plans to build an interurban railway from Kansas City to Bonner Springs and later to Lawrence and Topeka, may enter Kansas City by way of the Kansas City Outer Belt Railroad. The plan is to use about 2 miles of the belt line from Indian Creek to Eighteenth Street and Minnesota Avenue in Kansas City, there to connect with the Metropolitan Street Railway. A. L. Berger, attorney for Thomas A. Bigger, receiver for the Kansas City-Outer Belt Railroad, asked Judge Pollock to approve a lease whereby the interurban electric line was to use the north side of the right-of-way. Judge Pollock indicated that he favored granting the lease because those acquainted with the physical conditions said the use of a part of the outer belt, which has room for six parallel tracks, by an interurban line would benefit the property instead of injuring it. [E. R. J., May 10, '13.]

Orleans-Kenner Electric Railway, New Orleans, La.—Right-of-way is being secured and construction will be begun within the next sixty days by this company on its 15-mile line to connect New Orleans, Kenner, Hanson City, Harrihan and Shrewsbury. A tax of $77,500 has just been voted by Jefferson Parish to assist in the construction of the line. Officers: A. Smith Bowman, Wilcox, president; Andrew Fitzpatrick, New Orleans, vice-president, and Peter Stiffs, New Orleans, secretary. [E. R. J., June 14, '13.]

Texas-Louisiana Traction Company, Shreveport, La.—Right-of-way is secured and surveys are completed for the construction of this line, which will connect Shreveport, La., and Jefferson and Longview, Tex. The financing is said to have been arranged. A. B. Blevins, Jefferson, is interested. [E. R. J., Jan. 11, '13.]

Bangor Railway & Electric Company, Bangor, Maine.—This company will extend the Hampden branch track 1 mile this summer, but the proposed extension to Winterport will not be built this year. The work of connecting the Bangor and Brewer lines of the company on the new steel bridge over the Penobscot River will begin soon. A hearing will be held before the Railroad Commission in regard to the grade crossing which will be necessary at the Brewer end of the bridge, as the tracks of the Maine Central Railroad must be crossed there. The Bangor Power Company, a subsidiary of the Bangor Railway & Electric Company, has resumed work on the dam at Veazie, which will furnish increased power for the company.

Brandon, Man.—The citizens of Brandon have voted in favor of a by-law appropriating $150,000 for electric railway construction and equipment in Brandon. R. E. Speakman, city engineer.

Michigan & Chicago Railway, Grand Rapids, Mich.—Contracts for the third-rail equipment of the Michigan Central Railroad's branch from Montieth to Battle Creek have been awarded by this company, which recently brought the line from Battle Creek to Allegan. It is expected the line from Montieth, which will be the junction point, to Battle Creek will be completed as soon as the main line of the interurban from Grand Rapids to Kalamazoo. [E. R. J., May 24, '13.]

***Lakewood, Mich.**—Work has been begun on the new electric line between the railroad station and the club house at Lakewood, Mich.

Muskegon-Casnovia Land & Development Company, Muskegon, Mich.—The citizens of Casnovia are raising $10,000 to be used toward the construction of this railway between Muskegon, Casnovia and Saginaw. John O. Fraligh, Casnovia, is interested. [E. R. J., June 21, '13.]

Minneapolis (Minn.) Street Railway.—This company plans to build soon 15 miles of new track in Minneapolis.

***Biloxi, Miss.**—Plans are being considered to build an electric railway between Mobile and Biloxi. Among those interested are W. H. Bouslog, J. J. McIntosh, G. W. Grayson and E. B. Dunton.

Kingston & Excelsior Springs Electric Railroad, Kingston, Mo.—Surveys have been completed and right-of-way is being secured by this company for its 25-mile line between Kingston, Lawson and Excelsior Springs. Arrangements are being made to award the contracts for the construction of the line as soon as the right-of-way has been

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secured. Plans are being considered to build a line between Richmond and Excelsior Springs. B. Boner, Kingston, president. [E. R. J., May 31, '13.]

Moberly, Huntsville & Randolph Springs Railway, Moberly, Mo.—Grading has been begun by this company at Randolph Springs, the western terminal. This 12-mile line will connect Moberly and Randolph Springs. Charles H. Dameron, president. [E. R. J., June 21, '13.]

Billings (Mont.) Traction Company.—During the summer this company plans to extend its line to Polytechnic.

Fallon (Nev.) Electric Railroad.—Rapid progress is being made on the electric railroad being built from the Harrigan ranch to Fallon. Rails now are laid within 1 mile of Fallon. It is proposed to extend the line to Dixie Valley, in Nye County. A. E. Wilson, Fallon, secretary. [E. R. J., June 21, '13.]

***Dayton, Ohio.**—Plans are being considered to build an electric line between Dayton and Cincinnati, via Reading, Carlisle and Germantown. Among those interested are: J. G. Miller and L. T. Palmer, Middletown, and F. J. Ferneding and O. L. Mead, Dayton.

Springfield (Ohio) Railway.—Work will soon be begun by this company on its new line on Clinton Street to its proposed new carhouse in Springfield.

Tri-State Traction Company, Steubenville, Ohio.—It is reported that this company plans to build an electric and steam line betwen Quincy and Burlington.

Poland Street Railway, Youngstown, Ohio.—Surveys have been compieted and grading is under way along the entire 16-mile between Poland and Youngstown, via Lansingville, Pine Hollow and Poland Heights. [E. R. J., June 14, '13.]

Lake Erie & Northern Railway, Brantford, Ont.—Grading has been completed by this company between Waterford and Bloomsburg. Work has been begun on the Waterford bridge. The structure will cost $65,000. The route through Simcoe has been approved by the Board of Dominion Railway Commissioners.

Morrisburg & Ottawa Electric Railway, Ottawa, Ont.—This company has called for bids for the construction of 10 miles of its line of railway, from Ottawa, extending in the direction of Morrisburg, such bids to be based on the company's plans and specifications. Bids will be received up to July 8, 1913, and the plans and specifications for proposed work can be inspected at any time at the head office of the company in Ottawa, Ont.

Toronto, Ont.—The proposed electric railway between Toronto and Port Perry is now under consideration by the engineering staff appointed by the Hydroelectric Power Commission of Ontario.

Toronto Suburban Railway, Toronto Junction, Ont.—This company has been asked to remove its tracks from the west side of the road to the center on Main Street from Church Street to the northern boundaries of Weston.

Harrisburg, Pa.—Surveys are being made for a new electric line between Hershey and Elizabethtown, via Campbelltown, a distance of about 9 miles. It will be a feeder for the Hershey-Lebanon system, owned by the Hershey chocolate interests. Work on the construction of the new line is to be started soon.

Montreal (Que.) Tramways.—This company is relaying tracks in different parts of Montreal, this forming part of an extensive programme which will be carried out during the next few months. The old rails of 96 lb. weight are being replaced with rails of 116 lb., the guard rails being increased to 132 lb., which will be standard for the future. In certain sections special cedar ties are being laid down, the length being increased from 7 ft. to 8 ft., while they are put 2 ft. apart instead of 2 ft. 6 in. The roadbed has been greatly strengthened.

Middle Tennessee Traction Company, Franklin, Tenn.—This company has increased its capital stock from $10,000 to $250,000. This railway will connect Franklin, Eagleville, Shelbyville and Fayetteville. Grading has been completed from Franklin to Eagleville. The Interurban Construction Company, which has been organized to build this line, has elected the following officers: R. H. Crockett, president; P. E. Cox, vice-president and general manager; E. E. Green, secretary and treasurer, and G. B. Howard, chief engineer. [E. R. J., June 7, '13.]

Guadalupe Valley Traction Company, Seguin, Tex.—Grading has begun by this company on its 92½-mile line to connect Austin, Lockhart, Seguin and San Antonio. The company has not yet decided whether the motive power will be gasoline or electricity. Capital stock authorized, $100,000. Capital stock issued, $75,000. Officers: W. B. Dunlap, Seguin, president; E. W. Brown, Orange, vice-president; W. J. Crawford, Beaumont, secretary and treasurer; J. M. Abbott, Seguin, general manager, and Guy M. Simpson, Seguin, chief engineer. [E. R. J., June 28, '13.]

Salt Lake & Utah Railroad, Salt Lake City, Utah.—This company has awarded a contract to S. L. Chipman, American Fork, for grading 10 miles of its line south from Jordan Narrows. The company will soon award other contracts for construction of its line which will connect Salt Lake City, Provo, American Fork, Pleasant Grove, Springfield, Spanish Fork and Payson. W. C. Orem, Salt Lake City, president. [E. R. J., Feb. 22, '13.]

SHOPS AND BUILDINGS

Northern Electric Railway, Chico, Cal.—This company has completed its new freight depot in Oroville. It is reported that the company plans to build a new passenger depot in Oroville.

Northwestern Elevated Railroad, Chicago, Ill.—This company is considering plans to buiid a new terminal station in Wilmette. The cost is estimated to be about $12,000.

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind.—This company has taken out a building permit for an addition to its Spy Run Avenue power house, which it is estimated will cost approximately $300,000.

Cedar Rapids & Marion City Railway, Cedar Rapids, Ia.—This company plans to build a new two-story carhouse and workshop at Cedar Rapids in the near future. The cost is estimated to be about $55,000.

Holyoke (Mass.) Street Railway.—Among the improvements planned by this company will be the construction of new carhouses on the Hadley lot in Ward 1 in Holyoke.

Charlotte (N. C.) Electric Railway.—This company's paint shop and machine shops in Dilworth were destroyed by fire on June 14. The equipment, consisting of lathes, air compressors, etc., four cars and accessories, besides stores, were also destroyed. The loss is estimated to be about $50,000.

Oregon Electric Railway, Portland, Ore.—Plans and specifications have been received by this company for its new passenger station in Eugene. Bids are being asked for the construction of the building, which will be of brick. The express rooms will be located in the western end of the structure and the baggage rooms will be in the east end.

POWER HOUSES AND SUBSTATIONS

Georgia Railway & Electric Company, Atlanta, Ga.—This company has installed three transformers at its Dunlap power plant.

Union Traction Company, Independence, Kan.—This company is installing a new 750-hp engine and has received other machinery for installation at its power plant in Independence.

South Covington & Cincinnati Street Railway, Covington, Ky.—This company has placed an order with the Westinghouse Electric & Manufacturing Company for one 300-kw portable substation in which is installed one 300-kw, 600-volt d.c., three-phase, 60-cycle, 1200-r.p.m. self-starting rotary converter and one 330-kva, 4400-volt, three-phase outdoor-type O.I.S.C. transformer complete with one two-panel switchboard.

Holyoke (Mass.) Street Railway.—This company plans to bring its power plant in Holyoke up to date and will install new turbine engines.

Rio Grande Valley Traction Company, El Paso, Tex.—This company has placed an order with the Westinghouse Electric & Manufacturing Company for three 250-kva, 2200-6600-volt, single-phase, 60-cycle O.I.S.C. transformers and one switchboard.

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Manufactures and Supplies

ROLLING STOCK

Savannah (Ga.) Electric Company is in the market for three cars.

Maryland Electric Railway, Annapolis, Md., is reported as expecting to purchase a number of cars.

St. Joseph Valley Traction Company, Elkhart, Ind., will purchase three or four new cars.

Cape Breton Electric Company, Sydney, N. S., is reported as expecting to purchase a number of cars in the near future.

Washington, Baltimore & Annapolis Electric Railway, Baltimore, Md., is in the market for twelve all-steel interurban cars.

Genoa, Italy, will require twenty-two motor cars and a similar number of trail cars for the proposed 6-mile subway in that city. S. Cattaneo Adorno, Genoa, may be addressed.

Mobile & Baldwin County Railroad, Volanta, Ala., is in the market for two combination passenger and baggage gasoline cars that will seat from twenty to thirty-five persons.

Chicago (Ill.) Railways, noted in the ELECTRIC RAILWAY JOURNAL of June 14, 1913, as expecting to purchase 100 cars, has ordered these cars from the Southern Car Company, High Point, N. C.

South Covington & Cincinnati Street Railway, Covington, Ky., noted in the ELECTRIC RAILWAY JOURNAL of May 17, 1913, as having ordered twenty semi-convertible cars from the Cincinnati Car Company, has specified the following details:

Seating capacity.....32	Underframe .....composite
Length of body...21 ft 0 in.	Car trimmings .....Dayton
Length over vestibule, 30 ft. 9 in.	Couplers .....Van Dorn
	Curtain fixtures ....Forsyth
Width over sills.7 ft. 11¾ in.	Curtain material...Pantasote
Width over all.....8 ft. 2 in	Destination signs ...Hunter
Height, rail to sills....28 in.	Fenders or wheel guards, Hunter
Sill to trolley base, 9 ft. 3¾ in.	Gongs .....12 in.
Body .....wood	Hand brakes .....Peacock
Interior trim .....mahogany	Headlights .....U. S.
Headlining....poplar veneer	Trolley base .....U. S.
Roof ....monitor	Varnish .....Murphy

United Traction Company, Albany, N. Y., noted in the ELECTRIC RAILWAY JOURNAL of June 14, 1913, as having ordered twelve semi-convertible pay-within cars through W. R. Kerschner, from the Cincinnati Car Company, has specified the following details for these cars:

Seating capacity 44	Fare boxes.....New Haven
Weight (car body only), 18,000	Wheel guards.....Rochester
	Gears and pinions.....West.
Bolster centers, length, 18 ft. 11 in.	Gongs .....Standard
	Hand brakes.....Peacock
Length of body...30 ft. 11 in.	Heaters .....Cons.
Length over vestibule, 44 ft. 11 in.	Headlights ... Crouse-Hinds
	Journal boxes....Symington
Width over all.....8 ft. 4 in	Motors.....W. H. 101 B2 outside-hung
Height, rail to top of floor .....39 in.	Paint.....Devoe & Reynolds
Sill to trolley base..8 ft. 9 in	Registers.....New Haven
Body .....metal	Sanders .....Dewitt
Interior trim ....mahogany	Sash fixtures....Cin. Car Co.
Headlining .....Agasote	Seats, style.....H. & K.
Roof, type .....arch	Seating material...Pantasote
Underframe .....metal	Step treads.....Mason
Air brakes .....G. E.	Trolley catchers...Keystone
Axles .....Carnegie	Trolley base.....Ohio Brass
Bumpers .....Hedley	Trucks, type.....Taylor
Car trimmings..Cin. Car Co.	Varnish, Beckwith & Chandler
Conduits and junction boxes....Elec. S. Sup. Co.	Ventilators...Aut. Vent. Co.
Couplers .....Standard	Wheels.....forged steel
Curtain fixtures ..Cur. S. Co.	Door and step device, Cin. Car Co.
Curtain material...Pantasote	

TRADE NOTES

Tilsonburg Electric Car Company, Ltd., Tilsonburg, Ont., has been organized to manufacture electric street cars, snow sweepers, etc.

Protectus Paint Company, Philadelphia, Pa., has been appointed railway selling agent for the products of the Barber Asphalt Paving Company.

Fred Gardner Company, Chicago, Ill., has been incorporated with capital stock of $2,500 to buy, sell and deal in railway supplies, etc. The incorporators are Fred Gardner, Charles B. Moore, J. L. Nicholson.

Canadian Foundry Company, Ltd., Toronto, Ont., has appointed J. G. Seyfried engineer for the bridge department of the company. Mr. Seyfried was formerly connected with the Grand Trunk Railway at Montreal, Que.

S. F. Bowser & Company, New York, N. Y., have appointed W. E. Jenkinson railway representative, covering the territory vacated by E. F. G. Meisinger. In addition Mr. Jenkinson will take over the Southwestern and Pacific Coast territory.

Pyrene Manufacturing Company, New York, N. Y., has received recent orders for its fire extinguishers from the Allen Street Railway, the Standard Steel Car Company, and a repeat order from the Interborough Rapid Transit Company for fifty extinguishers.

Curtain Supply Company, Chicago, Ill., has received recent curtain orders from the following railways: New York State Railways, Rochester, N. Y.; Washington Railway & Electric Company, Washington, D. C.; Holyoke (Mass.) Street Railway, and the Manhattan Bridge Three-Cent Fare Line, Brooklyn, N. Y.

Pantasote Company, New York, N. Y., has elected E. H. Outerbridge vice-president and managing director of the company. Raymond Harvey, who has been associated with Mr. Outerbridge for more than ten years, has been elected secretary and treasurer to fill the vacancy caused by Mr. Outerbridge's recent appointment.

Union Switch & Signal Company, Swissvale, Pa., has recently received a contract from the Ohio Electric Railway for signaling its line between Fort Wayne and New Haven, Ind., a distance of 4.2 miles. This division, which has the first track circuit signaling on the system, contains two blocks, using four type B semaphore signals and four light signals.

Electric Service Supplies Company, Philadelphia, Pa., has recently received large orders for automotoneers from the Philadelphia (Pa.) Rapid Transit Company. These are placed on the trolley car controllers to compel the motorman to stop for a short interval of time on every point in throwing power from "off" to full "on." It is claimed by the manufacturer of this device that it substantially reduces the cost of controller and motor maintenance.

Anger Manufacturing & Supply Company, Ltd., Preston, England, manufacturer of the Anger improved automatic brake adjuster, reports a large increase in its business. The company has received recent large orders from the Sheffield Corporation Tramways, the Birmingham Corporation Tramways, the Cardiff Corporation Tramways, the Santos (Brazil) Tramways, and many others. The company has recently made arrangements with another factory to manufacture the various parts of this device at Hapton, which makes four factories that this company is now operating in Europe. The company has also closed an agreement with the Ackley Brake & Supply Company, New York, N. Y., to manufacture and sell its device in the United States, Mexico, Cuba, Porto Rico, Central America and the Philippine Islands.

Van Dorn Electric Tool Company, Chicago, Ill., has been formed to take over the portable tool department of the Van Dorn & Dutton Company. This latter company has for nearly eighteen years specialized in the production of gears and gear cutting. Some seven years ago it took up as a side line the design and production of portable electrically operated drilling and reaming machines, to which have since been added electric grinders and portable

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tools and within the past two and one-half years the products have been materially improved and widened in scope. For some time past it has seemed to the company that the portable tool operations had grown to such an extent that this branch and that of the gear operations would be best served by operating each as a separate and distinct company, particularly by reason of the fact that the original interests were expanding to an extent equal to the other operations. As a result the above company was formed, taking over the portable tool operations. The gear interests, as during the past eighteen years, continue under the old company, the officials of which all remain the same. The officials of the new company are W. P. Johnston, president and treasurer; F. G. Hodell, vice-president, and H. A. Rock, secretary. Franklin Schneider will continue to supervise the manufacture and design of these portable electrically operated tools.

Pierson, Roeding & Company, San Francisco, Cal., announce a reorganization of the personnel of their organization as a result of the resignation of S. K. Colby, vice-president, and the appointment to this position of Thomas Finigan, as recently mentioned in this paper. The rapid development of the company's business during the past ten years has led to the establishment of a number of branch offices on the Pacific Coast, and it now is able to serve promptly and has a large business in all of the states west of the Rocky Mountains as well as in British Columbia and the Hawaiian Islands. H. R. Noack, who retains the position of president in the reorganization, has been actively connected with the company since 1898 and during this time has been a large instrument in its success. Thomas Finigan, the new vice-president, brings to the firm the strength of a wide acquaintance, made while associated with the United Railroads of San Francisco and with the Consolidated Traction Company of New Jersey. The treasurer of the company, George R. Murphy, who is in charge of the storage battery department, is also originally from the East, having been connected with the Metropolitan Street Railway of New York and later with the Electric Storage Battery Company. He joined the forces of Pierson, Roeding & Company in 1909. The financial department of the company is in charge of the secretary, George P. Dahle, who has been associated with the company and its predecessors for the past twelve years. The Los Angeles branch of the company is in charge of A. L. Havens, who has been with electrical interests since 1895. The Portland office is in charge of S. Herbert Lanyon and the Seattle office of N. H. Silver, both with long experience in the design and construction of electrical plants and the manufacture of electrical apparatus. The business of the company is also divided into departments, and each is in charge of a specialist. The president of the company, Mr. Noack, cares for the transmission projects, and the railway department is managed by Vice-president Finigan. The car and truck department, an important one because the company represents The J. G. Brill Company on the Pacific Coast, is managed by Ford A. Richards, for many years with the Peckham Manufacturing Company and later with the J. A. Hanna Company. The underground conduit department is directed by C. G. Gauntlett, formerly with Siemens Brothers & Company of London and later with the Pacific Coast Electric Corporation at San Francisco. The sale of poles and cross arms is in charge of F. L. McGillan, at one time general superintendent of the pole yards of the Valentine Clark Company in Chicago and later vice-president and general manager of the California Pole & Piling Company of San Francisco. Finally the hydraulic department is under the direction of E. G. Dewald. While S. K. Colby will no longer be actively identified with the company, he will retain his interest in it and is still a director.

ADVERTISING LITERATURE

Condensite Company of America, Glen Ridge, N. J., has issued a folder describing its synthetic oil and waxes for all uses.

Dossert & Company, New York, N. Y., have issued a very attractive catalog illustrating and describing all types of "Dossert" solderless connectors for solid and stranded wire.

Walter A. Zelnicker Supply Company, St. Louis, Mo., has issued Bulletin No. 139, illustrating and describing the rails, equipment, heavy machinery, etc., it now has on hand.

Thayer & Company, New York, N. Y., sole American agents for the Chillingworth one-piece seamless gear case, have issued a folder describing their gear cases and containing several illustrations of them and the firm's Jersey City plant.

Van Dorn & Dutton Company, Cleveland, Ohio, have issued a catalog illustrating and describing their different types of gears. The catalog also contains a set of rules on gearing and tables of diametral pitch, circular pitch, and a great deal of other valuable information.

Electric Controller & Manufacturing Company, Cleveland, Ohio, has issued very a attractive catalog entitled "More Chips." The catalog contains an article by H. F. Stratton, on "Automatic Control of Machine Tools," with a great many illustrations, of all types of machines, using this automatic control.

Protective Signal Manufacturing Company, Denver, Col., has just issued an eight-page circular describing the "railway crossing protector." Several notable improvements have been made in this highway crossing signal, which are said to have decreased its cost of installation and maintenance, and to have increased its reliability.

California Corrugated Culvert Company, Los Angeles, Cal., has issued a very attractive catalog describing its culverts and containing many illustrations of work that is under construction and completed. The catalog also contains the official report of test made by Prof. A. N. Talbot, of the University of Illinois, on its culvert.

Nachod Signal Company, Philadelphia, Pa., has issued an attractive catalog in three colors entitled "Merit Tells," which is generously illustrated with interurban views. It describes the Nachod products, including automatic signals for single and double track electric railways controlled by trolley contactors, crossing bells and automatic headway recorders.

The J. G. Brill Company, Philadelphia, Pa., prints in its June, 1913, issue of the *Brill Magazine* an illustrated biography of John Frank Calderwood, vice-president and general manager of the Brooklyn (N. Y.) Rapid Transit Company. Among the feature articles are the following: "Conditions Which Govern the Type of Car for City Service, Seattle, Wash.," "Radiax Trucks in New Bedford, Mass.," "Changes in Platform Arrangement and Ventilators on the Near-Side Car," "Convertible Prepayment Car for the Slate Belt Electric Railway," "San Diego Center Entrance Car" and the "Storage Battery Cars for the Heaviest Traffic Street in the World." The magazine this month contains a new feature under the heading "Addressed to Men," which contains good advice to men who have a purpose to rise in rank and who would regard their calling in electric railway work as something more than a mere means of livelihood.

Locke Insulator Manufacturing Company, Victor, N. Y., has just issued "The Insulator Book." This work is an excellent example of the tendency of manufacturing companies to have catalogs carry valuable general technical data on their specialty in addition to the customary descriptions of the firm's products. The present publication contains an interesting essay on insulating materials, leading to the extremely important matter of preparing general insulator specifications with explanations of the purpose of each kind of test. The discussion is followed by notes on the construction and application of suspension insulators, now so prominent in high-tension work, sherardizing, etc. The apparatus described covers the company's porcelain insulators of pin and suspension types, glass insulators, porcelain bushings and tubes, arcing rings, brackets, pins and other fittings. All items may be economically ordered by telegraph through the use of code words. The book is prepared in loose-leaf form so that changes in patterns can readily be noted by the user without the nuisance of keeping a number of more or less obsolete publications.

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THE AUTO-TRUCK FOR EMERGENCY SERVICE

The recent decision of the New York Railways to use electric emergency wagons hereafter will drive the vanishing horse out of his last stronghold in railway service. The greater mileage possibilities of auto-trucks require no expatiation at this day, but attention may be called to their much greater flexibility in meeting specially arduous conditions. Thus, the shorter length of the auto-truck in comparison with a horse and wagon combined make it much easier to move through and out of congested streets. Furthermore, when it is necessary to remove a broken-down vehicle or other heavy obstruction from the track the auto-truck is equally serviceable for pulling or pushing from either end. The preference of the company in question for electric instead of gasoline trucks is also of interest. It found that, on the combined basis of first cost, operation and upkeep, the former actually were cheaper for use on streets with heavy traffic. For general city service the introduction of auto-trucks has made it feasible to operate safely those without towers at an average speed of 15 m.p.h. The stresses set up by the swaying of towers, however, do not make it advisable to operate tower trucks at more than 12 m.p.h.

CITY SUBSIDY TO AID LOCAL TRANSPORTATION

The demand of the residents of East Boston that the city assume the responsibility of the payment of the interest and sinking fund charges on the East Boston tunnel, in order that they may be relieved of a penny toll, illustrates the universal desire of individuals to transfer their charges upon the government through its power of taxation. On the other hand, the reception accorded this demand shows the growing opposition of taxpayers at large to any additions to their burdens. The question at issue is, of course, the extent to which a city should go in subsidizing transportation facilities to different localities. While the city undoubtedly profits by the extension of every transportation line, the individual locality profits in an even greater ratio, and the practice of requiring special bonuses or assessments for improved transportation facilities is on the increase. Not long ago an insistent minority could often bring enough political pressure to bear upon authorities in most cities to secure the public assumption of a burden of this kind, but now municipal expenses have been growing so rapidly that a different condition prevails, and the opposition of organized taxpayers' associations is also becoming more pronounced. The result of the Boston referendum will throw light upon the way in which the matter is regarded in that city. The subject is an important one, because the laws governing many public service commissions permit them to require railway companies to build extensions upon order of the commission.

CAR BUILDING BY THE SMALL COMPANY

The lure of showing something as "home-made" occasionally leads the small railway to wasteful operating expense which more than offsets a real or fancied saving in first cost. The small railway rarely finds it necessary to buy a new utility car, as it is usually possible to press into service an antiquated passenger car which can be converted at a low charge, or, at the most, a new body may be assembled with old trucks, motors and brake rigging. Such service cars are likely to lack refinement in design and construction, but as their mileage is small their extra weight is of no great importance. Home design and construction of passenger cars, however, should be approached with greater caution. To begin with, as the small company cannot afford an expert designer, the finished car is likely to be much heavier than necessary and to embody crudities in construction which an experienced car engineer would have avoided. Needless weight not only implies higher first cost but excessive energy consumption, greater strain on the motors and injury to special work. Again, the narrow shop facilities of the small company and the fact that the car is built during odd moments are not conducive to the best work. In any event, if conditions do favor home construction, as when a company which is isolated from car builders can get raw materials cheaply, it would be wiser to imitate the successful designs of other companies for like conditions than to run the risk of serious errors through inexperience.

THE FINANCING OF HOLDING COMPANIES

The failure of the First-Second National Bank of Pittsburgh and the appointment of receivers for the American Water Works & Guarantee Company emphasize the dangers which lurk, particularly at the present time, in the over-extension of holding companies. The exact causes of the bank failure are under investigation by the authorities of the Treasury Department, but the facts seem to in-

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dicate that the assets of the bank consisted largely of non-liquid securities, not necessarily excessive in amount, but evidently of inferior quality, upon which the government placed a lower valuation than the bank. On account of the connection between the officers of the bank and the officers of the American Water Works & Guarantee Company, presumably a considerable portion of the securities held were those of the latter company and its controlled corporations. We believe that intrinsically public utility properties, such as water companies, electric light and power companies and electric railway companies, when conservatively managed, ought to be among the most desirable classes of investments because they are less subject to fluctuations in commercial conditions than most manufacturing enterprises or trunk-line railroads. It is very difficult now, however, to market any securities except on a basis of a high interest or dividend return, and the securities of the public utility enterprises are not exempt from this condition. In fact, the uncertainty in regard to the legislation and labor conditions has accentuated the situation in regard to these securities. These special conditions, we believe, will pass away, but while they remain they have to be taken into consideration, and any attempt to pyramid upon securities not readily salable is liable to result in disaster.

THE LIMIT IN LABOR UNION ACTIVITY

Just one year ago one of the most disastrous wrecks in the history of American railroading occurred near Corning, N. Y. Forty-one passengers were killed and many were injured. Yet to-day, notwithstanding vigorous efforts on the part of the public authorities, the man whose criminal negligence obviously was the cause of the disaster stands acquitted of the charge of manslaughter which was lodged against him.

The primary cause for this miscarriage of justice is charged directly, in an open letter to a New York newspaper by one of the prosecuting attorneys, to the pernicious activities of the railroad men's unions. This procedure is by no means new, although it probably establishes a record, because the railroad brotherhoods have for some obscure reason developed the custom of fighting vigorously against every case of discipline imposed by a railroad, quite regardless of its merits.

To influence a jury to the extent where it will acquit in the face of what is described as overwhelming evidence and upon the grounds of a defense consisting largely of testimonials of good character is admittedly a logical step for the brotherhood, yet there is a vast difference between the subversion of discipline on a railroad which is willing to pay almost any price to avoid labor trouble and a perversion of justice effected by tampering, even indirectly, with a jury. If this course is to be followed in future, it is difficult to believe that public sentiment can fail to take cognizance of the fact that the trainmen's organizations have just as much regard for the public interests as a frog has for a pair of rubber boots.

Public sentiment has meant much to the railroad labor organizations in the past, and if they lose its support their present power is hardly likely to remain unimpaired. Their action in presenting themselves as lobbyists in the courts is unwise, to say the least, and, aside from the vicious precedent which is set up, the result in the end cannot fail to be detrimental to the organizations themselves.

SEGREGATING TECHNICAL DATA

Unlike the great philosopher Bacon, who said that he had taken all knowledge to be his province, the average reader of a technical paper feels satisfied if he can read carefully all that is published on his own specialty. It is the aim of every well-edited journal to aid this purpose by the use of appropriate captions and sub-captions as guide-posts, but the application of the facts thus given necessarily depends upon the individual. Each reader of this paper probably has his own way of utilizing the information published, but the method of one which recently came to our attention may be of interest to others. His particular work was car maintenance, and his plan, briefly, was to compile the information published in this paper on that subject and to combine it with facts gained from his own experience. This material was then rewritten on a typewriter, according to the subdivision of the subject, and kept available for easy reference.

An abstract of this assembly shows the following typical arrangement: Under motor inspection he classed commutators, leads, brushes, brush holders and yokes as parts which soon expose defects, whereas neglected commutator dust caps, hand-hole plates and armature clearance rarely evince themselves until an actual breakdown occurs. The absence of commutator dust caps encourages the entrance into the motor of brakeshoe filings, dust and armature bearing oil, which find their way into the armature and field windings and burn them out eventually through excessive heating. An armature may run for months with a clearance below the safety line, but when it does go down on the pole pieces the failure is complete. The compiler's conclusion is that it is cheaper to inspect all parts frequently than to have costly repairs and loss of mileage.

The section on brakeshoes lays stress on the desirability of having an experienced man check the adjustments of small but important parts which may be made by unskilled laborers; also on saving and matching the least-worn shoes of discarded sets, or, better still, of avoiding uneven wear by keeping the brake rigging equalized. The hints on truck and wheel maintenance serve as reminders that non-equalized brake rigging, poor lubrication of center plates and side bearings and lack of clearance on side bearings produce unnecessary flange wear and that other common oversights in truck work are loose or broken bolts and lack of oil on swinging joints and places subject to the rubbing of the brake rods.

In the section on compressors the compiler set down methods of determining trouble by ear, such as a thump for crank-shaft trouble and a positive click for a loose crank pin. On the subject of controllers he added the following pointer from his experience: "Do not neglect to replace the pole piece bolt after completing inspection. Since the magnetic effect of the blow-out is inversely proportional to the square of the distance across the air gap, even a slight increase in the air gap causes a large decrease in the efficiency of the blow-out. When its bolt is not replaced the pole-

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piece is dependent solely upon the controller cover to keep it in place, and if the cover is loose the pole piece is free to swing back and forth to a certain extent. The consequent flashing destroys the temper of the finger springs and introduces complications which burn up the controller. Again, the use of pliers to bend back the finger spring, in order to make it easier for the shop man to start the screws, takes the life out of a spring and shortens the usefulness of the finger. The adjustment of finger tension without tightening the jam nuts causes many buckled fingers and locked controllers."

The foregoing facts have not been presented because of anything novel which they may contain, but rather to show how one busy man has harvested and bound in a single sheaf the crops of facts that were of the most direct value to him.

TRAIN DISPATCHING ON INTERURBAN RAILWAY

The wreck near Vallejo, Cal., on the line of the San Francisco, Napa & Calistoga Railroad, which occurred on June 19 and resulted in the death of thirteen passengers and serious injury to a score or more, strongly emphasizes the crying necessity for greater care and efficiency in the operating departments of many interurban electric railways. In some parts of the country there is a tendency to regard an interurban electric line in the same light as a street car system, in which the schedule is arranged by the operating department but the maintenance of the schedule is left to the individual car crews.

It is reported that a number of dangerous defects in the operation of the San Francisco, Napa & Calistoga Railroad were pointed out by the State Railroad Commission in a letter addressed to the management on the day before the accident. Specifically the defects to which attention was called were said to be the absence of train registers for checking the arrival and departure of trains, the omission of a dispatcher's book record of train orders issued, the failure to follow prescribed forms as outlined in the book of rules, and the lack of standard clocks with a daily registration of the condition of watches of motormen and conductors. The company was also warned that trainmen must make meeting points positive in case of a wire failure and an interruption to service due to trains being late.

The conductor of the northbound Calistoga flier has strongly maintained that before leaving Vallejo he telephoned to the dispatcher at Napa and received from him the reply "No orders," meaning that the train should run on regular schedule. The dispatcher has as strongly maintained that up to the time of the accident the conductor of the northbound Calistoga flier had not telephoned him for orders and that had he done so the accident would have been averted. There is little evidence to indicate which of the contradictory statements is true. Nor is it of any importance to the public whether the conductor or dispatcher neglected his duty, except that the dispute points out the inefficiency of such a system of issuing train orders. Indeed, the investigation now in progress before the State Railroad Commission of California, while it may serve to determine the liability of the company for damages, will be of little value if it does not lead to the adoption on interurban single-track electric lines of stringent dispatching regulations.

THE NEW HAVEN AND ITS TROLLEY LINES

The ownership of the trolley lines of the New Haven Railroad is condemned this week in no uncertain terms by the Interstate Commerce Commission, whose criticism is not only directed against the prices paid for the properties but includes a strong condemnation of the extension by an interstate road of its activities beyond its own direct field.

Unfortunately for its balance sheet, the New Haven railroad acquired these trolley properties either too early or too late. If it had decided upon the purchase of the Providence system five years earlier than it did, for instance, it would undoubtedly have been able to save a large part of the $13,500,000 for which the commission considers that it secured nothing. If it had waited an equal length of time, or until 1911 or 1912, assuming that such a purchase would have been permitted by the state and federal laws, the price paid would also undoubtedly have been considerably less than in 1906. But the company embarked upon its plan of securing a monopoly of the transportation facilities in southern New England at a time when there was an exaggerated idea of the economies to be obtained from consolidated ownership and when the disadvantages of a monopoly were not so thoroughly understood as at present. At that time, too, there were exaggerated ideas of the possible profits to be derived from trolley operation.

It was also hoped, and we believe that Mr. Mellen expressed this belief on several occasions, that the service of the trolley lines and that of the through line could be combined; that is to say, that cars traveling over the street railway tracks in one town could make an interurban run over the through tracks of the steam railroad and then continue their run over the city tracks in an adjoining town. We believe that this plan has never been extensively followed on the New Haven road, and the two services have been kept quite distinct, except so far as the trolley companies have been able to benefit from the services of the engineering, accounting and transportation departments of the larger company. At all events, the commission has expressed itself as opposed to this policy of trolley control, not because it is against the law but because such ownership might be used to prevent the construction of competing lines in the future.

We do not understand this to be an order of the commission but simply an expression of opinion. If put into the form of an order, the problem might prove as complicated as that of divorcing the Union Pacific and Southern Pacific Railroads, to which so much study has lately been devoted. Moreover, we doubt whether it would accomplish the result sought. One may be skeptical of the advantages of the control of trolley lines by interstate steam railroads and yet not understand why it prevents the construction of competing trolley lines in a state where the public service commission has wide powers over service, rates and franchises. Until quite recently we were told that a monopoly, rigorously controlled and subject to revocation of its franchise if it did not obey orders, was the most desirable form of public utility. Now we are taught that there must be competition in addition to keep it in check and to make sure that it will perform its service to the public.

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Recent Improvements in the Electric Railway System of Providence, R. I.

Introduction of Platform Collection Cars—Improvements in the Handling and Distribution of Traffic—Use of Automatic Block Signals on Single-Track Lines—Other Features

The system of the Rhode Island Company, of which the street railway lines of the city of Providence form the nucleus, is one of the most comprehensive in the East, embracing within its limits a combined urban and suburban trackage of about 320 miles. The service of the company extends throughout the greater part of the smallest and yet the most densely populated state in the Union and includes a passenger, freight and express business yielding a gross revenue of about $5,000,000 per year. In general, the system radiates from Providence in all directions, including interurban lines running to points in Massachusetts and Connecticut, and providing rapid and frequent transportation between Providence, Fall River, Narragansett Pier, Danielson, New Bedford, Worcester, Brockton and other populous centers. The operating headquarters of the company and the most pressing problems of the management center at Providence, and in the following paragraphs are given the details of some recent improvements associated with the urban lines, including the introduction of platform collection cars, improved methods of handling traffic, the enlargement of the power plant facilities and the conduct of a large express and freight business.

Providence Improvements—Exchange Place Loop

The traffic problems of Providence are greatly complicated by the geography of the city, the narrowness of the streets and the rapid growth of the great manufacturing, mercantile and residential district of which the city is the center. For this reason the relation of car design to the transportation needs of the system is recognized by the company to be a matter of fundamental importance. An exhaustive investigation of the traction conditions and desirable improvements within the Providence district was made in 1911 by Bion J. Arnold, who was retained by the city as its consulting engineer. Mr. Arnold's report was briefly abstracted in the Electric Railway Journal of Aug. 19, 1911, and included among other recommendations one advising the use of semi-convertible platform collection cars with lengthened vestibules and the gradual retirement of the smaller and relatively inefficient rolling stock in use upon the city lines. The company concurred in this view, and thirty-five cars of this type have been placed in service.

The business center of Providence is located in a flat basin whose outlets are narrow and handicapped by heavy grades. Large carrying capacity per unit of rolling stock is dictated by the traffic density and the restrictions upon schedule speed imposed by the absence of broad and level thoroughfares over which high-speed operation can safely be permitted. Providence is essentially a short-haul city, but the population of 286,000 within the 5-cent fare zone renders the use of large cars essential in the most efficient handling of the dense traffic carried. The present schedule of cars operated into or within the city of Providence comprises, with the exception of the semi-convertible platform collection cars to be described later, three principal classes having twenty-six, thirty-four and forty-two seats respectively, some being designed for urban and some for suburban service. The company owns 985 passenger cars, 435 of which are of the open type. With the exception of the suburban or long-haul cars, all have longitudinal seats, the former having cross seats or a combination of cross and longitudinal seats. A large number of open cross-seat cars are operated in the summer. The smaller cars have been retained chiefly on account of the difficulty of operating any other type of car over the College Hill approach to the East Side of the city. This obstacle will in the near future be largely overcome by the construction of a tunnel under the hill for the use of all types of rolling stock operated by the company. Prior to the introduction of the new platform collection cars, the latest type of equipment for passenger service consisted of cars seating forty-two persons each, double trucks and four motors being standardized for the service. Nearly all these cars are arranged for double-end operation and the majority have outside-hung motors. The principal objection to the use of two-motor cars in

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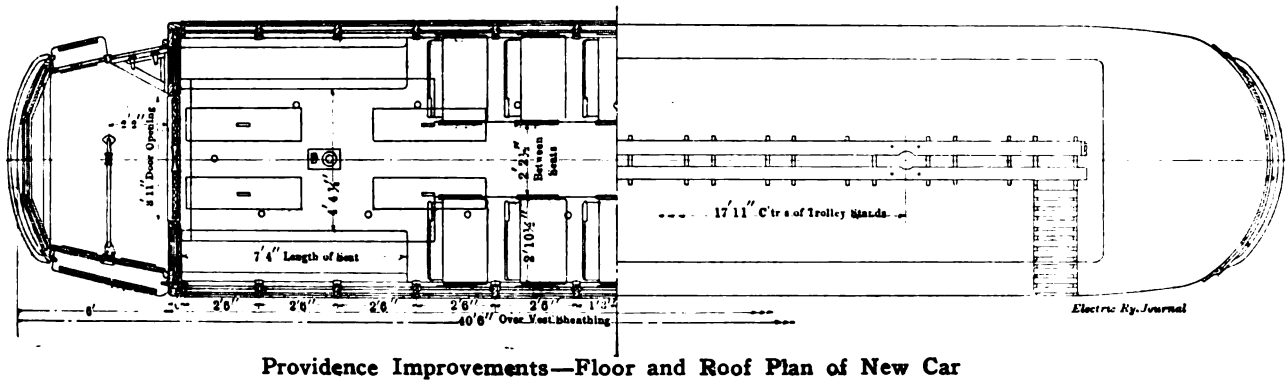
Providence is the reduced tractive effort secured on heavy grades, which range up to 8 per cent.

GENERAL ARRANGEMENT OF NEW CARS

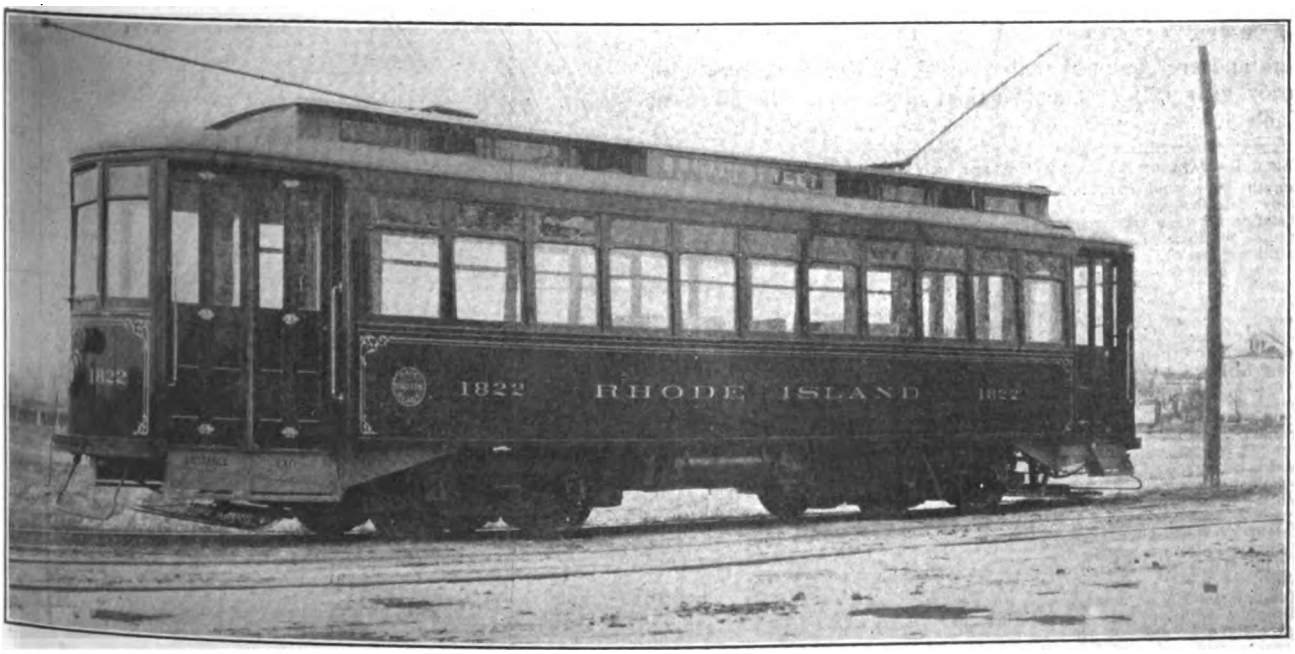
One of the chief difficulties with the former rolling stock has been the short and narrow vestibules universally existing. On the older equipment the vestibules are set in from 8 in. to 12 in. in order to provide for a step flush with the car body. The thirty-four-seat class has a platform varying from a minimum of 4 ft. 8 in. to 5 ft. 2 in. in length over all from center posts, which permits a side door



Providence Improvements—Floor and Roof Plan of New Car

of only 28½ in. and a bulkhead door of 32½ in. clear when open. The forty-two-seat cars have 5-ft. platforms, 28-in. side doors and bulkhead doors 30 in. in the clear when open. The narrow vestibules in these bodies resulted from the necessity of securing as great a seating capacity as possible in the car body and the city ordinances limiting car dimensions to 43 ft. over all. In considering the use of platform collection cars for Providence it was borne in mind that a relatively long platform would have to be provided, on account of the need of supplying adequate loading capacity while passengers are receiving change.

The open bulkhead or platform collection type of car was selected for Providence service largely because it was originally developed to suit conditions identical with those on this system, viz., narrow streets and sharp curves. It was also favored for the reason that it is best suited to the Rooke fare-collecting system, which has been in successful use on the lines of the Rhode Island Company for the past five years. This system was described in the ELECTRIC RAILWAY JOURNAL for Dec. 30, 1911, as applied in Providence, and consists essentially of a portable register carried by each conductor, each fare being passed through the register as it is presented to the passenger. A register is



Providence Improvements—New-Type Car Arranged for Platform Fare Collection

Mr. Arnold emphasized this point particularly in discussing the advantages of platform collection car service with the public authorities, stating that persons unfamiliar with the advance payment principle are apt to criticise it severely on the score of slow loading, whereas an essential feature of prepayment car operation is the separation of passengers entering and leaving, thereby avoiding the interference which is the source of so great delay in the single-entrance type of car. Tests showed that with the present narrow platform the average time of loading per passenger is fully equal to, if not greater than, the time required for the modern type, both under rush-hour conditions. Experience with the initial platform collection cars installed has shown the company that a decided saving in loading and unloading time is accomplished in the outlying parts of the city, although the duration of stops downtown is practically unchanged. As soon as the car leaves the congested district the benefits of its capacity and arrangement are felt in reduced length of stops.

assigned to a conductor in the morning and turned in each night or during the middle of the day in case the lay-off exceeds three hours. The carhouse receiving office issues and reads the registers and checks them against the conductors' cash receipts. The car used allows much more space on the platform for incoming passengers than does the standard type. Stationed just at the entrance to the car body, the conductor also has much more latitude in receiving passengers than he would have if he was stationed outside behind a bulkhead. The conductor stands behind a

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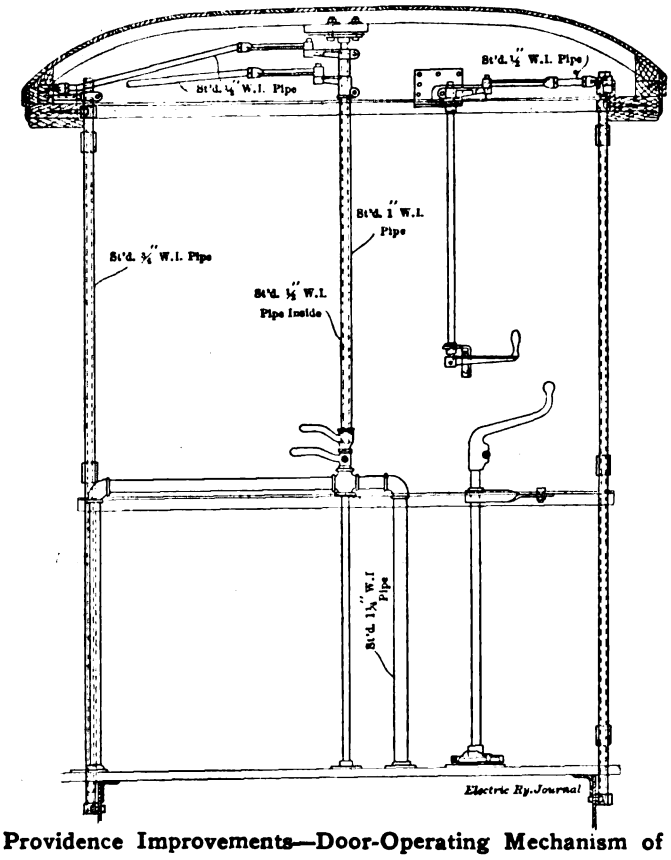
1¼-in. wrought-iron pipe railing carried about 3 ft. above the vestibule floor.

Exterior and interior views of the platform collection car used are shown herewith. These cars are being made by the Osgood Bradley Car Company, of Worcester, Mass. They are 41 ft. 6 in. long over bumpers, seat forty passen-



Providence Improvements—Door-Operating Mechanism of New Car

gers and are equipped with four G. E. No. 80 motors with 19:67 gear ratio. The principal dimensions are given in Table I.

TABLE I—DATA ON PLATFORM COLLECTION CARS, RHODE ISLAND COMPANY

Length over dasher	40 ft. 6 in.
Body length	28 ft. 6 in.
Distance between truck centers	17 ft. 11 in.
Inside width	7 ft. 11½ in.
Width of aisle	2 ft. 2½ in.
Number of cross seats	10
Number of longitudinal seats	4
Width of cross seats from panels	2 ft. 10½ in.
Length of longitudinal seats	7 ft. 4 in.
Width of seats	17 in.
Spacing of cross seats on centers	2 ft. 5¼ in.
Height of seats above floor	18 in.
Capacity each longitudinal seat	5
Width of aisle between longitudinal seats	4 ft. 4⅞ in.
Type of operation	Double-ended
Inside dimensions vestibule, maximum	5 ft. 6 in x 6 ft.
Number doors per vestibule	3
Width of forward exit door	2 ft. ¾ in.
Width of rear exit door	1 ft. 11 in.
Width of entrance door	2 ft. 2 in.
Type of steps	Fixed
Height of step above rail	17 in.
Height of platform above rail	2 ft. 7 in.
Height of car floor above rail	3 ft. 6 in.
Width of steps	8 in.
Maximum width of passage outside collection bar	36 in.
Minimum width of passage entering car	24 in.
Car body door opening (double doors)	3 ft. 11 in.
Number and make of heaters	12 Consolidated
Extreme width of car outside over sheathing	8 ft. 6 in.
Width over eaves, car body outside	8 ft. 4 in.
Make of trucks	Standard Motor Truck Co.
Wheelbase	4 ft. 6 in.
Wheel type and diameter	33-in. forged steel
Axle diameter	4½ in.
Gear seat	4¾ in.
Controllers	"K-35"

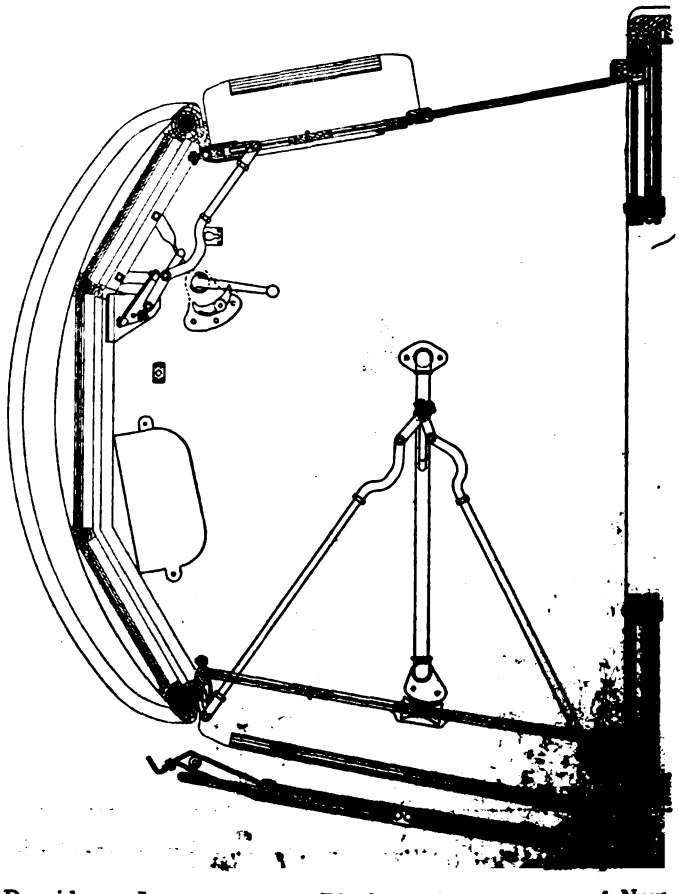
DETAILS OF EQUIPMENT

The cars are equipped with straight-air brakes with G. E. "CP-27" compressors. Providence "Consolidated" wheelguards are used. The weights of the car are as follows: Body equipped, 20,900 lb.; motors, 11,500 lb.; trucks, 13,000 lb.; total, without passengers, 45,400 lb.

The outer vestibule doors are all operated by levers and handles inside the vestibules. The forward exit door is opened and closed by the motorman by a handle brought down from the upper part of the vestibule, where a system of levers connects with the upper part of the door. The rear entrance and the rear exit doors are operated by the conductor from his position behind the rail. The doors are operated by overhead levers as in the foregoing case. The vestibule doors are all of the folding type and are equipped with rubber buffers on their outer edges. Two bulkhead doors are provided at each end of the car body, these sliding into side pockets when not in use.

OPERATING FEATURES OF NEW CARS

The first platform collection type of car was placed in service on Dec. 14, 1912, on the Broad Street line, between the Union Station and Thurber Avenue, five cars being operated under the new arrangement. For two days before the company published a notice in the daily papers announcing the introduction of the new rolling stock and stating that its use was in accordance with the recommendations of Bion J. Arnold, consulting engineer to the joint municipal committee on railroad franchises, and with the franchise agreement between the city of Providence and the Rhode Island Company, which provides that the latter shall adopt a type of car substantially as recommended in the Arnold report. The notice called attention to the stationing of the conductor in the new car, and to the plan to collect fares at the entrance and stated that, to make the system the success which Mr. Arnold and the city's representatives desired in recommending such a type of car, passengers should co-operate by having the



Providence Improvements—Platform Arrangement of New Car—Door Slide Shown Below

exact fare ready immediately upon boarding the car. Attention was also called to the importance of leaving the car so far as practicable by the front door and to the mechanical operation of the latter by the motorman. The cars were successful from the first, and in a few days the service was extended to Norwood Avenue, slightly be-

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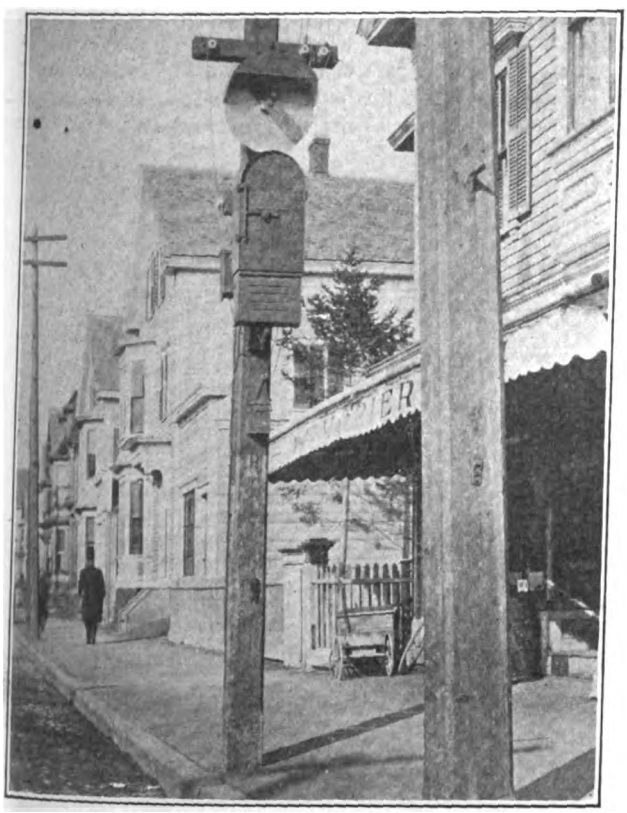
yond the city limits, and on Jan. 1, 1913, cars were operated to Pawtuxet, about 5 miles from the center of the city.

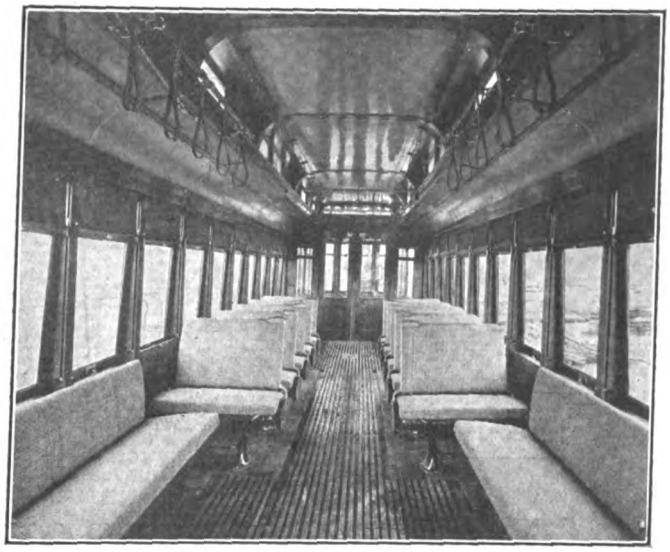
In the operation of these cars the conductor does not leave his position behind the railing except at terminals and upon arriving at transfer limits, when he enters the car and collects cash fares from all persons who have ridden on transfers. He is also permitted to leave this position in emergencies demanding his attention elsewhere. In case the conductor leaves the car all vestibule doors are closed, so that no passengers can board during his absence. In case passengers enter the car without paying fare the conductor is required to enter and make the proper collection as soon as his duties permit. Should passengers ride to the terminus of the line and return on the same car the conductor enters the car and makes collection from all passengers before starting from the terminus. Passengers are not allowed to remain upon the rear platform unless the car is overcrowded. The doors are kept closed when passengers are not using them, as in ordinary prepayment car practice.

TRAFFIC CONDITIONS

The down-town loading district of Providence extends from Market Square to the east to Cathedral Square and Hoyle Square on the west, and from the Union Station to the Providence River in the other direction. The civic center of the city is a large open area lying between the Union Station, Exchange Place, the City Hall and the Post Office, and is shown in the accompanying map, which indicates the track layout best adapted to meet the traffic conditions as determined by all the parties interested. This trackage arrangement is now practically complete and provides valuable loop facilities around the plaza containing the Soldiers and Sailors' Monument, increased switching connections between intersecting tracks, additional cross-over facilities and a new storage track for lay-overs. A loop serving the Union Station has been a feature of the civic center for many years, and this is retained in the new arrangement of tracks, although additional switches are provided to enable cars operated on Washington and Francis Streets to reach and leave the railroad station. The Washington Street side of the Plaza is used largely in unloading and the Exchange Place side in loading cars, and this reserved area forms an island which provides ample refuge for passengers while waiting for particular services.



Providence Improvements—Automatic Signal on Prairie Avenue



Providence Improvements—Interior View of New Car

The Exchange Place loop was placed in commission in December, 1912, and has relieved congestion in adjacent thoroughfares as shown in Table II.

TABLE II—CARS RUN BETWEEN 5:30 P. M. AND 6:30 P. M. BEFORE AND AFTER INSTALLATION OF EXCHANGE PLACE LOOP

Name of Street	Direction	Between	Before	After
Weybosset	Eastward	Mathewson and Dorrance Streets	151	129
Weybosset	Eastward	Dorrance and Turk's Head	131	90
Westminster	Westward	Turk's Head and Dorrance	138	94
Westminster	Westward	Dorrance and Mathewson	123	87
Dorrance	Southward	Loop Branch-off and Westminster	103	72
Dorrance	Southward	Westminster and Weybosset	103	72
Dorrance	Northward	Weybosset and Exchange Place	84	63

In this rearrangement of traffic the car movement was increased from sixty-five to seventy-five cars per hour on Washington Street, east-bound, between Mathewson and Dorrance Streets; from fifty-eight to seventy-five per hour between the same points, west-bound; from ninety to ninety-five on Dorrance Street, south-bound, at the Washington Street branch-off into the loop; and on the north side of the loop, or on Exchange Place, west-bound, from seventy-eight to 122. Cars are run around the south side of the loop at the rate of 103 per hour. Weybosset, Westminster and Dorrance Streets are all narrow thoroughfares in the heart of the city.

The traffic conditions have also been improved by the installation of electric track switches at various points, and within a short time twenty-five of these will be in service. Thirty per cent of the white-pole stops have been removed within the city limits upon the initiative of the railway company, and the result has been a noticeable improvement in transit conditions particularly in the residential districts. Thus, on the Olneyville suburban line a saving of five minutes has been effected in the running time in a distance of about 2½ miles during certain hours as a result of the reduction in stopping points. The operating conditions on the Prairie Avenue and Ocean Street single-track lines have also been much bettered by the installation of Chapman automatic semaphore type block signals. On the former line are seven turnouts, making six track blocks in a distance of 1¾ miles. Four of these blocks are covered by signals and the other two are not equipped for the reason that a clear vision exists between the turnouts. A ten-minute headway is operated on this line and cars are in service upon it for about twenty hours per day.

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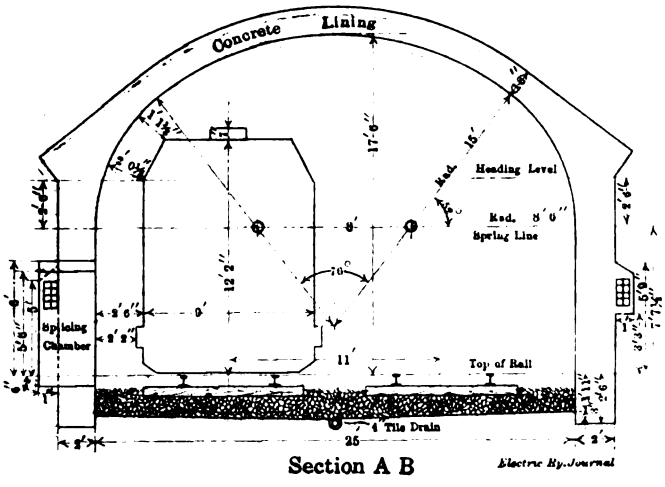
The line is carried through narrow and crooked streets, and the use of the automatic signals saves time and safeguards the service. On the Ocean Street line three blocks are equipped in a distance of 1.5 miles.

TUNNEL CONSTRUCTION

The East Side tunnel, which will provide a short connection betwen the business district and a near-by but



Providence Improvements — Cross-Section of East Side Tunnel

comparatively undeveloped section of the city, will extend from the intersection of North Main and Waterman Streets to the west side of Thayer Street, a distance of 2165 ft., the grade being 4.8 per cent and the total rise 90 ft. The distance between portals will be 1790 ft. A cross-section of the tunnel is shown in the accompanying drawing. The tunnel is designed to accommodate two tracks spaced 11 ft. on centers and is 25 ft. wide, with an arched roof carried 17 ft. 6 in. above the top of the rail. The lining is of concrete, the roof being 18 in. and the walls 24 in. thick. The roadbed is to be of rock ballast, 18 in. deep at the center, and is drained by a 4-in. tile pipe at the bottom. The cables are to be carried in ducts located in the side walls, splicing chambers being provided on each side, staggered, and 160 ft. apart. An overhead trolley will be used.

POWER DEVELOPMENT

The supply of electrical energy for the operation of the system is the Manchester Street station, located on tidewater in the heart of Providence. This plant, which is one of the largest street railway power stations in New England, consists essentially of a double-deck boiler room containing sixteen 520-hp B. & W. water-tube boilers, of which eight are installed on each floor, and engine and turbine-driven generators aggregating 25,500 kw in rating. The boilers are fed from overhead coal bunkers having a capacity of 3000 tons and are fired by Roney stokers. Eight boilers are operated to give from 105 to 110 deg. superheat for turbine service, the others giving saturated steam for the engines. Condensing water is drawn from the Providence River and boiler-feed water is taken from the city mains.

Prior to the installation of the present equipment, the station contained six units aggregating 12,100 kw in rating, the units being as shown in Table III.

TABLE III—FORMER INSTALLATION IN MANCHESTER STREET POWER STATION

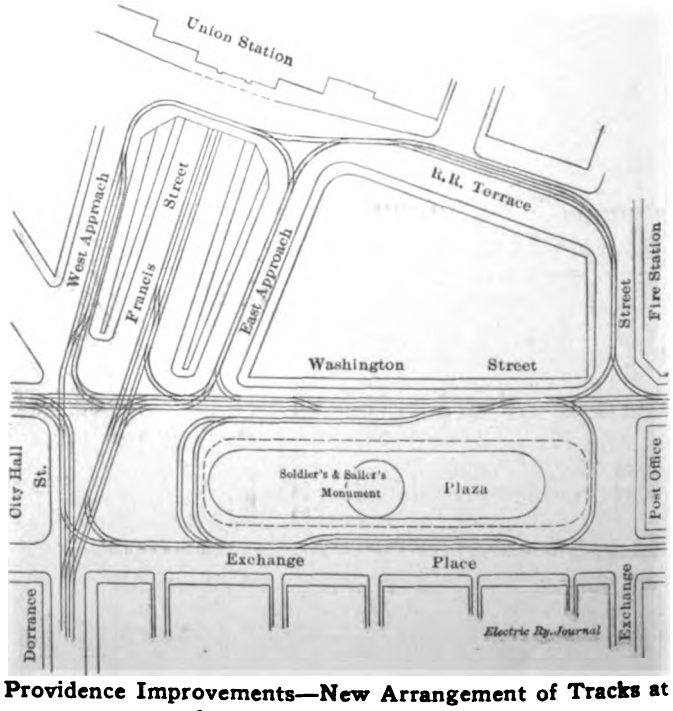
Number	Kw Rating	Prime Mover Type	Current	Voltage	Notes
2	1,500	Engine	A.C.	11,000	Horizontal units
2	2,500	Engine	D.C.	600	Vertical units
1	1,600	Engine	D.C.	600	Vertical unit
1	2,500	Turbine	A.C.	11,000	Horizontal unit

Increasing demands for power within the past few years have led to the removal of the 1600-kw unit above mentioned and the erection in its place of a 15,000-kw, 11,000-volt Curtis turbine which now carries the brunt of the service on the entire system. No additions in the boiler room equipment were necessary on account of the installation of this unit. The turbine delivers three-phase, 25-cycle current to the station buses, and, as shown by the load curve on page 62, is ordinarily operated about twenty hours per day. The turbine is a six-stage machine and runs at 750 r.p.m. The weights of the principal parts are: rotating element, complete, 182,000 lb.; stationary armature, 170,000 lb.; turbine casing, 110,000 lb.; base, 98,000 lb.; total weight, 908,000 lb. Steam is supplied to the turbine at 150 lb. pressure through a 16-in. delivery pipe connected with a 20-in. horizontal steam main in the boiler room. The height of the unit above the foundation is about 35 ft., the base being 15 ft. 3 in. x 16 ft.

The turbine discharges through a 13.5-ft. x 5-ft. outlet into a Westinghouse-Leblanc twin condenser installed in the basement at one side of the turbine foundation. All the foundations are of concrete supported on piling. Air for the ventilation of the generator is taken from the basement just below the engine room floor level through a 50-in. circular iron duct terminating after a right-angled turn in a 9-ft. x 3-ft. inlet at the top of the generator casing. An opening in the floor of the engine room surrounds the turbine and its principal auxiliaries and facilitates handling the parts of the equipment.

AUXILIARY EQUIPMENT

The condenser is guaranteed to maintain a vacuum of 28 in. absolute when condensing 250,000 lb. of steam per hour, if supplied with injection water at a temperature not exceeding 70 deg. Fahr., the temperature of discharge being not less than 5 deg. Fahr. below that corresponding to the vacuum carried. The amount of injection water required is 8,000,000 lb. per hour at full load, the lift from the river being about 20 ft. Salt water is drawn from the river for injection purposes through a concrete conduit about 175 ft. long, discharging into a suction well from which a 36-in. pipe carries it into a manifold located on the basement floor. From the latter two 20-in. main injection pipes lead to the condenser. The main discharge of the



Providence Improvements—New Arrangement of Tracks at the Exchange Place Loop

condenser consists of two 18-in. pipes emptying into a chamber of concrete, of 7-ft. x 4-ft. oval cross-section, located about 2 ft. above the top of the suction chamber. After leaving the building the discharge is carried into the river about 50 ft. above the intake by a conduit leading off at an angle of 45 deg. A 10-in. pipe leads from

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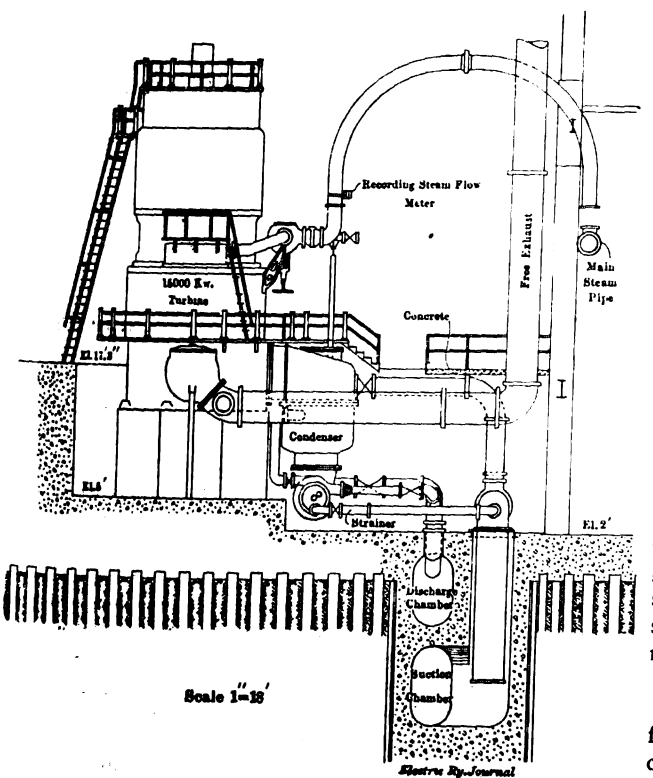
the suction manifold on each side of the condenser installation to an air pump of special design in which a vacuum is produced by the passage of a series of water pistons by the outlet of a 12-in. air exhaust pipe leading from the condenser casing to the pump. The air pump discharge is delivered into the main discharge pipe of the condenser by a 12-in. connection. There are two main centrifugal pumps in the condenser equipment, and these, with the two air pumps, are direct-driven on a single horizontal shaft by a 450-hp non-condensing turbine running normally at 700 r.p.m. on 150 lb. steam pressure and 75 deg. Fahr. superheat. A 5-in. steam inlet and a 12-in. exhaust pipe are provided for the turbine. The main turbine unit is also provided with a 36-in. atmospheric spiral riveted galvanized-iron exhaust pipe which is carried up through the boiler room roof to a head located about 20 ft. above the latter.

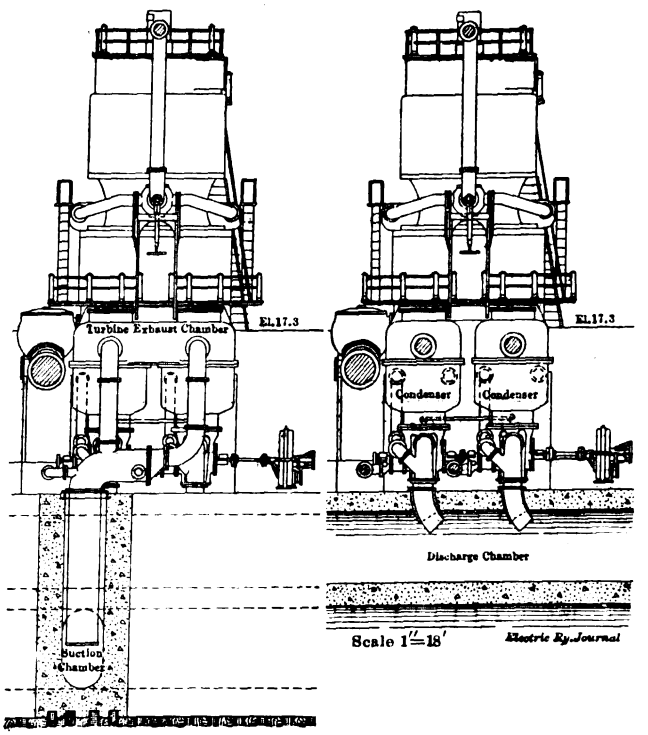
The step-bearing lubrication is provided by duplicate oil pumps of the Deane duplex type, with cylinders 14 in. x 3½ in. x 12 in., and supplying oil under a pressure of 1100 lb. per square inch to a Wood accumulator, which is located in the floor opening of the engine room. The step bearing is operated at a pressure of 700 lb. per square inch, the drop being obtained by the use of a screw baffle between the accumulator and the bearing. The supply of oil to the valve gear and upper and middle turbine bearings is furnished by duplicate 6-in. x 4-in. x 6-in. Deane duplex pumps located in the basement. The turbine oiling system exclusive of the step bearing is connected with a Turner oil filter of 50 gal. per minute capacity and a storage capacity of 2000 gal., also in the basement. A Blake twin vertical 18-in. x 20-in. x 24-in. priming pump is connected to the twin condenser.

The generator leads are carried away from the machine in a 12-in. x 14-in. sheet-iron casing leading to the basement, and thence they are carried to the switchboard gallery on the north side of the engine room. The operating gallery is located about 30 ft. above the turbine room floor, and the switchboard contains five a. c. feeder panels and eighteen d. c. panels for feeder service, in addition to the usual controlling panels for the generators, exciters and a rotary converter installation in the engine room.



Providence Improvements—Sectional Elevation Showing Piping for 15,000-kw Turbo-Generator

The turbo-generator panel contains a power-factor indicator, field ammeter, curve-drawing kilowatt-meter, an indicating ammeter, voltmeter and wattmeter and a watt-hour meter with synchronizing connections and the usual switch control. The oil switches, on a lower gallery, are motor-operated, current for this service being supplied by the exciters. A 75-kw, 125-volt steam-turbine-driven exciter



Providence Improvements—Cross-Sections Showing Suction Piping and Discharge Piping for Condenser

running 3300 r.p.m. was installed in connection with the large turbo unit, the remaining exciter equipment consisting of one 35-kw engine-driven outfit and two 55-kw machines, each direct-driven by a 75-hp, 440-volt, three-phase induction motor. The rotary converter equipment of the station consists of one 1000-kw and four 2000-kw machines, located in the engine room and operated for the purpose of supplying direct current to the car service of the central Providence district in conjunction with the a. c. generators or in parallel with the d. c. engine-driven units mentioned above. The transformer equipment of the station includes three 375-kw units, three 750-kw units and three 2100-kw three-phase units, the latter being of the air-cooled type, each transformer being supplied with air by a 36-in. Sirocco blower direct-driven by a 7.5-hp induction motor running 750 r.p.m.

On the engine-room wall near the larger turbine is located a black marble panel carrying a steam gage, vacuum gage, step-bearing gage and turbine first-stage indicator, speed indicator and frequency meter. A General Electric steam-flow meter is connected with the supply pipe of the main turbo unit.

POWER STATION OPERATION

In starting the large turbine the step-bearing pumps are first thrown into service, raising the shaft off the step. The condenser pumps are started at about the same time, a steam seal being put on, and as soon as the condenser is working sufficiently the throttle is gradually opened between the steam main and the turbine proper, the machine being brought gradually up to speed and synchronized with any other apparatus which may be running. The condenser gives a vacuum of about 15 in. in the early stages of its operation, and the normal vacuum in operation is about 28.6 in., depending upon the temperature of the condensing water.

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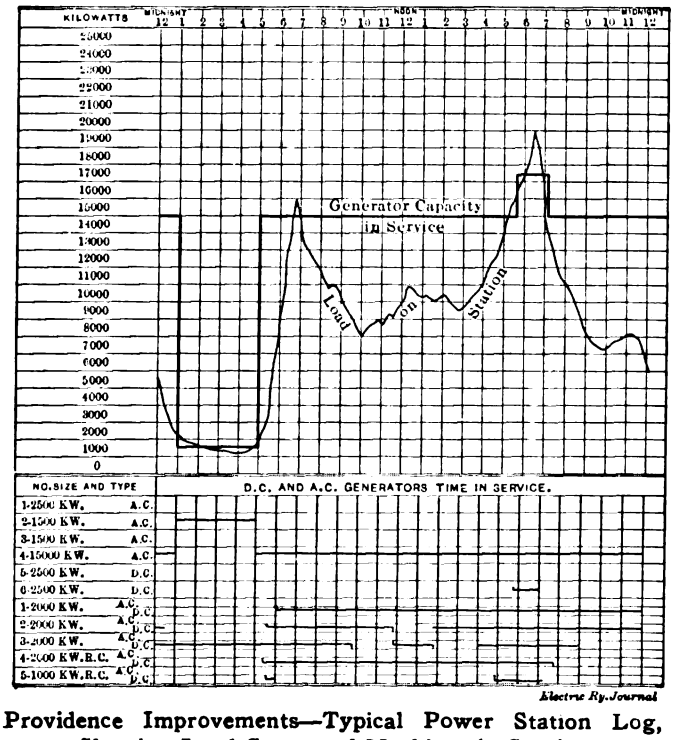
In the operation of the 15,000-kw turbine one man is stationed on the engine room floor in charge of the valve gear and oiling of the shaft, the taking of steam pressure readings half-hourly and the general oversight of the machine excluding its auxiliaries. A second attendant stationed in the basement is in charge of the auxiliary pumps, oil filter, condenser and piping and takes the temperature of the injection water and air-pump discharge hourly. Neither of these men is allowed to leave the apparatus under his care for an instant without being relieved. These two men are handling 15,000 kw, whereas with the old engine-driven equipment three additional oilers were required and the total generating capacity of the plant was but 12,100 kw, or less than 50 per cent of the capacity of the present installation. The car service of over a dozen cities and towns is carried entire by this unit throughout a large portion of the day.

Energy for car operation in the outlying districts is transmitted at 11,000 volts, three-phase, to four substations located at Pawtucket, Riverview, Farmington and



Providence Improvements—Typical Power Station Log, Showing Load Curve and Machines in Service

Westcott, two lines being carried to the first-named point to provide additional capacity and increased reliability of service.

A typical load curve is reproduced as of Thursday, Dec. 12, 1912, the peak occurring at 6.30 p. m. and reaching the value of 20,000 kw. About 460 cars were operated during the rush hour, four-fifths of which are routed in and out of Providence or within the city limits. The large turbine was operated throughout the entire day except between 1 a. m. and 5 a. m., and but one other generator was called upon while the turbine was in service, this being a 2500-kw d. c. machine which was cut into service for about an hour to assist on the evening peak. The minimum load on the system, occurring between 1 a. m. and 5 a. m., was handled by a 1500-kw alternator working through rotaries to supply the d. c. feeders. The lowest point reached by the load curve was 1200 kw, at 4 a. m. The morning rush-hour peak was 15,900 kw, this being reached at 6.45 a. m. The territory served by the company is occupied largely by manufacturing plants whose working day begins at 7 a. m. and ends at 6 p. m., so that the peak occurred naturally just before the opening of these establishments. The curve also shows the traffic increase caused by office workers starting in between 8.30 a. m. and 9 a. m., the forenoon shopping influence, the noon traffic between working places and homes characteristic of a city of this size, and the homeward travel at night. The average load on the station for the entire day was 8420 kw, and the station load factor was 42.1 per cent.

Station logs are kept on 11-in. x 19½-in. sheets upon which are plotted the daily load curve and the capacity in generators in service at every quarter hour, readings of instruments being shown in figures. The charts also show the time at which each generator was placed in service and withdrawn from operation, including the service rendered by rotary converters at Manchester Street. All five rotaries were required to handle the direct-current peak local load on the day shown, besides the 2500-kw generator mentioned above. The charts provide for the plotting of the daily load curve on the basis of fifteen-minute switchboard instrument readings, and also show the number and cause of circuit-breaker openings, so far as known, when fully noted.

RETRIEVING OIL AND WASTE ON DENVER TRAMWAY SYSTEM

The Denver City Tramway Company has been using with excellent success a method of retrieving the oil and waste used in its car journals and armature journals. The waste removed from the car journals is first picked over by hand, and any bad or knotted parts are thrown away. The good waste is then put in a cleaning tank, which consists of an iron receptacle 5 ft. 6 in. long, 3 ft. 6 in. wide and 17 in. high. This tank contains a horizontal screen on which the waste rests. This screen extends half-way across the tank and is 13 in. from the top and 4 in. from the bottom. Clean hot oil is then poured over the waste to wash it and drips into the lower part of the tank, carrying with it such dirt and other impurities as may be in the waste. After the waste has been washed in this way and allowed to drip it is clean and ready for re-use. The company puts through this cleaner about 150 lb. of car journal and armature waste each week, and it has not been obliged to purchase any new waste since December, 1912.

The oil from this cleaning tank is filtered and then used over again. The filter is also home-made and is next to the cleaning tank. It is a round tank filter, 3 ft. wide and 4 ft. high, surrounded on the outside by a coiled live-steam pipe. The upper part of the filter contains 12 in. of excelsior, under which is a division containing 12 in. of packed waste. The filtered oil is taken out through a cock at the bottom.

In addition, in each division of the carhouse the company has a half barrel for picking up the old oil in the pit. This oil is filtered through another type of filter which is a duplicate, in outside dimensions, of the cleaning tank first mentioned. This filter has a series of four or five vertical screens and also is kept warm by steam pipes. In the first one or two chambers of this filter the oil which passes through the screens is apt to contain some grease, but in the final chambers the oil is clean. The oil containing grease is used on the side and center bearings of trucks and also on brake rods, where they run over rollers. All of the tanks are cleaned out once a week and all journal boxes are gone over once a month.

The company uses only new oil for its armature bearings but uses retrieved oil for its car journals. The standard journal oil used is the No. 639 heavy oil of the Texas Oil Company. The repair shop foreman is at work on a device for reclaiming cotton waste used in the shop for cleaning, but none has yet been built.

All motors are oiled on a time basis; ten days is the allowance for the recent type of motors and three days for the earlier types of motors. Overhauling is done on a mileage basis.

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WORK OF THE MAINTENANCE-OF-WAY DEPARTMENT, NEW YORK STATE RAILWAYS, AT ROCHESTER

The Rochester Lines of the New York State Railways comprise nearly 250 miles of single track, of which about one-half is in the city. The rest is divided among the Rochester & Eastern, the Rochester & Sodus Bay and several shorter lines. The single-track mileage of the two mentioned is about 45 miles each. This extensive trackage is maintained by a maintenance-of-way department, the organization and work of which are described in the following paragraphs:

ORGANIZATION OF THE DEPARTMENT

The organization of the department has been modified to meet the local conditions, particularly by specializing repair work and by systematizing the handling of reports. The accompanying chart shows the general plan of organization. Several features, however, which are not brought out in the diagram deserve special attention.

In the first place, one force of men is kept constantly at repair work. This force is divided into groups which specialize in different classes of repairs. For example, one group looks after switch and special work repairs, tightening switches, welding new points on tongues and resetting old or setting new hard centers. Another group prepares offset joints for regrinding with the Kerwin rail grinder. By having the same men do repairs of the same kind continually, they become exceedingly expert and uniformity of results is secured.

The system of inspection and reports is simple but complete. Beginning with the force of eight curve cleaners, who inspect and report daily the condition of all special work, the inspection of every detail of maintenance and construction is provided for. In addition to the inspectors connected with the office of the engineer of maintenance of way, others report to the general foreman of city lines, and still others, belonging to the transportation department, report track conditions requiring immediate attention. The platform inspector is charged with the responsibility of informing the foreman of unsafe conditions in temporary platforms used during construction to enable passengers to alight from cars. In this feature the department co-operates with a committee on accident prevention. Permanent platforms at park entrances are also included in the platform inspector's jurisdiction. The joint inspector checks the construction force by testing all joints for tightness.

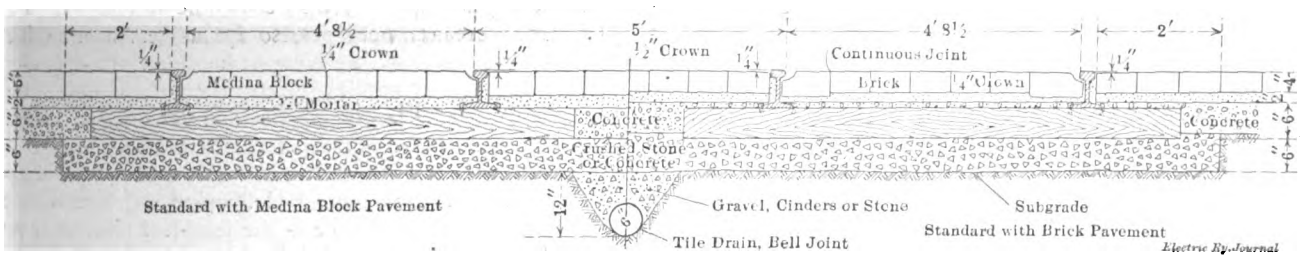
The status of all maintenance work is shown by a weekly summary filed in the engineer's office. A record form similar to the organization chart is used for assembling the data. By means of this chart the engineer can keep up the necessary co-operation among his sub-departments. For example, if the report shows that after several days have elapsed since the completion of a piece of track repair the paving is still uncompleted, the attention of the paving foreman is called to the delay.

NEW AND OLD CONSTRUCTION COMPARED

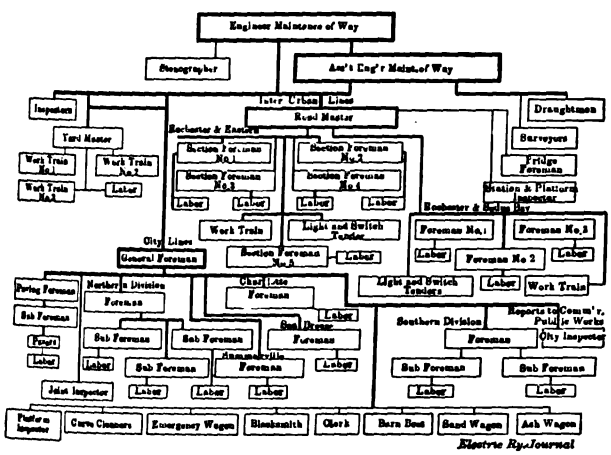
During the present season three types of track construction will be replaced on Main Street, the principal thoroughfare of the city. The first one, which was laid in 1900 and 1901, consists of wooden ties, crushed-stone foundation, 9-in. girder rail and medina block pavement. This rail has been subject to very heavy traffic. Practically all of the lines in the city until recently have included this part of the street in their route.

The second section is a type laid without ties, the rails being fastened to plates which are bolted into concrete beams under the rail. The plates are spaced about 16 ft. apart excepting at the joints. Another feature of this construction is that instead of the concrete being tamped up to the base of the rail there was left a ½-in. space between the concrete and the rail base which was filled with asphalt mastic. This construction was laid in 1898. The joints were later taken out and electrically welded. This section of track has not been subjected to the extreme heavy traffic of the first section and for some years past has given considerable trouble, requiring a great deal of shimming and repair work to keep it in safe condition for operation.

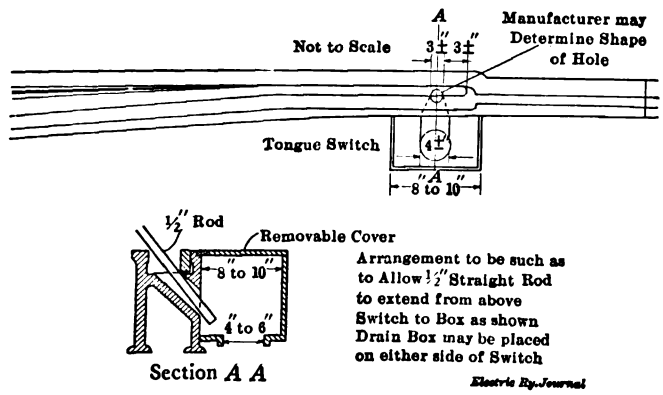
The third section was laid in 1898 with steel ties, 7-in. girder rail and brick pavement. This track has been subject to moderate traffic only. It has, however, required a great deal of expense in order to keep it in safe condition for operation. It was found difficult to shim this type of track construction so as to have the work effective for any length of time, the rail continually becoming loose and destroying the pavement.



Rochester Way Department—Standard Track Construction



Rochester Way Department—Organization Chart



Rochester Way Department—Drain Box for Switch

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The new track will consist of 7-in. T-rail and continuous rail joints carried by oak ties laid on a broken-stone ballast. In accordance with a city ordinance, concrete will be used as a foundation for the paving only. Drainage will be provided by a 6-in. tile under the center of single track and between tracks in double-track construction with paving drains located at low points at intervals of about 500 ft. Concrete has been omitted from the new construction partly because the rails and the steel ties where used have been found to loosen from the concrete under the heavy vibration of street traffic. The cost of renewal of concrete-laid track was also found to be excessive owing to the difficulty of breaking up the foundation.

JOINT TROUBLES

Much difficulty has been experienced in the past with all bolted joints. With joint plates of ordinary steel the underside of the rail head on the side of the joint ahead in the direction of travel has cut into the plate and produced a rough joint. This has been overcome by the use of nickel-steel plates. Ordinary bolts in joints have given breakage trouble which has also been eliminated by the use of nickel-steel bolts. The drainage of electric switches has also been advocated strongly and several manufacturers have expressed a willingness to cast switches with a large hole through which surface water can fall into a drained cast-iron box at the side. The drainage hole permits easy cleaning of the switch, for the tongue can be pushed to either side and a rod shoved through the hole into the drainage box. The drainage box may then be cleaned from time to time and the sewer connection flushed out.

POLES PURCHASED IN 1911

Statistics of the number of wooden poles purchased in the United States in 1911 by steam and electric railroads, electric light and power companies and telephone and telegraph companies are presented in a bulletin soon to be issued by Director Durand, of the Bureau of the Census, Department of Commerce. The figures include the pole purchases of practically all of the telephone and telegraph, electric railroad, electric light and power and steam railroad companies, and accordingly reflect very closely the actual drain upon the pole timbers of the forests of this country. The bulletin was prepared under the supervision of W. M. Steuart, chief statistician for manufactures.

In 1911 the total purchases of poles in the United States amounted to 3,418,020 sticks of timber; of these 2,402,724, or 70.3 per cent, were purchased by the telephone and telegraph companies; 787,649, or 23 per cent, by the electric railroad and electric light and power companies, and 227,647, or 6.7 per cent, by the steam railroads. The total number of poles purchased represents a decrease of 452,674 as compared with 1910 and of 320,720 as compared with 1909, but it exceeds the totals for 1908 and 1907 by 168,886 and 134,752 respectively. The decrease in the purchases of 1911 as compared with 1910 was confined to telephone and telegraph companies and steam railroads, while substantial increases in purchases were reported by the electric railroad and electric light and power companies.

Five kinds of wood—cedar, chestnut, oak, pine and cypress—supplied over 90 per cent of the pole requirements of the United States during each of the five years 1907-1911. Cedar, which has long been the preferred wood for pole purposes, supplied 61.4 per cent of the total number reported in 1911. Purchases of chestnut increased substantially from 1908 to 1911, amounting in the latter year to 177,440 more than in 1908.

The number of oak poles used increased rapidly from 1907 to 1910 but decreased greatly in 1911, in which year the number reported was more than 65,000 below the figure for 1910. Oak poles, which are marketed in relatively short lengths, have been used extensively in rural telephone lines, the development of which has been very great in recent years. The figures indicate, however, that this development was much less marked in 1911 than in 1909 and 1910. The use of pine has increased but little since 1907.

The demand upon cypress has fallen off slowly year by year, the number of cypress poles purchased in 1911 being only about three-fourths as great as the number purchased in 1907. This falling off is due to the high price of cypress lumber and to the fact that this timber is found generally in sizes too large for poles.

The preferred species of wooden poles have the general physical qualifications of durability in the soil, strength, lightness, straightness, a surface which will take climbing irons readily and comparatively slight taper. The various species of cedar combine these qualities in high degree. Cedar poles are cut principally from the white cedar of the Lake States, the red cedar of the Northwest and the Southern white cedar of North Carolina, Virginia and New Jersey. Chestnut is cut principally in the Atlantic Coast States from Georgia to New Hampshire. Oak, a very widely distributed species, is cut for poles chiefly in the hardwood states of the Ohio and Mississippi valleys. Most of the pine reported is that commonly known as Southern yellow pine and includes several species—long-leaf pine, short-leaf pine, loblolly pine and some others. Of these, the most durable is the long-leaf pine, while the loblolly pine gives very brief service unless it is treated with a preservative. In the West another species—Western yellow pine—is reported, which also requires preservative treatment.

PRESERVATIVE TREATMENT

The woods used for poles in the United States are chiefly those which are naturally very durable in contact with the soil. The life of timber under this condition varies considerably according to the species, to differences in the wood of the same species, to the character of the soil and to climatic conditions. Cedar, chestnut, cypress, juniper and redwood usually last from ten to fifteen years, while white oak has an average life of somewhat less than ten years.

The resistance of the poles to decay can be considerably increased by the use of preservatives. Wood preservation is now on a firm footing in the United States, but the advantages which this practice affords are by no means fully utilized by the pole consumers. Preservatives not only add from three to fifteen or more years to the service of the woods now commonly used for poles but also make it possible to use cheaper woods which in their natural condition lack durability in the soil although possessing all the other qualities necessary in pole timber. The durability of woods which ordinarily last but a few years can thus be increased to more than double the normal life of cedar.

The principal preservatives used for treating poles are those classified as refined coal-tar oils. Under this heading are included creosote oil and various proprietary preservatives. Creosote oil was used in treating 159,321 poles, of which 50,021 were cedar and 83,035 yellow pine.

The cost of treating poles varies according to the wood treated, the kind of preservative and quantity used and the process employd, but it is only in rare instances that the adoption of a pole-treating policy is not economical. The United States Forest Service has a large number of poles treated by different methods under record and subject to annual inspection in order to determine the relative values of the different methods and preservatives.

By a governmental decree of May 7, 1913, authorization to work in Brazil has been accorded to the Electric Tramways of Ribeirao Preto, Brazil, Ltd. The headquarters of the company are in England, and its principal object is the exploitation of a system of tramways at Ribeirao Preto, State of Sao Paulo. The capital of this corporation is $1,050,000.

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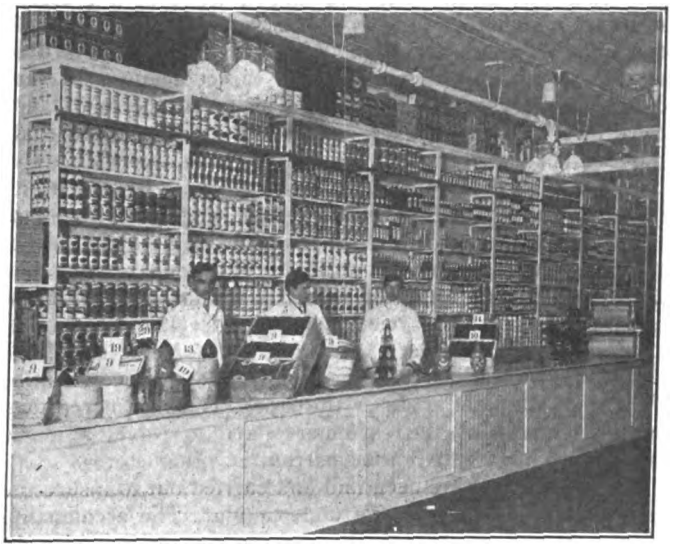
RAILWAY CO-OPERATIVE GROCERY STORES IN NEW YORK

The institution of a co-operative depot at 816-818 Eighth Avenue on March 12, 1913, for the benefit of the employees of the Interborough Rapid Transit Company and the New York Railways Company has proved to be a wise and beneficial move, according to D. W. Ross, who is vice-president of both of the railway companies concerned. Already the interest and support of the employees have led to the opening of a second store on the southeast corner of Eighth Avenue and 152d Street and a third depot near Lexington Avenue and Ninety-eighth Street.

Business from the very outset was brisk in the new stores, and in reality the extent to which they have been patronized by employees and their families has been beyond expectations. The three heavy sales days of the week are Thursday, Friday and Saturday, with the last outrunning the others. On the first Saturday, March 15, 2993 customers were served at the Fiftieth Street store, and the present average for Saturday trade lies between 2900 and 3000 people. On Saturday, May 3, at which time the second store was in operation, the trade of the first store fell off, owing to a transfer of customers, but over 2000 people were in each store during that day. The sales for Store No. 1 for the month and a half that it has been operating have averaged $5,000 per week, and the companies expect that with the increase of customers due to Store No. 2 the gross income from sales will average fully $8,000 per week.

At the present time the two stores are carrying a stock of goods valued at between $6,000 and $7,000. This is practically turned over every week, almost half of it being disposed of on Saturdays. The stock consists of all classes of foodstuffs carried by groceries and meat markets, provided they are not of an extremely perishable character. Staple groceries and meats, dairy products such as cheese, butter and eggs, canned goods, the less perishable vegetables like beets, potatoes and carrots, breadstuffs, fruits—all these are offered for sale and in several different grades, in order that the employees may have a wide basis of choice. It has been found, however, that there is more call for the better grades of goods than for the poorer. It is expected that the important items of cream and milk will soon be added by the companies to the list of available commodities at these stores.

Thursday is the day on which the stock is replenished. Each store is in charge of a manager, who makes a requisition for supplies to Mr. Gard, a representative from the purchasing department. D. W. Ross, who as vice-president in charge of contracts and supplies controls this department, was for two years general purchasing agent for all the commissary supplies with the Isthmian Canal Commission and the Panama Railroad. His assistant, Mr. Fuhrer, was also connected with this work for some time, and Mr. Gard, who has the actual supervision of the co-operative branch of the department, has had extended experience along the line of all commodities handled in the co-operative stores, having spent twelve years doing purchasing work for some of the largest firms in Washington Market. On account of the organization and equipment of this department the best possible prices can be obtained for the distributing depots, and this, when taken together with the fact that supplies for about 15,000 employees will be purchased regularly, means a material saving. Purchases are made as far as possible directly from the producer in order to eliminate the profits of the middleman. A storeroom is to be constructed in connection with the store at 152d Street which will serve as a general distributing center. All the supplies ordered by the purchasing agent will be stored here, debited to the various distributing points as



New York Co-operative Stores—Canned Goods and Staple Grocery Goods Department

New York Co-operative Stores—Vegetable and Fish Departments

New York Co-operative Stores—Employees Waiting Turn at Meat Counter

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needed and transported to them by means of auto trucks.

The fact has been much emphasized by the officials of the companies that this co-operative move is by no means a philanthropic one. All sales are made on a cash basis and at actual cost. No profit of any kind is to be charged by the companies, but on the other hand the companies do not expect to run up a deficit. The scheme is to make both ends just meet. The two largest items of a grocery store are eliminated, delivery and advertising, and the rent and light expenses are slight, inasmuch as the stores are all operated on property owned by the company. Of the overhead charges the biggest item by far is the labor and clerk hire, and when taken as a whole it is estimated that the overhead charges will amount to only approximately 10 per cent of the gross sales. With all these figured in, it is calculated by the companies that a general average deduction of 15 per cent to 20 per cent can be made in the prices charged by private dealers. No comparative table of prices has been compiled, owing to the fact that different grades of goods are carried and it is difficult to obtain the prices of private dealers for goods of the same standard. The best indication that the prices are decidedly satisfactory is that the trade at the stores is daily increasing, although many of the customers have to travel a much longer distance than if they patronized other stores.

Careful plans have been laid and carried out to insure the success of this co-operative undertaking. The accompanying views, taken at Store No. 1, are illustrative of conditions and scenes at the new stores. They are thoroughly equipped with modern fixtures and apparatus. The new ones have ammonia refrigerating plants, and everything possible has been done to conform to the sanitary laws and the wishes of the employees. The location of the stores themselves was an important factor, and after a study of the locations of the residences of the employees, the officials endeavored to locate the stores at the centers of population near terminals, carhouses and shops, in order that the greatest number of people might best be served. Another essential point was the provision for the serving of none but employees. At present the men are allowed to enter the stores by means of their pass cards. Dependent members of their families are provided with identification cards by the companies and one of the clerks is stationed at the front door of each store to prevent the entrance of all other persons.

It has been a question whether the companies would eventually extend the co-operative system to include ice and fuel, as in the case of the Philadelphia Rapid Transit Company. In view of the fact, however, that this would necessitate a delivery system and much additional expense and that the average New York employee lives in a flat where he does not need to buy coal, it is doubted that the companies will make such extensions. Such practices may be advisable in the "city of cottages," but conservative management rules otherwise in New York.

Considerable interest has been manifested by other electric railway companies in the progress of these co-operative stores, and developments are being closely followed. As the matter stands now, sales are increasing daily, and it will probably not be long before the full chain of four stores as planned will be established. The employees have the certainty of securing good quality, full weight and complete measure at a substantial cut in price, and they have supported the movement beyond anticipations. The companies have not instituted this system as a mere grocery business or entered into a destructive competition with existing merchants, but they have simply utilized their immense buying power for the advantage of their employees. The general result has been to raise the purchasing power of the wages paid, to lower proportionately the cost of living of the employees, and at no expense to the company to make for better service and efficiency on the part of the workmen.

PSYCHOLOGICAL TESTS OF MOTORMEN

The importance of accident prevention on street railways has attracted the interest of many thoughtful students of industrial economy within the last few years. Among the investigators in the field of conservation of human life who have given particular attention to the causes of accidents on electric traction systems, Prof. Hugo Munsterberg, of Harvard University, occupies a foremost place, and in his recently published volume, "Psychology and Industrial Efficiency," he presents an outline of various researches upon the psychological characteristics of motormen in relation to the avoidance of accidents which suggests an entirely new method of attacking the important problem of selecting suitable employees for the front end of the car. The work was conducted through the co-operation of the Boston Elevated Railway Company, which furnished a large number of motormen of varying ability and lengths of service for the experiments, and while the latter are regarded as in large measure preliminary, the results obtained were consistent with the theory on which the tests were planned and indicate the possibility of discriminating between safe and unsafe motormen by psychological tests at the time of application for employment.

Without going into the minor details of the investigation, it may be pointed out that Professor Munsterberg sought at every step to reproduce by practical apparatus the mental reactions accompanying the efforts of a motorman on a car continuously to adjust himself to the changing panorama of the street. The use of model cars in a laboratory was considered inappropriate in connection with collision studies as tending to arouse ideas, feelings and volitions which have little in common with the processes of actual life. There are differences between the simulated and the real performance which appear to vitiate the reliability of such methods in testing motormen, the essential point being not the external similarity of the apparatus but exclusively the inner similarity of the mental attitude. The method of examination promised to be valuable if it showed good results with good motormen and bad results with unreliable ones and, secondly, if it vividly aroused in all the men the feeling that the mental function which they were going through during the test had the greatest possible similarity with their experience on the front platform of the electric car.

The tests were made by requiring a motorman in the laboratory to call out unit areas designated by letters on a track 13 in. long and ½ in. wide upon which an assumed pedestrian, horse-drawn vehicle or automobile would land by passing from positions outside the track across the latter in accordance with numbers designating their positions and indicating by the color and digit employed whether a given number of steps would occupy or clear the track space. The track lines were drawn upon a card 9 in. wide, and a window attached to a belt and giving the motorman an advancing view of 2½ in. down the track was passed over the card in the test at a speed determined by the rate at which a crank driving the belt was turned by the man under examination. The areas at each side of the track contained both black and red digits, the former representing vehicles and pedestrians moving parallel to the track and therefore not in dangerous positions, and the latter representing persons and vehicles crossing the track in front of the car. The man to be experimented upon ascertains as quickly as possible those points on the track which are threatened by the red or dangerous digits. In some cases the red digits are negligible because the number of unit steps which they represent would carry them clear across the track; in others they fall short of the track, and in the remaining cases they occupy it. The task is difficult, as the many black figures divert attention and as the red figures too near or too far are easily confused with those which are just at the dangerous distance.

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In conducting these tests Professor Munsterberg employed a dozen such cards, timed the motormen with a stop-watch and carefully analyzed the errors and omissions made by each man in calling off the so-called dangerous digits. The motormen agreed that in undergoing the test they passed through the experiment with the feelings which they have in car service. Professor Munsterberg states that the necessity of looking out in both directions, right and left, for possible obstacles, of distinguishing those which move toward the track from the many which move along the latter, the quick discrimination among the various rates of speed, the steady forward movement of the observation points, the constant temptation to give attention to those which are still too far away or to those which are so near that they will cross the track before the approach of the car—in short, the whole complex situation with its demands on attention, imagination and quick readjustment—soon bring the men into an attitude which they themselves feel as identical with that in practical life. Again, the results show a far-reaching correspondence between efficiency in the experiment and efficiency in actual service, and for this reason the method deserves further study as a possible agency in the scientific selection of potentially competent motormen.

BRITISH TRAMWAY STATISTICS FOR 1911-1912

The British Board of Trade has issued under date of Jan. 14, 1913, statistics relating to tramways and light railways in the United Kingdom for the calendar year 1911-1912. The report includes particulars relating to 290 undertakings, 172 of which belong to the local authorities and 118 to companies or other parties. The number of passengers carried is shown to be equal to about sixty-nine times the estimated population of the United Kingdom. The total capital expenditure on 2637 miles of lines open for traffic was £77,377,390, and the number of passengers carried during the year 3,127,000,000. Of the total mileage, 1777 miles of line are owned by local authorities, all but 206 miles of which are operated by the authorities themselves.

The returns also mention 5 miles of trackless trolley route operated by the Leeds and Bradford corporations. The figures show an increase of 40 miles in electric mileage. The net receipts of municipally worked tramways amounted to £4,233,874 on the year's traffic, and of this sum £1,247,908 was applied to the reduction of tramway debt, while £488,509 was paid in relief of rates or taxes. The balance, £975,504, was carried to reserve and renewals funds. The returns show that in twenty-two cases it was necessary to obtain aid from the municipal funds to meet some part of the charges for the year. The total sum thus obtained was £62,032, as compared with £68,055 in the previous year. The net receipts from all tramways amounted to £5,801,648. The detailed figures on which the foregoing totals are based appear in three accompanying tables from the report.

TABLE I

	ELECTRIC PERIOD		Steam Period, 1898	Horse Period, 1879
	1911–12	1910–11		
Miles of route open	2,637	2,597	1,064	321.27
Total number of passengers	3,127,318,732	2,907,177,120	858,485,542	150,881,515
Number of miles run by cars	323,354,389	310,494,243	90,593,716	19,418,373
Capital expenditure per mile of single track open:				
Lines and works	£13,623	£13,534	£7,770	£7,840
All items	£18,005	£17,873	£10,469	£9,877
Percentage of net earnings to total capital outlay	7.50	6.97	6.38	3.97
Percentage of net earnings to net capital outlay (eliminating amounts expended on construction or purchase of old lines and works now superseded)	8.15	7.60	Not avaliable	Not available
Percentage of operating expenses to gross earnings	60.60	61.70	79.93	83.81
Passengers carried per mile of route open	1,183,620	1,119,389	806,703	469,641
Passengers carried per car mile	9.67	9.36	9.48	7.77
Average receipts per passenger	1.079d	1.089d	1.23d	1.84d
Number of horses	1,579	1,880	38,777	10,958
Number of locomotives	31	32	589	17
Number of cars (electric)	12,435	12,120	5,335	1,610
Number of cars (non-electric)	509	589		
Kilowatt-hours used	548,695,979	516,241,612	.....	.....

TABLE II

	1911–12	1910–11	1906–7	1903–4	1902	1900	1894	1886	1878
Total capital expended	£77,377,390	£75,672,826	£64,092,091	£46,451,444	£31,562,267	£21,735,988	£14,388,698	£12,573,041	£4,207,350
Miles of route open	2,642*	2,592	2,394	1,840	1,484	1,177	975	865	269
Number of horses	1,579	1,880	7,378	15,353	24,120	37,481	30,528	24,535	9,222
Number of locomotives	31	32	148	249	388	558	564	452	14
Numbers of cars, all kinds	12,9 4	12,709	11,746	9,468	7,752	6,410	4,179	3,440	1,124
Number of electric cars	12,435	12,120	10,369	7,132	.....	.....	.....	.....	.....
Passengers carried	3,127,318,732	2,907,177,120	2,454,807,487	1,799,342,673	1,394,452,983	1,065,376,347	616,972,930	384,157,524	146,001,223
Units of energy used (kw-hours)	548,695,979	516,241,612	369,362,473	211,112,476	.....	.....	.....	.....	.....
Gross earnings	£14,726,068	£13,777,001	£11,849,175	£8,604,884	£6,679,291	£5,445,620	£3,615,837	£2,630,338	£1,099,271
Operating expenses	£ 8,924,420	£ 8,500,941	£ 7,363,762	£5,602,774	£4,817,873	£4,075,352	£2,859,050	£2,021,556	£868,315
Net earnings	£ 5,801,648	£ 5,276,060	£ 4,485,413	£2,912,110	£1,861,418	£1,370,277	£756,781	£608,782	£230,956

*Including 5 miles of trackless trolley.

TABLE III

	1911–12	1910–11	1906–7	1903–4	1902	1900	1894
Number of undertakings:							
Owned by municipalities	172	174	179	162	118	70	37
Owned by companies	118	122	139	150	115	107	116
Route length (miles):							
Municipalities	1,782	1,744	1,571	1,148	886	585	316
Companies	860	853	823	692	598	592	660
Single-track length:							
Municipalities	3,028	2,972	2,637	1,915	1,465	936	497
Companies	1,275	1,261	1,212	984	871	830	814
Capital expenditure:							
Municipalities	£52,644,616	£51,147,236	£41,735,547	£28,060,524	£18,910,467	£10,203,604	£3,887,534
Companies	£24,732,774	£24,525,590	£22,356,544	£18,390,920	£12,651,800	£11,532,384	£10,501,164

Active construction is now under way on the North-South subway, the first crosstown rapid transit line of Berlin. The present subway-elevated system connects the residential districts of the west with the business district of the east, but the new line will join the factory and working-class districts.

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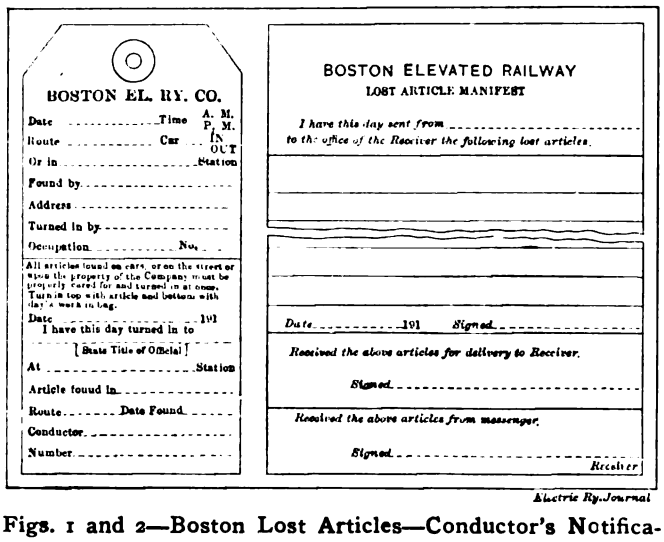
CARING FOR LOST ARTICLES IN BOSTON

BY EDWARD DANA, ASSISTANT SUPERINTENDENT OF SURFACE LINES BOSTON ELEVATED RAILWAY

In many cities of which I have knowledge the transportation departments do not maintain an elaborate system for handling the numerous articles left on the company's cars or property. In Boston, however, a system has for some years been in vogue which, although it puts the company to considerable trouble and expense, is considered to be very



Figs. 1 and 2—Boston Lost Articles—Conductor's Notification Tag and Manifest Signed by Receiver

efficient. The ordinary passenger, however, knows little of this burden placed upon the company and so long as he is not affected cares less. Even some who have benefited by the efficiency of the system consider that they have no reason to be grateful for the return of their property, as the company is no more than living up to its duties as a public servant in return for the valuable franchises which have been granted to it. There are many, however, who deeply appreciate a system whereby articles, sometimes of

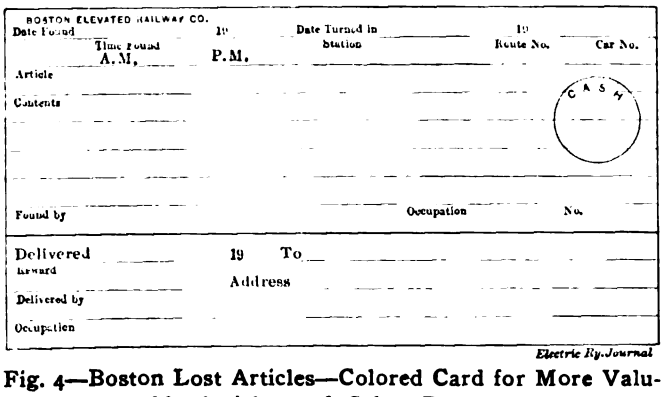


Fig. 4—Boston Lost Articles—Colored Card for More Valuable Articles and Other Purposes

considerable value, which they had lost by their own carelessness have been returned to them. These people express their appreciation and feel that the company has gone to much trouble for them. The good will which such patrons spread probably more than offsets the cost entailed. The following account of our system may be of interest.

When an employee finds an article he assumes the care of it and upon reaching a carhouse he fills out the tag form reproduced as Fig. 1 and attaches it to the article, tearing off the bottom half. This bottom half he turns in with his regular work to the receiving cashier, who in turn forwards it to the lost article clerk in the office of the superintendent of surface lines for checking purposes. Each day the official in charge of the station where the article has been received forwards promptly all turned-in articles to the receiving station of the division. He uses the manifest, Fig. 2, to insure safe arrival of the articles. The receiver checks the manifest with the articles and then returns the manifest, signed, to the local station.

The receiver classifies the articles according to a printed guide which contains ten general classes and fills out in duplicate Fig. 3, which is of convenient filing size, namely, 5 in. x 3 in. These slips are filed according to the classification number which is printed on an extension in the upper edge of the slip. The original is retained and the duplicate forwarded to the lost article clerk at the office of the superintendent of surface lines. These records are then checked against the lower portion of the tag which has

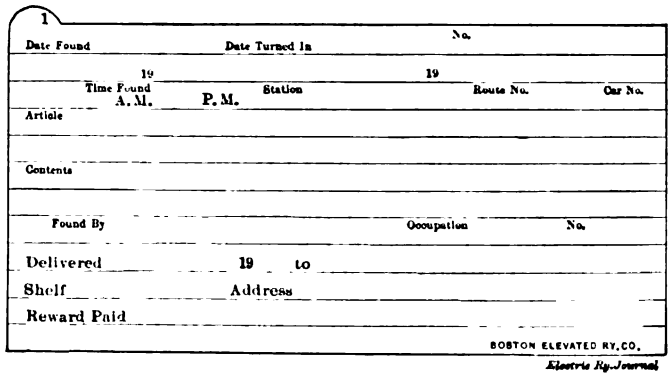


Fig. 3—Boston Lost Articles—White Card for Indexing According to Class of Article

been received through the receiving cashier from the employee as noted above.

If an article is delivered promptly either at the carhouse or at the division receiving office to the rightful owner, the form shown in Fig. 4, which is printed on blue paper, is filled out in duplicate in order to complete the record. The original is retained in the division in the dead file and the duplicate is sent to the lost article clerk in the office of the superintendent of surface lines to check with the tags re-

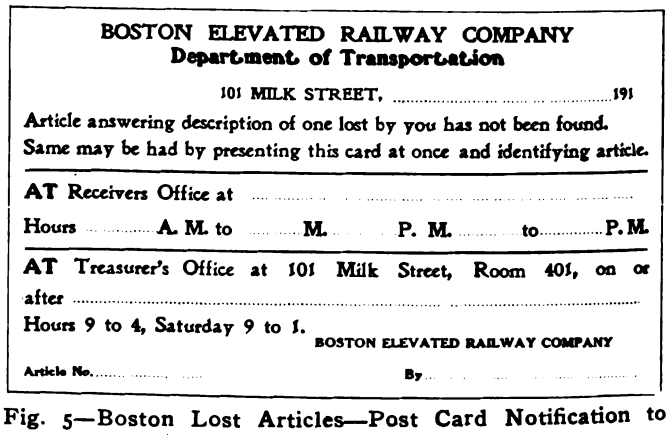


Fig. 5—Boston Lost Articles—Post Card Notification to Owner of Lost Article

turned and then filed in the dead file. Each day, also, this form is filled out for all articles which have been delivered since the original classification cards (Fig. 3) were sent in and forwarded to the lost article clerk in order that these classification cards may be removed from the live files.

Valuable articles are held three days in the division and then forwarded to the treasurer's office. In this event Fig. 4, but printed on green paper, is also used. The three copies made out are forwarded to the treasurer with the valuables. One is retained by the treasurer, one forwarded to the lost article clerk and one returned to the division receiver signed as a receipt for the safe arrival of valuables.

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Each month a list is prepared by the lost article clerk of the number of tags received from employees for which no "classification" or "delivered" card has been received and also a list of classification cards which have been received for which no tag was received. In this way the division authorities are advised of the failure of subordinate officials as well as of employees.

Each day the "lost and found" advertisements are clipped from the newspapers and if a similarity exists a postal card (Fig. 5) is mailed to the advertiser. When a postcard is sent on the strength of the "lost and found" advertisements the word "not" in the first sentence is crossed out. The word "not" is also eliminated in favorable replies to inquiries, but otherwise it is mailed as printed.

Many letters are received and answered in the course of a year. Approximately 3000 articles are turned in annually and about 45 per cent are returned to the owners, the remaining 55 per cent being returned to the finders at the expiration of two months. The direct cost is approximately $2,200 a year, although there is a considerable indirect burden, all of which probably, from the modern advertising man's standpoint, does not cost too much in consideration of the good will which results from those who appreciate the company's motives.

GERMAN ELECTRIC RAILWAY STATISTICS

The official statistics relating to German electric railways for the year ended March 31, 1912, show a total of 283 undertakings, an increase of fifteen as compared with the preceding year. More than 25 per cent of the lines carry freight. The length of single track is 2983 miles, an increase of 174 miles. The average seating capacity of the cars is about thirty-five. Of the entire number 132 undertakings are owned by municipalities and 136 by private companies. There are several traction syndicates, one of which operates seven street railways with a total of 87 miles. The railways carried 2,567,155,295 passengers for 428,000,100 train miles, which included approximately 313,100,000 motor-car miles. The increase in car miles as compared with the preceding year was about 38,000,000 car miles, and the increase in passenger travel about 251,000,000. The freight traffic also increased from 1,460,664 metric tons to 1,794,585 metric tons. The greatest density of traffic was shown by the Berlin subway-elevated system, with 1,122,485 passengers per mile, while the density of traffic on the surface system in Berlin was 645,669 per mile. The subway-elevated company also carried 7.2 passengers per car mile as compared with 6.9 passengers per car mile on the surface system. The total gross earnings, exclusive of non-reporting companies which operated a total of 120 miles of track, were $65,180,626, compared with $59,763,595 in 1910. The highest earnings per mile of track were achieved by the Berlin subway-elevated system, with $161,404, comparing with $67,856 by the Berlin surface system. The operating expenses, including employees' welfare, taxes and franchise payments, amounted to 86.4 per cent of the gross earnings. Tax and franchise payments constituted 7.4 per cent of the gross earnings. Of 170 Prussian railways sixteen paid no dividend, three had a dividend up to 1 per cent, thirteen up to 2 per cent, seventeen up to 3 per cent, twenty-six up to 4 per cent, nineteen up to 5 per cent and sixty-eight of 5 per cent to 10 per cent and eight more than 10 per cent. Five of the non-dividend lines were newly constructed.

During the year 236 passengers or pedestrians and seven employees were killed and 1060 passengers or pedestrians and eighty employees severely injured. Hanover holds the record for the greatest mileage according to population, namely, 2.68 miles per 10,000 inhabitants. The total population of Hanover is 376,000. The greatest density of traffic was achieved by Dresden, namely 238 rides per annum per inhabitant, and the corresponding figures for other German cities were: Frankfort-on-Main, 239; Cologne, 211; Leipsic, 204; Munich, 194; Düsseldorf, 187; Berlin, 186; Stuttgart, 153, and Hamburg and Breslau, 151 each. These figures are considerably less than for American cities of like size.

CARE OF STEAM BOILER ECONOMIZERS

Following an investigation of the fatal explosion of the economizers in a large Eastern power plant, in which it was shown that the principal damage resulted from an economizer unit which was idle at the time, the investigators give some pointed advice for observance in shutting down economizer units when not in service.

Two theories were brought forward to explain the accident. According to the first an explosive mixture of coal gas and tar might have been confined in the idle economizer, although this presupposes both poor combustion conditions in the furnace itself and some manner of firing the explosive gas after it was entrapped in the economizer chamber. The other and more probable theory is that the idle unit may have been fully or partly filled with water which was then so shut off that internal pressures which were generated could not be relieved. Leakage in the flue dampers might have admitted hot gases to the economizer chamber, raising the temperature and pressure of the confined water until destruction occurred.

To prevent the bursting of idle economizers, either from gas explosions or from the accumulation of water, it is important, therefore, when putting them out of service, to open up the soot clean-outs and any other openings that there may be into the gas chambers and to close the dampers as tightly as possible. When dampers become warped, or do not fit properly for any other reason, they should be promptly repaired. It is also highly important to maintain the safety valves on economizers in good condition, at all times. If they leak they should be repaired at once, instead of being screwed down tighter. In fact it would be well to adopt lock valves for economizers, so that they cannot be tampered with by irresponsible or thoughtless persons. To guard against the accumulation of steam or water within the idle economizer, its blow-off valve and air vent should be left open, so that no harm will result if the inlet should leak and admit water. If these precautions are taken in every case, according to the inspection division of the Travelers' Insurance Company, which made the investigation, the two causes of explosion that have beeen suggested in connection with this accident will be avoided.

NORWEGIAN RAILWAY ELECTRIFICATION

Work is well in hand on the conversion of the railway between Christiania and Drammen, Norway, a distance of about 33 miles, from 3 ft. 6 in. to standard gage, electric traction. A double track will be laid as far as Sandviken, 8¼ miles, but whether energy shall be taken from private companies or whether the government will establish its own power station has not yet been decided. As to rolling stock, seventeen electric locomotives of from 320 hp to 800 hp and eleven combined locomotives and carriages of 300 hp have been ordered. The latter are intended for use with a trailer on the Christiania-Asker section of the line, which is 14 miles long.

The Lexington (Ky.) Utilities Company, which is the local subsidiary of the Kentucky Traction & Terminal Company, has protested that 643 names on the petition which resulted in a popular referendum and consequent cancellation of its franchise are not registered or are otherwise invalid. It is now therefore possible that the referendum will be declared null and void, and in this case the franchise which was originally granted by the city commission of Lexington will became effective.

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TRACK AND OVERHEAD MAINTENANCE ON THE BEEBE LINES

The general plan of inspection followed by the companies forming the so-called Beebe syndicate is based upon steam railroad practice. All track is covered by track walkers twice a day and every incentive is given the men to observe the condition of rails and ties closely. A premium of $1 is given for each discovery of a broken rail. The bridge supervisors inspect all bridges at least once in two months. All of this inspection is recorded on report forms, and upon the inspection records are based the annual estimates of necessary renewals.

The fiscal year of the several companies making up the syndicate begins July 1, on which date the budget is adopted for the ensuing year. To be included in the budget, requisitions must have been turned in before the end of the preceding December, and preferably in September, so that the necessity for the construction and repair covered by the requisitions may be investigated before winter sets in. Requisitions originate in general with the track foremen, who are in close contact with the details and who turn them in to the four supervisors. On receiving the requisitions from the supervisors the chief engineer and the roadmaster personally investigate the condition of the track or other structure on which repairs have been recommended. Knowing approximately the amount of money which will be available during the coming year, these officials prepare a reasonable budget in detail for submission to the president. After allowances for the various divisions of the work have been made, plans are prepared for getting all track construction completed by Sept. 1 if possible so that it may be well settled by winter. Ties, rails and sundries are ordered in January for delivery between June 1 and July 15.

CATENARY CONSTRUCTION

The experience of the past few years has determined several fundamental maintenance precedents. In the first place, the type of catenary overhead construction adopted in 1909 and modified slightly after a few months' operation is an unqualified success. Future replacement of span and bracket construction will be with catenary, which costs comparatively little more. The maintenance cost of the catenary is very small, certainly less than one-half that of the wooden pole construction. The original catenary structure consisted of light steel A-frames made up of channels and stiffened with diagonal sway braces, the track being spanned with a light truss joining two A-frames and braced against side motion by means of diagonal braces. It was found, soon after commencing operation, that the sway braces made the frames too stiff in the direction of the track and they were accordingly removed. This change allowed a couple of inches motion of the top of the frame and thus removed the strain due to contraction and expansion of the messenger and trolley wires. At first the catenary hangers were spaced 10 ft. apart. Experience showed that the trolley wire thus hung was too stiff and the hangers were being twisted out of the horizontal with consequent hammering by the wheels. The interval between hangers was increased by steps up to 60 ft., which is now standard, and the flexibility of suspension is such that no trouble at the hangers is experienced. The original catenary messenger wire was a plow-steel cable, the feeders being carried on brackets attached to the A-frames.

In considering methods for reducing the cost of construction the engineers decided first to mount the feeders on top of the trusses on insulators similar to those used for the messenger wire. Further consideration led to the substitution of the 500,000-circ. mil, nineteen-strand, hard-drawn feeder cable for the steel messenger wire, and this plan has proved very satisfactory besides cutting down the cost of material and labor. Trouble was at first expected from side-swaying of the contact wires. To prevent this the wires were side-guyed to the A-frames on both sides with insulated guy wire large enough for 1200 volts working pressure.

The first line was put in operation before all these guy wires were installed, but the side sway developing even on the unfinished work and on a stormy February day was negligible. The guys are still used at the supporting bridges, but as only 550 volts d.c. is used, the insulators were removed and the ordinary Brooklyn strains employed to insulate from the steel bridges. These bridges are placed 300 ft. apart. By these changes the construction was reduced in cost by $800 per mile or more and the operation was improved at the same time.

TRACK CONSTRUCTION AND INSPECTION

A second fact that has been settled is that creosoted ties, if properly selected and treated, are economical. Approximately 15,000 creosoted ties have already been installed and about 50 per cent of the replacements are of this type. The ties are of long-leaf yellow pine, sound and square-edge quality, impregnated to the heart with creosote oil of the best quality and at the rate of 10 lb. per cu. ft. The railway employs R. W. Hunt & Company to inspect the ties, the creosote oil and the impregnating at the treating plant. Long-leaf yellow pine, prime quality heart timber and winter-cut second-growth chestnut ties compose the rest of the supply. These are untreated and are used to save excessive first cost. As the life of the treated ties is estimated at eighteen years, they will prodominate more in numbers each year until finally practically all will be of this variety.

A third item of standard practice is the thorough inspection of all other supplies as well as ties. The whole construction of the Beebe lines was based on the principle of the scientific use of materials. Rails, ties, ballast, drainage, etc., are all expected to yield the maximum return for the cost. If a 70-lb. rail is used, it is because that weight of rail has been determined, by the consideration of loads, speed and supports, to be the economic weight and size. But this economy of material means close inspection both of material and of condition after installation. The result of this care is a present track maintenance cost of less than $500 per mile of single track.

Following are the specifications under which ties are now being bought.

ROCHESTER, SYRACUSE & EASTERN RAILROAD COMPANY SPECIFICATIONS FOR TIES

Long-Leaf Yellow Pine—Untreated:

All ties to be freshly manufactured from live Georgia or Florida long-leaf yellow pine timber, of good sound quality, straight and free from loose or unsound knots, wind shakes or other imperfections that would affect their strength or durability. Ties to be hewn smooth on four sides with ends sawed square. One inch of sap will be allowed on each corner measured across the face.

Long-Leaf Yellow Pine—Treated:

All ties to be freshly manufactured from live Georgia or Florida long-leaf yellow pine timber, of sound and square-edge quality, hewn on four sides, with the faces true and parallel, free from deep score marks, splinters and other injurious inequalities of surface; with the ends sawed square. The variation in thickness shall not be more than ½ in. and the variation in length not more than 1 in. On an 8-in. face tie there shall be allowed on the face of the tie 1 in. of wane, which may be either ½ in. on each side or 1 in. on one side—giving a measurement between the wanes of 7 in. They are to be creosoted, and each tie must contain 10 lb. of dead oil of coal tar per cubic foot after treatment. The coal tar to be in accordance with the following specifications:

The oil used shall be the best obtainable grade of coal-tar creosote; that is, it must be a pure product of coal-tar distillation and must be free from a mixture of oils, other tars or substances foreign to pure coal tar; it must be completely liquid at 38 deg. C. and must be free from suspended matter; the specific gravity of the oil at 38 deg. C. must be at least 1.03. When distilled according to the common method—that is, using an 8-oz. retort, asbestos covered with standard thermometers, bulb ½ in. above the surface of the oil—the creosote calculated on the basis of the dry oil shall give no distillate below 200 deg. C., not more than 5 per cent below 210 deg. C., not more than 25 per cent below 235 deg. C., and the residue above 355 deg. C., if it exceeds 5 per cent in quantity, must be soft. The oil shall not contain more than 3 per cent water.

Chestnut Ties:

Chestnut ties to be winter cut from sound, live timber.

Hewn ties to be 6 in. thick, 8 in. across faces and 8 in. long with score marks not deeper than ¼ in. Ties to have faces true and parallel and without splinters or other injurious inequalities of surface and with ends sawed square.

If "pole" ties are furnished (40 per cent of total order), they must be peeled, and the minimum face dimension shall be 6 in.

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STREET CAR ADVERTISING BY RAILWAY COMPANIES

In a decision handed down on May 19, 1913, in the special term of the Supreme Court in Monroe County, N. Y., in the case of the Electric Railroad Advertising Company against the New York State Railways, Justice Sutherland warned street railway companies that they must be very careful in regard to the wording of advertisements on the dashboards of cars and also within such spaces inside cars as may be allotted to them by agents who have contracts granting exclusive privileges for street car advertising.

The Electric Railroad Advertising Company has had for a number of years an exclusive contract with the New York State Railways covering all street cars in Rochester, N. Y., and giving to the railway the right to use the dashboards of the cars and two spaces near the center of each car for its own advertising. These inside spaces have been used for cards reading as follows: "Flower Show, Convention Hall, Nov. 5-6-7-8-9. Take Lake and Monroe or Hudson and South Clinton cars," and "Take cars of Dewey, Emerson and Driving Park lines, Automobile Show, Exposition Park, Jan. 27-Feb. 1, inclusive." Recently, however, cars appeared bearing outside large posters which read: "Baseball to-day," and on a test case an injunction was secured restraining the railway company from advertising on the outside of its cars anything except destinations or routes to particular places.

Following an unsatisfactory revision of the baseball sign, the suit was next carried to the Supreme Court. In his decision Justice Sutherland said in part:

DECISION

"I do not think the placards of a flower show at Convention Hall and an automobile show at Exposition Park, with date and route, violate the injunction. The managers of the shows paid the railway company nothing for such advertising.

"It is its own legitimate advertising, under the contract, to call the attention of the people to any attraction for the purpose of getting them out and persuading them to travel upon its lines. The fact that incidentally or equally with the carrying railroad the show advertised profits by the display which the railway makes does not make the display violative of the letter or spirit of the contract or injunction.

"As to the baseball placards displayed on the dashboard of the cars, I think a different conclusion must be reached. Under the final injunction, as modified by the Appellate Division, the defendant cannot display any advertising matter on the outside of its cars, but the use of signs indicating the route or destination of its cars, or containing notice to its patrons as to the car or line to reach a particular place, is not enjoined. The 'Baseball to-day' placards were hung not only upon the cars going to the baseball grounds but upon cars on other routes. These signs advertised the fact that baseball was to be played on that day, but did not indicate the route to the grounds."

Speaking of the revised sign, when the route was added to the "Baseball to-day" sign, Justice Sutherland said:

"The baseball sign seems to violate the injunction at least by the use of the word 'to-day,' which does not contribute in any degree to the location of a place or the designation of a route.

"If the sign hung on the outside contains any matter which has nothing to do with the destination or route but is put on there for the sole purpose of calling attention to the event itself or the time when it is to be held, the sign then becomes objectionable under the judgment which has been pronounced construing the contract which the defendant made with the plaintiff with respect to advertising."

The Louisville (Ky.) Railway has instructed its conductors to wait for passengers who are near an intersection when the car passes.

CENTRAL ELECTRIC RAILWAY ASSOCIATION, TRAFFIC ASSOCIATION AND ACCOUNTANTS' ASSOCIATION BOOKS

Brown Book No. 3, issued by the Central Electric Railway Association and the Central Electric Traffic Association, gives the official list of officers, railroad members, committees, annual reports, etc., for the year 1913. The total mileage of the interurban roads in the association as of March 15, 1913, was 3874. The members of the committees as published in the Brown Book were given in the ELECTRIC RAILWAY JOURNAL of March 29, 1913, page 594. The charges for interchange of equipment between members of the association are given as well as the rules and regulations governing the issue and exchange of annual transportation between lines. Other information pertaining to the work of the associations is included in the book, which is issued from the office of A. L. Neereamer, the secretary, Indianapolis, Ind.

A booklet issued by the Central Electric Railway Accountants' Association contains various reports and papers presented at the meetings of the association, a list of officers and committees, a list of members, a brief history and the constitution and by-laws. The book was prepared by the compiling committee of the association as follows: H. B. Cavanaugh, chairman; C. M. Witt, F. T. Loftus, A. F. Elkins and L. T. Hixson.

The following new members have been admitted to the Central Electric Railway Association:

Railway: Mansfield Railway, Light & Power Company, Mansfield, Ohio; Stark Electric Company, Alliance, Ohio.

Supply: Harry E. Adams, Nagel Electric Company; E. G. Beatty, Galena Signal Oil Company; W. K. Archbold, Archbold-Brady Company; George Bryant, Bryant Manufacturing Company; W. H. Brainard, Carnegie Steel Company; Norman M. Hench, Carnegie Steel Company; C. E. Slack, C. E. Slack Company; J. K. Hoffman, Hale & Kilburn Manufacturing Company; Joseph Hollis, Trolley Supply Company; W. J. Dann, R. F. Johnston Paint Company.

ELECTRIC TRAIN ORDER SIGNAL

The Union Switch & Signal Company has recently placed on the market an electric train order signal with two arms, one for each direction of traffic, and the table lever stand used to control it. The signal may be either the well-known Style "B" or Style "S." Each arm is arranged to indicate in the upper quadrant, working in three positions. The lower case may be omitted if desired. Standard automatic block signal practice is followed practically throughout. Only one lantern is needed in spite of the fact that the axes of the semaphore shaft do not coincide. The quadrants are notched in the center as well as at the ends so that the levers may be left in any one of the three positions corresponding to those of their respective signals.

WRAPPING RUSTY HANDRAILS

In many sections of the country where the humidity is comparatively high considerable difficulty is experienced in eliminating damage to clothing from rust accumulation on the hand rails. This difficulty is experienced particularly in Texas and has been overcome by the application of linen tape coated with shellac on portions of the hand rails in the vestibules of the pay-as-you-enter and pay-within cars. Those portions of the hand rails and stanchions which might come in contact with the passengers' clothing are wrapped with one layer of linen tape and receive three coats of shellac. After a comparatively short period in service, the surface of the paint wears as smooth as the iron rail, and there is no tendency for it to ravel.

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MEETING OF JOINT COMMITTEE ON STANDARD CLASSIFICATION OF ACCOUNTS

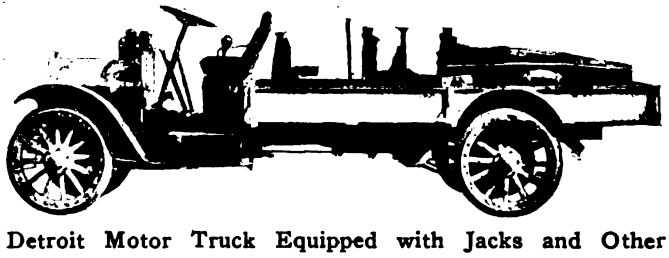
A meeting of the joint committee on standard classification of accounts of the American Electric Railway Accountants' Association and representatives of the Interstate Commerce Commission was held in Boston during the last week in June. Those present were William F. Ham, Washington Railway & Electric Company; F. E. Smith, Chicago Railways; H. L. Wilson, Boston Elevated Railway, and W. B. Brockway, Ford, Bacon & Davis, representing the Accountants' Association, and Fred W. Sweney, chief examiner of accounts, and George Geekie, assistant in charge of electric railway accounts, representing the Interstate Commerce Commission. Five full days were devoted to a consideration of a revision of the road and equipment accounts, of the operating expense accounts and of the operating revenue accounts, as well as a consideration of a revision of the income and profit and loss statements and the general balance sheet.

All of these schedules were carefully considered and are to be revised and again considered by the committee, after which the Interstate Commerce Commission proposes to publish all of these tentative schedules and send them out to all the electric railway companies for their consideration and criticism. When these have been received this committee will again meet with the Interstate Commerce Commission representatives for final approval of these classifications, and it is hoped and expected that they may be promulgated so as to be effective as of July 1, 1914. The committee has expended a good deal of time over these classifications, having spent four days in New York in January, five days in Atlantic City in April and five days in Boston in June.

EMERGENCY GASOLINE MOTOR TRUCKS FOR THE DETROIT UNITED RAILWAY

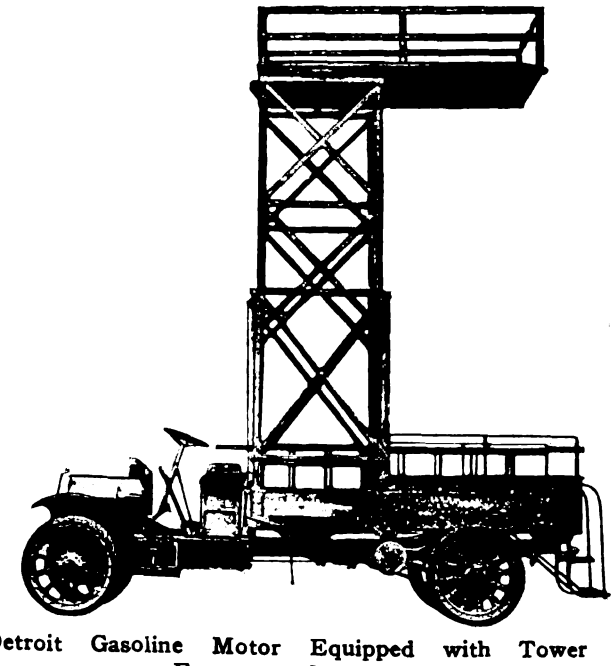
A striking example of what can be done in adapting the motor truck to emergency line repairs is found in Detroit, where the Detroit United Railway is employing with very gratifying results two gasoline motor trucks built by the Federal Motor Truck Company, Detroit, Mich. These trucks were built according to body designs supplied by E. J. Burdick, superintendent of power Detroit United Railway. One truck is used for hose jumper work, derailed cars, etc., and one is used for repairing overhead work. The trucks are housed in a building which is operated by the company on somewhat the plan of a city fire house, and emergency men are available for each wagon at any hour of the day or night.

The body of the truck used as a trouble wagon is 11 ft. long and built on the frame and is about 5 ft. wide inside.



Detroit Motor Truck Equipped with Jacks and Other Means to Handle Derailed Cars, etc.

The load is carried 30 in. above the ground, holding the center of gravity as low as possible. The truck is equipped with Swinehart cellular tires and has a speed of 18 m.p.h. There is a partition 5 ft. back of the driver's seat. The back wheels are housed, leaving room for tool boxes of ample size. The load carried in front of the partition is about 1100 lb. It includes jacks, bull ropes and other equipment for replacing cars on the track, etc. This load is always on the car. The space in the rear end of the truck, however, except that which is used for the side tool boxes, is available at all times for the use of hose jumper equipment, etc., which is always kept suspended above the car by means of an air hoist. The weight of the hose jumpers, etc., is about 2100 lb. A flexible cradle in which the hose jumpers rest is suspended from the air hoist. This cradle is made of log chains and steel tubing. If a call is received



Detroit Gasoline Motor Equipped with Tower for Emergency Wire Repairs

for a fire, the load in the cradle is dropped into the rear compartment over the wheel housing. The Detroit United Railway has an arrangement with the city fire department whereby all fire alarm calls are received at the central emergency station of the company. The company responds to all calls within the 1-mile limit which marks the most highly congested center, whether or not the fire is on a car line. The company responds to calls in the rest of the city if the fire is on a car line or if its services are specially needed by the city.

While the emergency trouble wagon, therefore, is equipped for constant use and has been found in practice to be of great value, the other truck, used for repairing overhead work, is equally valuable. This truck is also built with a low center of gravity and has installed upon it a standard Trenton tower top. The tires of this truck are also of the Swinehart cellular type. This truck likewise carries a complete set of repair equipment.

VENTILATOR FOR ARCH ROOF

The opportunity for decreasing weight of passenger cars of all descriptions and increasing their strength and durability by the use of arch roofs has been recognized generally during the past few years by electric railways, and a marked increase has occurred in the number of new cars which have this type of roof specified by their purchasers. An important difficulty with this design, however, has been the problem of ventilation. Roof ventilators operate under many difficult conditions. They must be light in weight, they must exert a strong aspiratory effect, they must operate regardless of the direction of the wind, even when it takes the form of a down draft, and they must eliminate any possibility of rain or dust entering the car.

To meet these conditions the Railway Utility Company, of Chicago, has been experimenting with different forms of its "honeycomb" type of ventilator, originally applied to cars with monitor-deck roofs, and this has resulted in the de-

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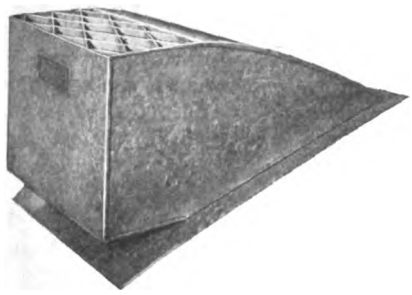
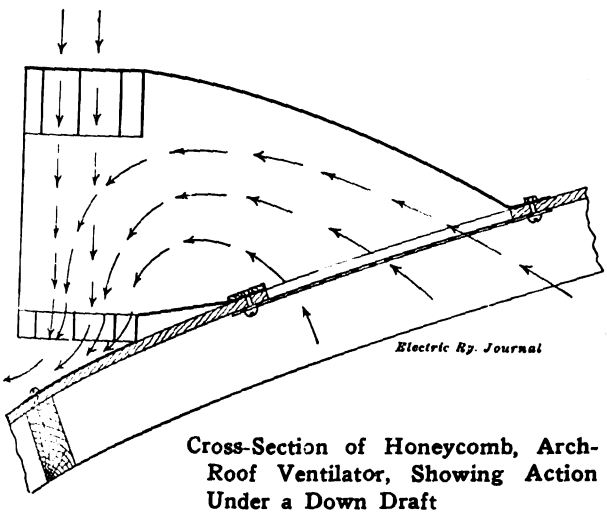
velopment of the ventilator for arch roofs shown in the accompanying illustration. The principle upon which it operates is exceedingly simple. A curved hood is extended out from a hole in the car roof, the hole being covered by a grating. The hood is blanked off at the outer end, but openings are provided in the upper and lower sides. These openings are divided up into a series of small openings by diaphragms of galvanized iron, making a structure quite similar to a honeycomb. The relatively great depth of the diaphragms in comparison to the size of each small opening compels any air which passes through the honeycomb to move absolutely in vertical lines either upward or downward.

Any current of air which passes vertically across the end of the ventilator hood naturally exerts a strong aspirating effect on the air within the hood, tending to set up horizontal currents which become intermingled with the vertical currents at the end of the hood, thus drawing air through the hood out of the car. The action of a down draft is shown by the arrows in the accompanying line cut. With a wind which is in a perfectly horizontal direction, as under the normal conditions, the honeycombs both on the upper and the lower sides of the hood exert an aspirating effect and draw air out of the hood both in an upward and in a downward direction, the currents within the hood still being generally horizontal.



Honeycomb Ventilator

Rain which beats into the upper honeycomb and cinders or dust which happen to be deflected into it are directed by the sides of each honeycomb cell straight downward through the lower honeycomb openings and out of the ventilator hood, so that there is no possibility for moisture or dust to be entrained or to find its way into the interior of the car.



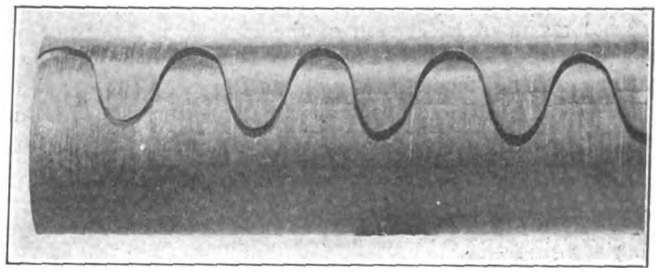
Cross-Section of Honeycomb, Arch-Roof Ventilator, Showing Action Under a Down Draft

Tests have shown that with a wind velocity of 10 m. p. h. each ventilator exhausts 110 cu. ft. of air per minute. At 20 m. p. h. the capacity rises to 230 cu. ft. of air per minute, and at 30 m. p. h. 310 cu. ft. of air is exhausted. For cars operating at the higher speeds it is generally considered advisable to install registers in place of the grating over the opening in the car roof, so that the ventilation can be controlled. These registers may of course be connected to operate simultaneously by means of a handle inside the car, similar to the customary method of opening sash in monitors.

A NEW INSULATING COMPOUND

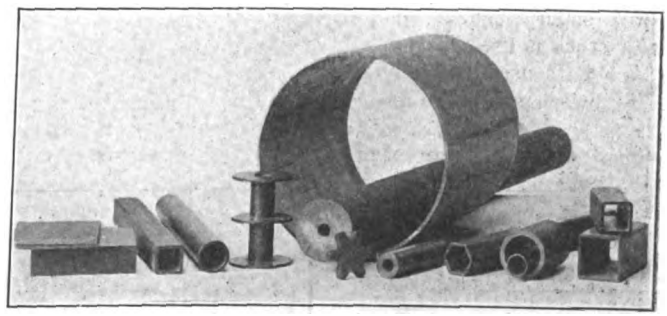
A new material to take the place of hard fiber, glass, porcelain, hard rubber, built-up mica, pressboard, rawhide and molded compounds has been developed by the Westinghouse Electric & Manufacturing Company at East Pittsburgh, Pa. It is known as "micarta" and is used for commutator bushings, brush-holder insulation, noiseless gear blanks, light-weight conduit, refillable fuse tubes, arc shields in circuit-breakers, etc.

Micarta is a tan-brown colored, hard, homogeneous material having a mechanical strength about 50 per cent greater than hard fiber. It can readily be sawed, milled, turned, tapped or threaded, if a sharp-pointed tool is used and the work done on a lathe. It can, however, be punched only in thin sheets and it cannot be molded. Micarta is not brittle and will not warp, expand or shrink with age or exposure to the weather, but takes a high polish, presenting a finished appearance.



New Insulating Compound—Harmonic Fracture of a Tube Showing Homogeneity of Material

Two grades of the material are made. The grade known as "bakelite micarta" will stand a temperature of 150 deg. C. (300 deg. Fahr.) continuously or 260 deg. C. (500 deg. Fahr.) for a short time. It is infusible and will remain unaffected by heat until a temperature sufficient to carbonize it is reached. It is claimed to withstand an electric arc better than hard fiber, hard rubber, built-up mica or any molded insulation containing fibrous or resinous materials. Its coefficient of expansion is low, being approximately 0.00002 per degree C. It is impervious to moisture. The other grade has the same mechanical and electrical properties as the bakelite micarta but differs in its chemical and thermal properties, behaving toward chemicals and heat very much as an ordinary resin. This grade is not used in plate form.



New Insulating Compound—Sample Forms in Which Material May Be Shaped

As proof of the uniformity of structure of bakelite micarta, the accompanying illustration of a fracture is shown. This is not a saw cut, but a natural break. The tube was held tight on a metal mandrel and a compressive force was applied at one end of the tube and when the force became sufficiently great the tube split as shown. Such a break is known as a "harmonic fracture." The strains in a homogeneous material under stress follow a sine wave law. If one part of the material is weaker than the rest, the strain

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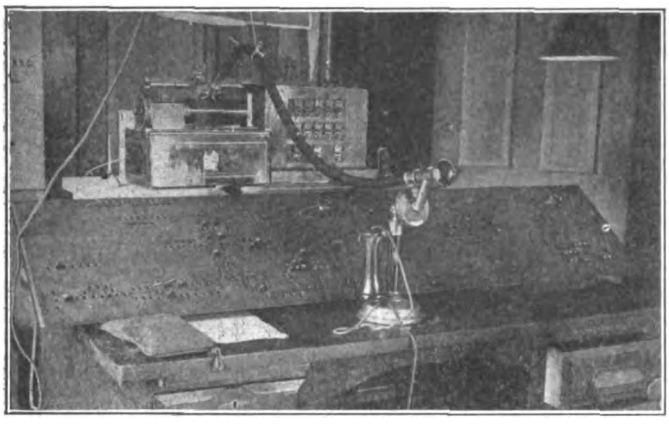
at this point becomes greater and the harmonic wave is distorted. However, it will be seen from the illustration, made from a photograph, that the strain followed the true harmonic wave almost as closely as the eye can detect.

DICTAPHONE IN DISPATCHING

The Southwest Missouri Railroad operates 75 miles of track, about one-third of which is double track. Cars are run at from three to thirty minutes' headway, but the lines upon which service more frequent than thirty minutes is given are double-tracked. For the past twenty years the dispatching of cars on this road has been by telephone, none of the orders being reduced to writing, and this system has been successfully used for a decade. On March 1 last, however, a new feature was added to the telephonic system by the installation of a dictaphone in the dispatcher's room, with the effect that during the last four months every order given to trainmen by telephone has been duly recorded on the dictaphone and can be reproduced in case of any dispute or misunderstanding. These records are preserved for a period of three days, when they are scraped and the blanks are put back into service.



Dictaphone on Telephone Dispatching Board

The officers and employees of the road are highly pleased with the results already achieved by the use of the dictaphone in the dispatching service. So far as known, the dictaphone in the Southwest Missouri Railroad Company's office in Webb City, Mo., is the first one used in train-dispatching work. In addition to the dictaphone and scraper, thirty-six blanks were purchased and the outfit has proved adequate.

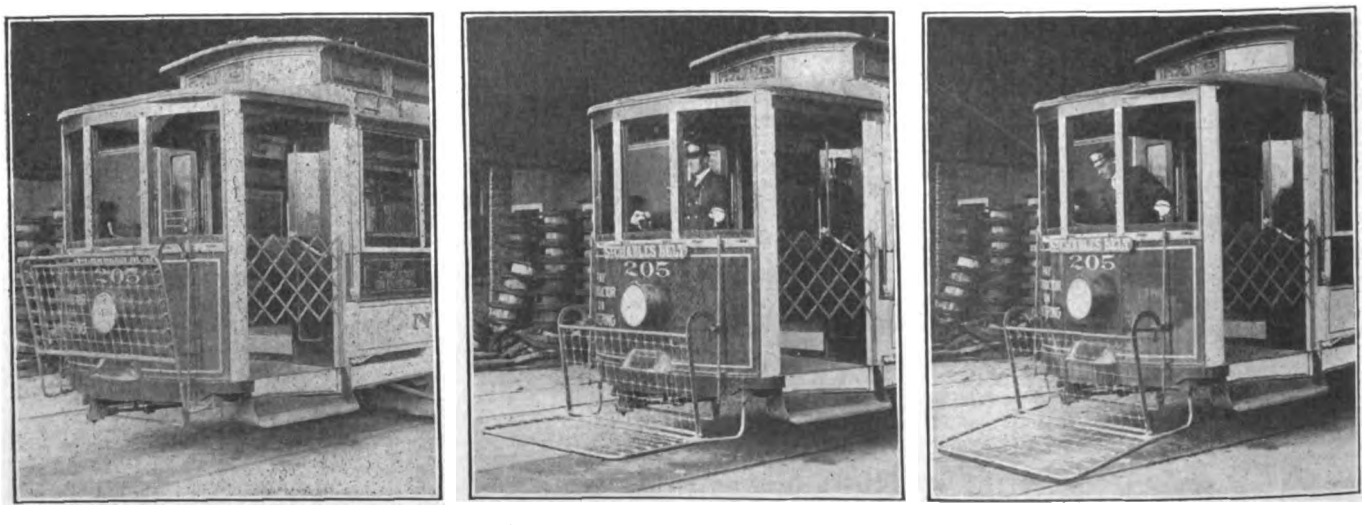
A LIGHT CAR FENDER

The New Orleans Railways Company has had in operation for some time past a number of Herr car fenders. As shown in the accompanying illustrations, this type of fender is made up of two sections, one horizontal and one vertical. These are hinged one upon the other, and in addition the horizontal section is hinged to castings attached to the bumper by means of extensions of the fender frame. As this section is raised, either to raise the fender from the rails to normal running position or from normal running position to raised position at the rear end of the car, the vertical section of the fender slides upward upon two vertical guide rods, to which it is connected by bent arms or extensions of its framework.

The fender is normally carried in running position by means of a pin in each of the vertical guide rods as these pins engage with sleeves on the ends of the bent arms which slide upon these rods. The rods are, however, furnished with cranks at the bottom, and the motorman can turn them to an angle of about 45 deg. by means of a handle extending up inside of the dashboard. When it is desired to drop the fender to the rails the rods are turned, and the pins in them engage with slots in the sleeves which slide on them, thus permitting the sleeves to drop about an inch and consequently permitting the outer edge of the fender to fall upon the rail.

The fender is reset to running position by raising it enough so that the sleeves slide up above the pins on the guide rods and this permits a spring to turn the guide rods back into the normal position. The principle is much like that used in raising an umbrella except that instead of the catch for the sleeve being pressed by the fingers, the catch, which in the case of the fender is a pin, is moved around to coincide with a groove in the sleeve and thus lets the sleeve pass by it. The fender is held in raised position when it is at the rear end of the car by means of a strap in the usual manner.

The new device, which has been developed by William Dickenson, master mechanic New Orleans Railways Company, is exceptionally light and strong. The total weight complete with fittings is but 90 lb. Its use in New Orleans has been approved by the City Council.



Manually Operated Fender Folded Up at Rear End, in Running Position and Dropped to Rails

The Appellate Division of the Supreme Court decided, on July 10, that the Brooklyn Rapid Transit Company must obey the ruling of the Public Service Commission, First District, New York, to equip its cars with power and geared hand brakes. This order was mentioned on page 96 of the issue of this paper for July 20, 1912.

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News of Electric Railways

Illinois Public Utility Law

The act providing for the regulation of public utilities in the State of Illinois has been signed by Governor Dunne and will go into effect on Jan. 1, 1914. The act substitutes for the present Railroad & Warehouse Commission a State Public Utilities Commission, consisting of five members, not more than three of whom may be affiliated with the same political party. The annual salary of each commissioner is to be $10,000. Before entering upon the duties of his office each commissioner is required to give bond, under security approved by the Governor, in the sum of $20,000. The usual restrictions are placed on all official connections with any corporation or person subject to regulation by the commission, and upon receiving any emoluments therefrom.

The commission will have general supervision over all public utilities, and it must examine these and keep informed as to their franchises, capitalization, rates and management and operation of property. The term "public utility," as used in the act, includes every corporation, company, association, joint stock company, partnership or individual, their lessees, trustees or receivers appointed by any court (except, however, such public utilities as are or may hereafter be owned or operated by any municipality) that owns, controls, operates or manages within the State, directly or indirectly for public use, any plant, equipment or property for the transportation of persons or property or the transmission of telegraph or telephone messages within the State, or for the production, storage, transmission, sale, delivery or furnishing of heat, cold, light, power, electricity or water, or for the conveyance of oil or gas by pipe line, or for the storage or warehousing of goods, or for the conduct of the business of wharfinger, and that may own or control any franchise, license, permit or right to engage in any such business. The term "service" is used in its broadest and most inclusive sense and includes not only the use or accommodation afforded consumers or patrons but also any product or commodity furnished by the utility and the plant or equipment and any facilities employed by the utility and devoted to the purposes of the corporation. The word "rate" includes every individual or joint rate, fare, toll, charge, rental or other compensation of any public utility or any two or more of such, and any rule, regulation, practice or contract relating thereto.

In the matter of stock and bond issues, the act states that the power of public utilities to issue evidences of indebtedness and to create liens on their property is a special privilege, the right of supervision, regulation, restriction and control of which is vested in the State to be exercised by the commission. Provision must be made for the proper identification of all issues by means of serial numbers or other devices. No issues payable at periods of more than twelve months from the date thereof may be issued except with the approval of the commission and then only for the acquisition of property for extensions, improvements or additions, for the lawful re-funding of its obligations, or for reimbursements of moneys paid from income not received from sale of evidences of indebtedness within five years after the application for authorization of the new issue. Before issuing any authorization the commission, when it is deemed necessary, "shall make an adequate physical valuation of the property of the public utility, but a valuation already made under proper public supervision may be adopted, either in whole or in part, at the discretion of the commission." Short-term notes for periods of not more than twelve months may be issued without the consent of the commission, but may not be renewed for an aggregate period of longer than two years. The commission has no power to authorize the capitalization of the right to be of a corporation, or to authorize the capitalization of any franchise, license or permit in excess of the amount (exclusive of any tax) actually paid to the State as consideration therefor. The commission also has full power of supervision and restriction over all the forms of intercorporate relations. The commission may also ascertain the value of the property of any public utility in the State.

Rates are required to be just and reasonable, and unless the commission otherwise orders no change shall be made by any public utility in any rate, classification, ruling, privilege or facility except after thirty days' notice to the commission and to the public. The commission has power, upon a hearing upon its own motion or upon complaint, to investigate any single rate, classification, etc., or the entire schedule, and to establish new rates, classifications, etc., in lieu thereof. This provision, however, does not affect the act establishing and regulating the maximum rate of charges for the transportation of passengers in the State. The establishment of through routes and joint rates is adequately provided for.

The last part of the act takes up in detail such points as the control over car distribution, standards of service, safety appliances and the character of proceedings before the commission and in the courts. The penalty for a violation of an order of the commission by a corporation is a fine of not less than $500 nor more than $2,000 for each offense, and a person violating its orders shall be punished by a fine not exceeding $1,000 or one year's imprisonment, or both.

Jamestown Companies to Claim Strike Damages

The strike of the employees of the Jamestown (N. Y.) Street Railway and the Chautauqua Traction Company, which collapsed and was declared off on June 29, as noted in the ELECTRIC RAILWAY JOURNAL of July 5, 1913, page 45, was begun on May 1, 1913, following the refusal of the officers of the company to comply with the demands of its union employees for 25 cents an hour for the first six months' service, 27 cents an hour for the second six months, 29 cents after one year, recognition of the union and the reinstatement of a conductor who had been discharged a few days before. The company started a partial service immediately with the men who remained faithful to it, but for some time no attempt was made to run cars at night because of the fear of violence.

On May 27, following disorder by strikers and their sympathizers, Frank W. Stevens, chairman of the citizens' committee which had been named by the Mayor, called a meeting of citizens to organize a citizens' police to preserve order. Five hundred were sworn in and equipped with night sticks and badges. On May 29 Mr. Stevens received from A. N. Broadhead, president of both companies, a statement naming the conditions under which he would agree to arbitrate. These terms were published in part in the ELECTRIC RAILWAY JOURNAL of June 14, 1913, page 1081. The men rejected the terms proposed by Mr. Broadhead because they did not provide for recognition of the union nor for the reinstatement of all the men on strike. Several counter proposals were made, but negotiations for a settlement were finally broken off.

As previously stated in the ELECTRIC RAILWAY JOURNAL, the company has prepared a list of twenty-five men who went on strike who will be reinstated on the terms promised by the company about six weeks before the strike was called, but at the bottom of the extra list. These terms provide for an increase in wages of about 1½ cents an hour for the conductors and motormen, making the minimum 19 cents an hour and the maximum 25 cents an hour; also for the change from the "swing run" to "the early and late day" plan. The increase in wages which had been promised the men took effect on May 1, and all who remained with the company and the new men taken on have benefited by it. After the strike had been declared off Mr. Broadhead issued a statement, in part as follows, in which he said that a claim would be filed with the city and county for damages sustained by the company on account of the strike:

"The gambling and drunkenness that have been going on will not be tolerated and the men that have not been honest with the company will not receive jobs. There are twenty-five of the men who can come back. The rest could not work for me if they worked for nothing and paid their own board. The strike has greatly injured the city and the lake region. I think it has cost the city and lake region at least

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$500,000. We are making out our account to the city and county for our loss directly and indirectly and the damage to our property, and the county and city will have to pay it. I am going to turn in my account for damage to property to the county and for loss of business to the city because I was not protected in the rights I have here. I expect to have every dollar. As soon as the first window was broken I gave orders to have the cost of replacing it jotted down.

"Personally I would rather not open Celoron Park this year, but instead make many alterations and open a new Celoron next year. There is a lot of work to be done there."

Railroad Terminal Matters in Chicago

The City Council of Chicago voted on June 30 to appropriate $10,000 for the employment of a commission of experts to submit a scientific railway terminal policy to the city. This action was taken by request of Alderman Geiger, chairman of the railway terminal committee, after a meeting of the committee in which a sub-committee was appointed to go into the subject. At the meeting a statement was filed by Charles H. Wacker, chairman of the Chicago Plan Commission, who urges the adoption of Twelfth Street as a location for all of the future railroad terminal development in Chicago.

Mr. Wacker makes the following arguments in favor of his plan:

"Three times passenger capacity. Can be enlarged if needed. Can be developed with office buildings as in New York. Can carry a subway beneath it. Correlation of terminals. Shortening the distance between entrance to passenger station and trains. Can carry an elevated line right through station if desired. Easy of access and non-interference with development of city's heart. Opens eight new streets."

The following criticisms of the plan proposed by the Pennsylvania Lines and associated railroads were made by Mr. Wacker:

"Lack of street car transportation and connection with proposed subways. No river roads. Trussing of viaducts above streets. No opening of Monroe Street. Provision for next fifteen years only. Natural limitation of expansion. Inaccessibility from East or North Side of city. Distance between train and coach-cleaning yards, necessitating heavy switching charges. Tracks approach over streets, leaving few unobstructed streets. Location of warehouses across proposed widened Congress Street. Places a new freight yard in heart of the city. It will remove from taxation 18 acres of down-town city property, meaning heavier taxes for West Side owners."

A. Bement, representing the Western Society of Engineers, has sent a letter to the committee on railway terminals of the City Council of Chicago in reference to the proposed railroad terminal development. Mr. Bement indorsed the suggestion made by the City Club that a scientific commission be appointed to study the problem before any action is taken on the ordinance authorizing the improvement desired by the Pennsylvania Lines and the other companies which are interested with that system in the Union Station. Mr. Bement said that he thought that the present Union Station would serve all purposes until a comprehensive study could be made of the entire problem of transportation in the city.

Final Hearing on Uniform Rules for Interlocking Plants

On June 26 the engineers for the Railroad Commissions of Indiana, Illinois, Wisconsin and Minnesota held a final hearing in the offices of the Illinois Railroad & Warehouse Commission in Chicago on uniform rules and regulations governing the construction, reconstruction, maintenance and operation of interlocking plants. On June 12, at a hearing at Madison, Wis., the engineers for the four commissions presented their revised rules to the committee representing the steam and electric roads in the four states. The final hearing held in Chicago, June 26, was to permit the engineers representing the steam and electric roads to present their objections to the revised rules.

At this hearing a number of revisions were requested by the steam road engineers as regards the merhanical details of the plant, the various reports to the commission, and locks and seals. Under the latter provision the rules require that all interlocking cabinets, time locks, time releases, emergency switches, indicator and relay cases must be provided with suitable covers and fastenings so arranged that they may be sealed or locked as conditions require, to be opened only in case of emergency. As to special requirements affecting electric railways, the clause requiring electric railways to provide suitable guards of an approved design to prevent the trolley from leaving the wire while in the act of crossing tracks within the interlocking limits was eliminated. The objection against this requirement raised at the meeting held March 12, and reported in the Electric Railway Journal of March 22, brought about the elimination of the trolley guard clause so far as interlocking crossings are concerned. B. J. Fallon, engineer maintenance of way of the Metropolitan West Side Elevated Railway, Chicago, objected to making the minimum length of detector bars 53 ft. He stated that there was no necessity for electric roads to install a 53-ft. detector bar. Accordingly the engineers for the commission made the minimum length 33 ft. and will increase it where the character of the rolling stock requires.

The commission's engineers are now engaged in making the final revisions to the proposed set of uniform rules and they will be submitted to the four commissions for final adoption in the very near future.

Letter from Company to Council of Cleveland

In a recent letter to the City Council of Cleveland John J. Stanley, president of the Cleveland (Ohio) Railway, expressed the hope that the deficit existing in the operating balance will soon be made up through the increased charge fixed by the board of arbitration. The letter was accompanied by a resolution adopted by the board of directors at their regular June meeting authorizing the company to take such steps as may be necessary to have the deficit made good and to use every reasonable effort to prevent other deficits from being created during the succeeding months. The directors say they hope and believe that the operating expenses of the road for June will be less than the new allowance, and that the surplus will within a short time wipe out the accumulated deficit. At the same time the Council was notified that the new allowance was insufficient to meet the expenses of the past three months.

Mr. Stanley has denied the rumor that he will join Horace E. Andrews in the operation of the Eastern properties in which both are interested. He states that he will remain at the head of the Cleveland Railway.

Mr. Mellen Resigns from Boston & Maine and Maine Central Railroads

Charles S. Mellen, president of the New York, New Haven & Hartford Railroad and the Connecticut Company, resigned on July 8 as president of the Boston & Maine Railroad and the Maine Central Railroad, and Morris McDonald, vice-president and general manager of the Maine Central Railroad, was elected to succeed him with both roads. Mr. Mellen stated that in assuming the presidency of the Boston & Maine Railroad and the Maine Central Railroad, in addition to looking after the New York, New Haven & Hartford's other interests, he had taken upon himself "more than one man could satisfactorily handle with justice to each."

In a letter to the stockholders who have deposited their proxies with the committee which has been appointed to inquire into the affairs of the New York, New Haven & Hartford Railroad, the members of the committee under date of June 30, 1913, said in part:

"At a recent conference between a sub-committee of this committee and the executive committee of the company the latter offered to this committee the fullest information 'without any restriction,' including free access to the company's books, in order to aid the committee in forming its own conclusions in the most independent manner. The executive committee then appointed a sub-committee, consisting of Messrs. J. P. Morgan, Milligan, Skinner, Rea and Vail, to confer with this committee in order to facilitate its work. It is apparent that the criticisms have been gen-

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eral, coming from public auhorities, both federal and state, and from the press, public bodies and private individuals throughout New England. The committee, while not intending to investigate all the charges that have been preferred, desires to inform itself fully as to such transactions of the past as will enable it to discuss and suggest in the interest of the shareholders the best course in future, having especial regard to questions of operation, organization and finance, and to those matters affecting the public policy which have been so largely discussed in public."

First Public Hearing on New Detroit Ordinance

At the first public hearing on the franchise settlement plan submitted to the Council of Detroit, Mich., recently by Mayor Marx, Horace G. Williams, representing the Municipal Ownership League, argued that the Marx plan furthers private ownership. He said that if the ordinance is adopted the company will cease to be a trespasser and all the work done up to this time will be of no value, except as a precedent foreshadowing what the Supreme Court may decide in new litigation. Mr. Williams contended that municipal ownership cannot be secured by entering into a new arrangement that is likely to be the foundation for further litigation. John McVicar suggested that the present rental resolution be repealed and that a new one be adopted making the rentals $1,000 or even $3,000 per day, instead of $300, for the use of the streets. Alfred Lucking, acting as the Mayor's adviser, insisted that the people's rights are safeguarded under the ordinance and that municipal ownership is not endangered. He admitted that the company will probably not accept the ordinance as it stands, but believes that a compromise can be secured that will be an improvement on conditions that now exist. He said that if the company is permitted to use the streets much longer without an agreement of some kind it will gain rights that will be difficult to recall.

Double transfers have been given on all lines of the Detroit (Mich.) United Railway since July 8 in an effort to relieve the congestion in the down-town district and facilitate travel in other ways. Patrons are permitted to transfer to crosstown lines and then transfer again to the intersecting lines that will take them to the desired destination, instead of riding to the business section of the city, changing there and going thence to their first destination. Those who use the workmen's 3-cent tickets do not receive transfers.

Strike on Chicago Suburban Lines

A strike was called on the lines of the County Traction Company and Suburban Railroad, taking effect at midnight on the night of Thursday, July 3. The County Traction Company operates the lines outside of the city of Chicago formerly controlled by the Chicago Consolidated Traction Company. About 300 employees participated in the strike. The companies have discontinued service as a result of the strike, although they have told officials of the numerous suburban towns served by the lines that they will operate the cars if the towns will protect them in so doing.

The trouble has been a long time in reaching a head. The employees of the County Traction Company were formerly organized in a local union of the Amalgamated Association. The Amalgamated Association then revoked the charter of the local union, and the men were absorbed into the union on the Chicago surface lines. The company does not pay the scale prevailing on the Chicago surface lines, holding to its maximum of 30 cents an hour as compared with the maximum wage of 32 cents per hour on the Chicago lines. The matter of a strike was before the employees of the company in the fall of last year, and it was decided at that time that a strike should take place. The officers decided that they would order the strike just before July 4. That is the best traffic period the lines have during the year. On the day before the strike took place a committee representing the employees called on Emil G. Schmidt, the president of the properties, to see whether he had changed his attitude on various questions affecting the employees since the previous conference six months before. Mr. Schmidt said that the lines were not earning operating expenses and told the men that operation would be discontinued if they stopped work. Nevertheless the strike was ordered. At midnight the employees who were on duty at that hour ran their cars into the carhouses, made their reports and went to their homes. Everything was conducted peaceably, and some of the employees in order to get their cars to the carhouses rode 4 or 5 miles away from their homes and walked back.

The Chicago Railways Company has twenty cars which are used usually on the lines of the County Traction Company. These cars were removed from the carhouse of the County Traction Company at Oak Park just before the strike took effect in order that no issue might be raised that would involve the Chicago surface lines or employees in the controversy.

The issue between the companies and the men is partly one of wages and partly one of working conditions and union affiliations. The companies were perfectly willing to have the men in a union of their own, but when the charter of the union was revoked and the men joined the larger union of the Chicago surface lines the companies did not like the change. Their lines are entirely outside of the city of Chicago and they took the position that the men should have their own local charter from the Amalgamated Association if they chose to have a union. They are not willing to submit this question to arbitration but are willing to submit to arbitration the question of whether the men shall have the wages prevailing on the Chicago surface lines. The traffic is mainly a summer traffic made up of business to the outlying parks, suburbs and summer resorts. President Schmidt expressed the views of the management when he said that if the men went out on a strike the cars would remain in the carhouses. He said that the companies would make no attempt to operate cars and so invite riots and trouble, but that they had announced to the officials of villages and towns whose inhabitants were greatly inconvenienced by the discontinuance of operation that they would go ahead and operate if the officials would promise to give protection from the attacks of strikers. Thus far no assurance of protection has been offered to the companies and no attempt is being made to resume operation.

Judge Hook on Form of Kansas City Franchise

Judge William C. Hook in the United States Court at Kansas City, Mo., says in regard to the form of the proposed new franchises on which the receivers of the Metropolitan Street Railway and the city are now trying to agree:

"As I understand it, the important difference between the receivers and the city in the negotiations for a new contract is over the time when the participation of the stockholders in the surplus income shall begin. On the one side is the claim that it should begin at once when the contract becomes effective. On the other hand, the Mayor claims that it should be postponed until the intangible elements in the agreed capital valuation of $30,000,000 are wiped out. To accomplish this he proposes to put back into the property the entire surplus and the city's profit in the tax fund.

"He also proposes that after this amortization is effected the stockholders may have a slightly increased percentage of participation. It is urged that the stockholders are allowed but a slight increase in the property—that is to say, the difference between the funded debt and the agreed capital value, plus the participation with the city in the surplus income—and that, as it is estimated that it will take eight years or so to effect what the Mayor wants, the participation will not only be postponed that long, but the stockholders will be brought that much nearer the time when the city will take over the property absolutely and all their interests end. There is force in this.

"On your basis it means that the stockholders yield one-fourth of about $7,000,000, but, on the other hand, the Mayor is willing to allow by way of recompense 8⅓ per cent increase in participation after what he desires is accomplished. I think the Mayor's plan is based on sound business principles and will work to the advantage of the property. I think therefore you should work to an agreement with the Mayor on the difference mentioned."

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First Through Train Over Oakland, Antioch & Eastern Railway

The laying of tracks on the Oakland, Antioch & Eastern Railway from Bay Point to Sacramento was completed on June 30, and the first through train from Sacramento to Oakland left the west end of the Northern Electric bridge, Sacramento, on July 2. The party on the train was composed of Samuel Napthaly, H. A. Mitchell, John I. Walter, A. W. Maltby, Henry T. Scott, W. Arnstein, G. T. Marye, C. A. Hunt and George T. Weeks. The regular electric train service will be begun on Aug. 15. The intervening time will be devoted to finishing the electrical equipment and ballasting the roadbed.

The new rolling stock equipment ordered by the company is beginning to arrive. Nine passenger coaches, including a parlor and observation car, are already in the Oakland yards and eight more steel cars are being built in Oakland. Four additional cars are due to be shipped from the East on July 15. Two 65-ton high-power electric locomotives will be shipped at the same time and two 50-ton freight locomotives are on the ground. The larger locomotives will be used in the passenger service and will be able to develop a speed of 65 m. p. h., drawing trains of five coaches each.

I. C. C. Report on Transportation in New England

The Interstate Commerce Commission made public on July 9 its report on railroad transportation conditions in New England. Referring to the increase in the capital liabilities of the New York, New Haven & Hartford Railroad since 1903, the commission says in part:

"June 30, 1903, the total capitalization of the New Haven company was approximately $93,000,000, of which $79,000,000 was stock and $14,000,000 bonds. The mileage then operated was 2040 miles. On June 30, 1912, the capitalization, excluding stock premiums, was $417,000,000, an increase of $324,000,000, while the operated mileage was 2090, an increase of 50 miles. While the New Haven operated 2040 miles in 1903, it owned of this operated mileage only 438 miles. During the nine years this owned mileage was increased by about 800 miles, and the New Haven company expended approximately $40,000,000 in acquiring this additional owned mileage. It expended during the nine years something over $96,000,000 upon its railroad for betterments and equipment, making a total of $136,000,000 devoted to its railroad property proper. This would leave the sum of $204,000,000 which in nine years had been expended in operations outside its railroad sphere."

Referring to the activities of the company in absorbing electric railways the commission says in part:

"The first transaction to which reference will be made is the purchase of the Rhode Island trolleys. In 1902 the United Gas Improvement Company entered the electric railway field in Rhode Island. A corporation known as the Rhode Island Company was organized which issued its capital stock in the sum of $2,000,000 to the Improvement Company, receiving in return $2,000,000 in cash. In 1904 the New Haven purchased a block of the stock of the Rhode Island Company. In 1906 it perfected arrangements for the acquisition of the entire stock of that company by organizing a third corporation, the Providence Securities Company, which exchanged its 4 per cent debentures guaranteed by the New Haven Company for the stock, bonds and notes of the Rhode Island Securities Company substantially at par. There was a cash payment of $10 per share by the stockholders of the Rhode Island Securities Company and an adjustment of $3 per share against this on account of interest. In whatever aspect the transaction is viewed the New Haven gave $13,500,000 for nothing. Since then additional money has been invested by the New Haven company in the development of the Rhode Island electric railways so that to-day the investment totals about $24,000,000. Professor Swain in his report to the validation committee estimated the value of the investment at $6,000,000."

Referring to the New York, Westchester & Boston Railway, the commission says in part:

"The New York, Westchester & Boston Railway is a four-track electric road extending from White Plains, N. Y., to a terminus at Harlem River, a distance of slightly more than 20 miles. This road was built and is owned by the New Haven. The books of the New Haven company offered but little information as to the actual process of construction. The road was completed and began operations about June 30, 1912, and on that date the New Haven had invested, including interest, almost $34,000,000. The New York, Westchester & Boston Railway is located entirely within the State of New York and reports to the Public Service Commission of that State. The first report of this corporation, under date of Sept. 30, 1912, gives the value of its tangible property at somewhat less than $22,000,000. Here, therefore, is an enterprise which has cost the New Haven company $12,000,000 in excess of the value of its property upon its own showing. In the case of the Rhode Island Company it was possible to locate the corporation, if not the individual, which had ostensibly obtained the money, but in this case it is impossible from anything upon the books of the New Haven company to do this even approximately."

In its general conclusion the commission says:

"Our general conclusion is that the outside financial operations of the New Haven company for the last nine years have been wasteful in the extreme and that the methods by which those operations have been conducted are unnecessarily involved and complex. The present management started out with the purpose of controlling the transportation facilities of New England. In the accomplishment of that purpose it bought what must be had and paid what must be paid. To this purpose and its attempted execution can be traced every one of these financial misfortunes and derelictions. The Rhode Island Company, the Westchester Company, the Billard transaction, the purchase of the Connecticut electric railways and the Massachusetts electric railways all sprang from the same source. Some of these investments have been less costly than others; perhaps those expressly referred to may be the extreme cases, although the purchase of the Boston & Maine stock, made in defiance of the law of Massachusetts and perhaps of the federal statute, may prove the most disastrous of all. This much is evident: There can be no readjustment of these conditions, no advance in rates upon these systems can be sanctioned, until it is made reasonably certain that the management of these properties will be lawful and prudent. Assuming that in some form that assurance will be given, we inquire what should be done."

The commission further says:

"In our opinion the New Haven should divest itself of its trolley lines."

Analytical Study of Operating Expenses

An analytical study of electric railway operating expenses is to be conducted by the new division of electrical engineering research of the Massachusetts Institute of Technology. The cost of this study will be defrayed from a fund, of which the donor is yet anonymous, amounting to $25,000 and is to be spent at the rate of $5,000 a year. The division of electrical engineering research under whose direction this sum will be spent has recently been organized by the Institute with an extensive laboratory and library and will be under the direction of Dr. Harold Pender, with H. F. Thompson as secretary. In addition to the gift already mentioned the laboratory has received an endowment of $10,000 a year for five years from the American Telephone & Telegraph Company, and the same company has also donated the Dering Library of more than 30,000 titles. The laboratory has also received a gift of $2,000 from the Boston & Maine Railroad and the New York, New Haven & Hartford Railroad to be used for the study of handling freight at terminals both inside and outside freight houses. This research is along the lines of work which technology has been doing for the past two years, an example being shown in the study of electric motor vehicles undertaken at the initiative of the Edison Electric Illuminating Company of Boston and financed by that company to the extent of $7,500.

Some other work on which Dr. Pender is engaged at present is a study of the effect of phase relation of harmonics in sound waves as affecting clearness of speech in telephone communications and also the resistance of con-

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ductors when used for alternating currents. In connection with the latter work a 500-ft. section of a 150,000-volt transmission line has been erected on the new site of the institute in Cambridge.

Dr. Pender, who has been connected with the Massachusetts Institute of Technology since 1909, is a graduate of the Johns Hopkins University and also studied at the Sorbonne, Paris. Later he was with the Westinghouse Electric & Manufacturing Company and in the electrical engineering department of the New York Central & Hudson River Railroad and has been connected with the work of the McCall Ferry & Power Company, the International Railway and the electrification of the Cascade Tunnel of the Great Northern Railway.

Delos F. Wilcox Reports on Newark Traffic Conditions

The issues of the Newark *Evening News* for July 7, 8 and 9 contained a review by Delos F. Wilcox, formerly franchise expert of the Public Service Commission of the First District of New York, of traffic conditions in Newark with particular reference to the proposed downtown terminal of the Public Service Railway. Dr. Wilcox states that apparently there is no way in which there could be public control of the terminal operations; that the franchise for the subway would be perpetual; that the power of the city to compel the construction of half-mile extensions of trolley lines or the re-routing of cars is doubtful; that the franchise requirements by the suburban towns of Montclair, Bloomfield and Bellevilie, which stipulate that cars from those towns shall run to the Market Street (Newark) station of the Pennsylvania Railroad, is against public policy; that electric railway service on Broad and Market Streets, the principal business streets of Newark, is not operated to its present full capacity, and that adequate relief from existing and future congestion can be brought about only by a revision of the city's street plan. Dr. Wilcox holds that a downtown terminal is not needed at present on account of the small number of interurban and semi-interurban cars and asserts further that the terminal route would divert passengers from their natural destination and make proper transfers inconvenient. Congestion if relieved at the intersection of Broad and Market Streets would be increased at other points, particularly as the use of a tunnel and elevated structure for the terminal would prevent through traffic on certain adjacent streets. Furthermore, the terminal site is badly located for street railway operation and, if any place at all, should be near the terminal of the Hudson Companies. Some provision should also be made whereby the tunnel to the terminal would not interfere with the later development of a regular subway system. Dr. Wilcox believes that traffic may be accelerated at congested corners by using cars which do not load and unload at the same end, by the operation of trailers, by having cars cross in groups, etc. He suggests also various modifications of the proposed re-routing plan of the Public Service Railway. In conclusion, Dr. Wilcox recommends that if the railway's terminal plans are approved the contract should acknowledge the city's right to make over the system, the right to compel the re-routing of cars and the power to compel the construction of short extensions.

Strike of Linemen in Lexington.—Linemen employed by the Kentucky Utilities Company in street railway work at Lexington, Ky., have gone on strike. The strikers are demanding a nine-hour day at 30 cents an hour, instead of ten hours at 27½ cents an hour. Officers of the company have announced that the places of the strikers will be filled if they do not return to work.

Long Dispute Settled.—The Ohio Public Service Commission has arranged a settlement of the dispute between the Western Union Telegraph Company and the Cleveland, Painesville & Ashtabula Railway. The high-tension wires of the railroad and the telegraph lines were strung close together and the telegraph company complained to the commission on account of the danger to its men.

Conference Proposed in Regard to Erdman Act.—President Wilson will confer at the White House on July 14 with representatives of the railroads as well as of the Brotherhoods of Conductors and Trainmen to seek an agreement upon legislation for the amendment of the Erdman law for the arbitration of wage controversies between railroads and their employees so as to meet the crisis which threatens to tie up the Eastern railroads with a strike.

Progress of Arbitration in Cincinnati.—The board of arbitration which is considering the differences between the employees and the Cincinnati Traction company had under consideration the latter part of the week ended on July 5 the extra pay that the men should receive for extra work. After hearing several motormen and conductors, the board suggested that the men endeavor to arrange this with the division superintendents before the boards go any further with it.

New York Registration Law.—There is some doubt in the minds of lawyers as to whether the new stock transfer tax law of New York State which went into effect on July 1 requires all corporations to file with the State Comptroller a certificate of the office where the transfers are made, etc., but as the law exacted a penalty in case these data are not filed by July 10 there was considerable activity throughout the State by corporations in applying for certificates and filing them.

Turnstiles in New Subway in New York.—The Public Service Commission of the First District of New York has granted permission to the Brooklyn Rapid Transit Company to use turnstiles in the Centre Street loop subway in collecting fares. The commission specified in granting the company's request that the use of the turnstiles should be considered experimental only and not as committing it to allowing their use in the Fourth Avenue subway, Brooklyn, and on the other new lines to be operated by the company.

Forty-Year Bonds Recommended for Municipal Line.—It has been decided by the public utilities committee to recommend to the Board of Supervisors of San Francisco, Cal., that the proposed issue of $3,500,000 of bonds, bearing annual interest at 5 per cent, for the purpose of making extensions to the Geary Street Municipal Railway, shall run for forty years, redemption to begin five years after issuance, at the rate of $100,000 a year. It was suggested that the city should reserve the option to redeem the bonds at any period after twenty years from date of issuance, but it was thought this might detract from the attractiveness of the offering.

The Work of the Ohio Public Service Commission.—The Ohio Public Service Commission was organized on June 1, 1911, and up to June 1, 1913, issues of stock of companies in Ohio amounting to $39,382,289 and bond issues amounting to $101,135,660 had been approved. During the same period authority to issue $7,204,55 stock and $13,275,250 bonds had been refused. Of the stock issues authorized, $26,283,474 were for railroads and $13,098,815 for public utilities, and of the bond issues, $86,973,500 were for railroads and $14,126,150 were for utility companies. Of the issue refused $6,460,000 stock and $12,962,000 were for railroads, while $744,550 of stock and $313,250 of bonds were for public utility companies.

Chicago Union Station Company Organized.—The Union Station Company has been organized in Chicago with a capital of $50,000,000 in the interest of the Pittsburgh, Cincinnati, Chicago & St. Louis Railway, the Chicago, Burlington & Quincy Railroad and the Chicago, Milwaukee & St. Paul Railroad. Of the total capital stock, $25,000,000 will be held by the Burlington road and $12,500,000 by each of the other two roads. The company was incorporated in accordance with an amendment to the State railroad act which became effective on July 1. Frank J. Loesch, attorney, on whose petition the articles of incorporation were issued, said that the question of a site for the proposed new union station was not concerned in the proceedings.

Petition Dismissed in Bridge Case.—Judge Anderson at Indianapolis has dismissed the petition of the Evansville & Henderson Railway to compel the Henderson Bridge Company to permit it to use the bridge across the Ohio between the two cities. The company desires to operate an electric railway between Evansville and Henderson, and to use the bridge for that purpose. The court held, on the report of a master appointed to take evidence, that unless the

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railway agreed to double-track the bridge approaches, to maintain a block system on the bridge and to furnish its own electrical equipment on the structure, its petition was without merit. The company refused to make an offer of this nature, and the case was accordingly dismissed.

Birmingham Strike Precipitate, Premature and Unwise.—Commenting editorially on the recent strike of fewer than 100 trainmen of the Birmingham Railway, Light & Power Company, Birmingham, Ala., one of the local papers said: "There appeared to be no question raised in the union committee's demand as to wages, hours or general treatment of the men. Apparently all those things were satisfactory. The only question was recognition of the union and a restoration to employment of discharged men. The grievance of the union leaders was purely the existence of a local union. They undertook to establish their position by force instead of by reason. The strike was precipitate, premature and unwise."

Proposed Municipal Extension at Cincinnati.—City Solicitor Bettman, of Cincinnati, has proposed to the City Council that the municipality construct an extension to the street railway line between Avondale and Bond Hill and that the Cincinnati Traction Company bear the interest and sinking-fund charges. He claims this will obviate the necessity of securing consents of property owners. On June 24 Judge Pugh rendered a decision to the effect that the company cannot build this line without securing the consents of property owners on Reading Road. Mr. Bettman says that, under the home rule amendment to the constitution, the city will not be compelled to obtain consents for a municipal line.

Agreement to Arbitrate Boston Differences.—An agreement has been reached on a method of arbitration by which it is expected that the differences between the Boston (Mass.) Elevated Railway and its employees will be adjusted. James L. Richards for the company and James H. Vahey, counsel to the union employees, were delegated on July 8 to select a third arbitrator to act with two others, one being named by each side. It was on the manner of choosing the third member that the strike hinged, an agreement made a year ago giving to the Mayor the power to select that official having proved unsatisfactory to the union. The men ask for increased wages and improved working conditions. The union had voted in favor of a strike.

Mayor Harrison on the Illinois Utility Law.—Mayor Harrison, of Chicago, has issued a long statement in regard to the Illinois public utility bill, declaring that the Governor knew that the people of Chicago had regulated their utilities satisfactorily in the past and that they wanted to retain in their own hands the control of the utilities for the future. Mr. Harrison referred to the "viciousness" of the bill and said that non-partisan home-rule clubs will be maintained in every ward until the Legislature restores home rule in Chicago. James G. Skinner, assistant corporation counsel of Chicago, declares that the public utilities law is unconstitutional because it gives judicial powers to a state commission, which is essentially an administrative body.

Subway Construction Bids to Be Opened.—On July 22 the Public Service Commission for the First District of New York will open bids for the construction of another section of the Broadway subway in Manhattan, to be operated by the New York Municipal Railway Corporation under the new contracts. This section extends from Union Square north under Broadway to about Twenty-sixth Street. There will be an express station at Union Square and a local station at Twenty-third Street, Madison Square. The commission has under consideration bids opened on June 24 for the construction of the section immediately south of this one, extending from Union Square down to the end of the present construction at a point midway between Houston and Bleecker Streets.

First Train Through Loop Connecting New York Bridges.—The first train was sent through the Center Street subway loop, connecting the Brooklyn, Manhattan and Williamsburg Bridges, on June 30. The loop, which has been under construction since 1907, is now nearing completion. The connection with the tracks crossing the Brooklyn Bridge is not yet completed, although work is progressing rapidly in that direction. The Center Street loop is of four and six tracks throughout. Its cost, according to Public Service Commission figures, has been $12,884,896. A contract will shortly be let for a connection, through Canal Street, between the Broadway subway and the Center Street loop. The loop is 6500 ft. long and will be operated by the Brooklyn Rapid Transit Company under the dual subway contracts.

Decision in Newark Gas Case Involving Intangible Values in Rate Making.—The Supreme Court of New Jersey on July 7, 1913, sustained the validity of the order of the Board of Public Utility Commissioners of New Jersey in requiring the Public Service Gas Company, a subsidiary of the Public Service Corporation of New Jersey, Newark, to establish a 90-cent gas rate within the district which embraces Passaic. The decision of the board was published in the ELECTRIC RAILWAY JOURNAL of Jan. 4, 1913, page 35. The principal question at issue was the valuation of the intangible property of the company, and in this matter the court upheld the ruling of the commission. To determine the correctness of the decision on which the order of the Board of Public Utility Commissioners was based the company, with the knowledge and approval of the commission, decided to obey the order and sue out a writ of certiorari in the Supreme Court of the State. The company has now announced that it will appeal the case to the Court of Errors and Appeals.

The Automatic Stop Competition.—The offer of $10,000 made by Charles S. Mellen, president of the New York, New Haven & Hartford Railroad, for the best automatic stopping and speed control device which would safely arrest trains disregarding fixed signals expired on July 1. On that date 2816 persons in all had entered the competition, but only 704 of the applicants thus far have submitted plans in reply to the circular sent to each applicant giving the conditions and requirements of the competition. Despite the fact that not all of the requirements have been met, the railroad will proceed at once to test the more meritorious of the devices submitted. These tests will begin the middle of this month and will take place on the western division between Hartford and Newington. The two automatic stop systems coming the nearest to all of the requirements will be tested first. One is the invention of Gene Webb and is the property of the International Signal Company. The other is an invention of an engineer of the Union Switch & Signal Company.

Dual Subway System Described.—The Public Service Commission for the First District of New York has published a pamphlet describing the dual system of rapid transit, the contracts for which were signed recently by representatives of the city of New York, the Interborough Rapid Transit Company and the New York Municipal Railway Corporation. In this pamphlet it is stated that the estimated total cost of the new system is $337,000,000, of which New York City will supply $171,000,000 and the two companies the remainder. The Interborough company's total expenditure will be about $105,000,000, of which $58,000,000 will go toward the construction of city-owned lines. The New York Municipal Railway Corporation will expend about $61,000,000, of which about $14,000,000 will be applied to the cost of city-owned lines. The balance of each company's expenditure will be devoted to the purchase of new equipment and the construction of elevated railroads and additional tracks thereon. The city of New York has already expended, or contracted to expend, about $76,000,000 of its contribution. This covers the work already completed or going on in the Fourth Avenue subway in Brooklyn, the Centre Street Loop subway in Manhattan, the Lexington Avenue subway in Manhattan with its branches in the Bronx, the Broadway subway in Manhattan and the elevated railroad in Queens. It is expected that the rapid transit facilities will be more than trebled upon the completion of the new system in the year 1917. The existing lines cover 296 miles of single track, whereas the total length of the new system will be 618 miles of single track. The existing lines are carrying about 800,000,000 passengers per annum, and it is expected that the dual system, used to its full capacity, will carry more than 3,000,000,000 passengers per annum.

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Financial and Corporate

Stock and Money Markets

July 9, 1913.

A fairly steady tone was shown in the early trading on the New York Stock Exchange to-day. The prices of nearly all the important issues shaded off slightly at the start and many issues showed fractional losses in the afternoon, among them Interborough-Metropolitan preferred. American Water Works & Guarantee Company preferred sold down from 56 to 47, whereas the most recent sale on the exchange was at 95. The common shares fell from 50 to 19. Sales of West Penn Traction preferred were reported at 30 against a recent price of 80, and the common declined from 33 to 10. Rates in the money market to-day were: Call, 2 @ 2½ per cent; sixty days, 2¾ @ 3¼ per cent; ninety days, 4¼ @ 4½ per cent; six months, 5¾ @ 6 per cent.

In the Philadelphia market further weakness in arbitrage issues was followed by fractional declines. On the recessions the offerings were quickly absorbed.

A strong tone featured the stock market in Chicago to-day. Bonds were firm.

In the Boston market to-day business was light and the price changes were small.

Increased activity was shown in the stock market in Baltimore to-day, with Baltimore Electric 5's the feature.

Quotations of traction and manufacturing securities as compared with last week follow:

	July 1	July 9.
American Brake Shoe & Foundry (common)	90	87½
American Brake Shoe & Foundry (preferred)	126½	126½
American Cities Company (common)	33¼	33¼
American Cities Company (preferred)	63	66
American Light & Traction Company (common)	*365	365
American Light & Traction Company (preferred)	*106	106½
American Railways Company	38	38
Aurora, Elgin & Chicago Railroad (common)	40	40
Aurora, Elgin & Chicago Railroad (preferred)	83	85
Boston Elevated Railway	84	87½
Boston Suburban Electric Companies (common)	7½	7½
Boston Suburban Electric Companies (preferred)	*66	50
Boston & Worcester Electric Companies (common)	a8	*8
Boston & Worcester Electric Companies (preferred)	42	42
Brooklyn Rapid Transit Company	87	86⅜
Capital Traction Company, Washington	115¼	114⅞
Chicago City Railway	*150	165
Chicago Elevated Railways (common)	*24½	26
Chicago Elevated Railways (preferred)	*75	75
Chicago Railways, ptcptg., ctf. 1	*100	95½
Chicago Railways, ptcptg., ctf. 2	24¼	23½
Chicago Railways, ptcptg., ctf. 3	7½	7
Chicago Railways, ptcptg., ctf. 4	*2¾	2½
Cincinnati Street Railway	110	*110
Cleveland Railway	102½	102½
Cleveland, Southwestern & Columbus Rv. (common)	*6	6
Cleveland, Southwestern & Columbus Ry. (preferred)	*29	29
Columbus Railway & Light Company	18	12
Columbus Railway (common)	69½	60
Columbus Railway (preferred)	88	80
Denver & Northwestern Railway	*107	107
Detroit United Railway	70	*70
General Electric Company	135½	137
Georgia Railway & Electric Company (common)	115	115⅜
Georgia Railway & Electric Company (preferred)	84	84
Interborough Metropolitan Company (common)	15	14⅞
Interborough Metropolitan Company (preferred)	55¾	54⅜
International Traction Company (common)	*30	30
International Traction Company (preferred)	*95	95
Kansas City Railway & Light Company (common)	*18	18
Kansas City Railway & Light Company (preferred)	*36	36
Lake Shore Electric Railway (common)	*6	9
Lake Shore Electric Railway (1st preferred)	*92	90
Lake Shore Electric Railway (2d preferred)	*25	25
Manhattan Railway	125	125
Massachusetts Electric Companies (common)	13	13½
Massachusetts Electric Companies (preferred)	66	68¼
Milwaukee Electric Railway & Light Co. (preferred)	*100	90
Norfolk Railway & Light Company	25	25
North American Company	65	65
Northern Ohio Light & Traction Company (common)	80	..
Northern Ohio Light & Traction Company (preferred)	105	..
Philadelphia Company, Pittsburgh (common)	40½	39½
Philadelphia Company, Pittsburgh (preferred)	39	39
Philadelphia Rapid Transit Company	21½	21¼
Portland Railway, Light & Power Company	*62	58
Public Service Corporation	110	109
Third Avenue Railway, New York	31¼	30¼
Toledo Railways & Light Company	2	2½
Twin City Rapid Transit Co., Minneapolis (common)	102	101½
Union Traction Company of Indiana (common)	*4½	4½
Union Traction Company of Indiana (1st preferred)	*80	80
Union Traction Company of Indiana (2d preferred)	*30	30
United Rys. & Electric Company (Baltimore)	26	25½
United Rys. Inv. Company (common)	19	17
United Rys. Inv. Company (preferred)	34	31¾
Virginia Railway & Power Company (common)	52	51
Virginia Railway & Power Company (preferred)	87½	a92
Washington Ry. & Electric Company (common)	89½	89
Washington Ry. & Electric Company (preferred)	87¾	87
West End Street Railway, Boston (common)	71	70½
West End Street Railway, Boston (preferred)	87	85
Westinghouse Elec. & Mfg. Company	58¼	57
Westinghouse Elec. & Mfg. Company (1st preferred)	105	104

*Last sale. a Asked.

Receiverships for Kuhn Properties

The First-Second National Bank, Pittsburgh, Pa., the second largest bank in that city, was closed on July 7 by order of the Controller of the Currency. The First National Bank of McKeesport also closed its doors on the same day. Both are controlled by the J. S. & W. S. Kuhn interests. J. S. Kuhn on the same day had receivers appointed for J. S. & W. S. Kuhn, Inc., and the American Water Works & Guarantee Company. J. K. Duff, treasurer of the company, was appointed receiver for J. S. & W. S. Kuhn, Inc., and J. S. Kuhn, W. S. Kuhn, J. H. Purdy and F. G. Kay were appointed receivers of the American Water Works & Guarantee Company. W. S. Kuhn was president of the First-Second National Bank, vice-president of the American Water Works & Guarantee Company and vice-president of J. S. & W. S. Kuhn, Inc. J. S. Kuhn was president of the American Water Works & Guarantee Company and chairman of the board of directors of J. S. & W. S. Kuhn, Inc.

In a statement which he made on July 8 W. S. Kuhn said:

"The reason for the controller closing the bank in Pittsburgh was simply because the government had a different method of valuation for the securities, assets and reserve from our own estimate as to their value."

One of the members of the board of directors of the First-Second National Bank said:

"The bank is solvent. We also are convinced that the claims will be paid in full. If the Treasury Department had not subjected the bank to rigid examination by special examiners who were unable to judge values of property and securities in this community, we should have been able to work out with success the problems which, while existing, were not of our making."

J. S. & W. S. Kuhn, Inc., are incorporated in Delaware, with a capital stock of $500,000. The Kuhn interests have centered largely of late in irrigation projects in the West. They also control the West Penn Traction & Water Power Company and the operations of a group of bituminous mines in Pennsylvania, especially the United Coal Company, of which W. S. Kuhn is president and director. W. S. Kuhn is also a director of the Colonial Trust Company, Commercial National Bank and Commonwealth Trust Company, Pittsburgh; vice-president and director First National Bank, Allegheny; director First National Bank, McKeesport; vice-president and director Pittsburgh Bank for Savings; president and director Kittanning & Leechburg Railway; president and director Sacramento Valley Irrigation Company and president and director Twin Falls North Side Land & Water Company.

James S. Kuhn, besides being president and director of the American Water Works & Guarantee Company, is president and director of the First National Bank, Allegheny; president and director of the First National Bank, McKeesport; director in the Colonial Trust Company and Freehold Bank, Pittsburgh; director in Kuhn, Fisher & Company, Inc., Boston; president and director of the Pittsburgh Bank for Savings; director of the Security Investment Company and Twin Falls North Side Land & Water Company; vice-president and director of the United Coal Company and West Penn Traction Company, also of the West Penn Traction & Water Power Company, and director in the Westinghouse Electric & Manufacturing Company.

The American Water Works & Guarantee Company is probably the largest operating water-works company in the United States, controlling more than forty such plants throughout the country. It was chartered in Pennsylvania in 1882 and has an outstanding capital stock of $5,000,000. Since 1889 the stock has paid an annual dividend of 6 per cent, and in June last year a stock dividend of 150 per cent was declared from the surplus. This called for the disbursement of more than $5,000,000.

The West Penn Traction Company, formerly the West Penn Railways, was incorporated Feb. 18, 1904, under the laws of Pennsylvania, and is a consolidation of the Pittsburgh, McKeesport & Connellsville Railway, the Uniontown & Monongahela Valley Railway, the Connellsville Suburban Street Railway, the Greensburg & Southern Electric Street Railway and a number of electric lighting com-

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panies operating throughout the western part of Pennsylvania. In May, 1906, the West Penn Company acquired a controlling interest in the McKeesport & Duquesne Bridge Company and the entire capital stock of the Latrobe Street Railway. A year later the company secured a majority of the stock of the Pittsburgh, McKeesport & Greensburg Railway. The company was twice reorganized and has authorized $25,000,000 in bonds, of which $6,584,000 are outstanding. In February, 1910, the American Water Works & Guarantee Company of New Jersey agreed to guarantee all the bonds of the West Penn Traction Company, and at that time agreed to purchase all the bonds of the West Penn Traction Company that might be issued within two years from that time.

Financing the Proposed Toronto Purchases

A great deal of interest attaches to the means which are likely to be adopted if the city of Toronto should conclude the negotiations which are being conducted with the end in view of taking over the properties of the Toronto Railway and the Toronto Electric Light Company. Financial interests in Toronto point out the growing cautiousness of London in taking Canadian municipal debentures and the trouble experienced by the city of Toronto last year in trying to float $6,000,000 of bonds. One man who specializes in municipal securities is quoted as follows:

"Money is very tight, and it is difficult to dispose of municipal securities of any kind. The English market has been flooded with Canadian municipals. Horne Payne's speech in which he warned English investors against Canadian municipal debentures may not reflect the opinion of English financial men accurately, but it at least shows there is a growing feeling against them. Toronto's experience last year is another case in point. Besides, many capitalists do not look with favor on municipally owned railways or lighting systems. As things are I am quite sure that Toronto cannot float debentures for $25,000,000 except at a ruinously high rate."

Mayor Hocken would not say just how the city would finance the deal, but indicated that it would not be necessary to float debentures in London. He is quoted as follows:

"I do not anticipate any difficulty in the financing of the purchase of the street railway and the Toronto Electric Light Company by the city, if the citizens decide to go ahead with the project. If the city had to float $25,000,000 of municipal debentures in the open market in order to pay cash, I would not be very sanguine of the agreement going through as we could only get the money on very high terms, if at all, and the city's credit for years to come would be curtailed."

Columbus Railway & Light Company, Columbus, Ohio.—The time for depositing securities of the Columbus Railway & Light Company and the underlying corporations has been extended to July 15.

Commonwealth Power, Railway & Light Company, Grand Rapids, Mich.—The quarterly dividends of 1½ per cent on the preferred and 1 per cent on the common stock of the Commonwealth Power, Railway & Light Company are the initial dividends on the enlarged capitalization of the corporation.

Goldsboro (N. C.) Traction Company.—The Goldsboro Traction Company has been placed in the hands of R. W. Winston, Jr., Raleigh, as receiver by Judge Henry G. Conner of the District Court of the United States for the Eastern District of North Carolina, on the application of the Mercantile Trust & Deposit Company, Baltimore, Md., trustee representing the holders of the bonds of the company. The property has not been operated for three months. The company purchased power from the plant owned by the city. This plant was taken over some time ago by the Carolina Power & Light Company, and the Goldsboro Traction Company, unable to arrange to purchase power from the new company except at terms which it considered exorbitant, suspended the service.

Lehigh Valley Transit Company, Allentown, Pa.—R. P. Stevens, president of the Lehigh Valley Traction Company, has been elected president of the Easton Consolidated Electric Company, control of which is now owned by the Lehigh Valley Transit Company. Mr. Stevens, J. C. Dawson and Albert L. Smith have been elected directors of the Easton Consolidated Electric Company to succeed Joseph S. Lovering, Robert L. Montgomery and John S. Bioren.

Ocean Shore Railroad, San Francisco, Cal.—The Railroad Commission of California has authorized the Ocean Shore Railroad to execute its promissory notes in the sum of $22,986 to make rental payments upon locomotives which it uses, and to execute notes in the sum of $29,615 as part payment upon forty freight cars.

Pacific Coast Railway, San Luis Obispo, Cal.—Upon motion of the Railroad Commission of California to ascertain the various elements entering into the value of the property of the Pacific Coast Railway, findings of fact were made as follows: That the "reproduction value" of the operative physical property of the company as of June 30, 1912, is $1,970,843, and that the "present value" is $1,529,646. Owing to the fact that the original cost records of the company were destroyed in the San Francisco fire in 1906, no report is given by the commission on the original cost of the property.

Railways Company General, New York, N. Y.—A special meeting of the stockholders of the Railways Company General has been called for July 15 to consider a proposal to decrease the capital stock of the company from $500,000 to $400,000. The company was incorporated in 1899 to acquire, lease, sell and operate electric railways and other utilities. The original capital stock was $1,500,000. In September, 1905, it was reduced to $900,000, the stockholders voting to cancel the stock bought in by the company. In September, 1906, it was further reduced to $700,000 by similar action and again in December, 1908, a reduction to $500,000 was authorized to be made by retiring shares owned by the company and by purchase of shares not over par. An initial dividend of 10 per cent was paid out of surplus earnings in September, 1909; in 1910 14 per cent and in 1911 9 per cent were similarly paid out of surplus earnings. In 1912, and thus far this year, regular dividends have been paid by the company quarterly at the rate of 4 per cent per year.

Southern Power Company, Charlotte, N. C.—The Southern Public Utilities Company, a subsidiary of the Southern Power Company, has taken over the Anderson Water, Light & Power Company, Anderson, S. C., and Z. V. Taylor, president of the Charlotte Electric Railway, one of the Southern Power Company properties, has been elected president of the Anderson Water, Light & Power Company.

Washington (D. C.) Utilities Company.—The Public Utility Commission of Washington, D. C., has decided that the Washington Utilities Company can hold the $2,900,000 worth of Washington Railway & Electric Company stock under the anti-merger law, but the commission has refused to approve an issue of $10,000,000 of bonds because the Washington Utilities Company has acquired or seeks to acquire more than 20 per cent of the common and preferred stock of the Washington-Virginia Railway. The Washington *Star* says: "The decision of the commission will not prevent the Washington Utilities Company from presenting a new bond issue plan which will not take into account the stock of the Washington-Virginia Railway, more than 20 per cent of which, the commission holds, is held by the corporation in violation of the anti-merger act. At the recent hearing before the commission, officials of the Washington Utilities Company stated that that concern, prior to the going into effect of the anti-merger law, owned a large amount of the stock of the Washington Railway & Electric Company. A sufficient number of shares of this stock subsequently were disposed of to reduce the holdings of the company to less than 20 per cent, the limit fixed by the anti-merger act, it was stated. It was further contended by the corporation representatives that Congress did not contemplate that no stocks or bonds of a local public utility could be held by another foreign or local public utility corporation, the provisions of paragraph 54 of the act being cited in support of this contention. It was learned that officials of the corporation already have taken up informally consideration of a new plan for financing the immediate and future needs of the company."

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Dividends Declared

Brooklyn (N. Y.) City Railroad, quarterly, 2 per cent.

Chicago (Ill.) Railways, 6 per cent, participating certificates, series one; 4 per cent, participating certificates, series one.

Commonwealth Power, Railway & Light Company, Grand Rapids, Mich., quarterly, 1½ per cent, preferred; quarterly, 1 per cent, common.

Green & Coates Streets Passenger Railway, Philadelphia, Pa., quarterly, $1.50.

Kentucky Securities Corporation, Lexington, Ky., quarterly, 1½ per cent, preferred.

Lewiston, Augusta & Waterville Street Railway, Lewiston, Maine, quarterly, 1½ per cent, preferred.

Mexico (Mex.) Tramways, quarterly, 1¾ per cent.

Middlesex & Boston Street Railway, Newtonville, Mass., 4 per cent.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis., quarterly, 1½ per cent, preferred.

West Penn Traction Company, Connellsville, Pa., quarterly, 1½ per cent, preferred.

West Penn Traction & Water Power Company, Pittsburgh, Pa., quarterly, 1½ per cent, preferred.

Youngstown & Ohio River Railroad, Leetonia, Ohio, quarterly, three-fourths of 1 per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

AURORA, ELGIN & CHICAGO RAILROAD, WHEATON, ILL.

Period			Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m.,	May,	'13	$168,721	*$105,380	$63,341	$33,226	$30,114
1 "	"	'12	159,362	*98,089	61,173	30,966	30,207
12 "	"	'13	1,770,937	*1,061,547	709,390	355,288	354,102
12 "	"	'12	1,664,062	*985,948	678,114	348,036	330,078

CLEVELAND, SOUTHWESTERN & COLUMBUS RAILWAY, CLEVELAND, OHIO

1m.,	May,	'13	$108,624	$62,528	$46,096	$31,589	$14,507
1 "	"	'12	100,774	57,921	42,854	30,638	12,216
5 "	"	'13	463,557	293,572	169,986	155,804	14,182
5 "	"	'12	435,701	271,021	164,681	151,604	13,077

DETROIT (MICH.) UNITED RAILWAY

1m.,	May,	'13	$1,172,683	$770,082	$402,556	$179,567	$222,989
1 "	"	'12	995,581	600,362	395,218	175,635	219,583
5 "	"	'13	5,208,515	3,441,855	1,766,660	896,862	869,798
5 "	"	'12	4,445,499	2,826,804	1,618,696	889,852	728,844

MONONGAHELA VALLEY TRACTION COMPANY, FAIRMONT, W. VA.

1m.	May,	'13	$79,475	$26,771	$52,702	$24,111	$28,591
1 "	"	'12	71,392	30,470	40,921	18,209	22,712
5 "	"	'13	363,329	124,341	239,099	120,533	118,555
5 "	"	'12	314,624	129,103	185,521	91,252	94,269

NORTHERN OHIO TRACTION & LIGHT COMPANY, AKRON, OHIO

1m.,	May,	'13	$279,993	$167,697	$112,295	$58,131	$54,164
1 "	"	'12	255,104	142,804	112,299	43,821	68,478
5 "	"	'13	1,205,720	750,103	455,616	284,500	171,116
5 "	"	'12	1,100,375	638,341	462,033	219,108	242,925

PADUCAH TRACTION & LIGHT COMPANY, PADUCAH, KY.

1m.,	April,	'13	$13,701	*$14,088	$387	$7,339	†$7,726
1 "	"	'12	23,626	*16,264	7,361	7,131	230
12 "	"	'13	281,033	*186,886	94,146	87,276	6,871
12 "	"	'12	275,716	*177,896	97,819	83,289	14,530

PUGET SOUND TRACTION, LIGHT & POWER COMPANY, SEATTLE, WASH.

1m.,	April,	'13	$689,941	*$414,102	$275,839	$171,728	$104,111
1 "	"	'12	969,409	*393,186	276,223	164,898	111,325
12 "	"	'13	8,320,185	*4,865,208	3,454,977	2,011,187	1,443,790
12 "	"	'12	.....	.....	.....	.....	.....

SAVANNAH (GA.) ELECTRIC COMPANY

1m.,	April,	'13	$66,378	*$43,687	$22,689	$22,553	$136
1 "	"	'12	60,721	*44,763	15,958	15,953	5
12 "	"	'13	776,153	*564,357	211,795	211,289	506
12 "	"	'12	717,590	*529,791	187,799	186,667	1,132

ST. JOSEPH RAILWAY, LIGHT, HEAT & POWER COMPANY, ST. JOSEPH, MO.

1m.,	May,	'13	$98,836	*$61,337	$37,499	$20,198	$17,301
1 "	"	'12	94,248	*57,618	36,630	19,710	16,920
12 "	"	'13	1,210,026	*683,796	526,230	238,224	288,006
12 "	"	'12	1,137,216	*687,325	449,891	232,882	217,009

TAMPA (FLA.) ELECTRIC COMPANY

1m.,	April,	'13	$60,181	*$33,105	$27,075	$4,551	$22,524
1 "	"	'12	62,394	*34,077	28,317	4,262	23,956
12 "	"	'13	765,345	*399,198	366,147	54,810	311,337
12 "	"	'12	713,514	*388,234	325,280	57,671	267,609

TWIN CITY RAPID TRANSIT COMPANY, MINNEAPOLIS, MINN.

1m.,	May,	'13	$742,153	$356,946	$385,207	$149,905	$235,301
1 "	"	'12	690,630	331,905	358,725	143,079	215,646
5 "	"	'13	3,476,037	1,802,983	1,673,053	733,186	936,867
5 "	"	'12	3,233,703	1,712,753	1,520,950	712,395	808,554

*Includes taxes. †Deficit.

Traffic and Transportation

Brooklyn Company's Medical Inspection Bureau Made Permanent

The Brooklyn (N. Y.) Rapid Transit System has made permanent the medical inspection bureau which was organized and put on a temporary basis in December, 1912, to provide free medical attendance to the operating employees of the system and compulsory medical inspection preliminary to sick excuse. This bureau, conducted by physicians directly in the employ of the company, has made a record in the past six months in the reduction of the sick list on the system.

The idea of establishing a medical inspection service for the purpose just described grew out of an examination of the company's welfare system which T. S. Williams, president of the company, began in the fall of 1911. It appeared in the course of this examination that material variations existed between the different depots and terminals in the treatment of sick excuses, and that these variations responded more or less to local conditions and were subject to a large extent to the individual determination of assistant superintendents in charge of the various operating divisions.

There had also grown up in the operating department a custom to report sick when men wanted time off for recreation, and from this evasion of the letter of the law in the matter of sick excuses a tendency was observed to justify other evasions of operating requirements. Therefore the proposal to establish a medical inspection bureau was advanced, based fundamentally on the following propositions:

First—If a man is sick, it is contrary to the interests of the company, as well as the man, that he should be required to work.

Second—The proper individual to determine a condition of sickness or health is not an operating official but a physician.

Third—When a man is excused on account of illness it is quite as important that his recovery for work should be certified as his original sick excuse.

Fourth—A proper amount of time off should be allowed for recreation, but recreative excuses should be granted as such and not under guise of sick excuse.

A study of conditions on the system and of the medical records of the benefit association whose members had received free medical attendance from the association's physician when they asked for it resulted in a plan put into effect on Dec. 20, 1912, by which the medical inspection bureau came into existence. Dr. H. H. Stearns, the chief physician of the employees' benefit association, was placed in charge of the bureau. Medical inspection offices were established at East New York and at Thirty-ninth Street and Fifth Avenue, in South Brooklyn, at which physicians were present during certain hours of the day to conduct examinations. Dr. Stearns' headquarters in Brooklyn was availed of for consultation cails at hours other than those of the inspection offices, and a routine was laid down which very briefly may be described as follows:

When a man reports sick at his depot or terminal he receives an excuse card which entitles him to go to the nearest examination office at the next office hour to have his ailment diagnosed. The doctor at the inspection office examines him and either excuses him indefinitely, excuses him for a limited period, as in cases of minor ailments, or, in the event that it appears that the man is feigning illness, orders him to report back to his depot, where discipline is administered.

In case a man is excused indefinitely, he receives treatment during his illness at home or at the doctor's office, as the case may be, and upon recovery receives a certificate saying when he is required to report back for work. He then resumes his run in the regular course.

In case a man reports ill from his house and is not able to go to his depot, the depot notifies the headquarters of the medical inspection bureau, and within six hours a doctor calls at the man's house and issues an excuse card under the same conditions described above, or in the event of feigned illness orders him back to work. If a man is excused for a limited time and is unable to return to work at

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the expiration of that time, he reports sick at his depot or from his house again and receives a new excuse card, after which the same routine is followed. This system, accompanied by constant exchange of information between the medical bureau and various depots and terminals, has worked, almost without a hitch, to the accomplishment of a very substantial reduction in the days of work lost on account of illness in the first six months of 1913 as compared with the first six months of 1912.

In that period of 1912 the aggregate sick list represented the loss of 44,459 days' work among approximately 9000 operating employees of the system, whereas in the six months ended June 30, 1913, the aggregate time lost on account of sickness was 34,148 days' work—a gain of 10,311 days' work, or 23 per cent of the entire sick list for the first six months of 1912.

The observation of the physicians in charge of the medical inspection work, entirely confirmed by the record of the last six months, indicates that the gain in the sick list is due not to a reduction in the total number of cases reported sick but to a reduction of the time lost by men who are sick—in other words, a shortening of the period of illness. Prior to the establishment of the medical bureau, Dr. Stearns and his assistants were providing medical attendance as asked for to about 7000 members of the benevolent association. The number of calls, office and house, answered by the doctors, exclusive of the examination period at the two medical inspection bureaus, was approximately double in the first six months of 1913, when about 9000 men were under attendance, the number of calls answered in the corresponding period of 1912.

In a circular to employees dated July 1 J. F. Calderwood, vice-president and general manager of the company, announced the permanent establishment of the medical bureau. Commenting upon the results attained, he said:

'The result is highly satisfactory from the point of view of the company because it means more consistent and efficient operation of the lines. It is equally fortunate from the point of view of the men who operate these lines because every day's sickness saved not only represents a gain in health and comfort but it means a gain in earning capacity. The public, in whose interest the system is operated, also shares largely in the achievement, for the satisfactory operation of our lines is in no small degree dependent upon the standard of health which we are able to maintain.

"So far as is consistent with operating requirements, the officials of the operating department have endeavored, in connection with the work of the medical inspection bureau during the past six months, to make systematic provision for excuses from work for the purpose of recreation. This effort will be continued. But all employees should remember that the first consideration in such a system as ours is to meet the demands of the public for service, and that on such days as Saturdays, Sundays and holidays, when the public requires the operation of the maximum amount of equipment, application should not be made for excuses for purely recreative purposes.

"The all-important thing in making the operation of the medical inspection bureau as satisfactory permanently as it has been during the last six months is co-operation between the management and the men in living up to the spirit of the plan under which the bureau has been established. The management has every reason to believe that the employees of the operating department will continue to co-operate in this matter as they have done during the six months ended June 30, 1913."

The company plans to widen the usefulness of the medical inspection bureau. Dr. Stearns is studying the facilities offered for first aid to the injured in the shops, power houses, depots and terminals of the company and will in the near future arrange for systematic instruction at these operating centers in first-aid treatment. The medical inspection bureau also proposes systematically to follow up cases in which men have been admitted to service suffering from some minor ailment not severe enough to warrant their rejection from employment but detracting from their general state of health. It is planned to chart such cases upon original examination for employment and require the men to report to the physicians of the medical bureau and to remain under treatment until they receive a certificate of health.

Philadelphia Co-operative Plan Indorsed

The motormen and conductors in the employ of the Philadelphia (Pa.) Rapid Transit Company voted on July 7 in favor of continuing in force for another year the Mitten co-operative plan adopted in November, 1911, under which 22 per cent of the gross receipts of the company is set aside to pay the wages of the motormen and conductors. The vote was 4320 in favor of the plan as compared with 2028 against it. In Co-operative Bulletin 19, dated July 1, 1913, in which the announcement in regard to the election was made, T. E. Mitten, chairman of the executive committee of the company, called attention to the large advance in wages and general improvement in the relations between the men and the management that has taken place under the co-operative plan. Referring to the new wage scale effective that day, ranging from 24 cents an hour for new men to 29 cents for five-year men, it is shown that the maximum pay has been raised 6 cents an hour under the present management. Men holding regular runs are guaranteed against reduction during the re-routing now going on. New regular men are guaranteed $2.25 per day, Sundays excepted. Extra men are guaranteed $12 per week. Mr. Mitten also repeated the assurance that on Sept. 1 there will be another wage raise, putting new men at 25 cents and five-year men at 30 cents. A striking result of the co-operative plan has been the great reduction that has taken place in the number of dismissals. Discharge is now the last resort in administering discipline. Dismissals for a number of years, ended May 31, compare as follows:

Year	Discharges	Year	Discharges
1906	1287	1910	2376
1907	1374	1911	1635
1908	2038	1912	855
1909	1075	1913	536

Schenectady Railway Ordered to Reduce Round-Trip and Commutation Fares.

The Public Service Commission of the Second District of New York has issued an order directing the Schenectady Railway to reduce its round-trip and commutation fares between Ballston Lake and Schenectady. Commissioner Hodson says that the fare charged by the company between the lake and Schenectady "is unfair and unreasonable and should be reduced." The commissioner believes the single fare is satisfactory on the present zone basis, and should not be disturbed. An order has been entered embodying the following reductions in fares:

First, that beginning July 15, 1913, the company shall sell a round-trip ticket upon its railroad between its station at Ballston Lake and any station in Schenectady, either way, at the regular rate and price of 25 cents for the round trip between such points, said round-trip ticket to be sold at its offices in Schenectady and at Ballston Lake.

Second, that beginning July 15, 1913, the company shall sell a monthly commutation ticket upon its railroad between any point in Schenectady and Ballston Lake at a rate and price of $5.40, good for twenty-seven round trips between Ballston Lake and Schenectady, either way, within the month of its issue, such tickets to be sold at all times after July 10, 1913.

Third, that beginning Sept. 1, 1913, the company shall sell a monthly school commutation ticket upon its railroad between any point in Schenectady and Ballston Lake at the rate and price of $4.60, good for twenty-three round trips between those points within the month of its issue. The company is requested to notify the commission on or before July 10 of its acceptance of the order.

Ruling in Regard to Indianapolis-Louisville Shipments.—The interurban electric railways which operate between Louisville, Ky., and Indianapolis, Ind., were ordered on July 9 by the Interstate Commerce Commission to establish through routes and joint rates on less-than-carload shipments between the two terminal cities and to intermediate points. Specific class rates are prescribed by the commission.

Accident Report of United Railroads of San Francisco.—The United Railroads, San Francisco, Cal., filed on June 30 its reports of accidents covering the three months which

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ended on March 31. It shows six fatalities and a total of 280 injuries of all characters. One of the fatal accidents was reported to have been due to a car collision, two to collisions between cars and automobiles, one to a collision with a wagon and one to a leap from a moving car, while the sixth victim, a boy, was fatally hurt through having skated against a moving car.

Accident in Ogden Canyon.—Five persons were probably fatally injured and more than twenty-five others received serious hurts on July 4 in a head-on collision in the Ogden Canyon between two cars of the Ogden (Utah) Rapid Transit Company, each drawing trailers. P. D. Kline, general manager of the company, was quoted by the Salt Lake *Tribune* in its issue of July 5 as follows: "All of the men who were not injured in the accident are busy getting the cars in operation again and I have made no effort as yet to place the responsibility."

New High-Speed Service Between Newark and Trenton.—The Public Service Railway, Newark, N. J., has established a new high-speed through service between Newark and Trenton, cars leaving either terminal on the hour, the first car at 6 a. m. and the last at 9 p. m. The cars from Newark follow the route of the Elizabeth car to the arch in Elizabeth and proceed down South Broad Street and over Bay Way and through a private right-of-way for 12 miles to Bonhamtown. Thence the regular route is used through New Brunswick and Milltown, after which a private right-of-way is used to Trenton.

Officials and Directors Charged with Manslaughter.—Fifteen prominent officials and directors of the Metropolitan West Side Elevated Railway and the Aurora, Elgin & Chicago Railroad, Chicago, Ill., have been arrested on a charge of manslaughter. This proceeding arises from an accident which occurred recently when an automobile was struck by a train and two persons were killed. The arrests were made in accordance with a finding of the coroner's jury. The officials and directors who were arrested were forced to remain several hours in the Criminal Court building, but were finally released on bonds of $5,000 each.

I. C. C. Decision on New Haven Commutation Rates.—The Interstate Commerce Commission decided on July 9 that the existing scale of commutation passenger fares of the New York, New Haven & Hartford Railroad from points in Connecticut to New York City was not unreasonable, generally, although certain stations were found to be unjustly discriminated against. The commission held it to be discriminatory against Connecticut commuters for the company to refuse to sell them reduced rate fifty-trip family tickets, while such tickets are sold by the road between New York City and all points situated within New York State.

Kansas Commission Reserves Decision in Transfer Case.—The Public Utilities Commission of Kansas has reserved its decision after hearing testimony relative to the transfer system maintained by the Metropolitan Street Railway and the Kansas City-Western Railway. The demand is for the interchange of transfers between the two roads. The Kansas City-Western Railway has a stub line known as the "Kensington Branch," running through the western part of the city. A 5-cent fare is charged and no transfer is given. The city contends that transfers should be exchanged between this line and the Metropolitan Street Railway.

Passes Ordered Abolished in Washington.—As the result of an opinion submitted by Corporation Counsel E. H. Thomas to the effect that the issuance of free passes in the District of Columbia is prohibited by the new utilities act, the Public Service Commission has issued an order practically abolishing the use of passes on the electric railways in the District. Street railways will be permitted to provide their own employees with free transportation. The only other exception to the ruling is the case of persons who have contracts for placing advertising in cars. The prohibition also will apply to them, however, upon the expiration of the present contracts.

Welfare Program of Lehigh Valley Transit Company.—On July 4 the Lehigh Valley Transit Company, through R. P. Stevens, president, announced an extensive plan of insurance, sick benefits and pensions financed entirely by the company. The plan affects all employees of the company and employees also of the Lehigh Valley Light & Power Company. The plan includes the payment of $200 death benefits, the payment of $1 per day in case of illness and retirement at $20 per month after twenty-five years' service with the companies. The plan also contains provisions for social affairs for the employees and their families and for free medical and surgical treatment under certain conditions.

Part of Accident Payment Returned.—The Louisville Railway reports that a recipient of damages for injuries suffered while riding on one of its cars returned part of the money on the ground that the amount paid was excessive. The person injured was a woman prominent in church and charity work in Louisville. After the accident, which it appeared was due to negligence on the part of employees, the legal department recommended a settlement without trial for $2,000, which was paid. Recently the lady in question presented a check for $750 to the company with the explanation that her injuries were not as serious as she feared they would be, and that the cost of medical services was also less. She believed that $1,250 was the amount to which she was justly entitled.

Free Transportation for Policemen and Firemen in Perth Amboy.—As a result of an order of the Board of Public Utility Commissioners of New Jersey which went into effect on June 12, 1913, the Public Service Railway, which operates in Perth Amboy, N. J., must furnish free transportation within the city limits to all policemen and paid firemen while on duty. It was held by the board that nothing exists in the state laws to abrogate the city ordinances requiring such free transportation, as was claimed by the railway company. Evidence showed that the policemen of Perth Amboy might be on duty while not in uniform, and if in this case free carriage was denied to them the company would fail to observe the ordinances in question. How the company is to determine just when a man is "on duty" and the obligation of free carriage is incumbent on it the board did not state, but it did say that if it sets up tests, such as that of uniform, which work to violate its obligations under the franchise, it would become liable therefor.

Extension of Co-operative Buying in Philadelphia.—The board of trustees of the co-operative beneficial association organized among the employees of the Philadelphia (Pa.) Rapid Transit Company has approved contracts with additional merchants who are now authorized to accept coupons from members of the association in payment of goods, thereby opening up forty-two additional places at which cash coupons of the association will be accepted the same as though the cash itself was used in payment for goods. A revised list of merchants has been published covering more than 100 stores now open to the patronage of the members of this association. Under the contracts which the company has with the stores included in the list the merchants agree to accept, in payment of purchases, cash coupons of the co-operative beneficial association at the face or purchasing value, the cash coupon books being sold by the association to its members at a discount of 8 per cent.

Illinois Valley Wonderland.—The Chicago, Ottawa & Peoria Railway, Joliet, Ill., has issued a booklet descriptive of its lines entitled "Illinois Valley Wonderland." The booklet contains twenty-four pages and cover and is profusely illustrated. The cover is in colors and is especially decorated to symbolize the country as it was in its primitive state. It shows the view from Starved Rock, where the Illini Indians made their last stand. All of the historic territory thereabouts has been purchased by the State of Illinois for a public park and is being preserved in all its pristine splendor. The Chicago, Ottawa & Peoria Railway is the only means of direct transportation to the park, and the trip to the park is made down the famous Illini trail through the Valley of the Illinois. The text of the booklet, which is by Edward C. Clark, contains besides a general description of the territory served by the lines of the company brief descriptions of Joliet, Ottawa, Morris, Seneca and other cities on the line. A page at the back of the booklet is devoted to the subject of passenger rates and special cars to Starved Rock. On the outside of the back cover there is a map of the territory served by the company's line.

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Personal Mention

Mr. O. P. Davis, assistant superintendent of the Southern division of the Pacific Electric Railway, Los Angeles, Cal., has been advanced to the position of superintendent of that division, to succeed Mr. F. T. Annable.

Mr. S. E. Wilson, chief dispatcher of the Pacific Electric Railway, Los Angeles, Cal., has been appointed assistant superintendent of the Southern division, to fill the vacancy created by the promotion of Mr. O. P. Davis.

Mr. R. P. Stevens, president of the Lehigh Valley Transit Company, Allentown, Pa., has been elected president of the Easton (Pa.) Consolidated Electric Company, which has been taken over by the Lehigh Valley Transit Company.

Mr. William E. Leffingwell, Watkins, N. Y., has been nominated by Governor Sulzer as a member of the Public Service Commission of the Second District of New York to succeed Mr. Frank W. Stevens. Mr. Leffingwell is a hotel proprietor.

Prof. E. A. Hitchcock has resigned from the department of mechanical engineering of the Ohio State University at Columbus to become consulting engineer for the E. W. Clark Management Corporation, Philadelphia, Pa. He will make his headquarters at Columbus.

Mr. F. L. Annable, formerly superintendent of the Southern division of the Pacific Electric Railway, Los Angeles, Cal., has been appointed superintendent of the Northern division of the company, to succeed Mr. J. C. McPherson, whose appointment to the Southern Pacific Company was noted recently in the Electric Railway Journal.

Mr. Z. V. Taylor, president of the Charlotte (N. C.) Electric Railway, one of the Southern Power Company properties, has been elected president of the Anderson Water, Light & Power Company, Anderson, S. C., which has been taken over by the Southern Public Utilities Company, a subsidiary of the Southern Power Company.

Mr. Charles J. Chase, Croton-on-the-Hudson, has been nominated by Governor Sulzer as a member of the Public Service Commission of the Second District of New York to succeed Mr. Curtis N. Douglas. Mr. Chase has been in the employ of the New York Central & Hudson River Railroad for more than twenty years as a locomotive engineer.

Mr. F. A. Nims, who has been secretary and treasurer of the Muskegon Traction & Lighting Company, Muskegon, Mich., has been elected president of the company to succeed Mr. John T. Young, who has been elected vice-president, general manager and a director of the Grand Rapids (Mich.) Gas Light Company. Mr. Young has been elected vice-president of the Muskegon Traction & Lighting Company.

Gen. George H. Harries, president of the American Electric Railway Association and an officer of several public utility properties controlled by H. M. Byllesby & Company, has been elected president of the Louisville Gas & Electric Company, chartered in Kentucky as a consolidation of the Louisville (Ky.) Gas Company and four other utility companies. Mr. H. M. Byllesby is chairman of the board of the new company.

Mr. T. W. Shelton has been appointed general superintendent of the Kankakee & Urbana Traction Company, Urbana, Ill., a newly created position with the company. Mr. Shelton was formeriy master mechanic of the Fort Dodge, Des Moines & Southern Railroad, Fort Dodge, Ia., and previous to that was connected with the Indianapolis, Columbus & Southern Traction Company. He was also connected with the Northern Ohio Traction & Light Company, Akron, Ohio, the Fort Wayne & Springfield Railway, Decatur, Ind., and the Peoria (Ill.) Railway.

Mr. William F. Woerner has been appointed the fifth member of the Public Utilities Commission of Missouri by Governor Major. For several years Mr. Woerner has been identified with municipal affairs, having been associate city counselor during the administration of Mayor Rolla Wells. He was the Democratic nominee for Mayor in 1909. Mr. Woerner has been rather prominent in Democratic politics since 1898, when he was a candidate for probate judge. He served as police commissioner for one month under Governor Dockery. He served two years as associate city counselor and was later appointed by Mayor Wells to revise the ordinances of St. Louis. Mr. Woerner holds the chair of "wills and administration" at St. Louis University school of law.

Mr. Albert Benham, formerly assistant general manager of the Ohio Electric Railway, Springfield, Ohio, who has been appointed general manager of the company, was born in Ohio in 1868. He entered railway work with the Fifth Avenue Cable Company, Pittsburgh, Pa., in 1891, and continued in the service of that company and the Consolidated Traction Company, Pittsburgh, in various departments, until January, 1901, when he became identified with the Cincinnati (Ohio) Traction Company, acting in the capacity of inspector and assistant general superintendent until March, 1906, at which time he was appointed general superintendent of the Indiana, Columbus & Eastern Traction Company, with headquarters at Columbus, Ohio. In 1908 he was appointed assistant general manager of the Ohio Electric Railway.

Mr. R. E. Lee, whose resignation as general superintendent of the Cincinnati (Ohio) Traction Company to become connected with the Firestone Rubber & Tire Company, Akron, Ohio, was noted in the Electric Railway Journal of July 5, 1913, began his street railway career in February, 1886, as a conductor on one of the horse car lines of the Baltimore (Md.) City Passenger Railway. After serving in various capacities with this company he was appointed division superintendent in October, 1894, and remained in that position until April, 1899, when he became connected with the Washington Railway & Electric Company, Washington, D. C., as general superintendent. He resigned from the Washington Railway & Electric Company in April, 1903, to become general superintendent of the Cincinnati Traction Company, which position he will relinquish on July 15.

Mr. William McClellan, who resigned a short time ago as chief and engineer of the division of light, heat and power of the Public Service Commission of the Second District, has been retained as assistant to the president of the Buffalo (N. Y.) General Electric Company. Mr. McClellan was educated at the University of Pennsylvania and is a member of the council of the University of Pennsylvania Club of New York City and president of the Associated "Pennsylvania" Clubs, an organization of the alumni associations of the University of Pennsylvania in all parts of the world. He is a member of the Railroad Club of New York, of the Engineers' Club of New York City and of the University Club of Albany. He is a fellow and manager of the American Institute of Electrical Engineers and a member of the American Society of Mechanical Engineers. He is a director of the Automatic Train Stop Company and of the Campion McClellan Company, engineer and constructor, with offices at Philadelphia. Mr. McClellan will establish offices in New York City and will assist in the operation and management of public service properties.

Mr. J. F. Rodgers has been appointed superintendent of track of the Chicago (Ill.) City Railway to succeed Mr. W. F. Graves, whose resignation was mentioned in the Electric Railway Journal for May 24. Mr. Rodgers was graduated from Tuscarora Academy in 1893. He then entered Pennsylvania State College. After leaving college he began work as assistant engineer with the Pennsylvania Traction Company, Lancaster, Pa. In 1898 he was made superintendent of construction of the Tennis Construction Company, Philadelphia. While in the employ of this company Mr. Rodgers had charge of the construction of the Williamsport & Montoursville line, now a part of the Montoursville Passenger Railway, Williamsport, Pa., and the line between Trenton and Bordentown, N. J. In 1899 he was made manager of the Philadelphia, Bristol & Trenton Street Railway, Philadelphia, Pa., following which he accepted a position with the transportation department of the North Jersey Street Railway Company, Jersey City, N. J. During the time he was there Mr. Rodgers served in various positions and was finally made assistant superintendent of one of the lines. In 1904 Mr. Rodgers accepted the position of assistant engineer with the United Railroads, San Francisco, Cal., where he was engaged in rehabilitation work

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before and after the earthquake and fire. In July, 1907, he accepted a position as assistant engineer on the Board of Supervising Engineers, Chicago Traction. The following year he was made field engineer in charge of track and roadway construction, in which position he remained until January, 1913, when he was appointed engineer of track and roadway.

Mr. H. C. Hazzard, who has been elected permanent secretary of the Pacific Coast Electric Railway Association with offices in the Electric Building, Portland, Ore., was graduated from Leland Stanford, Jr., University with the degree of A. B. and from Columbia University with the degree of LL. B. He was admitted to the New York State bar in 1899 and the following year began the practice of law in New York City as the junior partner of the firm of Thompson & Hazzard. In 1905, when, as the result of the legislative investigation into the gas rates charged by the Consolidated Gas Company, New York, the State Commission of Gas and Electricity was established, Mr. Hazzard was appointed secretary of the commission and held that position until Mr. Charles E. Hughes became Governor and the New York State Public Service Commissions superseded the Gas Commission, Railroad Commission and Rapid Transit Commission. Mr. Hazzard then announced his intention of retiring from public office and returning to the practice of law, but was prevailed upon by the members of the Public Service Commission of the Second District of New York to organize and become executive head of the division of light, heat and power of the commission. During the five years he served in this capacity his work was not confined to that of routine supervision over the gas and electrical matters immediately under the jurisdiction of that division, but concerned the wide responsibilities relating to fundamentals of all utilities over which the commission had supervision. The legal as well as the executive character of his work enabled Mr. Hazzard to become acquainted with problems confronting governmental regulation and the difficulties with which the public utilities have to contend. Following the ideas of Governor Hughes, the Legislature of California enacted, to take effect March 23, 1912, an act enlarging the powers and jurisdiction of the then existing railroad commission, and in the same month of that year Mr. Hazzard resigned from the Public Service Commission of New York to become assistant attorney of the State Railroad of California and continued in that capacity up to the time he accepted the position of permanent secretary of the Pacific Coast Electric Railway Association.

H. C. Hazzard

A new workmen's compensation act, approved by Governor McGovern of Wisconsin, which goes into effect on Sept. 1, provides that every employer of four or more persons will be subject to the provisions of the act, unless he specifically elects otherwise. The benefit to injured employees or their dependents remains almost unchanged, the chief exceptions being in the case of workmen permanently disabled, in which event the compensation is extended six years from the date of the injury. The new act abrogates the defense of contributory negligence. The act of 1911 abolished only the two defenses of assumption of risk and negligence of a fellow servant. The provision under which employers automatically will come under the law unless they elect to the contrary will affect approximately 2000 employers in the State, 1500 employers having already come under the law. The new act contains provisions of considerable importance to contractors, who are made liable for injuries to employees of sub-contractors. Special provision is made, however, for the contractor to protect himself against losses. A new section requires all employers to carry insurance unless specially exempted.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Minnesota Central Railway, Brainerd, Minn.**—Application for a charter has been made by this company in Minnesota to build an electric railway to connect Brainerd, Ironton, Crosby, Cuyuna, Deerwood and other towns on the North Cuyuna range, and with Barrows, on the south range. Capital stock, $250,000. Incorporators: Joseph Ferrier, Duluth; George Reid, William F. Henry and John Hill, Ironton and Duluth.

***Niobrara, Sioux City & Omaha Railway, Omaha, Neb.**—Application for a charter has been made by this company, which proposes to build an interurban railway in Nebraska through the counties of Holt, Knox, Dixon, Dakota, Thurston, Burt, Cuming, Stanton, Antelope, Pierce, Madison, Platte, Colfax, Dodge, Washington and Douglas. The Baker Construction Company and the Niobrara Power Company, interrelated companies, have also filed articles of incorporation. Capital stock, $100,000. Incorporators: Charles Baker, Herman Buhman, Henry Ruwe, Frank Gelston, Chancy Snyder, John Lowery and Peter Mangold.

***Maryville-Knoxville Interurban Railway, Knoxville, Tenn.**—Incorporated in Tennessee to build an electric railway to connect Knoxville, Marysville, Vestal, Madisonville and Vestal. Capital stock, $10,000. Incorporators: Howard Cornick, John H. Frantz, T. G. McConnell, Charles M. Seymour and R. M. Mitchell.

***Dallas, Fairfield & Gulf Railway, Fairfield, Tex.**—Chartered in Texas to build an interurban railway to connect Dallas, Ferris, Fairfield and Jewett, a distance of 100 miles. Capital stock, $105,000. Incorporators: T. Alexander, Teague; W. H. Miller, R. N. Compton and W. F. Storey, Fairfield; R. L. Harrer, W. J. Hall, Corsicanna and J. W. Wright, Ferris.

Gulf, Freeport & Northern Railway, Freeport, Tex.—Chartered in Texas to build an 85-mile electric interurban railway between Freeport, Sealy, Brazoria and West Columbia. The power plant will be located in Freeport. Capital stock, $100,000. Incorporators: C. L. Sharp and J. H. Bartlett, Marshall, Tex.; R. B. Loggins, J. S. Bartlett, C. E. Clark and George Edwards, Columbia, Tex.; D. A. Barr, Freeport, Tex.; William L. Hall, C. Davis, T. C. Millard and C. L. Pierce, Damon, Tex.

FRANCHISES

***Mount Pleasant, Ark.**—G. Haggard Rider, Mount Pleasant, has received a franchise from the City Council to build an electric railway in Mount Pleasant.

West Vancouver, B. C.—The Pacific Great Eastern Railway has asked the City Council for a franchise to build an electric line between West Vancouver and Dunderave. Taxpayers of West Vancouver have asked the Council to grant the request. Work will be begun as soon as the permission is granted.

Los Angeles, Cal.—The Los Angeles Railway will ask the City Council for a franchise to change its motive power from steam to electricity over Hoover Street in Los Angeles.

Santa Barbara, Cal.—The Santa Barbara & Suburban Railway has received a franchise from the Council to extend its lines to the Normal School Grounds on Mission Ridge.

Solano City, Cal.—The Sacramento Valley Electric Railroad has received a franchise through the Solano Irrigated Farms and has arranged for terminal facilities at Solano City. C. L. Donohue, Willows, president. [E. R. J., April 26, '13.]

Mount Vernon, Ill.—The Mount Vernon Traction Company has asked the City Council for a franchise in Mount Vernon on Broadway and Sixteenth Street, Casey Avenue and Twenty-fourth Street; from the south city limits on Tenth Street to Broadway; from Broadway on Ninth Street to and across Taylor Avenue, and on Pace Avenue and Oakland Avenue to and across Twelfth Street.

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Tisbury, Mass.—The Martha's Vineyard Street Railway has received permission from the Board of Railroad Commissioners to extend its tracks in Beach Road to Tisbury and for location of tracks in Wamsutta Avenue, Back Alley, Circuit Avenue, Kedron Avenue, Siloam Avenue and Dukes County Avenue in Oak Bluffs.

West Orange, N. J.—The Orange Mountain Traction Company has received a fifty-year franchise from the Council in West Orange to double-track its line from the Swamp Line tracks along Olaf Place to Valley Road to Central Avenue to the Orange line.

Maryville, Tenn.—The Maryville-Knoxville Interurban Railway, the incorporation of which is noted elsewhere in this issue, has asked the County Court for a franchise along the Maryville pike from Vestal to Stock Creek or the Blount County line. A similar franchise will be filed in Maryville for the section of the line between Maryville and Stock Creek.

Jackson, Tenn.—The Jackson Railway & Light Company has asked the City Council for a fifty-year extension of its franchise in Jackson.

Richmond, Va.—The Virginia Railway & Power Company has received permission from the Council to extend its lines along Broad Street from Robinson Street to Roseneath Road in Richmond.

Anacortes, Wash.—George W. Krebs, Anacortes, has asked the Council for a franchise over the main streets of Anacortes. He agrees to have 3 miles of the line in operation in two years.

Parkersburg, W. Va.—The Charleston, Parkersburg & Northern Railroad has received permission from the Wood County Court for right-of-way across the county roads. This 47-mile electric railway will connect Parkersburg, Charleston and Sissonville. K. B. Stephenson, Parkersburg, president. [E. R. J., May 21, '13.]

TRACK AND ROADWAY

***Leeds, Ala.**—Citizens of Leeds are taking steps to organize a company to build an electric railway to connect Leeds and Irondale.

Phœnix (Ariz.) Railway.—This company has been ordered by the Arizona Corporation Commission to double-track its West Washington Street line from Seventh Avenue to Seventeenth Avenue in Phœnix.

Northern Electric Railway, Chico, Cal.—Construction will soon be begun by this company on its 50-mile line extending from the Yuba City-Colusa line at Meridian, on the Sacramento River, and extending south through the Fair ranch to Woodland, forming a loop and giving direct connection for all points on the west side with Sacramento and San Francisco over the Vallejo & Northern Railway.

Pacific Electric Railway, Los Angeles, Cal.—Paul Shoup, president of the Pacific Electric Railway, stated recently that if the rights-of-way were secured and other conditions complied with, the work of constructing the proposed electric railway from Los Angeles to Santa Monica could be commenced within sixty days, and that the new rapid transit line would be a reality within fifteen or sixteen months. The proposed road will be 9 miles in length and will connect with the Eighth Street line in Santa Monica. Surveys will be made at once by this company for double-tracking its line on Lake Avenue in Pasadena.

Stockton Terminal & Eastern Railroad, Stockton, Cal.—This company has placed orders for rails for its Miner Avenue extension in Stockton to the water frontage on the north side of Stockton Channel. The company has received a franchise to build this extension and work will be begun in the near future.

Big Four Electric Railway, Tulare, Cal.—Grading of this railway from Tulare to Poplar, a distance of 21 miles, has been completed. Contracts for the rails have been let.

Sacramento Valley West Side Electric Railway, Willows, Cal.—This company has arranged for the sale of $6,000,000 of bonds at 80 and will rush construction north to Redding and from Shasta City to Eureka. C. L. Donohue, Willows, president. [E. R. J., April 26, '13.]

***Buhl, Idaho.**—J. Stewart Clark, Twin Falls, and associates plan to build an electric railway between Buhl and Wendell via Hagerman, a distance of 25 miles.

Southern Traction Company of Illinois, East St. Louis, Ill.—Former United States Senator William Lorimer, of Illinois, head of the Lorimer-Gallagher Construction Company, Chicago, accompanied by M. S. Gallagher, conferred in St. Louis recently with C. G. Young, New York, and others in regard to the feasibility of adopting storage battery cars as a part of the equipment of the Southern Traction Company's extension from East St. Louis to Belleville. The line has been graded from East St. Louis to the bluffs near Belleville and will be put in operation by Nov. 1.

Public Utilities Company, Evansville, Ind.—This company plans to begin work in August on the extension of the Bell Street line from Kentucky Avenue to Walnut Lane, near the gates of Woodmere.

***Hopkinsville, Ky.**—It is reported that plans are being made in Hopkinsville to build an electric railway in Hopkinsville and extend it to surrounding towns. The names of the promoters have not been made public.

Kentucky Traction & Terminal Company, Lexington, Ky.—This company contemplates extending its line to Richmond and has begun preliminary work.

Iron River, Mich.—F. D. Sullivan, representing the proposed 12-mile electric railway in Iron County, states that surveys have been made and construction will be begun some time in July on the electric line from Spring Valley to Stambaugh and Iron River and out to the mines north of Iron River. Later a line will be built to Crystal Falls. [E. R. J., April 12, '13.]

***Owosso, Mich.**—Joseph Gibson, who with several others has been at work securing the right-of-way for an electric railway from Owosso to Corunna, states that the Michigan Railway Engineering Company, Kalamazoo, which is building a line from Kalamazoo to Grand Rapids, is behind the project. The line will eventually be extended from Owosso to Flint via Flushing or Durand.

Atlantic Coast Electric Railway, Asbury Park, N. J.—Plans are being considered by this company to build an extension to Brielle.

Chautauqua Traction Company, Jamestown, N. Y.—Work of double-tracking this company's line to Lakewood will be resumed at once.

New York State Railways, Rochester, N. Y.—This company has placed in operation its extension on West Dominick Street from Expense Street to Charles Street in Rome.

Yonkers (N. Y.) Railroad.—This company has awarded a contract to Thomas J. Crimmins & Company, New York, to double-track, construct additional turnouts and extend some of its lines in Yonkers.

***Hickord (N. C.) Railway.**—Surveys have been made by this company between Hickory River, Catawba Springs, Newton and Lincolntown. This 178-mile line will connect Hickory, Newton, Lincolntown, Taylorsville, Lisletown, Conover and Wilkesboro. M. E. Thornton, Hickory, president.

Toledo, Ottawa Beach & Northern Railway, Toledo, Ohio.—Right-of-way has been secured by this company for an extension of its line to Monroe, where a connection will be made with the Detroit, Monroe & Toledo Short Line Railway.

Ottawa & St. Lawrence Electric Railway, Ottawa, Ont.—Surveys have been completed between Ottawa and Morrisburg, 45 miles, and grading will be begun later in the summer by this company on its line to connect Ottawa, Morrisburg, Brockville and Armprior. John E. Askwith, Ottawa, president. [E. R. J., June 28, '13.]

Lehigh Valley Transit Company, Allentown, Pa.—This company has awarded a contract to the Allen Engineering & Contracting Company, Netcong, N. J., for the grading of 3 miles of track north of Quakertown, ½ mile at Sellersville and 3½ miles between Souderton and Lansdale, all on the Philadelphia division. Right-of-way has been secured for double track, but only one track will be laid this summer. This line is a revision of the existing line, but the present line is along the edge of the highway and contains numerous sharp curves and heavy grades.

***Anderson, S. C.**—Plans are being considered to build an electric railway between Clemson College and a connection with the Blue Ridge Railway, by which interurban trains could be operated between Clemson College and Anderson.

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*Dallas, Tex.—J. S. Kendall and associates are said to be considering plans to build an electric railway through the Doran-Hughes property east of Dallas and near White Rock Lake.

Dallas-Denton Interurban Railway, Dallas, Tex.—Preliminary surveys are being made by this company in Denton. This is part of a plan to build an electric line to connect Dallas, Denton, Carrollton, Lewisville, Grapevine and Irving. E. P. Turner, Dallas, is interested. [E. R. J., June 28, '13.]

Texas Traction Company, Dallas, Tex.—Surveys are being made by this company for an extension of its Hull Street line into South Denison.

Utah Light & Railway Company, Salt Lake City, Utah.—This company is asked to consider plans to extend its line to Second North Street and Main Street in Salt Lake City.

Monongahela Valley Traction Company, Fairmont, W. Va.—The grading for the Lumberport extension of this company's line is completed and rails and overhead work will be finished about the time that the new bridge being built at Lumberport across the West Fork River is completed. This line will extend across the new bridge and connect Lumberport and Haywood.

Northfork, W. Va.—Plans are being made to build an electric railway between Northfork and Keystone. L. G. Toney, Northfork, is interested.

SHOPS AND BUILDINGS

Charlotte (N. C.) Electric Railway.—Material has been ordered and work will be begun at once by this company on rebuilding its carhouse in Dilworth, which was destroyed by fire recently.

Scioto Valley Traction Company, Columbus, Ohio.—The plans of the Columbus Depot Company, which is controlled by the Scioto Valley Traction Company, for a modern fireproof terminal building have been approved by the committee on railroads and viaducts of the City Council. The building will be located on property bounded by High, Front and Town Streets in Columbus and the company plans to commence construction work at an early date.

Springfield (Ohio) Railway.—Plans are being considered by this company to build new carhouses and machine shops in Springfield.

Bartlesville (Okla.) Interurban Railway.—This company has been authorized to begin at once the construction of its new carhouses and also to make other improvements in Bartlesville costing approximately $12,000. The structure will be 150 ft. x 40 ft. and of brick and steel construction and capable of holding a dozen cars. It will be constructed on property of the company adjoining the company's power house in the east section of Bartlesville.

Salt Lake & Utah Railway, Salt Lake City, Utah.—The selection of the site for the joint terminal station in Salt Lake City of the Salt Lake & Ogden Electric Railway and the Salt Lake & Utah Railroad has been announced. The structure will be located on West Second South Street between West Temple and First Street and will cost $40,000.

POWER HOUSES AND SUBSTATIONS

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind.—This company, which will build soon a 34-ft. x 142-ft. addition to its Spy Run power house, plans to install two 6250-kw General Electric turbines, which will generate at 4000 volts, three-phase, 60-cycle. The company will also install two 1000-kw motor-generator sets to take care of the Fort Wayne city service, retaining the present station. Contracts have been let with the General Electric Company for the electrical equipment, the Worthington Company for the condenser apparatus, the Adams Construction Company for the building, the Northern Engineering Works for the crane, and the Alberger Company for the pumps.

Southern Traction Company, Dallas, Tex.—Work has been begun by this company on its new substation in Ennis. The structure will be 40 ft. x 50 ft. and of brick construction. The other substations will be built at Waxahachie, Hillsboro, Corsicana and Lisbon. The stations will be equipped by the General Electric Company.

Gulf, Freeport & Northern Railway, Freeport, Tex.—This company plans to build its main power house in Freeport.

Manufactures and Supplies

ROLLING STOCK

Bartlesville (Ohio) Interurban Railway is in the market for one or more new cars.

Charleston (W. Va.) Interurban Railroad has placed an order with the Jewett Car Company for two 35-ft. interurban cars.

Cleveland (Ohio) Railway, noted in the ELECTRIC RAILWAY JOURNAL of June 14, 1913, as expecting to purchase fifty cars, has ordered these cars from the G. C. Kuhlman Car Company.

Puget Sound Traction, Light & Power Company, Seattle, Wash., noted in the ELECTRIC RAILWAY JOURNAL of May 17, 1913, as having ordered ten prepayment, semi-convertible cars from the Cincinnati Car Company, has specified the following details for these cars:

Seating capacity..... 62	Underframe .....steel
Bolster centers, length, 29 ft. 0 in.	Air brakes.....West.
	Bumpers, Hedley anti-climber
Length of body....38 ft. 4 in.	Car trimmings.....Dayton
Length over vestibule, 48 ft. 4 in.	Curtain fixtures.....National
Width over sills....8 ft. 4 in.	Curtain material...Pantasote
Width over all.....8 ft. 8 in.	Destination signs.....Hunter
Height, rail to sills.33 3/16 in.	Hand brakes .....Peacock
Sill to trolley base, 8 ft. 6 1/16 in.	Sanders.....Ohio brass
	Sash fixtures.....Edwards
Body .....semi-steel	Seats, style.....H. B. & W.
Interior trim.....mahogany	Seating material.....birch
Headlining.....carline finish	Step treads.....Mason
Roof, type.....turtle-back	Trucks, type.....Standard

West Jersey & Seashore Railroad, Camden, N. J., noted in the ELECTRIC RAILWAY JOURNAL of June 7, 1913, as having ordered twenty-six 34-ft. cars from The J. G. Brill Company, has specified the following details:

Seating capacity.....54	Curtain fixtures..Cur. S. Co.
Weight (car body only), 16,000 lb.	Curtain material...Pantasote
	Destination signs.....Hunter
Bolster centers, length, 24 ft. 6 in.	Lifeguard.....H. B.
	Gears and pinions.....G. E.
Length of body.34 ft. 1⅜ in.	Gongs .....Dedenda
Length over bumper, 45 ft. 2 in.	Hand brakes.....Brill
	Heaters .....Cons.
Width over posts..8 ft. 5 in.	Headlights .....Dayton
Width over all.....8 ft. 6 in.	Journal boxes .....Brill
Height, rail to sills, 2 ft. 6¾ in.	Motors..G. E., outside-hung
	Paint .....Murphy
Sill to trolley base.9 ft. 0½ in.	Sanders .....Ohio brass
Body.....wood and metal	Sash fixtures.....Brill
Interior trim.oxidized bronze	Seats, style...Brill "Winner"
Headlining.....maple veneer	Seating material.spring cane
Roof, type.....plain arch	Springs .....Brill
Underframe .....metal	Step treads.....Universal
Air brakes.....G. E.	Trolley catchers or re-
Axles.....hammered steel	trievers .....Keystone
Bumpers.....channel iron	Trolley base.....U. S.
Cables .....G. E.	Trucks, type.....Brill
Car trimmings.....Brill	Varnish .....Murphy
Conduits and junction	Ventilators .....Brill
boxes .....G. E.	Wheels.....rolled steel

TRADE NOTES

George E. Austin, president, American General Engineering Company and Imperial Rubber Company, New York, N. Y., sailed for Europe this week in the interest of his export business.

P. V. Martin and E. L. Adams, New York, N. Y., formerly of the sales department of Waterbury & Company, have opened offices at 8-10 Bridge Street as manufacturers' agents for electrical material.

Curtain Supply Company, Chicago, Ill., has received an order from the Southern Pacific Company to equip eighty-nine of its new cars with curtains, using ring No. 88 fixtures and Rex all-metal rollers.

J. G. White Engineering Corporation and the J. G. White Management Corporation, New York, N. Y., both declared an initial dividend at rate of 7 per cent per annum

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for five months ended June 30, 1913, on preferred stock, payable Sept. 1, 1913, to stock of record Aug. 20.

H. W. Johns-Manville Company, New York, N. Y., has recently opened a branch office at Charlotte, N. C. The new office, which is located in the Commercial Bank Building, is in charge of E. U. Heslop, who is assisted in covering the western section of North Carolina by P. J. McCusker and Paul W. Whitlock.

The J. G. Brill Company, Philadelphia, Pa., has recently received an order from the Chicago Railways for 400 39-E trucks and another from the Nashville Railway & Light Company for one pair of the same type. The Charleston Consolidated Railway & Lighting Company has also placed an order for one 21-E truck.

Van Dorn Electric Tool Company, Cleveland, Ohio, which was noted in the ELECTRIC RAILWAY JOURNAL of July 5, 1913, as having been formed to take over the portable tool department of the Van Dorn & Dutton Company, was through error said to have its main office in Chicago, Ill. This should have been Cleveland, Ohio, as stated above.

Siemens Company of Canada, Ltd., Montreal, Can., has appointed Arthur S. Herbert general manager of the branch offices in Australia. Mr. Herbert, who was formerly general manager of the company, is now in England, but will return to Canada for a few weeks in July, sailing for Australia about the end of August. He will be succeeded in Canada by C. A. Ablett.

Curtain Supply Company, Chicago, Ill., has received an order from the Southern Pacific Company to equip eighty-nine of its new cars with curtains, using ring No. 88 fixtures and Rex all-metal rollers, and also another curtain order from the New York State Railway to equip the twenty-five new trail and the twenty-five new motor cars, using ring No. 89 fixtures and Rex all-metal rollers.

Atlas Preservative Company of America, New York, N. Y., has received recent orders for its Atlas-A weed killer from the following electric railways: Fort Dodge, Des Moines & Southern Railroad; Elmira, Corning & Waverly Railroad and Northwestern Pennsylvania Railway. The company has also received orders for Atlas-A weed killer from the Pennsylvania Railroad and the Southern Railway.

Universal Lubricating Company, Cleveland, Ohio, has recently been reorganized in order to take better care of its rapidly growing business. Under the new organization G. W. Schofield was re-elected president and C. B. Arthur was elected secretary-treasurer and placed in active charge of sales. Edward Dreher has been appointed assistant to Mr. Arthur. C. B. Emery, who was formerly with the company, is no longer in its employ.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., has sold to Kuhn, Loeb & Company an issue of $3,250,000 of two-year 6 per cent notes to retire a like amount of the $4,000,000 issue which matures on Aug. 1, 1913. The balance will be paid off from cash now in the company's treasury. Since April 1, 1913, the company has reduced its obligations by $1,500,000. The new notes are to be offered to holders of the maturing issue in exchange, and the balance which is not taken by the present holders will be offered for subscription at a price around 99.

ADVERTISING LITERATURE

Green Fuel Economizer Company, Matteawan, N. Y., has issued a leaflet entitled "Green's Conical Flow Fan." This leaflet illustrates and describes the company's fan or blower, which is of novel design.

Ohmer Fare Register Company, Dayton, Ohio, has issued a folder describing its register and also contains a list of some of the companies from which new and renewal contracts and additional orders have been received since Jan. 1, 1913.

Charles N. Wood Company, Boston, Mass., general sales agent for Chapman automatic signals, has issued a very attractive catalog describing these signals and containing a number of illustrations showing them in operation throughout the country.

Ideal Case-Hardening Compound Company, New York, N. Y., has just issued for free distribution the fifth edition of its pamphlet on case-hardening. This is entitled "Case-Hardening and Heat-Treating of Steel." As its title implies, the new edition has been substantially broadened in scope, although the material contained in the preceding edition has been retained. By the addition of numerous practical rules and the amplification of the theoretical discussions, the pamphlet has been developed into practically the form of a work of reference of exceptional value to every one interested in the use or fabrication of steel which is used in the manufacture of machinery.

General Electric Company, Schenectady, N. Y., has issued Bulletins Nos. A4121, A4123, A4127 and A4129. The first is a revision of its bulletin on direct-current motors of the commutating-pole design. The next describes its automatic voltage regulators for the regulation of generation voltage, which are made for use with both alternating and direct current. The third describes its straight and automatic air-brake equipment designed for use on either single cars or trains of three or more. The last illustrates and describes in considerable detail its small feeder voltage regulator, which is of the pole type and is built for use on single-phase feeders only. It is made in two designs, one for outdoor installation and automatically operated and the other for hand operation and to be installed indoors only.

Electric Service Supplies Company, Philadelphia, Pa., has issued a new supplement to Catalog 4, Volume 2, listing, describing and illustrating many new devices recently placed on the market. This new supplement catalog contains the first complete listing ever published of Imperial luminous arc head lights and parts and a full listing and description of Keystone car destination signs. Other new devices listed are the new International coin registers, Keystone vacuum sanders, Keystone pneumatic gong-ringing devices, Keystone trolley pick-ups, Union standard trolleys, sanitary hand strap covers, Keystone cord connectors, Garton-Danils lightning arresters, automotoneers, Keystone motorman's seats, Keystone lamp guards, Keystone air valves and many other devices which make it of great interest to operating men. The 172 pages contained in this book are beautifully bound in cloth. This book may be had by operating men whose requests may be sent to any of this company's offices.

Street Railway Extensions for Chicago in 1913

The local transportation committee of the City Council of Chicago, Ill., has agreed on the location of the extensions to the street railway lines for 1913, and the Chicago City Railway and the Chicago Railways have been instructed to build the following extensions: Chicago Railways Company, Western Avenue, from Lawrence Avenue to Bryn Mawr Avenue; Armitage Avenue, from Forty-eighth Avenue to Grant Avenue; Belmont Avenue, from Milwaukee Avenue to Fortieth Avenue; Division Street, from Grand Avenue to Forty-eighth Avenue. In addition to these extensions this company has already been ordered to build the following lines: Elston Avenue, from Lawrence Avenue to Montrose Avenue; Harrison Street, from Forty-eighth Avenue to Sixtieth Avenue; Fullerton Avenue, from Fortieth Avenue to Forty-eighth Avenue. All of these extensions to the Chicago Railways Company total approximately 12.4 miles of single track. Under the 1907 ordinance requirement, the Chicago Railways Company also is required to build the following extensions: Ashland Avenue, from Belmont Avenue to Fullerton Avenue, 2 miles in length; Armitage Avenue, from Milwaukee Avenue to Elston Avenue, 2.4 miles in length, and Milwaukee Avenue, from Lawrence Avenue to the city limits, 6 miles in length.

The Chicago City Railway has been instructed to build the following extensions this year: Forty-third Street, from Ashland Avenue to Kedzie Avenue, and Robey Street, from Forty-seventh Street to Sixty-third Street, a total distance of 8 miles of single track. In addition to these the Chicago City Railway is required to build an extension on Forty-seventh Street, from Kedzie Avenue to Archer Avenue, a distance of 1 mile. The total mileage represented in the foregoing extensions is 33.8 miles of single track.

In addition to this construction work considerable rehabilitation of existing tracks will be undertaken this year by both companies.

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COMMISSION APPOINTMENTS IN NEW YORK

Charles J. Chase may be a most competent man at the engine throttle and William E. Leffingwell a most genial hotel proprietor and worker in village politics, but just why these excellent qualities per se should entitle their possessors to appointments on the Public Service Commission of the Second District is beyond our comprehension. Admitting that the last Democratic convention favored "the appointment of a practical railroad man" on the commission, we insist that if mere words are to be considered a track inspector might as well have been chosen for a practical railroad man as a locomotive engineer. Remedial and constructive rulings always require a common-sense liberal interpretation of the intent of the makers, and we believe that the words "railroad man" connote a man who has a wider business knowledge and breadth of mental activities than one who has lived his life in the cab. If either of the gentlemen appointed have any evidence of other qualifications for the high responsibilities that attach to the office they have been designated to fill, it is a safe assumption that Governor Sulzer would have mentioned them. A good public service commissioner must have more than a narrow technical experience or a capacity for leading local politics. He must be at once a man thoroughly versed in transportation and public utility problems, an economist, a financier. Indeed, public service commission work, properly conducted, requires the services of the brainiest and broadest-minded men of the community. We admit, of course, that a man properly qualified by nature might grow into a fitness for the position after appointment, but the commission is not and should never be a training school. The very essense of the success of that body means the putting of all complex and delicate questions involving the conduct of public utilities into the hands of men who are first, last, and all the time thoroughly competent to deal with them. These appointments have not yet been confirmed by the Senate, but whether they are confirmed or not, the making of them is a blow at the heretofore existing confidence of the public in the competency and ability of the whole commission.

ARE MODERN CARS TOO LARGE?

One of the many interesting questions brought up by the multiple-unit train tests in Newark, the results of which were published two weeks ago, is that of the most profitable size of car. The tests have shown conclusively that, as the capacity of the unit increases, whether it is a single car or a two-car train, the number of stops increases also, not in direct proportion, but in accordance with a law which is surprisingly well defined when it is expressed as a curve. This curve will naturally vary somewhat according to the character of service on the line under consideration, but its general form is probably the same for all lines and classes of service. Hence it is obvious that an increase in the number of stops, especially where this is already high, and where there is no chance to make up time between stops, is bound to affect the schedule detrimentally. Eventually, the size of the car or train unit will reach a point where a further increase in size will make comparatively little difference, as, for instance, where stops are made at every corner; but this point, as shown by the tests, is considerably beyond any capacity of the car or train which has received any consideration up to the present time. On the other hand, the increase in the number of stops per mile caused by an increase in capacity of a very small unit, such as a twenty-passenger car, is of serious proportions, and it is evident that an appreciable slowing down of schedules must have accompanied the change from the old single-truck 20-ft. electric car to the modern double-truck equipment with seats for fifty or more passengers. The exact extent of this general decrease in schedule speed is necessarily obscure, yet its presence is a matter well worthy of the most careful study, for it is certain that slower schedules mean higher operating costs in almost exactly inverse proportion.

CAR DEFECT REPEATERS

On some roads which are too small to afford a shop clerk the master mechanic is just about as keen to keep car records as the average auditor is to pack a journal box. He will not deny the worth of such data, but he does feel that pen and pit are too much of a combination for the same man. So from day to day he may tinker with car defects, but he will make no great effort to cure them unless his memory is good enough to catch what the shop man calls "repeaters," namely, those troubles which recur again and again despite renewals. To be sure, it is perhaps unreasonable to expect a ten-car or twenty-car railway to keep the mileage of a dozen items, yet a great deal of

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good will be obtained from a simple diary of every car. This fact was proved lately on a line where four cars of new type had been paying daily visits to the shop at an upkeep cost of 2½ cents per mile run. The first master mechanic had kept no records but had merely put in new parts as fast as the old ones failed. His successor, however, began to keep a log of all defects, one card being used for each car. In very short order he saw that one car was giving far more trouble from damaged brushes than any of the others. At first the brushes were replaced without thought, but the rapid returns of this car to the shop, as exposed by the record, forced a search for the cause of the evil. It was simply too much play in the brush holders. Grounded headlight resistances were found to be common on all of the cars, but this trouble was also rooted out as soon as it was found that the resistances needed shields to protect them from splashing water. Half a dozen other repeaters were detected, analyzed and removed by means of this simple record. It is likely that from now on the cost of repairs on that road will be far less than when the cars were new.

THE ILLINOIS PUBLIC UTILITY LAW

The Illinois public utility law, to which we briefly alluded in our news notes last week, illustrates the cumulative effect of the spirit of regulation which has prevailed in the country during the last few years. It aims to give power to regulate and to surround that power with various protective measures which shall make it easy for the regulators to regulate and hard for the regulated to object to any act which inexperienced commissioners may do.

In many of its essentials the law follows both the form and the spirit of older laws in other states whose influence has been wholesome, but in some respects it permits a course of action which under the guiding hand of a political or ultra-radical commission may nullify the desire which should exist in a state to upbuild and protect the utility properties.

Section 8 provides that the commission "shall inquire into the management of the business" of all public utilities. We had thought in our ignorance that the management of the business was the affair of those who owned it, provided they conducted it with due regard to the law and the rights, safety and comfort of customers, and that state interference should take place only when these fair methods of operation were not observed. The new commission will have an opportunity to interpret the power given to it, and we hope that it will do so in such a way so as to avoid undue interference with the development of business. We also trust that its "management" of the properties will be such that the managers who are really responsible will not have to dissipate their time by unnecessary attendance at commission hearings or be involved in wasteful expenditures for letters and reports to the commission.

Section 9 says that whenever required by the commission every public utility shall deliver to the commission inventories of its property. This clause wisely leaves action to the discretion of the commission. Few companies have inventories and those that have not prepared any can get them ready only by a material expenditure of time and money. This section should be read in connection with the reference to physical valuation in the part of the law which relates to the approval of new security issues. Under that section the commission, when it deems necessary, shall make an "adequate physical valuation of all property." Likewise we find in Section 22 a stipulation that in cases of reorganization the capitalization authorized by the commission "shall not exceed the fair value of the property involved." There is a broader, but less definite, reference to valuation in Section 30, which deals specifically with this subject. The commission receives power "to ascertain the value of the property of every public utility * * * and every fact which in its judgment may or does have any bearing on such value." The intent is, therefore, to give the commission full leeway to determine what, in its opinion, value comprises and the extent to which different elements constituting total value may be taken into consideration. In other words, what the law does not do specifically it puts within the power of the commission to do, as the judgment of the commissioners dictates. There is more room for justice in this section than in the restriction to physical valuation imposed by the section bearing upon security issues.

In Section 29 the disappointed home-rule advocates in Chicago find ground for complaint. This states that no contract or agreement with reference to franchises shall be valid unless it shall have been approved by the commission. Thus the state strengthens its potential control over matters in the cities.

The clause exempting municipally owned or operated utilities from the jurisdiction of the commission is of itself an unjustifiable piece of legislation; but it does not receive the full force of the injustice with which it should be credited until it is read in conjunction with the bill passed by the same Legislature authorizing cities to acquire, construct, own and to lease or operate public utilities and to provide the means therefor. In other words, cities are encouraged to embark on this uncertain field and have an additional spur by the promised exemption from the regulation to which the private utility is subject.

Among other clauses in the law we find that a known false statement in a stock or bond proceeding may constitute a felony on the part of the unfortunate individual, punishable by imprisonment, and that other similar penalties may be exacted for other acts of omission or commission. This is not the first injection of a provision for criminal punishment in a state public utility law, but it shows the extremes to which the country has passed.

The law provides for the identification of all securities issued with the approval of the commission. It may be difficult to keep this device from tending to operate to the disadvantage of that part of the securities of a utility which came into being before the commission entered office. Lest it should be thought that the stamp of approval of the state on securities passed by the commission constitutes an evidence of value the law includes a sweeping disclaimer to the effect that the acts of the commission shall not be held to mean that past and future issues represent actual value of property owned or to be owned by a public utility or the value of such property for rate-making purposes. We think

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that the state, notwithstanding its disclaimer, cannot escape a moral responsibility in the matter.

Several other clauses should be mentioned, such as the provision that the commission may order physical track connection between street railroads; that every accident causing the loss of life or limb to any person shall be communicated immediately to the commission by the speediest means, which of course is the telephone and will involve heavy expense unless modified; that any complaint may be made by any person, whether responsible or irresponsible; and the apparently far-reaching stipulation that the commission shall have power to examine books, etc., of construction or other companies or of firms or individuals with whom the utility shall have had financial transactions.

When we say that the law outlines the procedure in case of court review we do not state all the facts; for it stipulates that no new or additional evidence may be introduced in any proceeding, but the appeal shall be heard on the record of the commission and the findings and conclusions of the commission on questions of fact shall be held *prima facie* to be true; and that furthermore a rule, regulation, order or decision shall not be set aside unless it clearly appears that the finding of the commission was against the manifest weight of the evidence, or that the matter was without the jurisdiction of the commission. If legal, this will be a great advantage to the commission in any court proceedings.

We believe firmly in a wise policy of regulation, but hold that both the law and the administration thereof should be reasonable.

TROLLEY LINES FOR WESTERN MASSACHUSETTS

An act recently passed in Massachusetts, which is of supreme interest to the people of the western part of the State, provides for the unification of the electric lines in the State under the control of the New York, New Haven & Hartford Railroad, and the expenditure by this line of $5,000,000 for the building of new trolley lines and extensions to existing lines. The prompt and decisive passing of this bill over the veto of Governor Foss is quite indicative of the fight the hill-town people have been making, for its passage is simply the culmination of several years' work in electing legislators pledged to its support. The trolley question is an all-important one to the so-called five western counties, for in these, comprising an area of 4450 square miles, there are thirty-three towns with neither steam nor electric lines of any sort. According to Leonard Hardy, these towns have lost 50 per cent of their population since 1820, and intercourse, high-school transfer facilities and general prosperity have all suffered. Notwithstanding these facts, Governor Foss vetoed the bill on the ground that instead of providing merely for the needs of western Massachusetts the measure also gives a monopoly of the transportation throughout the center of the State, and that the $5,000,000 appropriated will not build the mileage specified in the act.

We believe that at least the $5,000,000 can be spent in a profitable manner, and central Massachusetts also can well utilize additional trolley lines. On the point of monopoly the power of the Railroad Commission is worth noticing. Besides the usual regulatory power, the commission is authorized to determine the cost of construction and maintenance of the roads, to decide what lines and extensions shall be built, and, if the commission is satisfied that the railroad is financially unable to make the improvements, the law becomes inoperative. If the company fails to construct the lines, it must forfeit a bond of $2,000,000.

From such facts we are led to conclude that the commission has sufficient power to see that the law is carried out by the New York, New Haven & Hartford Railroad along the channels desired, and we hope soon to see the completion of the proposed electric roads, opening up the central and western territory for improved farming and summer vacation land, and in general so quickening the whole territory that even the most hazardous line will soon pass into the actual profit-making class.

SIGNS AND FINES

Lack of legible and definite destination signs on the cars was the reason given by the Supreme Court, Appellate Term, New York, for the award, on July 5, of $50 to a passenger who had sued for the statutory penalty for the refusal of a transfer. On the route in question only two classes of cars are operated in each direction. The complainant thought that he was on a through car and therefore did not comply with the company's rule that even a continuing-trip transfer must be requested on paying fare. On learning that he was on a shuttle car he asked for such a transfer, but it was refused. The court admitted that the company's regulation as to the time of issuing transfers was reasonable, but held that the passenger was justified in his contention that the sign on the car was too inconspicuous at night. The destination indicator on this particular line is a block sign only 4 in. deep, and the lettering, of course, is still smaller. Although the sign is suspended from the front of the hood, it is not illuminated. It is almost necessary on this line, therefore, for the experienced passenger to signal the first car that comes along on this line, and, if it is the wrong car, to let it proceed, thereby putting the company to the delay and expense of an unnecessary stop. On the other hand, the chances are about even that the novice will board the wrong car and remain unconscious of his mistake until he is ordered more or less politely to get out.

We believe that the matter of car signs is very much neglected in this country, largely because their importance is underestimated. The elaborate European "story" signs are hardly necessary here, but better signs could usually be added to advantage. One company whose practice on signs is worthy of commendation is the Philadelphia Rapid Transit Company. The combinations of route and destination signs used in that city embody the best features of European practice and really improve on them, as the signs are not cumbersome and are placed to greater advantage. The consequence of this wise policy is that the stranger who desires to go to a certain suburb, say Darby, after he has left the West Philadelphia station of the Pennsylvania Railroad, will recognize his car at once and by the aid of street signs will be able to go to the very spot where his car will stop.

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Power-Generating Equipment on the Cleveland, Painesville & Eastern Railroad

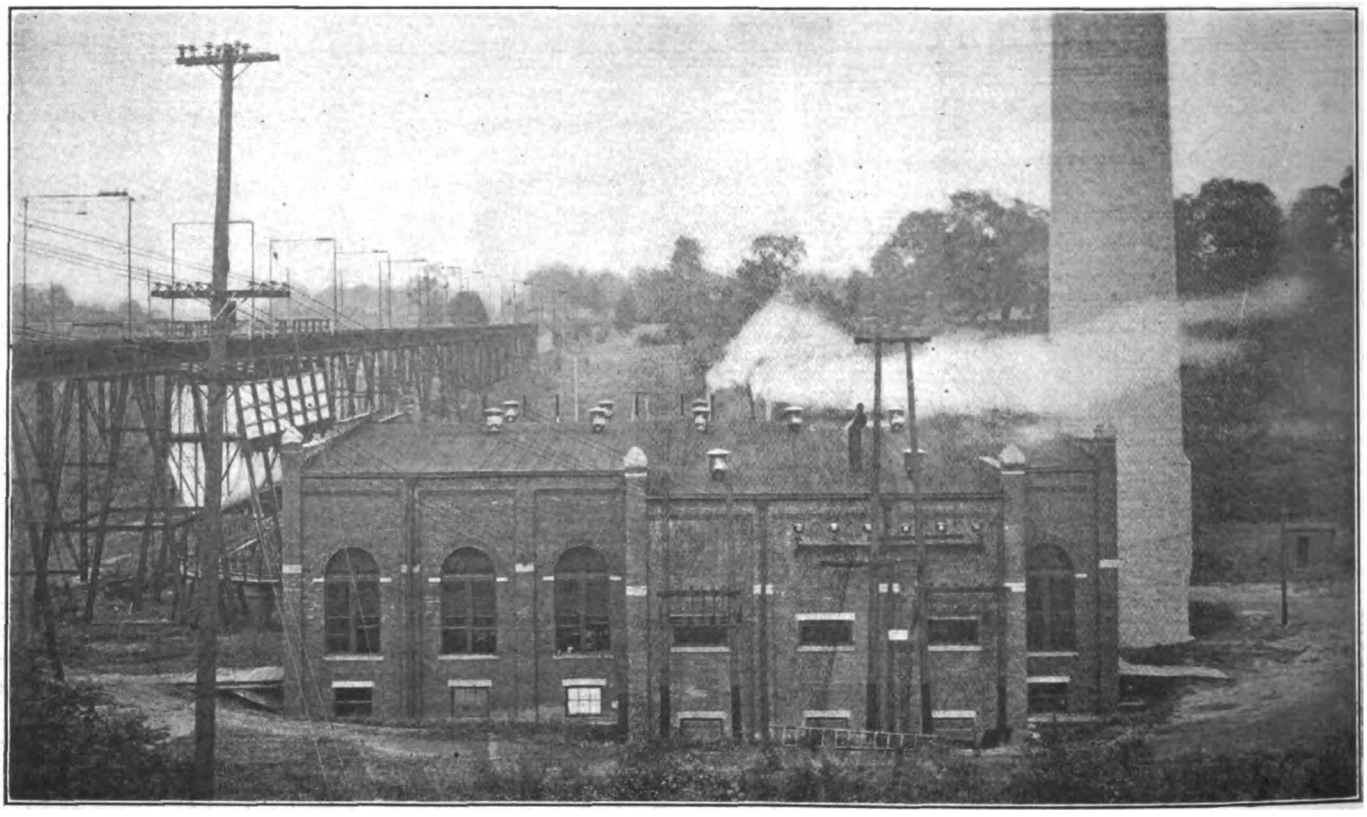
This System, Which Has Recently Consolidated Its Power Plants Into a Single Large Station Possessing Many Novel Features, Supplies Electric Power for Lighting and Industrial Service in Addition to That Required by Its Cars—Electric Current Is Distributed to Substations Equipped with Both Rotary Converters and Frequency Changes

A tendency toward the development of a broader field has of late been reported to exist among interurban electric railways. Following along this line, the Cleveland, Painesville & Eastern Railroad has adopted the policy of entering the lighting field in the towns traversed by its lines, as the company believes that the benefits gained by the recent consolidation of its plants in the railway field may be extended to the other branches of public service.

The town of Willoughby, Ohio, where the company's headquarters are located, has a municipally-owned plant and current is bought by it from the railway company at the switchboard. Power in large quantities, however, is sold directly to the user by the railway company. From Willoughby lighting lines are extended to Wickliffe on the west and Mentor on the east. From a substation in Painesville will be fed the towns of Perry, Richmond and Fairport, and the Geneva substation will supply Madison, Unionville and Saybrook, the average run being about 8 miles on each side of the generating plant or substation.

The company has been in the lighting business for only eighteen months and already has secured loads of over 250 kw in the towns of Willoughby and Mentor, and this without making any extensive campaign for lighting business. It is now negotiating with several municipalities for pumping their water supply and has excellent prospects of securing some good business along these lines.

The rate charged for lighting is 11 cents per kw-hr., less 2 cents discount if paid on or before the tenth of the month. Power rates are based on a sliding scale depending on the load factor. They vary from 5 cents per kw-hr. to 1¾ cents per kw-hr., with a guaranteed minimum of $1 per month per hp of connected load. Another schedule in force makes use of a maximum demand meter, with the same rates for installations over 50 hp in capacity, in which case the customer furnishes the transformer equipment and buys energy on the high-tension side at 2200 volts.



C., P. & E. Power—View of Power House, Showing Coal Bunker Under Main Line Trestle

The company has not entered into an active campaign for domestic appliances as yet, though a great many are in use on its lines, believing it best to develop the territory and secure customers before making a campaign of business development. The entire railway traverses a well-populated, fertile country, abounding in agricultural and dairy products and having great natural beauty. About 40,000 people are located in the territory served by the line.

POWER STATION

The power house is located in the town of Painesville, Ohio, on the banks of Grand River. It consists of a main building approximately 97 ft. x 105 ft. and an annex 42 ft. x 21 ft. The chimney is of Custodis radial brick 200 ft. in height and 13 ft. in inside diameter, built to take care of an ample increase in boiler capacity.

Coal is obtained over the tracks of the Lake Shore & Michigan Southern Railroad, and the method of handling it is one of the most unique features of the station. A

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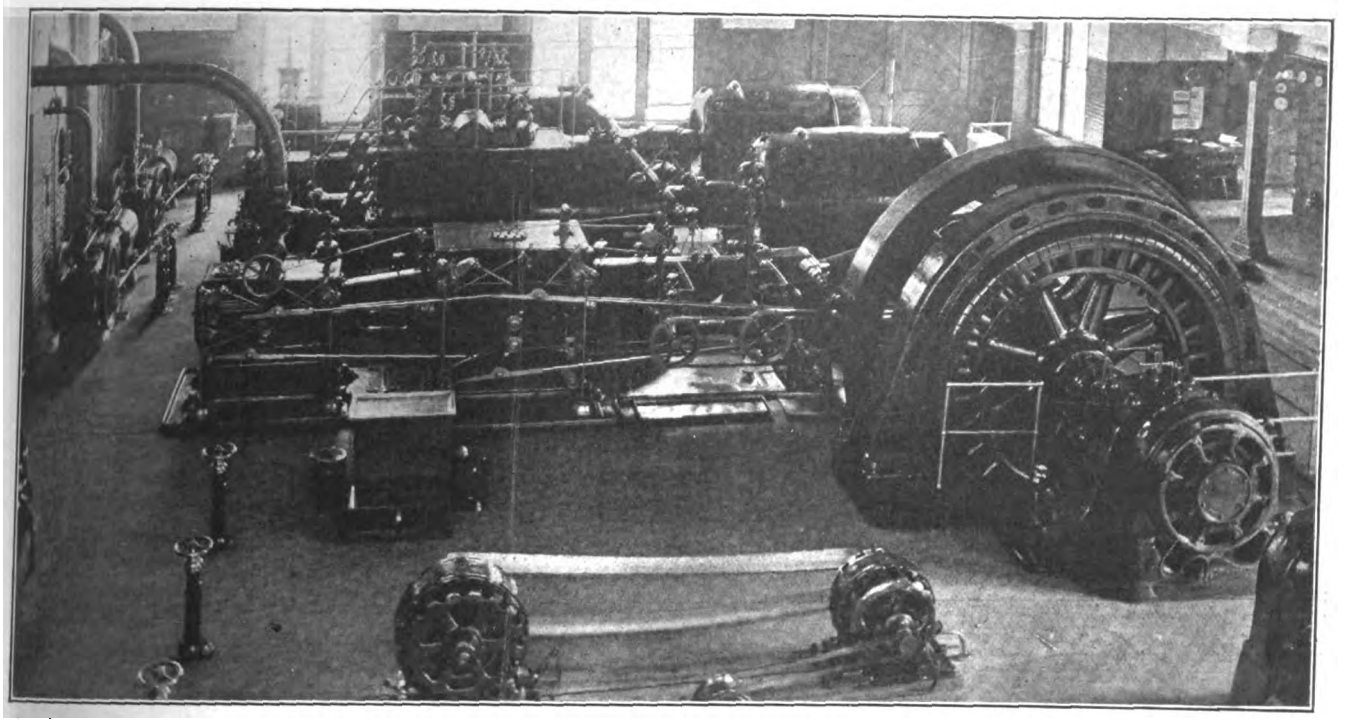
steel hopper with a capacity of 500 tons which receives coal direct from railroad cars is built into the trestle over which pass the tracks of the electric railway. The railroad car containing the coal is taken out on the trestle between the scheduled times for the interurban cars by a home-made electric locomotive, and the coal is dumped direct into the hopper, the entire unloading being accomplished in a period of about ten minutes. The hopper has sufficient capacity for approximately ten days' supply.

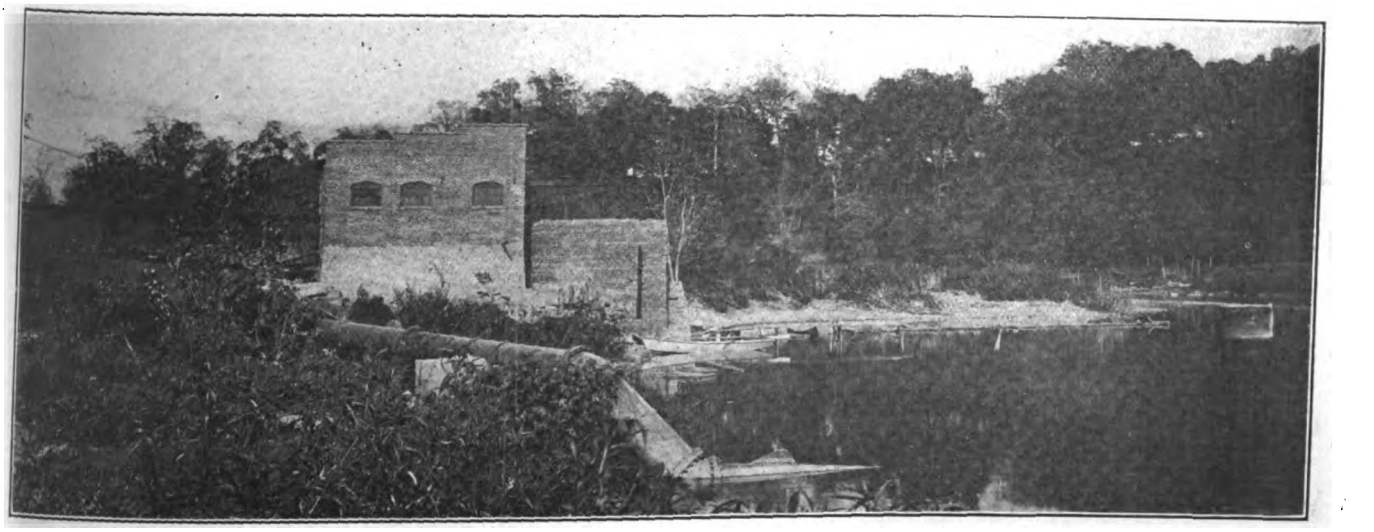
The locomotive, shown in the upper illustration on page 97, was made in the company's shops at Willoughby. It is weighted down with steel punchings from the shop and is equipped with two 50-hp motors and automatic air brakes. It will haul two gondola cars of coal at each trip and obviates the necessity of sending a work car and its crew from the carhouse at Willoughby whenever it is desired to unload coal.

From the hopper the coal falls by gravity into cars running on a track beneath, which is seen in the illustration. These run into the boiler room upon an elevated track located above the stoker hoppers as shown. Here it is dropped direct into the stokers as required. The average coal consumption is about 40 tons a day.

The ashes drop into brick-lined steel hoppers equipped with Hunt gate valves of the same type as those used for the coal. The ash tunnel is located directly under the furnaces, and ash cars run from there to an elevator, where they are hoisted to an outside track. The ashes are used for filling in the low ground adjacent to the power house. The ash cars are interchangeable with those used for hauling the coal, and it is proposed to extend the elevator at the end of the ash tunnel over the railroad tracks so as to enable the ashes to be raised and dumped directly into ballast cars.



C., P. & E. Power—Interior View of Engine and Turbine Room



C., P. & E. Power—Pump House, Intake Well and Discharge Line

BOILERS, PUMPS AND CONDENSERS

The boiler plant consists of three batteries of two 166-hp Stirling boilers, aggregating 2200 hp in capacity.

Cooling water for the surface condensers is taken from the Grand River, and the siphon circulating system used possesses some novel features. A pump house is located on the banks of the river approximately 350 ft. from the power house. It is a brick building with dimensions ap-

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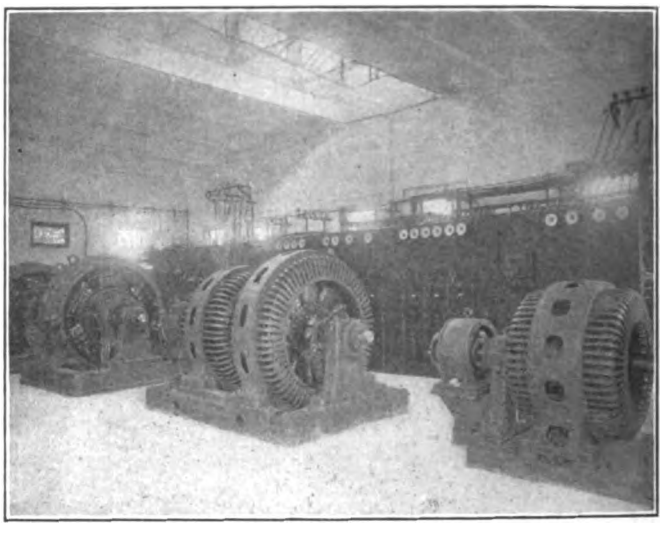
proximately 26 ft. x 17 ft., and, owing to its proximity to the river bank it was found impossible to secure even a clay foundation on which to build it. Consequently it was constructed in the form of a reinforced concrete basket set on concrete piling.

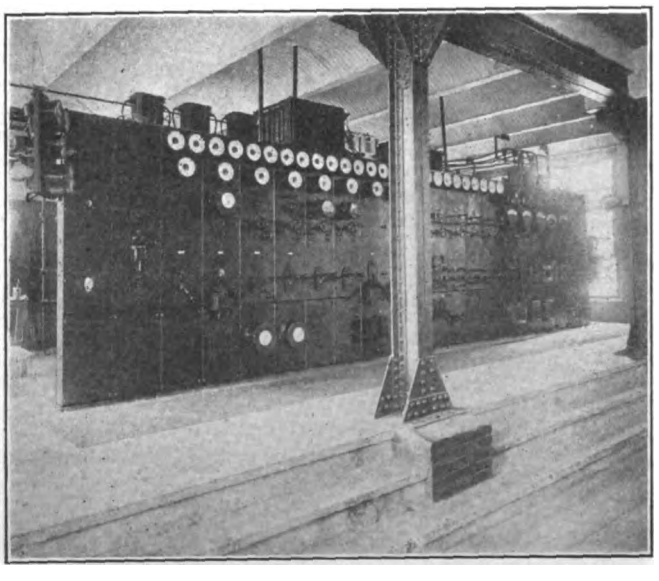
In order to secure an uninterrupted supply of circulating water free from all débris, a concrete intake box having two sets of screens was sunk near the edge of the main

C., P. & E. Power—Exterior View of Willoughby Substation, Showing Cable Racks at Front of Building

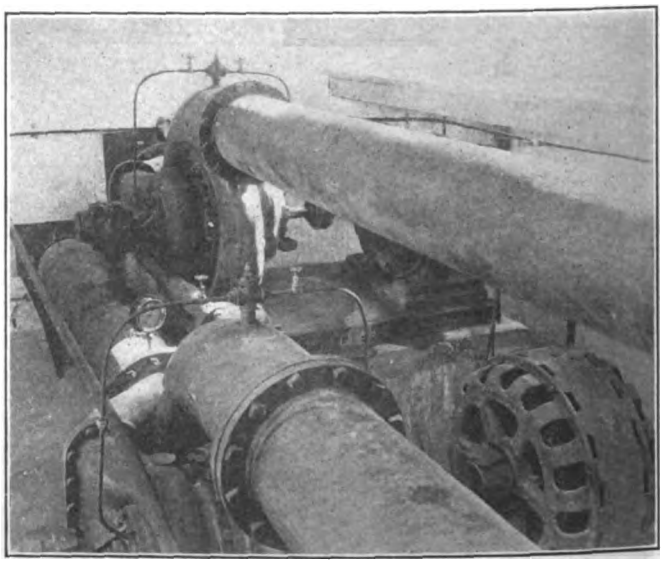


C., P. & E. Power—Interior View of Willoughby Substation, Showing Rotary Converters and Frequency Changers

channel of the river. The upper portion of the box is covered with a perforated caisson built of boiler plate and having a screen bolted to the top so that even when flood waters completely cover the intake clean water can be secured. The intake box is connected with a 24-ft. storage well just outside of the pump house by a 48-in. tiling some 80 ft. in length. The water before entering the well passes through another box equipped with double screens, and it has been found that an ample supply of clean water is



C., P. & E. Power—Main Switchboard in Power House



C., P. & E. Power—Interior of Pump House

assured without the use of the twin strainers or similar appliances usually introduced in circulating lines.

The pumping equipment consists of two 14-in. centrifugal pumps, each having a capacity of 500 gal. per minute and driven by a 50-hp, 440-volt induction motor. These motors are controlled entirely from the power house, although air-break switches are installed at the pump house for use in case of emergency. It is unnecessary, therefore, for anyone to visit the pump house except for purposes of inspection.

Each pump has a separate suction pipe to the well, but they both discharge into a single 20-in. main leading to the power house. The various condensers receive water from this single main and discharge it into another single 20-in. main which leads back to the river, making a completely closed siphon circuit. These pipes are cast iron, having flanged joints, and they are laid in a 6-ft. concrete tunnel extending from the power house to within 75 ft. of the pump house. Gate valves operated from the turbine floor control the supply and discharge lines to each condenser, so that any condenser may be taken off the line for purposes of inspection or repair without breaking the siphon effect of the circulating system. At the same time these permit regulation of the amount of water used in the condensers under various operating conditions. A combination wet and dry pump is installed to start the system if for any reason it should lose the vacuum in the siphon. The discharge pipe to the river is provided with a Y connection which it is proposed to tap with a pipe and thus provide a supply of warm water to get rid of any needle ice which may gather at the intake in the winter.

Owing to the fact that the system embraces a siphon, the motor-driven pumps have only to overcome the friction

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of the complete circulating system, thus calling for considerably less expenditure of energy than if they had to work against the entire head. A steam-driven centrifugal pump is also installed at the pump house for cleaning out the well, and a telephone line between the pump house and the power house affords a ready means of communication when anyone has occasion to visit the pump house for purposes of inspection.

PIPING AND TESTS

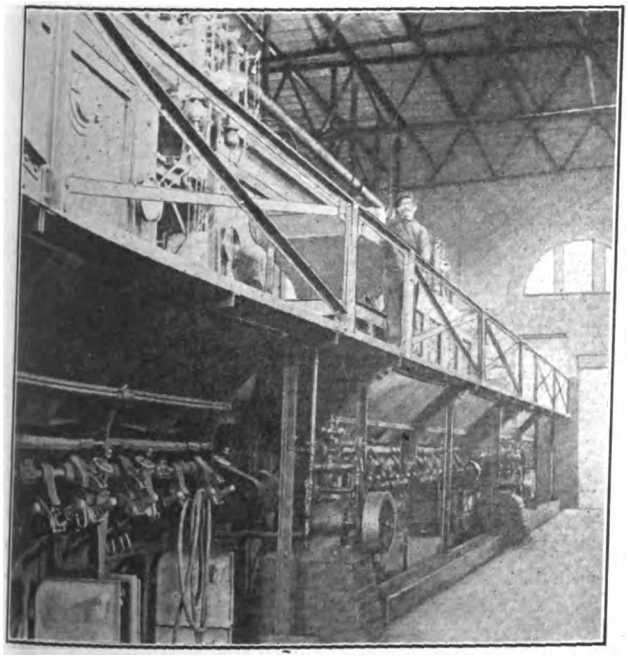
All of the valves used in connection with the engine, turbines and condenser equipment are controlled from the engine-room floor, so that the engineer does not have to leave the floor but can control all machinery therefrom.

Great importance is attached to the value of tests and one is being run all the time to ascertain just what is being done and what results are secured. Accurate records are kept of coal, water and ash, so that the operating efficiency can be computed at any time. A water meter accurately measures the boiler-feed water, the ashes are weighed, and the percentage of ash in the coal is obtained. The total operating force consists of eleven men working in two twelve-hour shifts.

The scheme of painting the piping around the station in different colors greatly facilitates the work of the employees, as one can tell at a glance just what the pipe is carrying. Live steam is indicated by green, exhaust steam by brown, hot water by red, cold water by black. The engine room walls are painted white with a green border.

ELECTRICAL EQUIPMENT

The generating equipment formerly consisted of two 360-kva, twenty-five cycle G. E. generators, direct-connected to two 18-in. x 36-in. x 42-in. Cooper Corliss engines delivering current at 6600 volts. The natural increase in load, however, and that due to extensions and other business secured, required additional station capacity, and the following apparatus was installed in 1912: Two 1670-kva, twenty-five cycle, 1500-r.p.m., 6600-volt Westinghouse

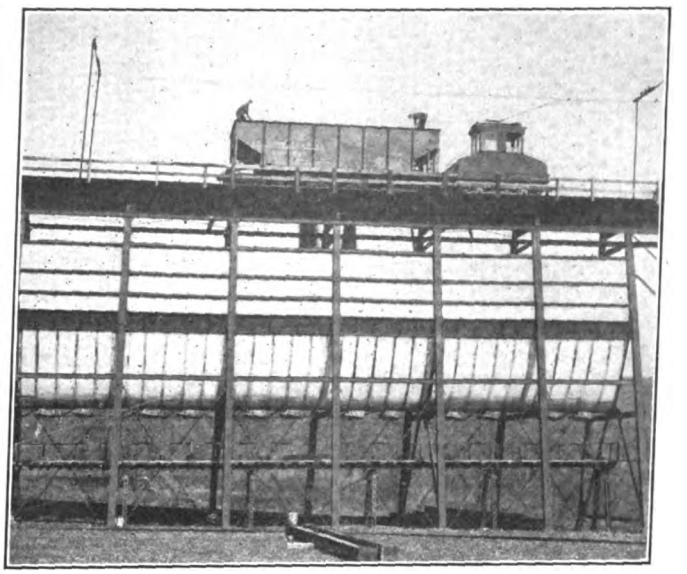


C., P. & E. Power—View of Boiler Room, Showing Push Car Bringing in Coal from Outside Bunker

turbo-generators and two 50-kw, 125-volt turbo-exciter sets, together with a twenty-two-panel switchboard.

The switchboard is located on a raised portion of the floor overlooking the remainder of the engine room. A swinging bracket at the end contains two voltmeters, a frequency meter and a synchroscope. Each generator panel is equipped with an ammeter, a voltmeter, power-factor meter, watt-hour meter, field rheostats and non-automatic oil switches. The high-tension feeder panels are equipped each with three ammeters, a watt-hour meter, an automatic oil switch and relays. Four panels are devoted to the control of the exciters with the usual equipment of ammeters, voltmeters, rheostats and knife switches.

A substation, consisting of two 360-kva, 600-volt d.c. rotary converters and a portion of the main switchboard devoted to their control, is located in the power house.



C., P. & E. Power—Coal Bunker Built Into Main Line Trestle

An interesting point in connection with the switchboard is the use of the 7-in. dial meters, which effect a great saving of space and yet do not sacrifice other essential features, such as accuracy or readability.

The main transformers are arranged in two banks, each having three 500-kva units, located in the basement. They step up the voltage from 6600 to 13,200 for transmission to the other substations at Willoughby, Geneva and Ashtabula. At some later date, however, the transmission voltage will be raised to 22,000.

WILLOUGHBY SUBSTATION

The exterior of the substation at Willoughby is shown in the illustration on page 95, and the method of bringing out the low-tension wires is indicated very clearly. The three-phase high-tension line is brought in at the rear of the building.

The transformers are in the basement, to which the high-tension lines run directly after passing through electrolytic lightning arresters and disconnecting switches, which are in a small annex on the side of the building where the high-tension lines enter.

The transformer equipment consists of three 115-kva, 2200-volt, twenty-five-cycle units for the frequency changers described below, and six 175-kva, 460-volt, twenty-five-cycle units for the rotary converters. These transformers are mounted on truck platforms, on concrete foundations, so that they can easily be moved for purposes of inspection or repair. Three 5-kw, 2200-volt to 440-volt transformers are also installed here for the motor-driven exciters. The field rheostats for the various machines in the substation are all installed on pipe framework in the basement.

Direct current for the operation of the road is obtained through one 300-kw and one 500-kw, six-phase, 600-volt, twenty-five-cycle rotary converter. Each rotary is equipped with an end-play device. For supplying lighting service to Willoughby and the neighboring towns the frequency is changed to sixty cycles by means of two motor generators. One of these sets consists of a 290-hp, 2200-volt, twenty-five-cycle, three-phase synchronous motor, direct-connected to and mounted on the same base with a 250-kva, 2300-volt,

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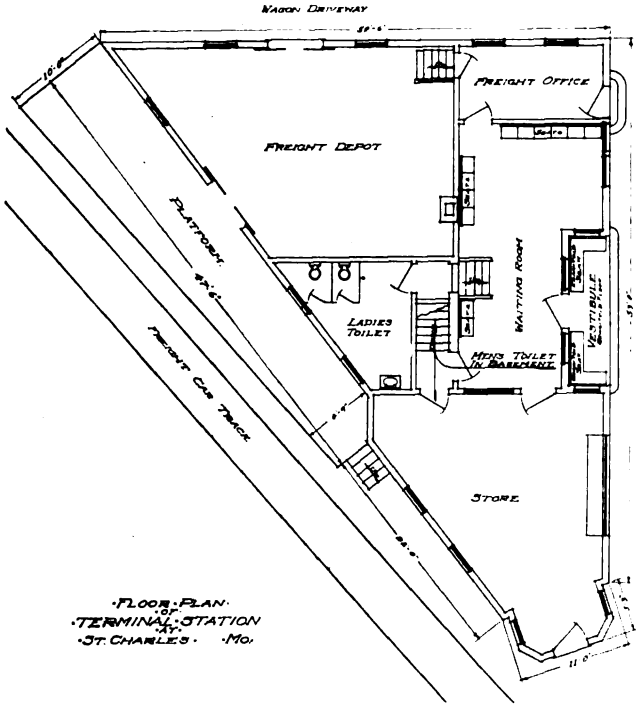
sixty-two-and-one-half-cycle, three-phase generator with a 6-kw, 125-volt exciter mounted at the end. The speed of the set is 750 r.p.m. The second set consists of a 112-hp motor, a 94-kva generator and a 5-kw exciter, the other characteristics being the same as those of the first set. A motor-generator set consisting of a 15-hp, 440-volt, three-phase, twenty-five-cycle induction motor and a 10-kw, 125-volt d.c. generator, running at 1400 r.p.m., is used to furnish excitation for the synchronous motor fields.

All of the apparatus installed throughout the main stations and substations, including the turbines, rotaries, motor-generator sets, switchboards, transformers and lightning arresters, was furnished by the Westinghouse Electric & Manufacturing Company.

OTHER SUBSTATIONS

The equipment of the substation at the Painesville power house will be increased in the near future by the addition of a 500-kw frequency-changer for lighting and power



At present the frequency changing equipment consists of a 75-kw, 2200-volt, sixty-cycle generator direct-connected to a 100-hp motor.

The Geneva substation is equipped with two 300-kw G. E. rotary converters. This station is now being enlarged to accommodate one 250-kw and one 150-kw frequency-changer, built by the General Electric Company. The general arrangement of this station will be similar to that of the Willoughby substation. At Geneva there is installed a 600-kw rotary converter and the same lighting equipment and general arrangement as described for Willoughby. At Ashtabula there is a 300-kw rotary for the railroad, but as yet no lighting equipment has been installed.

ENGINEERING

All of the engineering and construction work involved in the installation and operation of the above-mentioned apparatus has been installed under the direction of J. G. Swain, superintendent of power and shops.

The Bureau of Foreign and Domestic Commerce, Washington, D. C., has received from Commercial Agent D. C. Alexander, Jr., a report on street railways and electric lighting in China, which deals chiefly with the financial features of concessions and enterprises. The report will be loaned to interested persons or firms making application to the bureau.

NEW WAITING STATION AT ST. CHARLES, MO.

A new building of novel arrangement containing a waiting station for passengers and a freight station for the express company has recently been completed by the United Railways Company of St. Louis at St. Charles, Mo., a city of 10,000 inhabitants located on the north bank of the Missouri River, 13 miles from the city limits of St. Louis. This is the western terminus of the Missouri Electric Railroad Company, a subsidiary of the United Railways Company of St. Louis.

The building is triangular in shape, being 53 ft. in length along the Third Street side and extending 50 ft. back from this street. It faces the western end of the highway bridge across the Missouri River, and the track crossing the bridge divides as it approaches the waiting station into a switch for passenger cars on the street side of the building and a switch for the express cars at the rear of the building.

The structure is covered with white Portland cement

St. Charles Terminal—Plan Showing General Arrangement—Front View of Building

plaster laid on metal lath, and it includes a store, waiting rooms, express station and office, as well as the necessary conveniences for the public. A steam-heating plant is located in the basement beneath the express station, and the building is electrically lighted, ornamental lamps being placed under the eaves and around the tower. The total cost, exclusive of tracks for passenger and express cars, was about $7,000.

CONVENTION EXHIBIT HALL PLANS

The American Electric Railway Manufacturers' Association has found it necessary to rearrange the original floor plan of the main building on Young's Million Dollar Pier for the American Electric Railway Association convention in October on account of the large amount of space which has been applied for. This includes a rearrangement of both the exhibit and reception portions of the building. The exhibit committee is now arranging for many new and novel features for decorating this reception space and intends to make it more attractive and inviting than any previous convention. It is planned by the committee to hold practically all entertainments in the buildings on the pier as the rearrangement of the booths will provide a very considerable area which can be utilized in this manner to the fullest extent.

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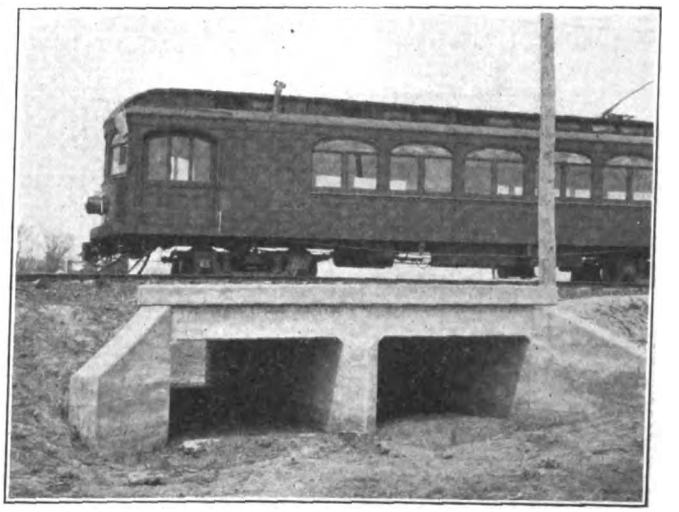
New 40-Mile Extension of the Waterloo, Cedar Falls & Northern Railway

An Account of a 600-Volt D. C. Interurban Line Recently Built in Iowa—The Design Includes Permanent Track and Roadway Structures, Well-Built Overhead Lines and Adequate Way-Station Facilities

The Waterloo-Urbana extension of the Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia., is a good example of a modern interurban electric railway. In the construction of this 40-mile section which, in all probability, will ultimately extend to Cedar Rapids, Ia., first cost has not been the governing factor, but each item entering into the road has been carefully considered with a view to reducing maintenance. In addition to providing practically all permanent structures in the roadway, adequate track facilities have been included at each way station, and passing sidings have been made sufficiently long to provide for future growth. The new line taps a fertile farming district and growing villages hitherto without rail transportation, with the exception of La Porte City, which is served by a steam railroad. Although the Waterloo-La Porte City section of this line has been in operation but a short time, traffic has developed rapidly, and this portion is now on a good paying basis.

Waterloo, Cedar Falls & Northern—Standard Flat-Top Bridge Over Cedar River



Waterloo, Cedar Falls & Northern—Standard Flat-Top Arch

ROADWAY DETAILS

The general direction of the new extension is southeasterly from Waterloo, and the entire line is constructed on private right-of-way varying in width from 100 ft. to 200 ft., dependent upon the grading and terminal facility requirements. To obtain a desirable outlet from Waterloo it was necessary to extend the belt line for a distance of 3 miles along the eastern limits of the city for through freight traffic, and one of the street railway lines serves as an entrance for passenger trains. Between Waterloo and La Porte City, a distance of 17 miles, one 6-deg. curve is the maximum, the rest being 3 deg. or less. The maximum gradient on this section of the line is 0.1 per cent. On the south end of the extension—that is, between La Porte City and Urbana, a distance of 22 miles—the maximum curvature is 5 deg. and the ruling grade is 1 per cent. This portion of the line traverses a comparatively broken country paralleling the Cedar River, and the maximum gradient is used at the point where the line leaves the river valley.

Grading on the northern section of this extension was comparatively light, but south of La Porte City the total quantity of earthwork to be moved is large. At the time of writing the grading between La Porte City and Urbana was 60 per cent completed, and the bridging, which includes a reinforced concrete arch bridge containing nine 80-ft. spans, was 85 per cent completed. All earthwork is being handled for 23 cents per cubic yard when the haul is less than 500 ft., with an addition of 1 cent per cubic yard per 100 ft. for hauls exceeding 500 ft.

The standard track and roadway design includes a 16-ft. roadbed on embankments and 24 ft. in excavation. The latter width provides for two 4-ft. ditches paralleling the cut slopes, which are 1½ to 1, except in rock, when the slopes are varied from ½ to ¼ to 1, depending on the quality of the material. For a distance of between 3 miles and 4 miles in the line between La Porte City and Brandon practically all excavation is through limestone. As soon as this section of the line is in operation the company intends to install a crushing plant to prepare ballast for the entire line.

BRIDGES AND CULVERTS

All concrete bridges and culverts were designed for Cooper's E 60-loading and the wooden trestles meet Cooper's E 50-loading requirements. The former loading is based on two 213-ton locomotives each on eight-drive wheels, followed by a 6000-lb. per lineal foot uniform train load. As these structures are permanent, it was considered advisable to design them to meet possible future requirements. All small waterways were provided with Acme nestable corrugated culvert pipes. When the opening was too large for a corrugated pipe a reinforced concrete flat-top arch was built. In a few instances where there were unstable foundation conditions and the opening was so large as to require pile foundations, ballast-deck trestles built of creosoted timber were used.

Some interest may be attached to the unit cost figures for concrete structures. Practically all the concrete bridges were built by the Gould Construction Company, of Davenport, Ia., at the following unit prices:

Furnishing and driving piles, 40 cents per lineal foot.
Dry excavation, 50 cents per cubic yard.
Wet excavation, $5 per cubic yard.
Cofferdams, $50 per 1000 ft. B. M.

The foundation specifications called for 1¼ barrels of

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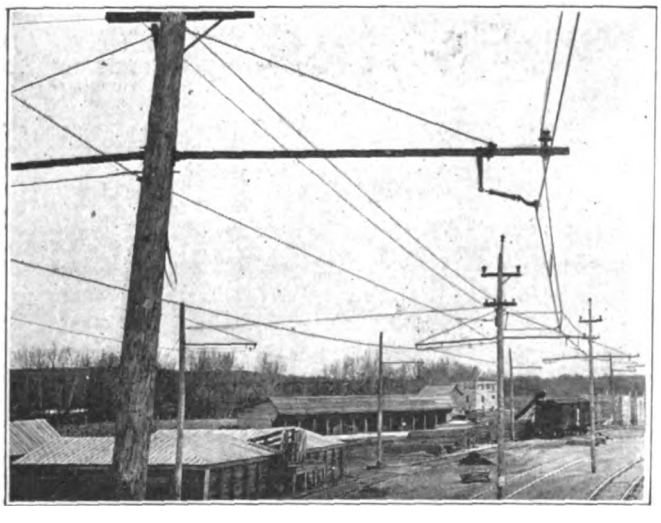
cement to each cubic yard of mixed concrete, at a unit price of $8.20 per cubic yard. The arch ring and spandrels were built of reinforced concrete in the proportions of 1¾ barrels of cement to the cubic yard of mixed concrete, for which a price of $8.90 per cubic yard was paid. The price of furnishing and placing reinforcing bars was 2½ cents per pound. All bridges and culverts were designed and built under the supervision of T. E. Rust, chief engineer Waterloo, Cedar Falls & Northern Railway. Views of two typical bridge and culvert designs are shown in the illustrations.

TRACK CONSTRUCTION

The main-line track is laid with 85-lb. A. S. C. E. rail in standard lengths with continuous joints and twin terminal compressed bonds. As is standard with this road, 6-in. x 8-in. x 8-ft. cedar ties were used, spaced seventeen to a 33-ft. rail. To insure against side shear as well as spreading gage on curves, standard tie plates will be employed at these points. Other track standards include passing sidings 2000 ft. in length, double-ended, with No. 9 turnouts in the main line. At each way station a passing track of this standard length has been built at 18-ft. centers with the main track, and industrial or other side tracks lead from it. Each turnout is provided with a high Ajax Forge Company's switchstand, set on two 6-in. x 8-in. x 12-ft. creosoted yellow pine head-blocks.

Just north of La Porte City a comprehensive interchange



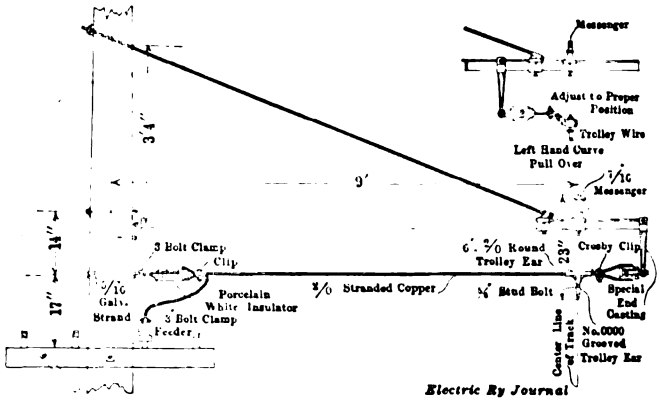
Waterloo, Cedar Falls & Northern—Catenary Construction at Sidings

track layout was installed between the main lines of the electric railway and the Chicago, Rock Island & Pacific Railroad, on the adjoining right-of-way. It was built to relieve the interchange track facilities between these roads in West Waterloo, and to serve at the same time for the reception and delivery of freight coming from the new territory tapped by the electric line south of La Porte City. This interchange layout includes two parallel storage tracks sufficient in length properly to clear fifteen cars on each, one serving as a delivery track and the other as a receiving track. Leads from both the steam and electric roads approach these two storage tracks at both ends. As mentioned in an article on the operation of this property in the Electric Railway Journal for Aug. 24, 1912, approximately all the interchange traffic between the steam railroads entering Waterloo is handled by the electric belt line, which practically surrounds the city.

OVERHEAD LINE CONSTRUCTION DETAILS

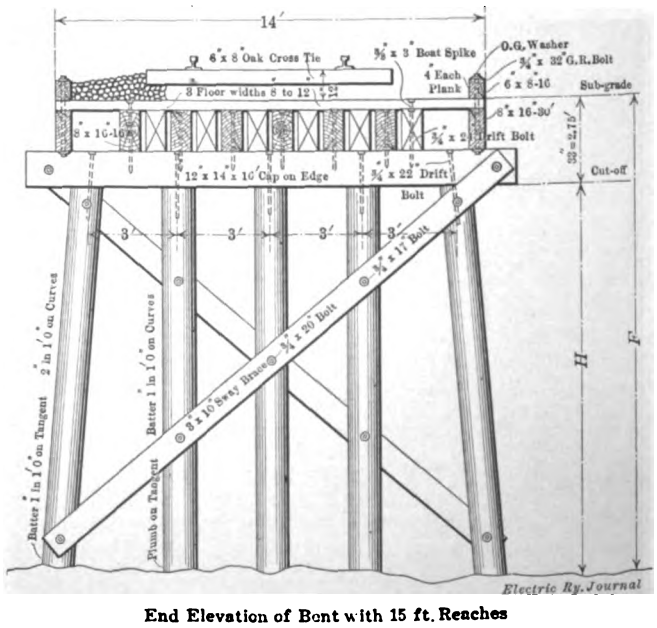
A single line of 40-ft. 7-in. cedar poles supports the catenary trolley, telephone, telegraph and transmission lines. These poles are spaced at 150-ft. intervals on all track up to a 1-deg. curve, at 120-ft. intervals between a 1-deg. and 2-deg. curve and at 100-ft. intervals for all curves of shorter radius. The catenary line material is of the Ohio Brass Company's open-loop hanger design with extruded metal clinch ears. These catenary hangers are arranged for five-point suspension and support a No. 0000 grooved trolley from a 7/16-in. galvanized strand messenger.

The catenary trolley construction is carried on a 10-ft. mast-arm, provided with a special end casting for pull-



Waterloo, Cedar Falls & Northern—Catenary Feeder and Steady Strain Construction

overs on curves. The use of this special-end casting permitted the purchase of a standard mast-arm for the entire road. As shown in the illustrations, the end casting may be applied to the mast-arm for either a left-hand or right-hand curve pull-over. On all curves up to 1 deg., where the pole spacing is at 150-ft. intervals, pull-overs are installed only at each mast-arm. As the curvature increases up to the maximum of 6 deg., the number of pull-overs is increased to make the trolley alignment conform as nearly as possible to the track curvature. Strain guys or catenary anchors are installed at each end of every curve. These



End Elevation of Bent with 15 ft. Reaches

Waterloo, Cedar Falls & Northern—Cross-Section of Ballast Deck Trestle

include an additional pole set opposite the one which supports the trolley and transmission lines, to which two strain guys are attached. These in turn connect to an anchor ear on the trolley and messenger 75 ft. distant. Back guys from these two poles carry the strains to ordinary guy anchors.

Other special features in the overhead-line construction embrace the method of supporting the trolley across

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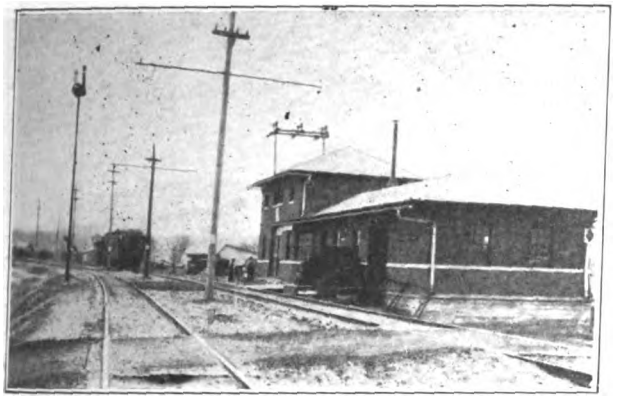
two reinforced-concrete bridges over the Cedar River. At these points tubular steel poles with an 8-in. base are set in 10-in. pipe openings, which were embedded in the concrete parapet walls when the bridge was constructed. After the trolley pole had been dropped in position it was set plumb and surrounded with a sand cushion. It also was necessary to insulate the mast arm from the pole. A brush or dipped treatment of carbolineum has been ap-



Waterloo, Cedar Falls & Northern—Standard Way Station Layout

plied to all pole butts, gains and ridges, and all cross-arms have been treated by a similar process.

WAY-STATION FACILITIES

The mileage between important way stations on this extension made it possible to build a combination passenger station, freight station and substation at each point. The standard design includes a building of brick, concrete and steel, 101 ft. in length by 22 ft. in width. The substation occupies 30 ft. 6 in. at one end of the building, adjoining which is a 12-ft. ticket office which extends across the width of the building. A waiting room 16 ft. in width and a freight room 36 ft. 6 in. long occupy the other end of the building. A view of one of these standard stations is shown in an accompanying illustration.

Other station facilities include a team track and well-built stock pens and loading chutes. Way-station property, wherever possible, includes a strip of land approximately 300 ft. in width by 2000 ft. in length to permit the railway to offer attractive long-term leases for grain elevators,

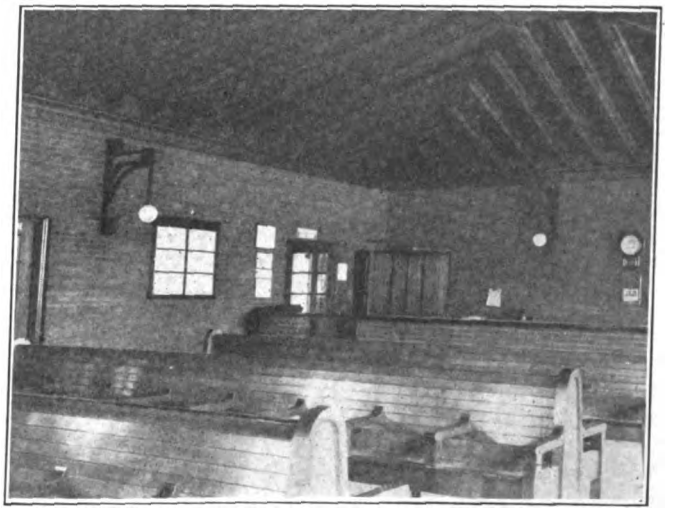
Waterloo, Cedar Falls & Northern—Combined Passenger, Freight and Converter Station at La Porte City

coal and building-material supply yards, etc. Each station is provided with a Union Switch & Signal Company's manually operated train-order semaphore. Blades displayed in the upper right-hand and left-hand quadrants control train movement in both directions.

LA PORTE CITY STATION BUILDING

At La Porte City a very handsome combination passenger, freight and substation building has been erected on one of the main thoroughfares. To provide access to this terminal it was necessary to build a stub track from the main line through the city streets for an approximate distance of ¼ mile. This arrangement will delay passenger traffic but slightly and permit through freight movement to be made without local ordinance restrictions. This station is of concrete, brick and steel construction, 50 ft. x 70 ft. in plan. The walls are built of a dark cherry-red face brick laid in mortar of a similar color with Bedford stone trim and coping. The bracket and eave construction is of wood, and the exposed portions of the roof are covered with a cherry-red Spanish roof tile. A comparatively steep ascending grade on one side of the station permitted the freight-room floor to be built at an elevation suitable for loading to and from cars and wagons. The elevation of this floor, as well as the one in the transformer room, is approximately 2 ft. below the waiting-room floor level. The interior of the waiting room is finished with a dark red quarry-tile floor and walls exactly similar to the exterior. The ceiling is paneled and beamed and like the rest of the woodwork is finished in natural oak. An agent's office occupies one end of the waiting room and is separated from it by a built-up brick counter surmounted with a Tennessee marble top.

Interior illumination in the waiting room is obtained



Waterloo, Cedar Falls & Northern—Waiting Room at La Porte City

from Alba balls mounted on especially designed wrought-iron electroliers. These Alba balls are in two sizes, 6 in. and 12 in., and the lighting scheme is so arranged as to give an evenly distributed but not intense illumination. All lighting circuits are carried in conduit to a lighting cabinet in the agent's office, where they are divided and controlled through separate switches and fuses. The lighting in the substation and freight room is also installed in conduit and controlled through a central cabinet. Lamps are installed where they are required for the operation of the substation and the handling of freight. Plans, exterior and interior views of this station are shown in the illustrations.

STANDARD SUBSTATION EQUIPMENT

Essentially, the standard substation equipment on this road includes a 500-kw Allis-Chalmers rotary converter, a four-panel General Electric switchboard with horizontal edgewise instruments, and three 165-kva, oil-insulated, self-cooled Allis-Chalmers transformers with 44,000-volt or 22,000-volt primaries. The a.c. side of the converter takes 405 volts and produces 650 volts d.c. The switchboard consists of four panels—two a.c. converter panels, one d.c. machine panel and one feeder panel. The instruments include a swinging-bracket d.c. voltmeter with a 750-volt range, a power-factor meter on the a.c. converter panel, a

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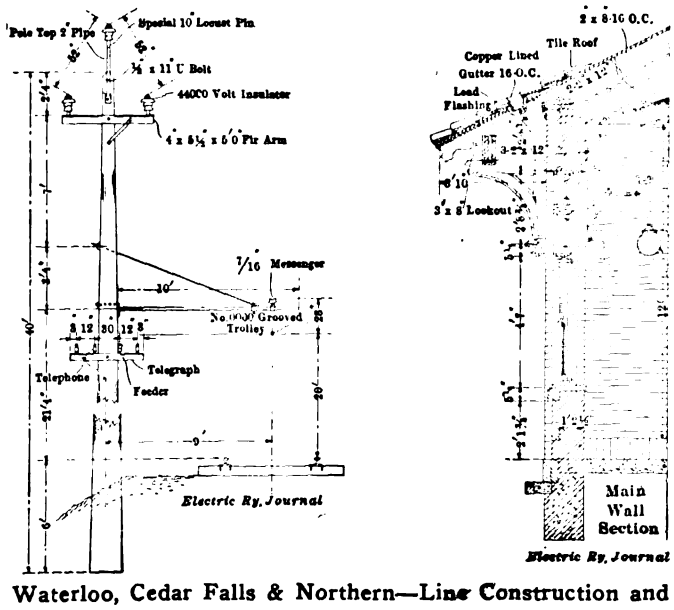
1500-amp circuit breaker provided with low-voltage release connected to the speed-limit device on the converter, a 1500-amp indicating ammeter and a 1500-amp GE graphic recording meter controlled by an eight-day clock. The high-tension oil switches are also of Allis-Chalmers hand-operated design.

Both the trolley and feeder have been sectionalized so that any section may be cut out without interrupting the others. These sections are approximately 9 miles in length and the section insulators are installed near each substation. In case a section fails a pole switch located near the substation serves to cut the line through the faulty section. The feeder taps, which are installed at 1000-ft. intervals, consist of No. 00 stranded copper insulated from the pole and mast arm by porcelain strain insulators. A sketch showing the details of the feeder-tap connections will be found on page 101.

The 44,000-volt three-phase transmission line from the generating plant at Waterloo also is sectionalized by a set of horn-gap, air-brake, disconnecting switches at each substation. These switches are mounted on a two-pole led-in tower, at one end of the substation building. An unusual electrical feature of these substations is that all direct current, both positive and negative, passes from the trolley feeder on the pole line into the substation by way of a manhole and underground conduit. The manhole is located near the main-line pole in front of the substation, and the circuits from this point to the feeder are carried up the pole in conduit. After a little more experience with this type of underground feeder connection, the company intends to install d.c. lightning arresters in the manhole so that discharges will be dissipated before they reach the station building. The circuits are installed in conduit throughout the building and all lights are fed from the low-tension side of the transformers. The train-order semaphores are lighted electrically as they are connected with the station lighting. A pilot light in the signal-lamp circuit installed in the station advises the attendant when the semaphore lamp is not burning.

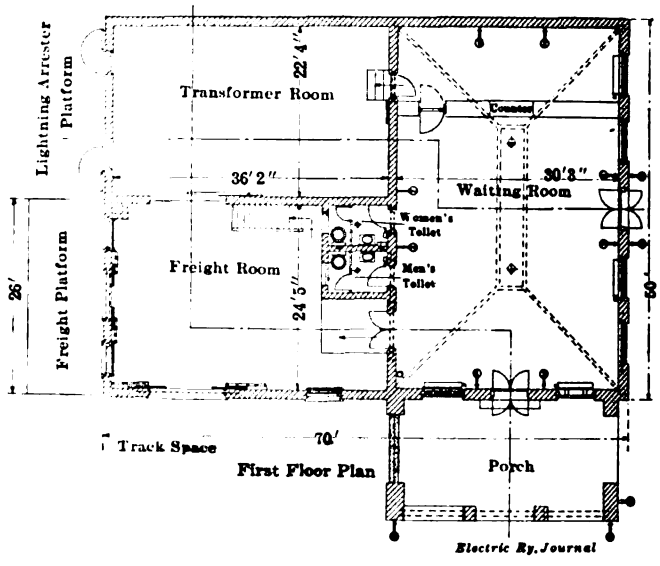
At each joint station the regular force consists of an



Waterloo, Cedar Falls & Northern—Line Construction and Detail of La Porte Station

agent and a helper. By apportioning the hours between these two and requiring the train crews to assist in loading and unloading freight and express, no difficulty is experienced in handling the necessary work.

The Waterloo-La Porte City section, including a 3-mile extension to the belt line, has been in operation since early in January. Judging from the progress already made on the La Porte City-Urbana section, the entire extension should be in operation before the end of this summer. At the present time the regular package-express schedule is composed of two trains each way daily, and an hourly schedule is maintained for the passenger traffic. Freight and express traffic have developed rapidly.



Waterloo, Cedar Falls & Northern—Passenger, Freight and Transformer Station at La Porte City

The design and construction of this new line have been under the general supervision of C. D. Cass, general manager Waterloo, Cedar Falls & Northern Railway, with T. E. Rust, chief engineer, in direct charge of track and roadway construction and G. A. Mills, electrical engineer, in direct charge of the building of overhead lines and equipping substations.

TEXAS COMPANIES CHANGING FROM OIL TO COAL

The rapid advance of the price of crude oil in Texas since 1911 has forced a number of companies to change from oil to coal as a fuel. In 1911 the price for crude oil was 83 cents per 42-gal. barrel. In 1912 it was 87 cents per barrel. In January and February, 1913, it was $1.10 per barrel, and since that time it has advanced to $1.20 per barrel. The necessity of a change in different localities in Texas to obtain most economical results depends largely on freight rates and boiler room efficiency. The Texas Traction Company found it more economical to use coal as a fuel when oil was quoted at $1.20 per 42-gal. barrel. Pea and slack coal is quoted at $1.40 net at the mine plus $1.25 per ton freight, making the cost to the company f.o.b. cars at the power station $2.65. Most of this coal comes from the Oklahoma and Arkansas fields and averages between 10,000 and 13,000 b.t.u. per pound. The quality of fuel oil used averages practically 19,200 b.t.u. per pound. Average results obtained from both the fuel oil and coal show that it requires approximately 2.6 lb. of fuel oil per kw-hr. and 5.5 lb. of coal per kw-hr.

A number of companies are experiencing considerable difficulty in securing a satisfactory automatic stoker which will give maximum results with the Texas bituminous coal. A problem confronting the manufacturers is one of a chain grate which will not permit the fine coal to sift through and at the same time keep the fuel in the fire box from reducing efficiency through the unusual coking quality of Texas coal. Most companies are resorting to hand firing and the use of slicing bars until such time as a satisfactory automatic stoker may be designed to handle Texas coal. Even under these conditions, however, plants which use Texas coal are obtaining economies which exclude the use of crude oil as a fuel at the existing market price.

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Papers Read at Pacific Claim Agents' Meeting

Abstracts of Papers Read at the Vancouver Meeting Last Week—The Subjects Discussed Include the Organization of Safety Committees, Unreported Accidents and the Value of Index Bureaus in Dealing with Fraudulent Claims

The fifth annual meeting of the Pacific Claim Agents' Association was held in Vancouver, B. C., on July 10, 11 and 12. Papers were presented by several members of the association. Abstracts of some of these papers are presented herewith.

THE ORGANIZATION AND THE WORK OF SAFETY COMMITTEES

BY THOS. G. ASTON, CLAIM AGENT THE WASHINGTON WATER POWER COMPANY, SPOKANE, WASH.

In discussing how safety committees should be organized and put to work, I wish to describe the system of our company, not as one exemplifying set rules applicable to all companies, for different companies have different needs, but simply as the system with which I am most familiar. We first incorporated a set of rules as follows:

"Name.—The name of the organization shall be the Safety Committee.

"Members.—This committee shall consist of a central committee and eight sub-committees. The central committee shall consist of the claim agent, chairman, general superintendent of railways, superintendent of light and power, superintendent of transportation, and the superintendent of construction. The sub-committees shall consist of:

"1. Two committees from the street railway department, namely: (a) One of the inspectors as chairman, and three motormen of the company. (b) One of the inspectors as chairman, and three conductors of the company.

"2. One committee from the shops, namely: (a) The master mechanic as chairman, and three members from the shops.

"3. One committee from the track and way department, namely: (a) The roadmaster as chairman, and three members from the track and way department.

"4. Two committees from the light and power department, namely: (a) One of the assistant superintendents as chairman and three members of the light and power department. (b) One of the assistant superintendents as chairman and three members from the power stations.

"5. One committee from the construction department, namely: (a) One of the assistant superintendents as chairman, and three members from the construction department.

"6. One committee from the claim department.

"Duties.—It shall be the duty of the members of these committees to report to the chairman of their committee all things which might cause injury to employees of the company, to the general public, to passengers on street cars, pedestrians, or drivers of vehicles, and to make suggestions as to how changes might be made to prevent accidents. These reports shall be made on a printed form, and it shall be that duty of the chairman of the different committees to forward all reports made to them, with their own suggestions, to the chairman of the central committee, whose duty it shall be to notify the members of the central committee to whose department these recommendations or reports refer.

"Term of Office.—These committees shall hold for a period of three months, with the exception of the central committee, which shall be a permanent committee. The members of all committees shall be appointed by the members of the central committee having supervision over the respective departments.

"Meetings.—Regular meetings shall be held by each committee at least once a week, and a report of each meeting forwarded to the chairman of the central committee, and joint meetings of all of the committees shall be held at least once a month for the purpose of discussing ways and means of preventing accidents. The members of the various committees, who are paid by the hour or by the day, shall receive compensation for such time as they shall be required to spend in attending meetings."

It will be noticed that the claim agent is chairman of the central committee. This is essential, for his work is to prevent accidents and he naturally will give more attention to it than would any other person connected with the company.

After appointment the committees are assembled and topics outlining the objects of the work and the duties of the members are discussed. Refreshments are served at the monthly meeting in order to make them more enjoyable.

It is the duty of the members of our committee to make suggestions that will prevent accidents even though the suggestions pertain to matters entirely foreign to our company. For instance, if one of them sees a wire of the telephone company hanging from a pole or the railing upon a bridge broken, he immediately reports it to the chairman of his committee, or if an emergency exists, the report is made directly to the chairman of the central committee, who immediately takes steps to see that the matter is remedied. If it is a matter that calls for double quick action, the report is made by telephone to the chairman of the central committee. We have found that such efforts on our part are greatly appreciated and have made many friends for the company.

Our employees are very free in making suggestions and many of them have been valuable. They are not allowed, however, to make suggestions and reports regarding their fellow employees. Some organizers of safety committees may not agree with me on this point, but I believe that if good men are to be obtained to serve on the committee the idea must be eliminated that one of their duties is to spy upon their fellow workmen.

At the monthly meeting of the general committee, the reports are taken up and discussed, and the disposition of the suggestions is explained to the members. If a suggestion is not accepted by the central committee, it is read and the reason given. In this way we avoid any feeling that a suggestion has been set aside without any consideration. The committee is asked if there are any suggestions which have been turned in and which have not been read and discussed. The men are allowed to discuss their suggestions, and they have an opportunity, if a suggestion has not been passed upon favorably, to make their argument in favor of it. We have found on a number of occasions that after a man has made his argument in favor of the suggestion, the central committee has reconsidered it. Very few foolish suggestions are sent in by the committeemen. One reason for this is that no man wishes to be placed in a ridiculous position as the author of the suggestion when it comes up for discussion.

Companies must expect that they will be called upon to spend a large sum of money if they allow the members of the committee to make suggestions, and, if they do not make the alterations and repairs that are pointed out to them, they will soon lose the benefit of suggestions, for the members will cease to send them in. Some suggestions have caused our company to spend considerable money, but we have prevented accidents that no doubt would have cost far

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more. We believe in the theory that safety and comfort to both the public and the employees are first, regardless of cost.

Through the work of the committee the company is enabled to undertake an effective campaign against careless driving on the streets, all kinds of motor and horse vehicles being included. Many letters have been sent to various firms calling attention to dangerous chances taken by their employees, and each letter has brought a ready response and pledge of future precautions. The men take down the exact time and location of every incident showing disregard of prudence on the street and it naturally bothers the driver, chauffeur or rider to get around this specific showing by a general denial, as the committeeman has turned in his number.

Some might imagine that after a period of a few months the interest in the safety committee would commence to decrease. This, however, has not proved to be a fact, as comparative statements show that the third committee turned in many more reports than the first, and that a greater percentage was adopted by the company. We keep an index file of the suggestions sent in by the members and they are kept advised as to the number submitted and the ones put into effect. The safety committee has been instrumental in bringing the men closer to the officials of the company and has caused them to feel that they are part of the organization and have more interest in the company than simply to do a day's work.

During the first year of the safety committee, which closed July 1, 1913, 423 reports were handed in. Of these, fifty were suggestions pertaining to the protection of the public in general and not connected, with our company, forty-six for the improvement of track and way, fifty-six reporting careless drivers, twenty-five referring to the installation of signs which would assist and protect the public, sixty-two for the betterment of street railway service, ninety-six for the improvement of equipment and thirty-two suggesting better and safer conditions for employees.

A few examples will suffice to show the range covered by the committeemen's vigilance. One of them noticed that visitors to one of the city parks who lived within walking distance took the short cut down a steep hillside to the platform where the cars loop for the return trip. It was a dangerous practice, especially when children came scrambling onto the tracks. The erection of a fence there was recommended, and the danger was eliminated.

In trimming arc lights in power stations men climbed along the beams, having nothing more than a rail to keep foothold on. A misstep would have meant a plunge to the concrete floor below, but one of the linemen suggested that running boards be put in such places. They were promptly put there.

An aid that every elderly person who rides on street cars appreciates fully was the result of a suggestion from the shop department. This was simply a brass rail set diagonally at the rear entrance inside. It is right where it ought to be for anybody who needs something to anchor to.

One of our conductors offered an improvement on the pay-as-you-enter cars that was gladly accepted, although it meant much work and no little expense. This is a light placed outside and over the rear entrance of the car so that on dark nights the conductor will not go ahead and leave passengers waiting. Another improvement along this line is a glass panel placed low on the rear door so that the conductor can see approaching children. A hand rail inside the car for ladies to hold onto when the car starts before they are seated is still another safety committee suggestion. They run from these down to the simpler matters, such as a conductor reporting a plank loose on one of the bridges and securing its repair the same day. Ideas on safety stops at crossings and congested points are numerous and practicable.

Most of these things seem of little consequence to the citizen whose safety and convenience are largely consulted in the safety committee scheme. They are of this much consequence, that an apparently insignificant fault remedied in time may prevent the loss of one or more lives and the destruction of property. It is the unnoticed little things that play the mischief in railroading, whether steam or electric, just as it is the seemingly simple improvements previously outlined that add the most to public comfort.

THE ORGANIZATION OF SAFETY COMMITTEES

BY G. N. SMITH, CLAIM AGENT OREGON-WASHINGTON RAILROAD & NAVIGATION COMPANY, PORTLAND, ORE.

For a number of years the Oregon-Washington Railroad & Navigation Company conducted superintendents' meetings convening monthly, at which time questions concerning the safety of its employees and the remedying of apparent faulty appliances and equipment were considered, as well as those dealing with the operation of the road. These meetings were composed of the superintendents with their assistants and men from various positions in the operating department. Yet in spite of the interest of these men and the activity in these meetings, as the lines were extended and business increased accidents likewise multiplied.

One fact, however, had been made to stand out clearly before the minds of the members at these meetings. While "self-preservation is the first law of nature," yet the individual who, in the face of danger, receives an injury and then says, "Oh, I forgot!" has never ceased to exist. His negligence brings dire results not only to himself but to others. Believing, therefore, that increased agitation would bring more vividly before the minds of such men the desolation that their oversight or negligence might bring and would reduce the total effect of the human negligence factor, the Oregon-Washington Railroad & Navigation Company, on July 1, 1912, put into operation along its lines a "bureau of safety."

This bureau is composed of a central committee of safety, created by appointment and consisting of one assistant general manager as chairman, all other assistant general managers, the superintendent of water lines, the general storekeeper, the assistant general attorney, the general claim agent and the chief surgeon. There is also a division committee on each division, consisting of the superintendent and members of his staff, one conductor, engineer, yardman, track employee, brakeman, fireman, agent, signal employee and shop employee and such other employees as may from time to time seem advisable. A district committee of safety is also appointed, consisting of one employee from each of the different branches of the shops along the line.

The members of the central committee and superintendents and their staff are considered permanent members of their respective committees, and the other members of the division and district committees serve for a period of three months. Obviously the purpose in changing the personnel of these committees is to get the benefit of the suggestions of as many employees as is reasonably possible in the course of a year.

The division and district committees of the shops hold their meetings regularly each month. At such times they review all the casualties and personal injuries that occurred during the preceding month, offer and consider suggestions and make recommendations for the prevention of accidents or personal injuries in the future. These matters are fully considered and if they are such as can be carried out without the change of any standards along the right-of-way or in the construction of equipment, they are ordered made at once. If not, then the suggestions are sent to the central committee either for approval or rejection.

When the meetings are called, the employees receive their

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expenses and are credited with their time while in attendance. Furthermore, when they are appointed upon these committees, they are presented with a safety button which after their retirement they retain in recognition of their service.

We have pursued this method for the past year and have made a vigorous campaign to bring about greater precaution upon the part of the employees for the sake of their own safety as well as the safety of others. We have kept constantly before them the dire results of their oversight or thoughtlessness, and we find after acting upon hundreds of suggestions and remedying existing conditions, both in operation and in equipment, that we have brought about a closer co-operation and greater friendliness between the company and its employees and a realization upon their part that the movement, through its elimination of accidents, alleviation of pain and suffering and banishment of desolation from the home, was and is for the betterment and safety of all.

THE PRACTICAL VALUE OF AN INDEX BUREAU

BY B. F. BOYNTON, CLAIM AGENT, PORTLAND RAILWAY, LIGHT & POWER COMPANY

Remarkable changes have taken place in the handling of accident work of every name and nature within the past few years. The claim agent, who a few years ago was not of much importance in the operation of a large railway system, has to-day become one of the prime factors. He is not only an adjuster of claims, but also a deviser of ways and means for the prevention of accidents, which means far more than the settlement of them.

The great fight of the claim agent is to protect the company's coffers against faking claimants, unscrupulous doctors and ambulance chasers. The claim department is often placed in a position where it must use every device possible in an honest and intelligent investigation to uncover fraud and endeavor to show, if possible, former injuries, upon which the present claim is often based.

In the handling of this complicated problem an index bureau is one of the most valuable and dependable adjuncts when it is intelligently used. The various bureaus established in the East and West have all been of great aid in meeting their respective local conditions, and I think that a closer union between these and an interchange of information and ideas would prove of great benefit in the work.

Our Pacific Coast bureau was organized June 1, 1912. Since that time it has received 10,425 cards, and from the newspaper clippings it has a record of 6,749 names, making a total of 16,904 records of accident claimants.

The value of the index bureau is not exactly determinable, for without it we may have a very serious case presented to us which might, if placed before a jury with no evidence to combat it, cost us an unlimited amount of money. With our index bureau at hand, however, when a case is presented that seems to contain some semblance of fraud, all we have to do is to ascertain whether the secretary of our index bureau has any record of the person making the claim under the name or alias under which he might be operating, or a record of anyone presenting a similar claim where the injury would perhaps coincide with the one in question. Our bureau might furnish us with information at once showing that the claimant has made similar claims in other places and this evidence would save the day for us and possibly land the repeater in jail. As our report shows, we have actually found, since the organization of our bureau about a year ago, 129 repeaters or parties by the same names.

E. H. Odell had a case in Tacoma where he would have cheerfully paid $2,000 in settlement of a collision claim, but through the index bureau he ascertained that most of the injuries were of long standing, having been gotten in an accident about a year before. By using this knowledge he got rid of the claimant for $500. This saving of $1,500 to Mr. Odell's company will pay its dues and expenses in the association for a number of years to come.

I could cite three cases of my own where I have been able to turn cases down, paying absolutely nothing, where if it had not been for the information in our index bureau, showing the parties to have been repeaters and to have collected from other roads on the same injuries on which they were trying to collect from us, it would have cost us thousands of dollars. I am satisfied that the amount we have saved in the first year has been enough to pay all the expense of the index bureau for the next ten or twenty years.

THE VALUE OF AN INDEX BUREAU IN DEALING WITH FRAUDULENT CLAIMS

BY S. A. BISHOP, CLAIM AGENT PACIFIC ELECTRIC RAILWAY, LOS ANGELES, CAL.

The value of an index bureau in dealing with fraudulent claimants depends, in my opinion, upon the ability of the individual claim agent to make use of it. Claim agents of ability and experience may often effect a substantial saving of money, some of which they may not even be aware of at the time, by making it plain to the suspected claimant that they have the facilities ready at hand to ascertain the true facts in each and every case.

The report of our index bureau, dated June 10, indicates that 9760 cards have been filed during the past eleven months. Besides enabling us to locate 118 repeaters, this bureau system has supplied us with a great number of newspaper clippings, names of attending physicians and lawyers and other facts with general reference to these claimants, any one or all of which items may prove of inestimable value when taken with the known facts concerning a fraudulent claim under consideration.

Let me illustrate how it works in practice. When a claimant calls and you discuss with him, first of all, the liability, next, the extent of injury, and, last of all, the amount of money proportionate to that injury, if you have reason to suspect that such claimant has exaggerated his injury, is protracting disability or is magnifying the real injury in an endeavor to get more than fair compensation, just digress for the moment from further consideration of the details of his particular claim and describe our organization. Tell him of the claim agents' index bureau and how a fraudulent claim was revealed through this organization, always emphasizing, however, your expressed opinion that his own claim is altogether a legitimate one and assuring him that you are positively convinced that he is a reasonable and rightminded person who is going to be satisfied with fair compensation for actual injury. You have then paved the way, as I have upon occasion, to name what seems to you a fair amount in payment of his bill of damages. If anything in his case is tinged with fraud, if he knows of any fact that may detract from the value of his claim, if in his conscience he realizes that he is not nearly as badly injured as he has represented himself to be, he is then warned against undertaking to follow in the footsteps of a fraudulent claimant who has come to grief. I believe that this deterrent effect of such an organization as ours is of far greater value than the actual benefits which accrue from fraud revealed.

In the business world of to-day men are taken to a large extent at their own appraisement. If one holds himself out to be of a certain character and looks the part, he is accepted, for the time at least, to be what he seems to be. The application of this fact is this. In the ordinary jury hearing the evidence of the plaintiff's physicians and the evidence of the defendant's physicians are usually both passed over, and the jurors give preference to the plaintiff's own

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evidence concerning the extent of his injury or at least to such portion of it as they credit, when supported by his personal appearance and general demeanor. But our index bureau is important in that it gives us a means of attacking this plaintiff's testimony itself. Having furnished a claim agent with an account of an injury suffered by a claimant on a railroad, it thereby affords the opportunity to submit the query to the claimant, "Did you suffer such an injury on such a date on such a railroad?" This gives the claim agent the "whip hand." If he follows up his advantage, his claimant, taken by surprise, is disconcerted and may not for the moment realize that this is the full extent of the claim agent's knowledge of him, and, having a "skeleton in the closet" to protect against the demoralizing effect of daylight, may sell his claim reasonably if not cheaply.

THE UNREPORTED ACCIDENT OR "BLIND CASE"

BY C. F. YOUNG, PUGET SOUND TRACTION, LIGHT & POWER COMPANY, SEATTLE, WASH.

Unreported accidents result from several causes, chief among which are:

(a) The train crew often fail to observe many slight occurrences like the movements of the car and the conduct of passengers, not from a desire to avoid reporting accidents, but because their attention was diverted to some other part of the car or street at the critical moment.

(b) The crew, seeing the accident, conclude that it is unimportant and unnecessary to report.

(c) The crew are often misled because the injured party laughs about the accident, remarks that it was his own fault, refuses to give his name and says that nothing will be said about it. Often the injured party even requests the conductor not to report the matter.

(d) The crew sometimes deliberately refrain from reporting an accident in an attempt to cover up an occurrence for which they are wholly to blame.

(e) In rare cases the reason why the accident has not been reported is that a bold attempt has been made to "frame up" a case.

(f) Accidents sometimes result from defects in track, overhead or right-of-way about which the employee has no knowledge.

From whatever cause they arise, the first intimation of these unreported accidents generally reaches the claim agent from one of three sources—the claimant direct, an outside physician or an attorney. The last condition is the hardest to combat because it prevents, as a rule, the securing of a signed statement and the opportunity to obtain the many little details necessary to begin investigation, as well as to learn who the claimant is, whence he came and whether he had any prior injury. Such information may be used later to advantage in case of suit, or as an aid in settlement—which, after all, is about the only basis upon which these claims can be settled where a thorough investigation fails to bring to light any evidence that such an accident really occurred.

The difficulty of investigating is obvious to all. The trainmen are either absolutely ignorant of the alleged occurrence or, having failed to do their duty in the first place, are very apt to deny all knowledge of the matter unless sufficient proof of their guilt is produced to break them down. Even then they are prone to distort the facts, leaving the claim agent "on the fence" as to what really occurred.

If it were possible in some manner to impress on each individual trainman the desirability of telling the truth in order that the claim agent might judge whether he was dealing with a real or fake injury, it would be an undisguised blessing. But no one thus far having advanced the proper solution, it is necessary to keep pounding away on the young student from the moment he is placed upon a car. Put him on with old men who not only know how to operate well but can be relied upon to drill into the new man the importance of reports. See that the instructors in the school cover accidents so thoroughly that when qualified to take a car out by himself the new man will feel it just as much a part of his work to report even the slightest accident as to stop or start his car on signals or collect his fares. Teach him how to approach people that he may secure their names as witnesses and to be unyielding to passengers who clamor for the car to be started until he has properly protected the company and himself. Joint meetings between the claim and the operating departments at the different carhouses to discuss the accident situation have good effect. The point should be emphasized that simply to reduce the number of reports while still having the same number of accidents only adds fuel to the fire. The fact should also be impressed upon the trainmen's minds that the reporting of an accident is not charged against a man's record unless the investigation shows him to be at fault. Even then, such treatment should be accorded the men that they will not be afraid to make a full report even when they are at fault.

The constant coming in contact with the trainmen at these meetings results in an acquaintance that creates increased interest in the subject of reporting cases whether the cases occur on the trainman's own car or on another car. Again, by the cultivating of this acquaintance between the trainmen and the members of the claim department a trainman is less apt to be confused or afraid when called into the claim department or interviewed by an investigator. Instead, he is cool and at ease and in better shape to give a statement.

Another important way of instilling into the men the proper attitude toward these unreported cases is the safety committee. This is one of the best means to get men to do their full duty in the matter of reporting everything because each trainman hopes some day to be appointed a member of the committee and all are aware that their records are carefully examined before appointments are made. After a man has served his six months on the committee, he has come into such close contact with the officials and attorneys of the company that his interest and his pride have been awakened and the possibility of his failing to report an accident is remote. There appears to be a better understanding between the claim and transportation officials than in times past, and this I believe to be the greatest factor in reducing the "unreported accident" to the minimum.

As to the claimant who presents a claim based upon the blind accident, it is a problem just what to do. There are genuine claims of these kinds, and it is sometimes difficult to determine which are just and which are fraudulent. After all is said and done, each claim must stand on its merits—the individuality of the claimant and the peculiar circumstances surrounding the case. The claim agent who possesses the faculty of guessing his man, who from experience and intuition can discern the fake from the just claimant, has to a great extent solved the problem. He is in a position to deal fairly with the just claimant, and also to impress upon the fraudulent claimant that his methods are known and that his attempt to extort money is not only futile but may ultimately land him behind prison walls.

THE UNREPORTED ACCIDENT OR "BLIND CASE"

BY J. H. HANDLON, CLAIM AGENT UNITED RAILROADS OF SAN FRANCISCO, CAL.

In almost every instance of an unreported accident the claim agent finds himself in a weak position and without his usual weapons of defense. Usually it is only by locating eye-witnesses to the occurrence and developing evidence of a conflicting nature that he can hope to combat the assertions of an unjust claimant.

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There are, however, several well-known practical methods that may be utilized to control and reduce the number of unreported accidents, and it is my purpose to discuss these briefly in this paper.

Platform men are often informed by their superintendents that they must report all accidents and obtain witnesses solely with a view of protecting the interests of the company. More beneficial results can be obtained if employees are convinced that by preparing reports of accidents or incidents occurring on or near their car they are protecting themselves. Supervising officials can materially assist in reducing the number of "blind" cases by showing a disposition not to take drastic action in disciplining employees for minor accidents in which they are negligent. Every employee, however, who knowingly fails to report an accident should be immediately discharged.

In San Francisco we have met with unusual success in decreasing unreported accidents by fostering an intense rivalry among the various divisions, each one striving to outdo the other in having the lowest number of "blind" cases. Notices showing the number of unreported accidents charged against each division are posted monthly.

Employees should be encouraged to report accidents, notwithstanding the fact that they were not in charge of the car involved. This precautionary act often protects the company in instances where the crew concerned knew nothing of the accident.

A local newspaper clipping file of miscellaneous accidents to pedestrians and vehicles should be maintained, for sometimes claims are filed for casualties foreign to the operation of the cars.

Friendly relations should be established with the local hospitals, the primary object of which is to enable the claim agent to keep informed of all railroad cases brought to such institutions.

If a claim agent strives to cultivate the good will of physicians practising in his community, they will be disposed to reciprocate by advising him of any railroad case they are attending. This will enable the claim agent to make a prompt investigation of the facts.

USE OF GIRDER RAIL IN SAN ANTONIO

David Daly, manager, Houston Electric Company, recently made a statement which was published in the papers of that city explaining the position of that company in regard to the T-rail. According to Mr. Daly, in 1903, the Council passed an ordinance compelling the use of the grooved girder rail in Houston, but subsequently on a few occasions has permitted the company to lay T-rail on certain streets. The new administration has directed the company to abide by the terms of the original ordinance. The company feels that its present method of laying 80-lb. T-rail on a concrete foundation is a far better method of construction than that possible with the proposed grooved girder rail, that this is the consensus of opinion of street railway engineers throughout the country and that many cities in the East and Central West are adopting the T-rail as standard. When the new administration came into office the company offered to pay the expenses of an impartial board of engineers to examine into the matter, but the Mayor and city commissioners declined to accept this offer and insisted on the grooved rail construction. In view of this fact Mr. Daly says that the company would agitate the question no further and that in its new construction it would place the grooved rail in all streets not now exempt from the terms of the ordinance.

Number 5 of *Special Libraries*, published by the Special Libraries Association, Boston, Mass., contains an exhaustive list of material written on the subject of efficiency and scientific management. The classification covers all sources of information.

COMMUNICATION

ROLLING STOCK WEIGHTS AND MANGANESE TRACK WORK

WM. WHARTON, JR., & COMPANY, INC.
PHILADELPHIA, PA., July 15, 1913.

To the Editors:

From time to time we hear the statement made by the railroads that the manganese steel which is put into track work at the present time does not give such good results as manganese steel supplied ten or twelve years ago. To refute such statements and to obtain definite information on the subject, an exhaustive investigation has been made, resulting in evidence which proves conclusively that the manganese steel of to-day as made by the company which I represent is superior to that made ten years ago. It is, in fact, tougher and less brittle. This investigation also developed the following important data in regard to the increased severity of service to which the steel of to-day is being subjected:

(1) At the present time roadbeds are more substantial, and this results in a more solid back to the wheel impact.

(2) The wheel impact is greater because the rolling stock and loads are heavier, speeds are higher and the service more frequent.

(3) The weights of all kinds of electric railway passenger rolling stock have increased to such an extent that they now closely approach those of steam passenger equipment. The following tabulation sets forth clearly the increased weight of electric railway passenger equipment:

		Average Weight in Pounds of		Per Cent Increase in Weight			
		Light Cars	Loaded Cars	Light Cars, 1902-1907	Loaded Cars, 1902-1907	Light Cars, 1907-1912	Loaded Cars, 1907-1912
1902	City	33,284	39,584	....	....	....	....
1902	Interurban	39,650	56,900	....	....	....	....
1907	City	43,400	53,900	23	26.6	....	....
1907	Interurban	51,575	71,575	23.3	20.5	....	....
1912	City	38,346	48,846	....	....	11½*	9.3*
1912	Interurban	68,190	88,740	....	....	24.4	19.3

*Cars for city service in 1912 were lighter than they were in 1907.

Average percentage of increase in weight, from 1902 to 1912 has therefore been as follows:

Light cars, city	11½
Light cars, interurban	47.7
Loaded cars, city	15.3
Loaded cars, interurban	39.8

From the above you will note a great increase in weight of both city and interurban cars between the years 1902 and 1907. The light weight of city cars decreased slightly between the years 1907 and 1912. In this same period interurban cars increased in weight. In preparing the above data representative cars were selected, that is, cars that are conceded by car builders to be typical for the average city east of the Mississippi.

(4) Notwithstanding all of the above aggravated conditions, the flange and wheel tread on electric railroad equipment has been increased but slightly in the width of the tread, so that the same unit of area is subjected to a greatly intensified pressure.

(5) Railways have recognized the necessity of fortifying the roadbed, building stronger bridges and using heavier rails, yet to-day the metal sections specified for manganese special-work castings are in many cases 10 per cent lighter than corresponding pieces of ten years ago.

LLEWELLYN W. JONES, Vice-president.

The Detroit (Mich.) United Railway has applied to the industrial accident board to come under the State compensation law.

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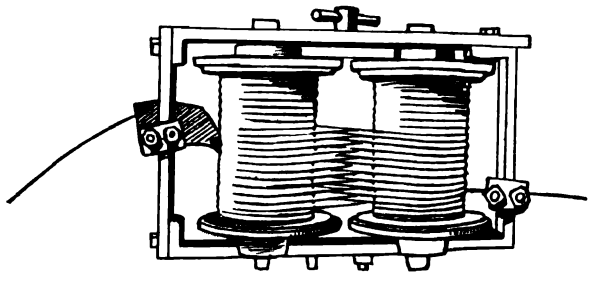
SINGLE-PHASE MOTOR MAINTENANCE ON THE DENVER & INTERURBAN RAILWAY

The Denver & Interurban Railway, the electrical branch of the Colorado & Southern Railway, was one of the early single-phase interurban railways built in this country, and although it has not been extended, it has been operating very successfully since it was put in operation in 1908. The cars use 11,000 volts alternating current when on the interurban sections and direct current when operating in Denver over the tracks of the Denver City Tramway Company. The cars also use direct current over a short section of track at Boulder, the other terminal city, so that the usual combination a.c.-d.c. controller and equipment are employed. In one round trip a car operates for about 55 miles on a.c. and 10½ miles on d.c., and each car averages from 350 to 400 miles a day. During week days an hourly service is run, and this requires three cars. On Sundays, during the excursion season, trains of four to six cars are run, made up of an even number of motor cars and trail cars.



Spools for Holding Banding Wire

Altogether this company has eight passenger motor cars. These cars are 55 ft. 6 in. long, 10 ft. wide and seat sixty passengers. They weigh loaded 60 tons. The original equipment was described in the ELECTRIC RAILWAY JOURNAL for Sept. 5, 1908, when each car was equipped with four Westinghouse 148-A 125-hp motors with a.c.-d.c. control.

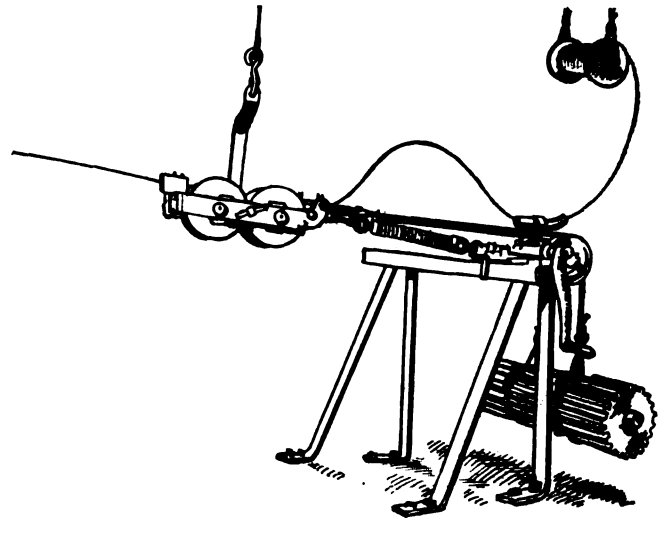
Originally some motor troubles were experienced, but during the last two years the company has lost only two armatures in spite of the fact that the motors are run at a higher speed than that for which they were designed. This immunity from armature troubles is attributed by the company to some extent to a number of changes made in the equipment. One of these is the method of applying banding wire. For this work the company has installed an automatic tension-regulating device so that the tension on the band wire, while it is being wound on the armature, can be kept continuously at any amount, that usually used being 400 lb. With this device, also, the usual tension clamp, which presses on the wire, is not required. This eliminates the danger of breaking the tinning on the steel banding wire, a fault found with the usual device.

The tension-regulating device consists of two grooved spools, each 4 in. in diameter and 6 in. long, held in a frame as shown in the first engraving. The wire is wound back and forth over these two spools, having about twelve turns on each spool. A leather washer fits between the end of the spool and the end plate in the frame in which the spools are mounted, and by means of a screw these end plates can be pressed down on the leather washer. In this way the power required to revolve the spools, and hence the tension on the wire as it leaves the spools, is regulated.

The second engraving shows the method of using the tension device while the banding wire is being put on an armature. The tension device, with the wire wound on it as described, is suspended from above and is held at the back by a set of powerful springs to which are attached cords which pass over pulleys and are connected at their lower ends with weights. In this way any variation in size in the wire which would cause inequality in the tension when the wire passes over the spool is taken up. The band wire is fed to the spools from a reel overhead. The tension is usually kept at about 400 lb. instead of the ordinary tension of about 300 lb. When this wire is wound on the armature tin clips are placed under the wire where it crosses each coil instead of under every fourth coil, as formerly. By these means the safe maximum speed of the motors has been increased from 1680 r.p.m. to from 1900 r.p.m. to 2000 r.p.m. and the capacity of the motor has also been increased.

Slight modifications have also been made in the construction of the armature itself. The covering on the head at the commutator end is left off to secure better ventilation, and at the pinion end of the armature the overhanging flange of the end bell has been cut off. This leaves a sharp edge on the end bell which has been found to be a better protection against the creeping of oil from the bearing into the armature. With these changes the cost of motor maintenance has been reduced to a minimum. Speer grade H brushes are used exclusively and give an average life of 15,500 miles.

In its switch groups and brake cylinders the company is using Emery lubricant and has not had to change a dozen leather washers in five years in the switch groups and has never had to make a change in the brake cylinders. The triple valves operate for a year with this lubricant.



Tension Device for Banding Wire—Denver & Interurban Railway

For boring out armature bearings a clamp is used to hold the bearing. It is set in the lathe by dowel pins and no centering is required.

LIFE OF PARTS

The following are average lives of some of the motor parts obtained on the Denver & Interurban Railway:

LIFE OF MOTOR PARTS IN MOTOR CAR MILES

	Motor Car Miles
Motor bearings, commutator end	68,000
Motor bearings, pinion end	60,000
Axle bearings	30,000
Commutator life between turnings	120,000
Carbon brushes	15,500
Pantograph shoes (made of No. 16 galvanized rion)	12,000

In the state of Texas it is general practice to install electrolytic lightning arresters in the open, and it has been found that the heating of the sun's rays during the summer months is sufficient practically to destroy the value of the electrolyte. In order to overcome this the lightning arrester tanks have been painted white, with the result that a sufficient amount of heat is reflected to eliminate this source of trouble.

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AN IMPORTANT INNOVATION PLANNED BY THE AMERICAN ELECTRIC RAILWAY ASSOCIATION

The benefits to investors and to operating officials which arise through the prompt publication of condensed statistics bearing upon the financial operation of electric railways have been generally recognized for a long time, and to this end the officers of the American Electric Railway Association are planning to inaugurate the collection and presentation of such information in a series of monthly reports which will show the trend of earnings and expenses of the electric railway industry as a whole.

The plan comprehends the publication in *Acra* of a monthly statement of much the same character as that issued by the Bureau of Railway Economics, an organization supported by the steam railroads of the country, which was formed for the express purpose of giving proper publicity to such statistical information about the steam railroads as would be useful to the public when expressed in concise and authoritative form. In this way such information, which is at present obtainable only through the reports of the Census Bureau issued at five-year intervals and through the financial annuals, would become available at once and would truly represent the conditions existing at the time when the statistics were published.

The work involved in the new plan will be largely complementary to that of the proposed Bureau of Fare Research, an institution which is being planned by the association for the purpose of investigating the general question of fares and which will include consideration of the service accorded to passengers for their fares, its cost to the railway, and the profits remaining for the investors in the property.

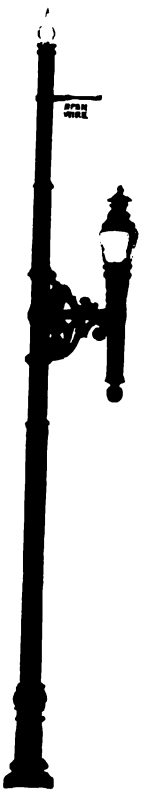
Both proposed plans naturally require the support of the member companies of the association, and with this object a letter of explanation was sent out last month giving an outline of the procedure involved by the collection of the data. In this it was explained that all information which might be furnished by the railway companies would be treated as absolutely confidential and that the statistics developed from the statements of the railways would be published in such a way as to avoid the possibility of identification of the source of information or the disclosure of the results of operations of any individual company.

The part of the work required from the member companies is to consist in providing the association with copies of their detailed monthly statements as soon as these are prepared, promptness in furnishing the information being essential so that publication of the data can follow within a month of the period covered by the statements. A series of questions regarding the feeling of the member companies with regard to their approval of the plan, their willingness to co-operate, and the time at which the first statement might be expected, was also included in the letter. To these questions the replies already received have shown conclusively that sentiment is overwhelmingly in favor of the plan and that it will be strongly supported by practically every electric railway of importance in the country.

The results which may be expected from the new plan cannot fail to be of immense advantage to the industry. Indeed the results which have been attained by the publication of steam railroad statistics through the Bureau of Railway Economics have been found to be so manifestly beneficial, after several years during which the bulletins have been issued, that the permanence of that institution is beyond any question of doubt; and the step is in consequence certain to be one of the most important ever taken by the association as well as one of the most productive of benefit to electric railways in general. The association believes that it is very well equipped for this work and that these figures will be a barometer of the industry and hence of value to railway companies and to the public.

COMBINATION RAILWAY AND LIGHTING POLE

Marked improvement is shown in a new type of bracket which has just been brought out by the Electric Railway Equipment Company, Cincinnati, Ohio, for its combination street railway and lighting pole. Both single and double brackets of this new type have given satisfaction on account of the provision which has been made for mounting the positive cut-out in the body of the bracket. When the cut-out is placed at this point it is not necessary to slot the tubular pole at the ground line, which has a tendency to weaken it at the point of greatest strain. In order that the cut-out can be operated quickly and without the necessity of using a ladder to reach it, a small chain has been provided with rings attached to the cut-out. The cut-out can be operated from the street level by the use of a small rod with a hooked end. The chain is carefully insulated from all current-carrying parts and there is no possibility of leakage at this point.



Single Bracket

Double Bracket

The company has furnished single-light combination poles of this type for Edmonton, Alta., Keokuk, Ia., Negaunee, Mich., Milwaukee, Wis., Dixon, Ill., Columbia, S. C., and Fort Worth, Tex. The company has also furnished the city of Missoula, Mont., with 110 of the same type of pole with a somewhat different bracket. The city of Niagara Falls, N. Y., will be the first city to adopt the double-bracket design, which is shown in the second illustration.

In an article entitled "First Single-Phase Railway in Spain" published in the issue of May 3, an error was made regarding the types of apparatus installed. The A. E. G.-Thomson-Houston Iberica (Spanish A. E. G.-Thomson-Houston Company) advises that it furnished five double-truck cars with A. E. G. equipments and also built the entire low-tension and high-tension overhead construction. The predecessor of the present Spanish Siemens-Schuckert Company furnished four single-truck cars and one double-truck car.

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News of Electric Railways

Detroit Company Cannot Accept Marx Plan

In the formal answer of the Detroit (Mich.) United Railway to the proposed Marx ordinance, Attorney Charles D. Joslyn on July 14 asserted that the company could not agree to accept the plan. The attorney read the company's statement at the hearing. The company offers unconditionally to sell its lines to the city at a fair price or to operate on terms similar to those rejected by the voters when the Thompson-Hutchins franchise was voted down.

The company's statement declares that the Marx plan provides a rate of fare which cannot pay the cost of operation and maintenance and that it requires immediate construction of extensions under such terms and conditions that it would be impossible to raise the necessary capital. The company says that figures obtained under the accounting system required by the Interstate Commerce Commission show that 3-cent fare operation of the Detroit lines would have resulted in a net deficit of $49,816 in 1912, and $20,429 during the first five months of this year. The company avers that the paving required by the proposed ordinance would greatly increase the deficit and the universal transfer clause, by reducing the amount collected, would also lessen the net revenue. The company statement refers to the "unquestioned right the company has over the greater part of its system in the city to receive a higher rate of fare than is prescribed by the proposed ordinance," and says that this right and many others must be given up without consideration if the measure is agreed to.

Extensions demanded by the Marx ordinance will cost $1,700,000, the statement says, and the company complains that the resultant operation would be at a loss, and the company might be compelled to cease operation at the will of the Council. Summing up the situation, the statement says that the Marx ordinance calls for impossible concessions and that the company under no circumstances can accept the proposal.

Calling attention to section 19 of the street car ordinance, approved Dec. 4, 1894, the company declares that it is ready and willing to comply with the terms of that ordinance and maintains that the city of Detroit cannot violate the terms of that ordinance. The company makes two distinct proposals to the city, as follows: To operate all city lines under the terms of the ordinance of 1894, known as the 3-cent fare ordinance; or to sell its lines to the city of Detroit for a fair price to be agreed on, or failing agreement, to be determined in any reasonable way.

The company offers, through General Manager Brooks, to open its books to the public to prove that 3-cent fares would result in a deficit.

Following the presentation of the company's statement Mayor Marx said:

"The proposal of the Detroit United Railway to agree to the terms of the old Detroit ordinance over the entire system is absurd and will not be considered for one minute. So far as I am concerned, the company will never receive a franchise in the streets of Detroit, nor will I ever sanction the submission to the people of any proposition involving a franchise. To do so after the people have, in numerous instances, expressed their will in a decisive and overwhelming manner, would be an insult to their intelligence.

"The purpose of inviting the officials of the company to these meetings of the committee was not to listen to a dictation of terms by them. It was rather to give them as interested parties a chance to offer reasonable objections to the proposed ordinance. I am firmly of the belief that the city is the one to dictate terms, and I have no intention of receding from this position. If nothing else, the company's statement should convince the people that municipal ownership is inevitable. No permanent settlement with the company is possible, nor should it be considered.

"I am pleased to have the first official announcement from the company that it is willing to sell. And I intend that we shall with all possible haste take advantage of this offer. Within the next few days I expect to appoint the street railway commission, empowered to open negotiations for the purchase of the system. While I wish to consult with Corporation Counsel Lawson and Messrs. Lucking and Frazer before finally approving this proposal, I believe that the agreement to sell is worthy of consideration. However, I intend that the people of Detroit shall obtain some advantage from the decision in the Fort Street case pending the negotiations for purchase of the system. The company is operating without authority on a part of its system. As a trespasser it cannot dictate terms. It must come to the terms which the city dictates or cease operation of its cars."

A digest of the terms of the ordinance proposed by Mayor Marx was published in the ELECTRIC RAILWAY JOURNAL of July 5, 1913, page 38.

Brake Order of New York Commission Upheld

As noted briefly in the ELECTRIC RAILWAY JOURNAL of July 12, 1913, page 74, the Appellate Division of the Supreme Court of New York by a unanimous vote upheld on July 10 the proceedings of the Public Service Commission of the First District in its order requiring the Brooklyn Rapid Transit Company to equip its cars with power brakes and geared hand brakes. The company had objected to the order and brought five separate writs of certiorari to the Appellate Division for review. The action of the Public Service Commission in each case is affirmed and the writs dismissed with $50 costs to the company.

The Public Service Commission instituted proceedings and held a public hearing on July 20, 1911, to determine whether the street railroad corporations and receivers should be ordered to equip all double-truck surface cars with power brakes of a type to be approved by the commission, and whether any other changes, improvements in or additions to the equipment then in use should be ordered as necessary to the effective and safe use and operation of brakes on the cars. On Oct. 10, 1911, the commission adopted a resolution to the effect that after June 1, 1912, "all passenger double-truck surface cars in service weighing over 27,000 lb. shall be equipped with power brakes and geared hand brakes." The order also provided that after June 1, 1913, all surface cars weighing over 25,100 lb. should be similarly equipped and all cars weighing less should be equipped with geared hand brakes.

The Brooklyn Rapid Transit Company gave notice on Nov. 1, 1911, that it would not obey the order, and requested a rehearing on the ground that the requirements of the order were not within the scope of the inquiry as stated in the resolution of the commission; that the evidence before the commission did not warrant the order, and that sufficient opportunity was not afforded the company to give evidence with reference to the comparative efficiency of the geared hand brakes and staff and chain brakes. The rehearing was granted and further evidence offered on both sides, and on June 21, 1912, the commission made a final order requiring the installation of the brakes.

Justice McLaughlin, who wrote the opinion, says that the Legislature clearly conferred authority upon the commission to make the order requiring a change with respect to the brake equipment of cars. He said:

"The commission was authorized to institute the inquiry on its own initiative and the hearing and determination are deemed judicial or quasi-judicial proceedings, and are subject to review by the writ of certiorari. It appears that all the cars to which the order applies were equipped with brakes known as plain staff brakes. The first provision of the order relates to passenger double-truck surface cars weighing over 27,000 lb., and required that they be equipped with power brakes and geared hand brakes. The relators owned at the time of the hearing 564 cars which would be subjected to this provision of the order. The relator also owned at this time 637 cars weighing between 25,100 lb. and 27,000 lb. which by the terms of the order are required to be equipped with power and geared hand brakes. The number of cars owned by the relators at the time of the hearing weighing 25,100 lb. or less, and which were required to be equipped with geared hand brakes, was 624. It also appeared at the hearing that the heavier cars on the lines were equipped with both power and hand brakes."

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Justice Laughlin says that the company did not seriously complain of the order in so far as it affected future purchases of cars, and that there was no evidence to show that the new cars were not equipped with both kinds of brakes. The company complained that the order compelling it to equip the cars on hand with both brakes was unnecessary, and that inasmuch as the installation of the brakes involved an expenditure of more than $500,000, it was unreasonable. All the other street railways in the city were affected by the same order, and they acquiesced. In conclusion, the opinion says:

"The statement of the evidence is sufficient to show that it does not preponderate against the determination made by the Public Service Commission in ordering the change of equipment. In the interest of the convenience and safety of the public the Legislature vested the commission with broad discretionary powers, and it would require clear and convincing evidence that their determination on the facts was erroneous to warrant the court in annulling the order."

Differences Between Ohio Valley Electric Railway and Its Employees Adjusted

The differences between the Ohio Valley Electric Railway, Huntington, W. Va., and its trainmen, in regard to wages and working conditions, have been adjusted without the company conceding recognition of the union or entering into any written contract with the men. Some of the men organized on June 30 and on the morning of July 6 attempted to present a list of demands to W. W. Magoon, general manager of the company, while he was addressing a meeting of employees of the company who were opposed to a strike. At this meeting Mr. Magoon told the men that the company would never recognize a union, and refused to accept the list of demands as coming from a union. He did, however, permit the demands to be read. They included a wage increase of 1 cent an hour, adjustment of certain working conditions, recognition of the union and the appointment of a temporary board of arbitration to settle all questions that could not be satisfactorily adjusted by the company and the union. Mr. Magoon announced that the matter of a wage increase had already been considered and that a favorable verdict would probably be reached within a few days. He added that he would receive any of the men individually and pledged himself to adjust all just grievances at once. Four days later the union tried to induce Mr. Magoon to recognize "an organization of the men" and permit a committee of this organization to treat with him. This request was denied.

Meanwhile, Mr. Magoon announced an increase in wages of 1 cent an hour to date from July 1. At 5.30 a. m. on July 10, a few hours after this announcement was made, the men in the newly-organized union voted against a strike. They announced that this action was taken on the promise of Mr. Magoon to adjust all grievances except recognition. Seventy-five per cent of the men voted against a strike when the ballot was taken.

In a very forceful statement of the position of the company which he made on July 9 Mr. Magoon said:

"No man now in our employ, so long as he attends to his duties and obeys the rules of the company, need fear that he will be blacklisted or discharged for having joined the organization movement that I have been informally notified is under way. Moreover, every man who works for the Ohio Valley Electric Railway knows, or should know, that no man has ever been discharged from its employ unless he was proved guilty of having broken one or more of its rules. In this connection I want to say that I have heard that it is being reported several men recently discharged were let go because they had been instrumental in passing around a petition for higher wages. That petition was never presented to me, although some of the men who had signed it asked me to erase their names, as they had signed it under a misrepresentation.

"I cannot state too forcibly, however, that that petition had absolutely nothing to do with the discharge of the men in question. The reasons for their discharge are on record in my office and can be seen by any employee who is interested enough to want to allay his suspicions as to why the men were let go. I do not care to make these reasons public, as I do not want to do anything which might tend to mortify the persons most vitally interested. In conclusion I wish to say that so long as I am manager of the Ohio Valley Electric Railway the door of my office will always be open to my men. If they think they have any grievances I want them to come to me with them, and if they are just grievances I will see that they are satisfactorily adjusted. This company, however, will never recognize a union. I do not say this as a threat—merely a plain statement of fact."

Strike in Lexington Settled

The strike of the motormen and conductors of the Kentucky Traction & Terminal Company, Lexington, Ky., who walked out on July 11, following the trouble that the company had with its linemen, as mentioned in the ELECTRIC RAILWAY JOURNAL of July 12, 1913, has been ended by an agreement reached on July 15 between the company and the representatives of the men.

The company agrees not to discriminate against members of the union on account of their affiliation with that body and also to arbitrate such differences as arise between the company and the employees. It is expressly stated that the open-shop principle shall prevail. No union emblems are to be worn by employees of the company. The agreement is to be in force for two years, and the present scale of wages is to be maintained during that time.

The strike of the motormen and conductors was a direct result of the linemen's strike. On July 10 the motormen and conductors organized a union and appointed a committee to communicate a proposal to the company looking toward a settlement of the linemen's difficulties. The company refused to recognize the union and the strike resulted. Service was discontinued on both the city and interurban lines until July 13 when the company attempted to operate cars with strikebreakers brought from New York City. Strike sympathizers attacked the men employed to operate the cars. One car was burned, switches were broken, and the company abandoned its efforts in the evening. Police and deputy sheriffs were powerless to handle the situation and few arrests were made. An extended investigation is now being made by the Grand Jury into the question of whether county officials failed in their duty. Judge Kerr, in a very strong charge, said that "every citizen of this community ought to hide his head in shame" on account of the strike outrages.

Decision Against Tort Creditors in New York

Special Master William L. Turner has rendered a decision in the tangled litigation of the Metropolitan Street Railway, New York, N. Y., which is adverse to the tort creditors who did not accept the offer of the receivers to exchange their judgment claims for bonds of the New York Railways, the successor company. There are claimants to the amount of between $400,000 and $500,000 in this class, while tort claimants to the amount of $1,400,000 accepted the receivers' offer.

The point before the Special Master was the class of claims that could rank against a large fund derived from the unexpended income of the old New York City Railway. Before anything can be done with this money the operating expenses must be paid out of it. The representatives of the tort claimants contended that the judgment claims for injuries received at the hands of the railroad were as much legitimate operating expenses as the claims of those who had supplied goods for the running of the road. Although they had authority for this claim in the form of a decision by the Court of Appeals of New York, it was opposed to a decision by the Circuit Court of Appeals and Special Master Turner was obliged to follow the ruling of the federal court. Consequently, the tort claimants who refused the receivers' offer must take their chance of getting their judgments settled out of whatever is left when the final settlement of the affairs of the New York City Railway is reached. It is expected that they will realize about 40 or 50 per cent of the amounts for which they

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obtained judgments. None of these legal complications affect the tort claimants who accepted the bonds of the New York Railways. Their judgment claims now belong to the New York Railways and it alone is now concerned with the value of these claims. These tort claimants have to consider merely the value of the bonds they received.

Seventh Avenue Subway Route, New York

The first step was taken on July 15 by the Public Service Commission of the First District of New York in the preparation of the Seventh Avenue route from Times Square to the Battery, which will be operated by the Interborough Rapid Transit Company. On Aug. 1 a public hearing will be held on the form of contract for this line, which is divided from the Battery to Times Square into six sections. The first runs from the Battery under Greenwich Street almost up to Vesey Street. The second is under Greenwich Street, West Broadway and Varick Street almost to Beach Street; the third runs under Varick Street and Seventh Avenue Extension to Commerce Street; the fourth under Seventh Avenue Extension and Seventh Avenue to about Sixteenth Street; the fifth goes as far north as Thirtieth Street, and the sixth carries the line onto its connection with the present subway, about 60 ft. south of Forty-third Street.

On Aug. 1 there will be also a public hearing on the form of contract for the New Utrecht Avenue division of the Fourth Avenue, Brooklyn, line, which will be operated by the Brooklyn Rapid Transit Company.

The commission has awarded the contract for the construction of the section of the Brooklyn Rapid Transit Broadway subway from Bleecker Street to Union Square to the Dock Contractor Company, Hoboken, for $2,578,078.

Mr. Whitridge's Apologia

Frederick W. Whitridge, president of the Third Avenue Railway, New York, N. Y., in the report of the company for the six months ended June 30, 1913, referred to elsewhere in this issue, has presented a brief apologia to the security holders of the company who have been uneasy over the course he has pursued with respect to the public authorities. His remarks were prompted by the decision of the Appellate Division of the Supreme Court, sustaining the company's contention in respect to the franchise taxes still in dispute. Mr. Whitridge said:

"I have said a good many things about the Board of Tax Commissioners and about the Public Service Commission which are not conventional and which are not pleasant to say, and I am aware that numbers of good people, who prefer the lines of least resistance and object to controversy, think that I have been 'unwise' and 'injudicious'; I am also aware that the public generally does not like its officials to be treated with apparent disrespect. But, in whatever I have said, I believe I have considered primarily only the interests of this property, and perhaps my critics may find comfort and justification for me in the fact that in all my litigations with the authorities, I have been invariably adjudged to be right. My course has, however, been deliberately chosen, because I have ventured to feel that in dealing with these subjects as I have, I was in some sense discharging a public duty.

"The plain truth is, both in the State and Nation, it is seldom that we find a first-class man or a second-class man in any administrative office. It sounds unpatriotic, but the fact is indisputable. These men are honest enough, almost without exception, but their performances are incredible. Take this company for instance: For five years I have been engaged in rehabilitating the Third Avenue Railroad, and in a year or two more the job will be finished. The Public Service Commission has not helped me at all; it has delayed me, put me to very great and wholly useless expense, plagued me in a hundred ways, and among many other foolish suits against me, brought one which might have ruined me individually. It is a shameful thing that such a state should exist. I am bound to add that with the advent of a new chairman and the change of control the spirit of common sense appears to have breathed upon the commission itself, though it has not permeated its organization.

"Take also the case of this Board of Tax Commissioners at Albany: Twelve years ago they assessed the value of the franchises of the railroad. After nine years' litigation their assessments were cut in two, and yet, during the next three years they continued to assess those franchises at the original figures fixed for them, as if the Court of Appeals never had spoken or did not exist. I submit that nothing more monstrous can be imagined.

"The same sort of thing is going on in a different degree all over the country. We see everywhere small people entrusted with enormous powers, and new powers and new functions are continually being loaded upon their poor, weak backs. The most of them have had to do with politics, and 'politics' makes cowards of them, every one. They become, as representatives of the State and of the people, as they suppose, arrogant, vain, determined to construct a great bureaucracy, regardless of expense, and they adopt and try to force upon us every sort of fad and vagary which can be found in printed books. Here, for instance, is the Interstate Commerce Commission, which has foisted upon the country a 'valuation' of all the railroads in the United States. It will cost millions, and it is as senseless a folly as any scheme of George Law's, or of Cagliostro's. When it is finished—if it ever is—the only conceivable effect of it will be to addle more brains and provide more sloppy oratory.

"As I perceive how the tendencies to interfere with corporations by regulation, which degenerates into mere meddlesomeness, has grown, how the pathetic belief of the public in these regulations has increased and how little the regulators themselves have improved, I have felt it was the duty of ever man concerned with corporations to speak of these tendencies with candor. I have endeavored to do so, but never without full provocation.

"I believe that these officials must be taught that corporation managers are as upright, as honorable, as keen for the public welfare, and as interested in social justice—whatever that is—as any other set of people whatsoever, and that they cannot with impunity be talked about or written about as if they were anything else. I have felt also that if plain, accurate language could compel these officials to be amenable to reason, to keep within the law, to mind their own business, and to realize their true relation to the universe, it was a duty to the State and a help to those officials themselves to see that plain, accurate language was used, for I firmly believe that if these tendencies are not checked we shall presently be thinking less of the new nationalism and the new freedom than of the new slavery and the various liveries in which it is sought to be disguised."

Strike Broken in Phoenix

The strike of the conductors and motormen of the Phoenix (Ariz.) Railway, which was begun on June 22, 1913, as noted in the Electric Railway Journal of June 28, 1913, has been broken. The strike was attended with considerable violence. On June 27 Samuel H. Mitchell, general manager of the company, in a statement which he tendered the Arizona Corporation Commission, agreed to arbitrate the question of wages and of seniority, two of the principal contentions of the men on strike, but he did not mention the question of recognition of the union or of the reinstatement of William Ward, who was discharged for threatening to make trouble. This offer was rejected by the strikers, whose places were promptly filled by the company with experienced men brought from Los Angeles, Cal. On July 1 the regular schedule was maintained on the Washington Street line and an intermittent schedule was maintained on three other lines, including the Glendale interurban. A considerable number of passengers were carried without molestation. In a statement which he issued recently in regard to the situation Mr. Mitchell said: "The men have turned down our proposition to arbitrate the questions of wages and seniority. Now we are going to raise wages voluntarily and I hope that when we do so many of our former employees will come back to work. The men from Los Angeles that we have put to work are experienced operatives and will stay until the present trouble is settled. Some may stay permanently."

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Cincinnati Arbitrators Submit Terms of Agreement

The board of arbitration consisting of John P. Frey, representing the employees of the Cincinnati (Ohio) Traction Company; Walter A. Draper, secretary of the company, representing the company, and Walter A. Knight, which has been considering the difference between the company and its employees, reported its findings on July 15. The board organized on May 27, 1913. Among the subjects considered were the discharge of certain men prior to the recent strike, the questions of wages, hours of service, etc. The hearings held in regard to the reinstatement of men were not open to the public, although each man as his case was heard was present at the examination. The sessions of the board in regard to the general questions which were arbitrated were open to the public and the press. The board served without pay. The board named forty-two men to be reinstated, rejected the claims of sixteen men for reinstatement and still had under consideration on July 15 the cases of three men. The cases of three other men were withdrawn by the representative of the men without a hearing. The new contract between the company and its employees is to be considered as going into effect July 1, 1913, and is to continue until midnight June 30, 1916. The new scale of wages for motormen and conductors is to date from May 20, 1913, the day the men returned to work. Negotiations for a new agreement are to be taken up at least sixty days prior to the expiration of the agreement of July 1, 1913, and in case of the failure to reach an agreement ten days before the expiration of the contract on July 1, 1916, the matter of a new agreement is to be referred to a board of arbitration consisting of a representative of the men, a representative of the company and a third member to be selected by these two. The findings of the board in regard to the scale of wages follow:

For the year from July 1, 1913, to midnight, June 30, 1914: First six months, 20 cents an hour; second six months, 21 cents an hour; second year, 23 cents an hour; third year, 23 cents an hour; fourth year, 24 cents an hour; fifth year, 24 cents an hour; sixth year, 24 cents an hour; seventh year, 25 cents an hour; eighth year, 25 cents an hour; ninth year, 26 cents an hour; tenth year, 27 cents an hour.

For the year from July 1, 1913, to midnight, June 30, 1915: First six months, 20 cents an hour; second six months, 21 cents an hour; second year, 23 cents an hour; third year, 23 cents an hour; fourth year, 24 cents an hour; fifth year, 24 cents an hour; sixth year, 25 cents an hour; seventh year, 25 cents an hour; eighth year, 26 cents an hour; ninth year, 27 cents an hour.

For the year from July 1, 1915, to midnight, June 30, 1916: First six months, 20 cents an hour; second six months, 21 cents an hour; second year, 23 cents an hour; third year, 23 cents an hour; fourth year, 24 cents an hour; fifth year, 24 cents an hour; sixth year, 25 cents an hour; seventh year, 26 cents an hour; eighth year, 27 cents an hour.

The rate for overtime is to be time and one-third.

Motormen and conductors transferred from the transportation department to operate other than regular passenger cars are to receive the following rates of pay: Sprinklers, 22 cents an hour; work cars, 22 cents an hour; mail cars, 24 cents an hour.

Time and a half is to be paid for all time put in on snow sweepers, including the time after reporting spent in waiting in the carhouses to take out the sweepers.

The regular rate is to be paid to men assigned to operate pay cars, sand cars, salt cars and special cars.

The following provision was made for arbitration in case of any dispute in regard to the meaning of any of the findings of the board under the agreement of July 1, 1913:

"In case of dispute concerning the meaning of any of the findings of this Board of Arbitration the disputed section or language shall be referred to this board for definition and elucidation, and should any one of said arbitrators be unable to act, the side represented by the arbitrator who may be incapacitated shall choose a third arbitrator, or in case the third arbitrator acting in the present arbitration shall be incapacitated, the two remaining arbitrators shall choose a third."

Resumption of Service Ordered on Chicago Suburban Lines

During the period of suspension of operation by the County Traction Company and the Suburban Railroad some of the Chicago suburbs reached by the lines have discussed the purchase of the properties with the idea of paying the wages demanded by the striking trainmen and thus securing resumption of service to the city. The City Council of Evanston, Ill., finally rejected on July 16 the proposition that it take over the line of the County Traction Company in that city as Corporation Counsel McNab said that the city had no legal right to own and operate the street railway system unless authorized by referendum. The sale of the Suburban Railroad, which is in the hands of a receiver, has been ordered by Judge Petit of the Cook County Circuit Court. Notwithstanding the statement of Emil G. Schmidt, receiver, that earnings will not permit the payment of the wages demanded by the striking trainmen, Judge Petit takes the position that the road must be operated and declared that he would order the sale of the property. Several independent petitions seeking to compel restoration of service have been filed.

Action on Through Routing in Chicago Deferred.—Action on the proposed ordinance providing for through routes on the elevated lines in Chicago with transfers and the construction of a terminal subway in the business district was deferred by the City Council on July 14 until the meeting of July 21.

Vallejo Wreck Results in Heavy Damage Suits.—Damage suits against the San Francisco, Napa & Calistoga Railway, Napa, Cal., as a result of the collision and wreck of two electric trains near Vallejo on June 19 last, will, it is estimated, amount to $500,000. In first large suit gross carelessness is alleged in the complaint, which asks for $75,000 damages.

Underground Trolley Ordinance in Chicago.—Mayor Harrison of Chicago sent ordinances to the City Council on July 14 requiring the railway companies to install the underground trolley in the district bounded by Thirty-first Street, Ashland Avenue, North Avenue and Lake Michigan. The ordinances were referred to the committee on local transportation.

Massachusetts Public Service Commission Organized.—The Public Service Commission, appointed under the provisions of chapter 784 of the Acts of the General Court of Massachusetts for the year 1913, and consisting of Frederick J. Macleod, George W. Anderson, George P. Lawrence, Clinton White and George W. Bishop, has organized by the choice of Frederick J. Macleod as chairman.

Power Contract Rumors in Louisville.—T. J. Minary, president of the Louisville (Ky.) Railway, said recently that the matter of the Louisville Gas & Electric Company supplying the railway with power, has not come before him. It is stated that the Byllesby interests, which control the Louisville Gas & Electric Company, have investigated the power requirements of the railway and are prepared to offer a rate which they think will result in the railway purchasing current.

America's First Safety Exposition.—The first international exposition of safety and sanitation ever held in America will take place in New York City, Dec. 11 to 20, 1913, under the auspices of the American Museum of Safety. Safety and every branch of American industrial life will be represented at the exposition. By a special act of Congress, exhibits from Europe and other foreign countries are to be admitted free of duty. All of the twenty-one museums of safety in Europe will contribute to the American exposition.

Severe Windstorm.—W. C. Sparks, vice-president and general manager of the Rockford & Interurban Railway, Rockford, Ill., reports that that company did not suffer any serious damage in the severe windstorm of July 8, although a few trolley wires were torn down when trees were blown on them. The telephone companies suffered very severely and as their wires were blown across the wires of the electric railway, it was necessary to suspend railway operation for a time on account of the possible danger to the public arising from the telephone wires.

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Municipal Ownership Advocates Heard in Detroit.—At the regular meeting of the Common Council of Detroit, Mich., on July 7, Henry Kumerford, president of the Detroit Federation of Labor, opposed the street railway ordinance proposed by Mayor Marx. He said that the people favor municipal ownership and that the Council, as the servant of the people, should report adversely on the ordinance. Several other advocates of municipal ownership spoke against the ordinance. Frank E. Hambarger, who is opposed to municipal ownership, supported the ordinance.

Meeting of State Railway Commissioners to Discuss Valuation.—A meeting of the committee representing the National Association of Railway Commissioners was held in Chicago on June 27 to discuss the appraisal of interstate carriers, which is now under way by the Interstate Commerce Commission. The following attended the meeting: Halford Erickson, Wisconsin; O. P. Gothlin, Ohio; Clifford Thorne, Iowa; George A. Henshaw, Oklahoma; Charles F. Staples, Minnesota; H. S. Martin, Kansas; Orville F. Berry, Illinois; C. L. Glasgow, Michigan, and H. T. Clarke, Jr., Nebraska.

Maine Public Utilities Act.—As predicted in the Electric Railway Journal of July 15, 1913, page 42, the new Maine Public Utilities Act was rendered inoperative on July 12 by filing a petition for a referendum, containing more than 10,000 names. Governor Haines will announce the date for a general election to decide on the matter. This election, however, cannot be held before Nov. 12. It is said that friends of the measure will test the right of proponents or opponents of a measure to purchase signatures to referendum petitions, as has been done in this case. Meanwhile, the present railway commission will continue in power.

Elevated Lines Suggested for Detroit.—Speaking before the city plan and improvement commission at Detroit on July 10, E. H. Bennett, a Chicago architect, suggested that an elevated railway be built on Woodward Avenue and that other elevated lines be built later on, with cross-town lines at convenient places. He said that cities in foreign countries have succeeded in eliminating the noise to a large extent. Mr. Bennett had not made an exhaustive study of the transportation problem in Detroit and his suggestions were based upon plans he had made for beautifying the city. He has made a set of maps showing the changes and improvements which he thinks necessary to make the city what the commission desires and the plans for transportation are incidental to the main idea.

Buffalo Wage Arbitration.—Statistics showing the wages paid throughout the country by electric railways to their employees have been presented to the board of arbitration named to settle the question of wages and conditions of service between the International Railway, Buffalo, N. Y., and its employees. Officials of the company started to put its evidence before the board on July 15. For almost three weeks the employees have been introducing their evidence before the board and it is expected it will take the International Railway about as long. Burt L. Jones, vice-president and general manager of the Great Gorge Route, represents the International Railway on the board; Assemblyman Edward D. Jackson appears for the men. Mayor Louis P. Fuhrmann, of Buffalo, is the third member. The sessions of the board of arbitration are secret.

Progress of Kansas City Negotiations.—After the conference on July 2 between the representatives of the city of Kansas City, Mo., and the officers of the Metropolitan Street Railway in regard to the details of the terms of the proposed new franchise to the company Mayor Jost said that the city is contending for a single engineer of its own choosing to manage the property. The company desires two engineers. The Mayor also said that the question of possible conflicting authority between the two Kansas Cities and the public utility commissions in Missouri and Kansas was also causing the negotiators some anxiety. On July 3 the questions of charges to the operating and maintenance accounts were considered. The conferences were then put over for a period of ten days. Following this conference the Mayor said: "I feel that we are making good progress." A statement in regard to the matters considered is given out after each meeting.

Erdman Act Amended.—On July 15, 1913, the Newlands bill, designed to broaden and strengthen the Erdman arbitration act, was rushed through both houses of Congress and signed by President Wilson. Instead of a board of arbitration of only three members, the amendment provides for a board of six members. It also creates a commissioner of mediation and conciliation, who, with two other Government officials to be appointed by the President, will constitute a board of mediation and conciliation. This board will name disinterested arbitrators to act with arbitrators chosen by employers and employees. The amendment relies upon voluntary arbitration. As a result of this action it is believed that the threatened strike of trainmen and conductors on the Eastern railroads will be averted through the submission of their grievances to the board of arbitration which is provided for in the new law.

First Municipal Car From Bay to Ocean.—San Francisco celebrated the completion of the Geary Street Municipal Railway on June 25. The Mayor, Commissioners of Public Works, Board of Supervisors and a few invited guests, among whom were the contractors who built the road, were passengers on the first car up Market Street from the ferries to the ocean. Under an agreement between the city and the United Railroads the cars of the Geary Street Municipal Railway and the cars of the Sutter Street line of the United Railroad operate over the same tracks in Market Street from the Ferry Building to Sansome Street. These tracks are on either side of the main United Railroad tracks, making a four-track system for this portion of Market Street. Transfers are exchanged between cars of the United Railroads and the municipal cars at corners where the municipal line intersects various United Railroad lines.

Governor Dunne on the Illinois Utility Act.—In a statement which he issued at the time he signed the Illinois utility act, abstracted in the Electric Railway Journal of July 12, 1913, page 75, Governor Dunne of Illinois said in part: "The public utilities bill passed by the Legislature in the form in which it comes to me for approval, is in many respects the best measure of its kind that has found its way into the laws of a State, notwithstanding that there have been eliminated from it certain home-rule provisions which I earnestly supported and tried to have placed in the act. It is elastic; it is workable; provides ample authority for a public utilities commission when appointed to deal efficiently with all problems it may undertake. It is, in my judgment, better than the Wisconsin law, which has been regarded as a model, to wit: (1) Giving the commission control of public-owned utilities, and (2) giving private corporations indeterminate franchises."

South Boston Service Improvement.—A new double-track surface car line will shortly be placed in service by the Boston (Mass.) Elevated Railway between the Boston South Station district and L Street, South Boston, forming a cut-off route between the city proper and the residential peninsula terminating at City Point. The route will include the extension of Summer Street and L Street, and will probably save about one-half mile of distance and at least five minutes in running time over the present Dorchester Avenue-Broadway route. Additional service will be given to new steamship docks and the line will be utilized by the company in operating morning and evening extras in and out of the business district, besides providing an attractive shore route for pleasure travel to and from the City Point Park district. It will also relieve traffic conditions on the Broadway lines, which serve a dense population lying within about 2 miles from the downtown section of Boston.

Washington's Herdic Transfer Case Carried to Supreme Court.—The Capital Traction Company and the Washington Railway & Electric Company, Washington, D. C., in separate actions filed in the Supreme Court of the District of Columbia, have taken steps to have that tribunal pass on the constitutionality of the law of Aug. 24, 1912, requiring reciprocal transfer agreements between the companies and the Metropolitan Coach Company. The District Commissioners, the Public Utilities Commission and the Metropolitan Coach Company are named as defendants. While the proceedings are in the form of bills for injunction, they are

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in effect an appeal from the order of the Utilities Commission, passed on June 2, requiring the companies to issue and accept transfers to and from the Sixteenth Street herdic line under the penalty of $100 for each violation. The companies, under protest, agreed to obey the order pending a legal determination of the constitutionality of the enactment and have been issuing and receiving transfers from the Metropolitan Coach Company.

Arbitration at Boston.—The issues pending between the Boston (Mass.) Elevated Railway and its car service employees are to be arbitrated by a board of three members, as noted in the ELECTRIC RAILWAY JOURNAL of July 12, 1913, page 80. The company will be represented by James L. Richards, of the executive committee of its board of directors, and the employees' union by James H. Vahey. The third member of the board will be James J. Storrow, president of the Boston Chamber of Commerce and a member of the banking firm of Lee, Higginson & Company. The questions which are to be considered are the wages to be paid by the company, the hours of labor of employees in the road and track departments, the establishment of uniform hours in shops, free transportation for employees, abolition of piece work, and the establishment of a minimum wage for extra men not assigned to work to the extent of seven hours. The board of arbitrators sitting in the Boston Elevated Railway wage issue has held preliminary sessions at Boston and has announced that it will hold public hearings for the presentation of testimony and other data beginning about July 20. It is possible that the sessions of the board will be held at the State House.

Proposal for Municipal Ownership in Seattle.—Scott Calhoun, one of the receivers of the Seattle, Renton & Southern Railway, Seattle, Wash., has proposed to the franchise committee of the City Council of Seattle, Wash., that the city purchase the property of the Seattle, Renton & Southern Railway within the city for $1,200,000, of which amount $350,000 is to be paid in cash or municipal street railway bonds and the remainder in 6 per cent public utility bonds to be issued for the purpose. Mr. Calhoun's offer, made as he explained at the suggestion of Judge A. W. Frater, of the Superior Court, is tentative, intended to end, if possible, the litigation in which the company is involved and take care of the creditors of the company. The proposition carries with it the immediate construction by the city of about 6 miles of extensions in the Rainier Valley through the sale of the remaining $150,000 of the $800,000 of municipal street railway bonds authorized by the voters nearly three years ago. Mr. Calhoun explained that he had no authority to make a price on the line outside the city limits, but expressed a belief that the city could acquire it at a very reasonable figure. He said he would submit to the Council an offer covering the entire property of the Seattle, Renton & Southern Railway as soon as it could be formulated.

New York Franchise Tax Assessments Ordered Reduced.—The Appellate Division of the Supreme Court has handed down a decision reducing the assessment of the State Board of Tax Commissioners on the special franchises of the Third Avenue Railway for 1910 from $7,920,000 to $5,493,695 and the assessment by the same board on the special franchise of the Kingsbridge Railway from $759,000 to $629,301. Justice Gavegan, at Special Term, had found that, although the assessments as made represented the full value of the special franchises as found by the State Board of Tax Commissioners, yet, as a matter of fact, the value of the special franchises of the Third Avenue Railway determined by the net earning rule, so called, was $10,863,806, and of those of the Kingsbridge Railway $1,033,513, and that, therefore, the assessment as made only represented about 73 per cent of the actual value of the special franchises. Counsel for the companies contended at Special Term and before the Appellate Division that they were entitled to have the assessment reduced to 89 per cent of the value as determined by the State Board in order to equalize them with other property assessments, and Justice Laughlin, who wrote the opinion, in which all concur, said that it had been authoritatively settled that the court should reduce special franchise assessments to the same percentage of valuation as has been followed generally with respect to the assessments of other real property on the same roll.

Financial and Corporate

Stock and Money Markets

July 16, 1913.

In the early trading on the New York Stock Exchange to-day the demand for stocks was brisk, contrasting strongly with the listless tone for several days past. Increased strength was shown in the trading after noon and further gains were made in the leading issues. Recessions were noted in the final dealings. Rates in the money market to-day were: Call, 2@2½ per cent; sixty days, 3½@4 per cent; ninety days, 5@5¼ per cent; four months, 5½@5¾ per cent; five months, 5¾@6 per cent; six months, 6@6½ per cent.

Philadelphia Rapid Transit and General Asphalt issues led in the improvement in the Philadelphia market to-day. Trading was on a more normal basis than for some time past.

The Chicago market was strong to-day. Chicago Elevated Railways preferred was an exception, falling six points to seventy.

The Boston market was active to-day. Advances were scored throughout the list with large gains in several issues.

United Railways issues were conspicuous in the trading in Baltimore to-day.

Quotations of traction and manufacturing securities as compared with last week follow:

	July 9	July 16
American Brake Shoe & Foundry (common)	87½	87¼
American Brake Shoe & Foundry (preferred)	126½	130
American Cities Company (common)	33¼	37⅜
American Cities Company (preferred)	66	66
American Light & Traction Company (common)	365	340
American Light & Traction Company (preferred)	106½	104
American Railways Company	38	38
Aurora, Elgin & Chicago Railroad (common)	40	39½
Aurora, Elgin & Chicago Railroad (preferred)	85	85
Boston Elevated Railway	87½	89½
Boston Suburban Electric Companies (common)	7½	7½
Boston Suburban Electric Companies (preferred)	50	50
Boston & Worcester Electric Companies (common)	*8	*8
Boston & Worcester Electric Companies (preferred)	42	42
Brooklyn Rapid Transit Company	86⅜	87⅞
Capital Traction Company, Washington	114⅞	119¼
Chicago City Railway	165	165
Chicago Elevated Railways (common)	26	*26
Chicago Elevated Railways (preferred)	75	*75
Chicago Railways, ptcptg., ctf. 1	95½	95
Chicago Railways, ptcptg., ctf. 2	23½	25
Chicago Railways, ptcptg., ctf. 3	7	7½
Chicago Railways, ptcptg., ctf. 4	2½	*2½
Cincinnati Street Railway	*110	110
Cleveland Railway	102½	103
Cleveland, Southwestern & Columbus Ry. (common)	6	6
Cleveland, Southwestern & Columbus Ry. (preferred)	29	29
Columbus Railway & Light Company	12	18
Columbus Railway (common)	60	69½
Columbus Railway (preferred)	80	88
Denver & Northwestern Railway	107	107
Detroit United Railway	*70	70
General Electric Company	137	139½
Georgia Railway & Electric Company (common)	115⅜	115⅜
Georgia Railway & Electric Company (preferred)	84	82¼
Interborough Metropolitan Company (common)	14⅞	15⅛
Interborough Metropolitan Company (preferred)	54⅛	56¼
International Traction Company (common)	30	*30
International Traction Company (preferred)	95	*95
Kansas City Railway & Light Company (common)	18	18
Kansas City Railway & Light Company (preferred)	36	36
Lake Shore Electric Railway (common)	9	9
Lake Shore Electric Railway (1st preferred)	90	90
Lake Shore Electric Railway (2d preferred)	25	25
Manhattan Railway	125	125
Massachusetts Electric Companies (common)	13½	14½
Massachusetts Electric Companies (preferred)	68¼	70
Milwaukee Electric Railway & Light Co. (preferred)	90	*90
Norfolk Railway & Light Company	25	25
North American Company	65	67
Northern Ohio Light & Traction Company (common)	75	a75
Northern Ohio Light & Traction Company (preferred)	100	a100
Philadelphia Company, Pittsburgh (common)	39½	39
Philadelphia Company, Pittsburgh (preferred)	39	39
Philadelphia Rapid Transit Company	21¼	21½
Portland Railway, Light & Power Company	58	58
Public Service Corporation	109	107
Third Avenue Railway, New York	30¼	32¾
Toledo Railways & Light Company	2¼	a12
Twin City Rapid Transit Co., Minneapolis (common)	101½	102½
Union Traction Company of Indiana (common)	4½	4½
Union Traction Company of Indiana (1st preferred)	80	80
Union Traction Company of Indiana (2d preferred)	30	30
United Rys. & Electric Company (Baltimore)	25½	26½
United Rys. Inv. Company (common)	17	18
United Rys. Inv. Company (preferred)	31¾	32
Virginia Railway & Power Company (common)	51	51
Virginia Railway & Power Company (preferred)	a92	89
Washington Ry. & Electric Company (common)	89	89½
Washington Ry. & Electric Company (preferred)	87	87½
West End Street Railway, Boston (common)	70½	70½
West End Street Railway, Boston (preferred)	85	85
Westinghouse Elec. & Mfg. Company	57	59
Westinghouse Elec. & Mfg. Company (1st preferred)	104	106

*Last sale. a Asked.

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Report of Third Avenue Railway

Frederick W. Whitridge, president of the Third Avenue Railway, New York, N. Y., in a statement to the stockholders of the company for the six months ended June 30, 1913, said in part:

"From the statements of income for June and for the past six months it appears that the total increase in gross receipts amounts to $572,756 and that the surplus income for the system, after providing for the interest on the 5 per cent adjustment bonds is $389,000 for the six months ending July 1. I accordingly recommend the payment of 2½ per cent on the adjustment bonds on Oct. 1.

"These figures include receipts and profits of the Belt Line Railway Corporation from March 22, and are in a small degree estimated, but the total will not be substantially affected by any changes.

"The Belt Line property was purchased at a total cost of $2,439,639. The Public Service Commission authorized the issue of 1750 bonds, bearing interest at 5 per cent, and ordered that they be sold at not less than 95. They have not yet been sold. The purchase has been carried on a note of the railway company, which falls due on Oct. 1. I have arranged for an extension of that loan together with an option on the bonds for a further period of six months from Oct. 1, and have agreed to pay on account of the principal of that note the sum of $500,000. I should add that the earnings of this property have exceeded my expectations. The interest upon the bonds authorized by the Public Service Commission has thus far been earned twice over, and so far as I can see the property promises to pay a handsome income on the total cost of the investment.

"I also submit a statement showing the items of capital expenditure for which refunding bonds might under the terms of the mortgage properly be issued. I do not, however, at this time, recommend that any application be made to the Public Service Commission for the issue of such bonds. The item for the New York City Interborough securities has been partly paid, so that the amount now due is only $1,000,000 and $500,000 will be paid on account of the Belt Line note on Aug. 25. We have cash enough on hand to pay for all of the budget expenditures mentioned in my last report and for so much of these capital expenditures as will fall due during the current year, and if an application to issue the bonds were granted, I should not really know what to do with them, as a sale at the present prices is not to be thought of. In addition to these items, however, an application will be made to the Public Service Commission for the issue of a sufficient amount of bonds, first, to purchase the Mid-Crosstown Railway [a cash offer was made for that property on the lines of the decision of the Public Service Commission. The bondholders of the Mid-Crosstown line would not even listen to it. Subsequently another offer for $500,000 of bonds, which the Mid-Crosstown people are willing to accept, has been made, which I have said to the Mid-Crosstown committee I do not believe the commission would permit us to carry out]: second, to arrange for a readjustment of the affairs of the Dry Dock road. This also is of such a character that the holders of the certificates of indebtedness have arranged to undertake to get the assent of the commission for the new mortgage required.

"I have also arranged with the Travelers Insurance Company of Hartford for the issue of a policy of $1,000 on each employee of the company upon terms which I think highly favorable. In the meantime, the cost of free medical advice, the sick pay and the club-room expenses are met by the association, and if a man does not wish to take out the $1,000 policy the association would still be able to pay the sum of $250 in case of death.

"I am happy also to report that during the last week a sweeping decision in favor of the company has been rendered by the Appellate Division of the Supreme Court, sustaining its contention in respect to franchise taxes still in dispute, and unless the authorities choose to prolong the litigation by appeal to the Court of Appeals, this will probably enable me to pay the residuum of all the franchise taxes due, for which the cash is on hand in our interest and tax account."

American Water Works & Guarantee Company, Pittsburgh, Pa.—Edmund S. Converse, Albert H. Wiggin and Charles F. Brooker at the request of holders of both common and preferred stock of the American Water Works & Guarantee Company have agreed to act as a stockholders' protective committee and request stockholders to deposit their stock certificates with the Bankers' Trust Company, New York, N. Y.

Belt Line Railway Corporation, New York, N. Y.—The Belt Line Railway Corporation has applied to the Public Service Commission for the First District for permission to issue $40,700 in stock to the Third Avenue Railway.

Dry Dock, East Broadway & Battery Railway, New York, N. Y.—Judge Lacombe, in the United States District Court, has denied the application of Frederick W. Whitridge, receiver of the Dry Dock, East Broadway & Battery Railway, for authority to issue $149,000 of receivers' certificates. Judge Lacombe said the matter was one that would have to be passed upon by a special master. Counsel for Receiver Whitridge and for creditors stated that the property of the railway company would have to be sold under foreclosure.

Hudson & Manhattan Railroad, New York, N. Y.—Kuhn, Loeb & Company, and Harvey Fisk & Sons, New York, N. Y., and Robert Fleming & Company, London, Eng., have announced that as more than 98½ per cent of the 4½ per cent mortgage bondholders and more than 95½ per cent of the preferred and common stock owners of the Hudson & Manhattan Railroad have assented to the plan of readjusting the company's finances, the plan is declared effective. Shareholders have been called upon to pay their assessment of $8.50 per share by Aug. 1.

Idaho-Oregon Light & Power Company, Boise, Idaho.—The State Bank, Chicago, Ill., trustee for the holders of the $3,319,000 of bonds of the Idaho-Oregon Light & Power Company, the interest on which payable on April 1, 1913, is in default, has filed suit in the federal court at Boise to foreclose the mortgage under which the bonds are secured. The company is controlled by the same interests that control the Idaho Railway, Light & Power Company.

International Railway, Buffalo, N. Y.—In the department "Financial and Corporate" in the ELECTRIC RAILWAY JOURNAL of July 5, 1913, reference was made to reported plans for a merger to include the International Railway, the Buffalo & Lake Erie Traction Company and the Buffalo, Lockport & Rochester Railway to provide a through trunk line between Rochester, Buffalo and Erie. E. G. Connette, president of the International Railway, is quoted as follows in this connection: "One of the provisions of the new mortgage for $60,000,000 recently executed contains a clause which prevents the International Railway from consolidating or taking over other properties. The Buffalo & Lake Erie Traction Company is now in process of reorganization. It may be months before the matter is taken into the courts, if ever, and the present mortgage foreclosed. The reorganization committee may bid in the line, and then the consolidation with the Buffalo, Lockport & Rochester Railway could be effected. The only way in which the International Railway is interested or connected with the deal is in the fact that these two lines in order to operate through cars from Erie, Pa., to Rochester would have to run over the tracks of the International Railway from Buffalo to Lockport. Officials of both of these lines have taken this matter up with the directors of the International Railway in an informal way, but the matter as it stands now is only in a premature state, as it were."

Lake Shore, Bowling Green & Napoleon Railway, Bowling Green, Ohio.—C. G. Taylor, receiver of the Sandusky, Norwalk & Mansfield Electric Railway, has been appointed receiver of the Lake Erie, Bowling Green & Napoleon Railway by the United States District Court, Northern District of Ohio. Mr. Taylor succeeds B. C. Harding and A. E. Royce, who have been receivers of the property since May, 1911. Mr. Taylor will continue to act as receiver and general manager of the Sandusky, Norwalk & Mansfield Electric Railway, and will divide his time between the two properties, having one office at Bowling Green and one at Norwalk, Ohio.

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Manchester Traction, Light & Power Company, Manchester, N. H.—Plans have been perfected for consolidating the Manchester Traction, Light & Power Company and the Nashua Light, Heat & Power Company. The Manchester Traction, Light & Power Company has an authorized capital stock of $2,800,000, all of which is outstanding, and $2,000,000 of bonds, of which $1,750,000 is outstanding. The Nashua Light, Heat & Power Company has $600,000 of stock and no bonded debt. The plan for the consolidation, which has already been approved by the directors of the Nashua light, Heat & Power Company, involves the exchange of one share of stock in that company for one share of full paid stock of the Manchester Traction, Light & Power Company and $40 in cash, provided that holders of at least 90 per cent of the stock of the Nashua Light, Heat & Power Company agree to the exchange.

Medfield & Medway Street Railway, Westfield, Mass.—Eugene H. Mather, receiver of Medfield & Medway Street Railway and the Dedham & Franklin Street Railway, was authorized by Judge Hammond in Supreme Court on July 12 to sell the franchises and property of both companies at public auction at such time and place as he selects, unless $126,448 was paid to the Old Colony Trust Company on July 17 on behalf of bondholders of the Medfield & Medway Company for bonds and accrued interest, and $114,322 was paid to the Beacon Trust Company to be paid to bondholders of Dedham & Franklin Street Railway.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—The Oakland, Antioch & Eastern Railway has been granted authority by the Railroad Commission of California to issue $1,000,000 of bonds to provide funds to complete its railway between Bay Point and Sacramento.

Public Service Company of Northern Illinois, Chicago, Ill.—The Public Service Company of Northern Illinois has sold to a syndicate composed of Lee, Higginson & Company, N. W. Halsey & Company and Russell, Brewster & Company, $2,500,000 of three-year 6 per cent collateral gold notes, secured by $3,125,000 of its first and refunding mortgage 5 per cent bonds. The notes are convertible into the first and refunding bonds at the buyer's option. They will be offered to investors on an income basis of 7 per cent.

San Francisco-Oakland Terminal Railways, Oakland, Cal.—A plan which has been proposed for the re-organization of the San Francisco-Oakland Terminal Railways provides for the organization of a new company with the same amount of capital stock as the San Francisco-Oakland Terminal Company, namely, $14,600,000 of common stock, $9,200,000 of A preferred stock and $1,000,000 of B preferred stock. Holders of A preferred will receive an equal amount of new 6 per cent preferred cumulative after Aug. 15, 1918. Holders of B preferred will receive an equal amount of 6 per cent non-cumulative second preferred, and holders of common will receive an equal amount of the new common. The new company will issue $4,000,000 of five-year 6 per cent notes, which, less the necessary expenses in carrying out the plan of reorganization, will be used to refund the $2,500,000 past due notes and to pay floating indebtedness of the San Francisco-Oakland Terminal Railways. Of the notes $2,000,000 additional will be reserved to be sold, if necessary, in the future to provide funds for betterments and extensions of the properties. To pay the $1,100,000 notes of the Oakland Terminal Company, which will mature on Aug. 20, 1913, it is planned to issue new 5½-year notes to be secured by the same collateral as the present notes. At a meeting of about fifty minority stockholders of the San Francisco-Oakland Terminal Railways and Oakland Traction Company, a committee of three was appointed to prepare a list of the minority stockholders and call a second meeting for the purpose of levying an assessment to defray expenses of having an expert accounting made of the books of the companies.

South Shore Traction Company, Patchogue, N. Y.—The assets of the South Shore Traction Company were sold on July 11 before Judge Chatfield in the United States Circuit Court in Brooklyn for $16,725. They consisted chiefly of franchises, tracks and ties. They do not constitute a continuous road, as the building was done in sections, as franchises were obtained. Arthur Nosworthy, a Brooklyn contractor, who built some of the lines for the company, bid in two sections of the road for $12,550. Robert D. Ireland bought in for the Babylon Railroad another section against which it holds a lien of $8,500. He paid $1,150 for it. Two other sections went for $1,000 and $2,000 respectively, and a franchise on which no construction had been done was sold for $25.

Southwestern Traction & Power Company, New Orleans, La.—The Southwestern Traction & Power Company has filed notice of an increase in its authorized capital stock from $1,500,000 to $3,000,000.

Toledo, Ann Arbor & Jackson Railroad, Toledo, Ohio.—The Public Service Commission of Ohio has authorized the Toleda, Ann Arbor & Jackson Railroad to issue to Lewis E. Ingalls, president of the company, as a full and final consideration for the assets and property of the company, its capital stock of the par value of $300,000 and to issue its 5 per cent bonds of the total principal sum of $850,000, the proceeds to be used to reimburse Mr. Ingalls for moneys advanced by him and used in the construction and improvement of the railway.

Dividends Declared

Chippewa Valley Railway, Light & Power Company, Eau Claire, Wis., quarterly, 1¾ per cent, preferred; quarterly, 2 per cent, common.

Columbus (Ohio) Railway, quarterly, 1¼ per cent, preferred.

East St. Louis & Suburban Company, East St. Louis, Ill., quarterly 1¼ per cent, preferred.

Jacksonville (Fla.) Traction Company, quarterly, 1¾ per cent, common.

New Hampshire Electric Railways, Haverhill, Mass., 2 per cent.

United Traction Company, Pittsburgh, Pa., 2½ per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

BANGOR RAILWAY & ELECTRIC COMPANY, BANGOR, ME.

Period			Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m.,	May,	'13	$60,280	*$28,087	$32,198	$17,136	$15,062
1 "	"	'12	53,790	*24,018	29,772	16,498	13,274
12 "	"	'13	736,500	*334,240	402,260	204,228	198,032
12 "	"	'12	643,612	*295,175	348,437	174,380	174,057

CHATTANOOGA RAILWAY & LIGHT COMPANY, CHATTANOOGA, TENN.

1m.,	May	'13	$123,315	*$67,425	$55,863	$24,607	$31,256
1 "	"	'12	88,888	*50,359	38,529	21,684	16,845
12 "	"	'13	1,148,956	*688,675	460,281	280,045	180,236
12 "	"	'12	984,516	*582,641	401,875	249,781	152,094

CUMBERLAND COUNTY POWER & LIGHT COMPANY, PORTLAND, MAINE.

1m.,	May,	'13	$175,866	*$100,501	$75,365	$57,293	$18,072
1 "	"	'12	166,126	*96,538	69,588	52,839	16,749
12 "	"	'13	2,199,570	*1,223,574	975,996	670,215	305,781
12 "	"	'12	2,067,554	*1,267,166	800,388	595,880	204,508
12 "	"	'12	2,067,554	*1,267,166	800,388	595,880	204,508

EAST ST. LOUIS & SUBURBAN COMPANY, EAST ST. LOUIS, ILL.

1m.,	May,	'13	$221,798	*$123,572	$98,226	$50,552	$47,674
1 "	"	'12	196,824	*114,262	82,562	48,286	34,276
12 "	"	'13	2,553,497	*1,411,160	1,142,337	585,174	557,163
12 "	"	'12	2,327,593	*1,294,196	1,033,397	560,736	472,661

GRAND RAPIDS (MICH.) RAILWAY

1m.,	May,	'13	$107,572	*$63,029	$44,543	$14,963	$29,580
1 "	"	'12	102,627	*53,187	49,440	14,497	34,943
12 "	"	'13	1,259,545	*727,589	531,956	176,690	355,266
12 "	"	'12	1,202,320	*671,154	531,166	177,172	353,994

LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY, LEWISTON, MAINE.

1m.,	May,	'13	$54,957	*$33,408	$21,549	$15,493	$5,056
1 "	"	'12	49,814	*31,143	18,671	14,447	2,224
12 "	"	'13	646,616	*395,298	251,318	174,554	76,764
12 "	"	'12	613,772	*382,855	230,917	172,277	58,640
12 "	"	'12	613,772	*382,855	230,917	172,277	58,640

NASHVILLE RAILWAY & LIGHT COMPANY, NASHVILLE, TENN.

1m.,	May,	'13	$184,147	*$112,124	$72,023	$37,877	$34,146
1 "	"	'12	173,675	*100,228	73,447	36,200	37,247
12 "	"	'13	2,130,057	*1,225,735	904,322	446,203	458,119
12 "	"	'12	2,006,607	*1,155,895	850,712	413,162	437,550

PORTLAND RAILWAY, LIGHT & POWER COMPANY, PORTLAND, ORE.

1m.,	May,	'13	$549,852	*$269,709	$280,143	162,174	$117,969
1 "	"	'12	543,813	*264,906	278,907	148,392	130,515
12 "	"	'13	6,697,304	*3,296,138	3,401,166	1,829,287	1,571,879
12 "	"	'12	6,446,311	*3,197,588	3,248,723	1,618,748	1,629,975

PORTLAND (MAINE) RAILROAD

1m.,	May,	'13	$79,691	*$61,299	$18,392	$10,729	$7,663
1 "	"	'12	77,570	*55,467	22,103	10,206	11,897
12 "	"	'13	1,003,694	*708,435	295,359	123,995	171,264
12 "	"	'12	968,160	*724,957	243,203	115,936	127,267

*Includes taxes.

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Traffic and Transportation

I. C. C. Decision in Indianapolis-Louisville Freight Case

The Interstate Commerce Commission rendered a decision July 9, 1913, ordering the Indianapolis, Columbus & Southern Traction Company, the Louisville & Southern Indiana Traction Company, the Louisville & Northern Railway & Lighting Company, the Indianapolis & Louisville Traction Company and the Interstate Public Service Company to establish on or before Sept. 15, 1913, and to maintain for a period of not less than two years thereafter, through rates and joint rates for the transportation of merchandise of less-than-carload lots from Louisville to Indianapolis and intermediate points. The decision was rendered in the case of the Louisville Board of Trade and others against the Indianapolis, Columbus & Southern Traction Company and the connecting lines previously mentioned. In deciding the case the commission said in part:

"From Louisville, on the south bank of the Ohio River, to Indianapolis, the Pennsylvania Railroad is paralleled for its entire distance of about 117 miles by a through route composed of the interurban electric railways operated by the Louisville & Southern Indiana Traction Company between Louisville and Jeffersonville, a distance of 3 miles; the Louisville & Northern Railway & Lighting Company, the lines of which extend a distance of 11 miles to Sellersburg; the Indianapolis & Louisville Traction Company, the lines of which extend some 41 miles to Seymour, where they connect with the Indianapolis, Columbus & Southern Traction Company, which operates from Seymour to Indianapolis, a distance of 61 miles.

"The last named line is now operated by the Interstate Public Service Company under a 999-year lease. The latter company, together with the two lines first mentioned, which form the route northward out of Louisville to Sellersburg, are owned or controlled by the Middle West Utilities Company, commonly referred to as the Insull lines. The Indianapolis & Louisville Traction Company, from Sellersburg to Seymour, however, is an independent company. In other words, the two lines running north out of Louisville, and the line extending south from Indianapolis are under a common control, while the connecting link between them is independently owned.

"A network of interurban lines extends from Indianapolis in every direction, with an aggregate of nearly 2000 miles of track, reaching practically all the eastern, northern and western portions of Indiana and to southern Michigan and western Ohio. Some twenty of these companies, with lines in Indiana and Ohio, are named as co-defendants herein. All of them, including the lines from Louisville to Indianapolis, while primarily carriers of passengers, participate in handling less-than-carload freight business; and many, if not all, of them have tariffs on file with this commission naming their local freight or express rates, and in some cases showing also joint rates with connecting electric lines.

"The Louisville commercial interests in this proceeding asked for an order establishing through routes for less than carload traffic to points north of Seymour, and more particularly to Indianapolis and to places on interurban lines reached through Indianapolis. Over such routes, when established, they asked for joint rates that would not exceed the present rates of the steam railways on the same articles to the same points. The local rates of the various defendants now in effect are, in a general way, the same as the rates of the competing steam roads between the same points.

"The testimony of manufacturers and jobbers at Louisville indicates that in the sale of their merchandise at local points in Indiana and western Ohio where they meet the competition of Indianapolis, the need of a package freight service over the through routes here demanded is keenly felt, and that Indianapolis with such an expeditious and efficient service at its command and with routes in effect over which the rates are the same as or less than the freight rates of the steam railroads, has a distinct advantage in soliciting the business of retailers and consumers in that territory. The testimony also fairly established the contention of the complainants that a schedule of express rates for this service as distinguished from freight rates would practically prevent the use of the proposed through routes. It is shown also that in proportion as the rates over these routes may exceed the rates of the steam roads the value of the routes will be reduced.

"The lines beyond Indianapolis took no active part in the hearing and they seemed not to be opposed to the establishment of through routes. Physical through routes already exist and are in actual use. The four defendants operating the route between Louisville and Indianapolis conduct a through passenger service of six limited trains, running daily in each direction, for which through tickets are sold. The northern link in the routes conduct a local package freight service between Indianapolis and Seymour. The three lines forming the other three links in the route not only conduct a local freight service over their respective rails, but join in through rates from Louisville as far north as Seymour. For a short time in 1908 there was joint through class rates in effect from Louisville, or from New Albany, just across the river, to Indianapolis. They were cancelled at the instance of the Indiapolis, Columbus & Southern Traction Company and it is this company that objects to their restoration. The traffic now moves between Seymour and Indianapolis, a one-line haul, and goes on through rates between Seymour and Louisville, a three-line haul. Certain perishable freight, such as berries, moves all the way from Jeffersonville to Indianapolis on joint through rates. All that is necessary to satisfy this complaint with general traffic is the withdrawal by the line of its insistance upon a transfer of traffic at Seymour. As a matter of fact the lines north of Indianapolis apparently stand ready to participate in through movements from Louisville."

All the electric railways centering in Indianapolis were defendants in the case. Speaking of the properties south of Indianapolis the commission said:

"In the history of these properties there is one fact of significance, although we have attached little importance to it in reaching the conclusions here announced. When the promoters planned the electric railway previously referred to as the independent link in the physical route between Indianapolis and Louisville, the Indianapolis, Columbus & Southern Traction Company, formerly known as the Irwin line, had its southern terminus at Columbus, Ind. The promoters of the independent line proposed to start at that point and build south to Sellersburg, but the owners of the Irwin line objected to this and an understanding was reached by which the Irwin line was to extend its rails south from Columbus to Seymour and the independent line was to commence at that point and build south to Sellersburg. This agreement is embraced in written contracts offered in evidence, which upon their face contemplated the subsequent establishment not only of the through passenger service between Louisville and Indianapolis but of a joint through freight service. The passenger service has long been in effect, but the establishment of the freight service has been blocked by the objections of the Irwin line."

The order of the commission follows:

"It is ordered that the defendants, Indianapolis, Columbus & Southern Traction Company, Louisville & Southern Indiana Traction Company, Louisville & Northern Railway & Lighting Company, Indianapolis & Louisville Railway and Interstate Public Service Company, be, and they are hereby notified and required to establish, on or before Sept. 15, 1913, and for a period of not less than two years thereafter to maintain, through routes for the transportation of merchandise or less-than-carload freight from Louisville, Ky., to Indianapolis, Ind., and to other points on their lines intermediate to Indianapolis.

"It is further ordered that the said last-named defendants, be, and they are hereby notified and required to establish, on or before Sept. 15, 1913, upon notice to the Interstate Commerce Commission and the general public by not less than five days' filing and posting in the manner prescribed in section 6 of the act to regulate commerce, and for a period of two years after said Sept. 15, 1913, to maintain, reasonable joint rates for the transportation of merchandise or less-than-carload freight over such through

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routes, which said rates in cents per 100 lb. shall not exceed these amounts between Louisville and the following cities:

Class	1	2	3	4
Columbus, Ind.	18	16	14.5	11
Edinburg, Ind.	20.5	19.5	18	12
Franklin, Ind.	23	21	18	13
Greenwood, Ind.	25	23	20	13.5
Indianapolis, Ind.	26	23	20.5	13.5

"The commission having found that any rates in excess of these rates will be unreasonable."

Report on Sanitation in Chicago

A report from G. B. Young, commissioner of health of Chicago, Ill., on the subject of sanitation in street railway cars, has been presented to the City Council of Chicago by the local transportation committee.

One man was detailed by the commissioner of health in March, 1912, to inquire into the methods used by the companies in cleaning their cars and maintaining them in a sanitary condition and to study the matter of suggested improvements. The report continues in part:

"In general it may be said that the cars as a rule are well cleaned at stated intervals. Little, if any, provision is made for additional cleaning in exceptionally bad weather, and practically no provision whatsoever for any cleaning while the car is in operation. It frequently happens that cars leave the carhouse after being thoroughly cleaned and are very dirty before the end of the first run. In many of these cases it would not be at all difficult to do a certain amount of cleaning at the end of the run. At any rate, the widely distributed expectorated matter and the mud could be got rid of very easily in a few minutes. In other cases, cleaning the cars while in operation presents difficulties which in all probability are almost insuperable.

"With respect to the enforcement of that portion of the ordinance prescribing an average temperature not lower than 50 deg. inspections made during the winter of 1912-13 showed it was the exception to find a car with a missing or broken thermometer, whereas hitherto this had been quite common. Some prosecutions were brought on violations discovered, and these resulted in convictions and assessment of fines.

"During the fall of 1912 and early months of 1913 quite extensive observations demonstrated that in cars equipped with ventilating fans the operation of the fan should be independent of the control of the conductor. Current meters on the cars equipped with fans have shown that the cost of continuous operation is negligible when compared with the advantage resulting therefrom.

"Investigation of the near-side cars showed that it was impossible to operate them as they were originally designed without an intolerable amount of dust. This finding was duly reported to the company concerned and to the city authorities.

"During the winter a considerable number of observations were also made in regard to the amount of carbon dioxide present in the air in street cars and a number of suits are now pending for violation of the ordinance. It is understood, however, that these cases will be carried up on appeal.

"There are several matters in connection with the transportation ordinance in which the health department has an interest and upon which it would like to be heard before any final revision of the present ordinance."

The Council has ordered the report to be published and filed.

Commutation Fares of New Haven Railroad Not Unreasonable

According to a report of the Interstate Commerce Commission handed down June 19, 1913, the commutation fares of the New York, New Haven & Hartford Railroad from points in the State of Connecticut into New York City are not unreasonable, except as to certain stations specifically named in the report. The report says in part:

"The record presents two questions for determination: 1. Are the increased commutation fares of the New Haven Railroad from points in Connecticut into New York City just and reasonable? 2. Is the New Haven Railroad, by its refusal to sell fifty-trip family tickets between Connecticut points and New York City, unjustly discriminating against the Connecticut commuters?

"While we have not made a minute examination of the fares within the State of New York, as fixed by the state commission, apparently the fares, fixed by the company itself, from points in Connecticut within the 25-35-mile zone from New York City are out of line with those fares. They are out of line, also, with the fares from points in Connecticut beyond that zone. They are also unreasonable when tested by the facts of record and by the schedule of fares into New York City that we have fixed on the Pennsylvania and on other carriers in New Jersey. The averaged fare at this time from points in that zone on the New Haven is $10.30. This, we think, is excessive, and we so find. Using Riverside, 30.26 miles from New York City, as a typical point in the zone, we find that a fare for the future in excess of $9.25 for a sixty-trip monthly ticket from that point to New York City will be excessive and unreasonable. The defendant will also be expected to scale its fares for the future in this zone in a proper relation to the fare of $9.25, here found as a reasonable maximum fare from Riverside.

"A careful examination of all the other fares in the New Haven commutation schedule fails to reveal any that is fairly open to criticism, when tested either by the fares of the Pennsylvania for similar distances or by the fares of any other of the New Jersey carriers, or when tested by any other matters shown of record. When the fares from points within that zone shall have been reduced to the basis here suggested the New Haven schedule as a whole will be slightly lower than the Pennsylvania schedule, the differential ranging from 25 cents at the nearer points to $1.15 at the more distant points."

In reference to the fifty-trip family tickets the commission says:

"In the exercise of a broad policy and from a broad point of view the respondent, in our judgment, ought to sell a fifty-trip family ticket from points in the State of Connecticut so long as they are sold from points in the State of New York either voluntarily or under the order of the state commission. Such tickets are in use on all other railroads furnishing commutation service between New York City and practically all points located within the so-called New York City commutation territory reached by their respective lines. They are in use almost universally where a commutation service is maintained. We regard it as unreasonable and discriminatory under the circumstances not to accord their use to Connecticut commuters."

Pennsylvania Commission on Responsibility for Shipments

The Northwestern Pennsylvania Railways, Meadville, Pa., has been notified by the Railroad Commission of Pennsylvania that it is not justified in requiring the payment of an insurance fee in order to make the company responsible for the safe transportation of packages consigned to its care. The matter was brought to the attention of the commission by E. J. Swanson, Edinboro, who advised that this company has a published rate on shipments from Erie to Edinboro, but if the rate is not prepaid an extra charge of 10 cents is assessed. It is called a billing or insurance charge. The position of the commission is that the company has no right to require the insurance of packages intrusted to it for delivery at agency points, but that it is its duty to deliver these packages according to the contract, and the responsibility for the loss of a consignment cannot be avoided by any insurance requirement. The letter of the secretary of the commission to the company in this connection follows:

"I have been directed to advise you that it does not appear to the commission that you are justified in requiring the payment of an insurance fee in order to make yourself responsible for the safe transportation of packages committed to your care. You cannot avoid the responsibility in that way, and by accepting packages for delivery you become responsible for any negligence or lack of care, whether delivery is insured or not, and it is your duty to deliver all such packages accepted by you for transportation.

"The case of your company and that of the government

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respecting the parcel post system are entirely different, as the government is not responsible for anything unless it makes itself voluntariiy liable, but that is not the case with transportation corporations.

"The commission, therefore, concludes that you have no right to require the insurance of packages intrusted to you for delivery at agency points, but that your duty is to deliver these packages according to the contract, and you cannot escape the responsibility for the loss thereof occasioned by your own negligence by any insurance requirement."

New Twin City Placards

A. W. Warnock, general passenger agent of the Twin City Rapid Transit Company, of Minneapolis, Minn., has had placards reading as follows posted in all stations, club rooms and places where the 2000 employees of the company congregate:

"Those engaged in railroading cannot fill responsible positions acceptably if they fail to practice the principles of courtesy.

"That courtesy is essential to those who desire advancement must be accepted as a fact. Without it, men with other talents and qualifications seemingly sufficient have failed. With it, those lacking in many other ways have been successful.

"Questions must be answered carefully and correctly, and with a cheerfulness that does not repel or discourage the questioner. They may seem irrational, or even silly, but always should be answered pleasantly and kindly.

"Every employee has many opportunities to increase the value of his services with a little personal effort that costs him nothing and wins smiles of approval that are more desirable than frowns.

"For his own personal good, and the strengthening of his character, every railroad employee should give the 'soft answer that turneth away wrath,' and cultivate the art of smoothing things out—truly more satisfactory than to end 'the run' or day with some unnecessary altercation with a patron rankling in his mind, of filling a part of his hours 'off duty' with the worry of such incidents.

"Every victory over discourtesy is well worth the effort, and makes a man bigger and stronger and a more desirable employee. It brings him nearer promotion and raises him in the esteem of his family and friends. It pays to be good humored! Let us suggest that you try it."

Safety Crusade Card Now in Use in Chicago

As a feature of its safety crusade the claim department of the Chicago (Ill.) City Railway is making an effort to keep attractive safety hint cards before the public at all times. The latest card to be displayed in the cars is printed in red and black, the two Maltese crosses appearing on all cards are red, and the words "Safety Hints" and the initial letters of each line of the six hints for safety are also in red. These initial letters spell the word "safety" and the lines are as follows:

"Safety requires watchfulness.
"Always look both ways before crossing track.
"Face forward when alighting.
"Enter and leave car only when it stops.
"The arm should not be put out of the window.
"Your co-operation is necessary."

These cards are 18 in. by 22 in. in size and are placed in the glass panel between the entrance and exit doors in the bulkheads at each end of the car. The cards are printed on both sides so that they can be reversed when required.

Front Exits Impractical in Minneapolis.—The City Council of Minneapolis, Minn., has decided that it is not practical to use the front exits for street cars until all streets are paved and a proposed ordinance in regard to the use of the front exits has been tabled.

Fifty-Ride Commutation Tickets Withdrawn.—The Puget Sound Traction, Light & Power Company, Tacoma, Wash., has filed with the Public Service Commission of Washington, a supplemental tariff canceling the fifty-ride commutation tickets between Tacoma and American Lake which sold for $5.

Advertising the New Albany Chautauqua.—The Louisville & Northern Railway & Lighting Company and the Louisville & Southern Indiana Traction Company, operated jointly by the Middle West Utilities Company, Chicago, are now exploiting the Chautauqua held at Glenwood Park, owned by the company, and located near New Albany, Ind. The cars all carry signs advertising the event, and placards are posted in the stations and elsewhere. The Chautauqua is operated under lease.

Los Angeles Railway Ordered to Reduce Fare.—A decision has been rendered by the Railroad Commission of California upon complaint of the city of Inglewood against the Los Angeles (Cal.) Railway and the Los Angeles Railway Corporation. A reduction has been ordered in the fare between Los Angeles and Inglewood from 15 cents to 10 cents, with transfer privileges. The price of the thirty-ride commutation ticket has been ordered reduced to $1.50, with transfer privileges.

Completing Work on Pittsburgh Cut.—After four months' work on the second half of the cut through the so-called "Hump" in Pittsburgh cars of the Pittsburgh (Pa.) Railways are to be re-routed soon to run over the affected streets. The first half of the cut was completed last fall and the cars have been using these streets since. When the second year's work began, the cars were taken off the streets to be cut and routed over the others, which made traffic heavy in Fifth Avenue and other prominent thoroughfares. The principal street affected by the second year's work was Sixth Avenue.

Increase in Wages in Dubuque.—The Union Electric Company, Dubuque, Ia., advanced the wages of its trainmen on July 1 to the following scale: First six months, 17 cents an hour; six months to one year, 20 cents an hour; second year, 22 cents an hour; third year, 24 cents an hour; fourth year and after, 25 cents an hour. The scale formerly in effect follows: First six months, 16 cents an hour; six months to one year, 19 cents an hour; second year, 21 cents an hour; third year and after, 23 cents an hour. All over time is paid for by the company at 5 cents an hour additional.

Special Twin City Pamphlet.—The Twin City Rapid Transit Company, Minneapolis and St. Paul, Minn., is distributing a pamphlet in regard to Minnesota's new prison at Stillwater, 20 miles from St. Paul, in order to increase traffic on the interurban line to Stillwater. Twenty thousand copies of the pamphlet have been published and placed in all hotels, railway stations and department stores in the Twin cities. All the railroads which operate into St. Paul and Minneapolis have also promised to distribute the pamphlets on their trains. The state authorities are aiding the company in advertising the prison, which is one of the most complete in the country.

Conference in Regard to Transfers in Cincinnati.—Walter A. Draper, secretary of the Cincinnati (Ohio) Traction Company, addressed the committee on street railways of the City Council of Cincinnati on July 11 in regard to the proposed ordinance to require universal transfers. He suggested that the committee prepare a list of the places where transfers are desired and said the company would consider them one at a time, but he opposed the universal transfer idea. The committee thought it would be impossible to make up such a list without canvassing the passengers on each car for some time in order to find out where transfers are desired. Arrangements were made for a conference with W. Kesley Schoepf, president of the company.

Written Examination for New Albany Employees.—The Louisville & Northern Railway & Lighting Company and the Louisville & Southern Indiana Traction Company, associated companies with offices in New Albany, Ind., held their regular semi-annual examination of employees in the operating division of the service at New Albany on July 9. The examination was based on the "Book of Rules" issued by the companies, covering not only the mechanical details of the operation of cars, but dealing largely with the features of the "safety first" campaign undertaken by these companies. One hundred and four of the trainmen took the examination, which was written, and forty questions

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were answered by each man. The papers are to be graded and the results announced. The examination was held under the direction of James Harmon, claim agent of the company.

Co-Operation Requested in Los Angeles.—W. E. Dunn, vice-president of the Los Angeles (Cal.) Railway Corporation, has addressed the following communication to the patrons of the company: "The duty and business of this company is to furnish Los Angeles with the best service possible under the congested conditions now existing on the streets, and to relieve this congestion wherever possible. Also continuously to extend our lines to keep pace with the growth of the city. To make these betterments and extensions millions of new money will be required constantly. Upon our relations with the city and the underlying conditions in our franchises will depend our ability to raise the necessary funds. We ask that you who are interested with us in the growth of the city and the betterment of our service do your part to aid in working out the problems that arise every time new lines are to be built and the franchises for their construction are required. Co-operation—that is the answer."

Resumption of Service Ordered.—Operation of interurban cars between Williamsville and Batavia, N. Y., was resumed on July 16 by the Buffalo & Williamsville Railway as the result of an order of the Public Service Commission of the Second District of New York. Service between these two points was suspended some time ago as officials of the company declared that they were losing from $4,000 to $10,000 each year in the operation of this line. Residents of Batavia appealed to the Public Service Commission and Devoe P. Hodson, one of the commissioners, held a hearing in the court house in Batavia recently. Godfrey S. Morgan, secretary of the Buffalo & Williamsville Railway, appeared for the company. He said that while the rights of the public are to be recognized, the interests of the stockholders of a losing public utility should be safeguarded. Mr. Hodson said the officials of the company secured the franchise for nothing and that the contract stands as an obligation of the company.

Serious Accident on Pacific Electric Railway.—In an accident on the evening of July 13 on the Pacific Electric Railway at Vineyard station ten persons were killed and more than 100 were injured. Three trains loaded with excursionists from the beach at Venice, 16 miles from Los Angeles, had stopped at a curve where a switch is turned. The last train began moving forward, while the two foremost trains remained at a standstill, and the motor car of the last train drove into the rear of the center train. It is said that some youths pulled the whistle of the center train and that this was interpreted by the motorman of the last train to indicate that his leader was under way. The curve in the tracks at Vineyard Station is held responsible for the failure of the motorman of the last train to see the stationary cars in time to bring his train to a stop before colliding with the standing train. No formal statements in regard to the responsibility for the accident had been issued by the officials of the company up to July 15.

Prosecution in Ohio for "Knocking Down."—The Northern Ohio Traction & Light Company, Akron, Ohio, has successfully prosecuted the first case against a conductor for "knocking down" that has been brought for a long time in Ohio. John W. Bernhart, a conductor, was arrested on the technical charge of larceny, which was subsequently changed to embezzlement. The evidence against him was so conclusive that on the advice of his attorney Bernhart pleaded guilty. Judge O. E. Lytle, in passing sentence, said: "I should like to impress it upon every employee everywhere that stealing from a corporation is no less a crime than stealing from an individual. The offense is of far too frequent occurrence and I should like to see the prosecuting attorney of the county take vigorous measures to break it up." County Prosecutor H. F. Castle said he would do this. Bernhart was fined $100 and costs and was sentenced to ten days in jail. Subsequently the $100 fine was suspended during good behavior, Bernhart being ordered to report weekly to the court officers concerning his conduct. This is the first action by the company in a campaign of prosecution for offenses of this kind.

Personal Mention

Mr. O. H. Bernd has been elected secretary of the Des Moines (Ia.) City Railway.

Mr. W. C. Sparks, who has been treasurer and general manager of the Rockford & Interurban Railway and the Rockford City Traction Company, Rockford, Ill., has been elected in addition third vice-president of the company.

Mr. T. C. Morris has been appointed acting purchasing agent of the United Railroads, San Francisco, Cal., to succeed Mr. Thomas Finigan, whose election to Pierson, Roeding & Company was announced recently in the ELECTRIC RAILWAY JOURNAL.

Mr. F. D. Gabriel has been appointed claim agent of the Chicago, South Bend & Northern Indiana Railway, South Bend, Ind., to succeed Mr. F. O. Jellison. Mr. Gabriel has also been elected claim agent of the South Michigan Railway to succeed Mr. Jellison.

Mr. W. A. Haller has been elected president of the Springfield (Mo.) Traction Company to succeed Mr. C. C. Chappelle, who has been elected vice-president Mr. Haller was formerly vice-president of the company and Mr. Chappelle was formerly president.

Mr. George F. Storms has been appointed auditor of the Fort Smith Light & Traction Company, Fort Smith, Ark., to succeed Mr. N. I. Garrison, who was recently appointed auditor of the Western States Gas & Electric Company with headquarters at Stockton, Cal.

Mr. A. C. Ham has been appointed general manager of the Marquette Gas & Electric Company, Ishpeming, Mich., to succeed Mr. W. J. McCorkindale, who resigned from the company some time ago to become connected with the C. H. Geist Company, Philadelphia.

Prof. Henry H. Norris has resigned his position as head of the electrical engineering department at Cornell University and will devote a part of his time to editorial work on this paper. He will have the title of associate editor and at present will make his headquarters at Ithaca, N. Y.

Mr. J. J. Murphy has been appointed general auditor and purchasing agent of the Chicago, South Bend & Northern Indiana Railway, South Bend, Ind., to succeed Mr. J. G. McKee. Mr. Murphy has also been elected general auditor and purchasing agent of the South Michigan Railway to succeed Mr. McKee.

Mr. T. W. Riley has been appointed superintendent of the Norwich & Westerly Traction Company, Norwich, Conn., to succeed Mr. S. J. Kehoe, whose resignation from the company to become superintendent of the Norwich Gas & Electric Company was announced in the ELECTRIC RAILWAY JOURNAL for May 31, 1913.

Mr. Robert I. Todd, president and general manager of the Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind., has been elected president of the Indiana & Northwestern Traction Company, Ind., which is leased to the Terre Haute, Indianapolis & Eastern Traction Company.

Mr. Foster Hannaford has been appointed assistant superintendent and operating engineer of the Galesburg Railway & Light Company, Galesburg, Ill., to succeed Mr. E. M. Wharff, whose resignation to become connected with the Automatic Devices Company was noted in the ELECTRIC RAILWAY JOURNAL for May 10.

Mr. J. A. MacDonald has been appointed superintendent of transportation of the Michigan United Traction Company with offices at Battle Creek, Mich., to succeed Mr. E. M. Raver, who as noted in the ELECTRIC RAILWAY JOURNAL of June 14, 1913, has become superintendent of transportation of the Lincoln (Neb.) Traction Company.

Mr. Charles S. Mellen, president of the New York, New Haven & Hartford Railroad and affiliated companies, which include the Connecticut Company, operating the electric railways in Connecticut controlled by the New Haven Railroad, presented his resignation at a meeting of the board of directors on July 17 to take effect at their pleasure, but in any event not later than Oct. 1.

Mr. Arthur E. Sherman has been elected treasurer of the Shore Line Electric Railway, Norwich, Conn., to succeed

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Mr. E. C. Winchester, New London, who has resigned to become secretary and treasurer of the Griswold Company. Mr. Sherman was formerly with Porteous & Mitchell, Westerly, R. I., later with the Thames Loan & Trust Company, and was auditor of the Norwich & Westerly Traction Company.

Mr. A. L. Drummond has been retained by the Philadelphia (Pa.) Rapid Transit Company to make a special study of traffic conditions in Philadelphia in connection with the plans of the company for re-routing its cars and improving its service. In addition Mr. Drummond will study the possibilities of establishing an electric railway freight system to extend to the agricultural districts of Eastern Pennsylvania.

Mr. Charles J. Pleming has succeeded the late Leon Fender as treasurer of the Knoxville Railway & Light Company, Knoxville, Tenn. Mr. Pleming's first position with the company was that of a stenographer to Mr. Charles H. Harvey, president of the company. Later he was made private secretary to Mr. Harvey. On the death of E. R. Roberts, Mr. Pleming was made park manager and continued as private secretary to Mr. Harvey. During the illness of Mr. Fender he acted as treasurer of the company for several months. Mr. Pleming will continue as park manager.

Mr. C. F. Blondell, formerly assistant to the master mechanic of the Trenton & Mercer County Traction Corporation, Trenton, N. J., has become connected with the Ackley Brake & Supply Company, New York, N. Y. Mr. Blondell began his railway career with the City & Suburban Railway, Baltimore, Md., in 1896. In 1901 he accepted the position of general foreman with the Bristol & Trenton Street Railway, Bristol, Pa., and later was made superintendent of the company. He served subsequently with the Philadelphia & Western Railroad, the Richmond Passenger & Power Company, the Montgomery Traction Company, the Washington Railway & Electric Company and the Coney Island & Brooklyn Railroad.

OBITUARY

L. L. Austin, claim agent of the Chicago (Ill.) Elevated Railways for twenty years, died on July 16 at his home in Chicago.

Henry Martyn Thompson, one of the first three Railroad Commissioners of the State of New York, is dead. He was seventy-one years old. About thirty years ago he was appointed a Railroad Commissioner. Later he took a position with the Brooklyn City Railroad, and remained until that company became part of the Brooklyn Rapid Transit Company.

Joseph L. Friedman, vice-president of the Paducah (Ky.) Traction Company and formerly president of the company, died in Chicago on July 5 of acute Bright's disease, following an attack which lasted but a short time. He was on his way to Michigan. Mr. Friedman was fifty-six years old. In addition to being vice-president of the Paducah Traction Company he was president of the Palmer Hotel Company, head of a large distilling firm and a large owner of real estate. He was a native of Louisville, Ky.

John J. Lane, secretary of the New England Street Railway Club from 1904 to 1912, died at his home in Reading, Mass., on July 12, following an illness of about two years' duration. Mr. Lane was widely known throughout the street railway industry through his connection with the club and editorship of its official organ, the *Street Railway Bulletin*, and was a recognized authority upon New England trolley service and timetables. He was born in Candia, N. H., in 1860, and engaged in printing at an early age, soon entering the country weekly field and publishing papers at various times at Candia, Suncook and Laconia. In 1895 he came to Boston in an editorial capacity for the Associated Press and located in Everett. He became secretary of the New England Street Railway Club about three years after its organization and contributed his best energies to its growth until his resignation last year. Mr. Lane was popular among his acquaintances and prominent in the Masonic and Odd Fellows orders. He served in the Everett Common Council in 1904 and also served on the Everett School Board. He is survived by his widow and two sons.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Butte, Boise & Winnemucca Electric Railroad, Boise, Idaho.**—Application for a charter has been made by this company in Idaho to build an electric railway between Butte, Mont., and Boise, Idaho. Capital stock, $40,000,000. Chester N. Halverton, Boise, Idaho, secretary.

***Park Point Traction Company, Duluth, Minn.**—Incorporated in Maine to build and operate electric railways in Duluth, Minn. Capital stock, $50,000. Officers: R. S. Buzzell, Augusta, president, and L. J. Coleman, Augusta, treasurer.

***Conception Bay Electric Company, Birgus, Newfoundland.**—Incorporated in Newfoundland to build an electric railway connecting Birgus, Cupids, Clark's Beach, Port de Grave, Bay Roberts and Spaniard's Bay. Incorporators: W. H. Jarret, Clarke's Beach, and G. H. Field, Birgus, Newfoundland.

***Dominion Railway & Plaster Company, Sydney, N. S.**—Chartered in Nova Scotia to build an electric railway between Sydney and the company's plaster works on Bras d'Or Lake and Gilbert Lake in Cape Breton, N. S. Negotiations are being carried on with the Cape Breton Electric Company and with the Sydney Council with a view of arranging for the construction of the line. Officers and directors: A. B. McCormack, president; T. Cozzolino, vice-president; J. P. Joy, secretary, and J. C. Mathers and F. de Young, all of Sydney, N. S.

***Olympia & Southern Railroad, Olympia, Wash.**—Incorporated in Washington to build a steam or electric railway from Olympia, on Puget Sound, to the Columbia River in either Cowlitz or Clarke County, and a branch line from Centralia to Willapa Harbor. Capital stock, $100,000. Incorporators: B. H. Rhodes, Centralia, and F. R. Brown, Olympia.

FRANCHISES

Birmingham, Ala.—The Kelley Street Railway has received a ninety-day extension of time on its franchise in Birmingham. George C. Kelley is interested. [E. R. J., June 21, '13.]

Los Angeles, Cal.—The Pacific Electric Railway has received a franchise between Tamarind Avenue and Hartford Avenue in Los Angeles. This company will ask the Board of Trustees of South Pasadena for a franchise to electrify the Southern Pacific tracks in South Pasadena with a double track and a permit to run express trains through South Pasadena.

San Diego, Cal.—The Point Loma Railway will ask the Council for a franchise to double-track its Ocean Beach line in San Diego.

San Francisco, Cal.—The Board of Supervisors has fixed the date of the bond election for the extension of the Geary Street Municipal Railway to the Exposition grounds, for Aug. 26. The company is also considering plans for the improvement of the present terminal facilities at the foot of Market Street in San Francisco.

Chicago, Ill.—The Chicago & Northern Interurban Company has asked the City Council for a franchise in Chicago. The ordinance was referred to the local transportation committee and then by that committee to a sub-committee. The sub-committee has reported favorably on the matter. The committee, however, referred the proposed ordinance to the Board of Supervising Engineers, Chicago Traction, for a report. The sub-committee did not consider the form of the ordinance submitted but recommended that an ordinance be granted.

East St. Louis, Ill.—The Alton & Southern Belt Railroad has asked the Council for a franchise to double-track its lines on certain streets in East St. Louis.

Springfield, Ill.—The Springfield & Central Illinois Traction Company has received a franchise in Springfield.

Taylorville, Ill.—The Springfield, Taylorville & Pana Interurban Railway has received a twenty-five-year franchise

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from the Council in Taylorville. This 17-mile railway will connect Springfield, Edinburg, Taylorville, Owaneco and Pana. Henry V. Gehm, 1208 Third National Bank Building, St. Louis, Mo., president. [E. R. J., May 17, '13.]

Waukegan, Ill.—The Chicago & Milwaukee Electric Railway has received a thirty-year franchise from the Council in Waukegan.

Dubuque, Ia.—The Union Electric Company has received a franchise to extend its line on West Locust Street in Dubuque.

Keokuk, Ia.—The Keokuk Electric Railway has received a franchise to extend its lines over certain streets in Keokuk.

Topeka, Kan.—The Topeka Railway has asked the Council for a franchise for a single or double-track railway on Tenth Street from the western boundary of Topeka to Gage Park.

Boston, Mass.—The Bay State Street Railway has asked the Railroad Commission to approve an extension on County Street and to build switches on Bay Street and Bedford Street in Boston.

Pittsfield, Mass.—The Berkshire Street Railway has received permission from the State Board of Railroad Commissioners to double-track its lines on North Street and Wahconah Street in Pittsfield.

Worcester, Mass.—The Worcester Consolidated Street Railway has asked for a franchise to double-track, relocate and extend some of its lines in Worcester.

Minneapolis, Minn.—The Minneapolis Street Railway has accepted the order of the City Council to construct in 1914 eight street railway extensions. The Council will not ask for other street railway extensions before Jan. 1, 1915.

West Orange, N. J.—The Mountain Railway has received a franchise for an extension from the South Orange and Maplewood line through Central Avenue to the Lackawanna Railroad tracks on Central Avenue in West Orange.

Columbus, Ohio.—The Fifth Avenue Railway & Light Company has received a franchise for a crosstown line on Fifth Avenue from Arlington east on Fifth Avenue to East Columbus.

Columbus, Ohio.—The Scioto Valley Traction Company has received a franchise from the Council over Parsons Avenue and Marion Road to the city limits of Columbus.

Portsmouth, Ohio.—The Portsmouth Street Railway & Light Company has asked the Council for a franchise to extend its line over the new Sciota River bridge and along the town path to Union Mills, in Portsmouth.

Oregon City, Ore.—The Clackamas Southern Railway has asked for a franchise over the principal streets in Oregon City.

Portland, Ore.—George F. Heusner, Portland, will ask the City Council for a franchise to build an electric railway from the Kenton district to the business section of the West Side in Portland. [E. R. J., Nov. 2, '13.]

Anderson, S. C.—The North Anderson Development Company has asked the City Council for a franchise for an electric railway from a point on North Main Street where it will meet the present line beyond the city limits of Anderson to the park in the lands now being developed by the company. This is part of a plan to build a 1-mile electric railway between North Anderson and Anderson. [E. R. J., June 14, '13.]

Cleburne, Tex.—The Dallas Eastern Interurban Railway, Dallas, has asked the Council for a franchise in Cleburne. E. P. Turner. [E. R. J., June 14, '13.]

Houston, Tex.—The Houston Electric Company has asked for a franchise to extend its line out Main Street from Capitol to Dallas Avenue in Houston.

Polytechnic, Tex.—The Northern Texas Traction Company, Fort Worth, has received a franchise to extend its lines in Polytechnic.

Everett, Wash.—The Pacific Northwestern Traction Company, Seattle, has asked for a franchise in Everett.

Seattle, Wash.—The City Council recently granted the Puget Sound Traction Light & Power Company permission to abandon a portion of its present Fauntelroy Park line and to construct a shorter connection on Avalon Way.

TRACK AND ROADWAY

Birmingham Railway & Light Company, Birmingham, Ala.—Surveys have been made by this company for an entirely new route to connect Fairfield with Birmingham. The proposed line will involve the construction of about 1½ miles of new track south of Fairfield to a point near Martin's station on the Bessemer line.

British Columbia Electric Railway, Vancouver, B. C.—This company has been petitioned by the Municipal Council to construct an extension on the Fraser Avenue line from River Road, across the North Arm bridge to Number 4 road on Lulu Island, Richmond.

West Vancouver, B. C.—The rate payers of West Vancouver have requested the Council to authorize the by-law granting the Pacific Great Eastern Railway a right-of-way between North Vancouver and Dunderave. The cars are to be operated by either electricity or gasoline.

Fresno (Cal.) Traction Company.—Grading has been begun by this company on its extension to Biola.

Pacific Electric Railway, Los Angeles, Cal.—Contracts have been awarded by this company and material is being placed on the ground for the completion of the trestle between Naples and Bay City which will open up a new line from Long Beach.

Big Four Electric Railway, Tulare, Cal.—This company, which has a portion of its line completed from Tulare to Woodlake, will apply to the State Railroad Commission for a permission to increase its capital stock to $5,000,000 with the intention of extending its lines north in Dinuba, Hanford and Fresno. [E. R. J., July 12, 13.]

Jacksonville (Fla.) Traction Company.—Plans are being made by this company to extend its lines on Banana, Date, Margaret, Myra, Stockton and Lemon Streets in Jacksonville in the near future.

Jacksonville & St. Augustine Public Service Corporation, St. Augustine, Fla.—It is stated that financial backing has been secured and construction will be begun in the near future by this company on its line between Jacksonville, St. Augustine, Diego and Pablo Beach. Work will be begun at South Jacksonville and then at South St. Augustine. Thomas R. Osmond, St. Augustine, general manager. [E. R. J., June 21, '13.]

Chicago, Ottawa & Peoria Railway, Ottawa, Ill.—This company contemplates building an extension to Seatonville.

Laporte, Logansport & Southern Railroad, Laporte, Ind.—Right-of-way is being obtained by this company on its line between Logansport, Laporte and Winamac. It plans to obtain financial backing by fall and begin the construction of its railway in January. Ora Boseman, president. (E. R. J., May 17, '13.)

Pocatello, Idaho.—L. R. Martineau, Salt Lake City, Utah, who secured a franchise to construct an electric railway in Pocatello last February, recently placed engineers in the field to make preliminary surveys, etc. Construction will begin in the immediate future and two lines of the proposed railway will be completed before the end of the year. The initial line will be 2 miles in length. Several additional miles will be built during 1914. [E. R. J., Feb. 1, '13.]

Clinton (Ia.) Street Railway.—Construction has been begun on this company's extensions at Second Avenue and Second Street in Clinton by the North American Railway Construction Company.

Kansas City, Kaw Valley & Western Railway, Bonner Springs, Kan.—This company has awarded the contract for grading the right-of-way between Bonner Springs and Kansas City via the Kaw Valley to Turner & Roberts. Eventually the line will be extended to Lawrence and Topeka. J. D. Waters, Bonner Springs, president. [E. R. J., July 5, '13.]

Independence, Neodesha & Topeka Traction Company, Independence, Kan.—Plans are being made to begin soon the construction of the first section of this company's line between Independence and Neodesha, 17 miles. From Fredonia the line will be extended to Yates Center, Burlington, Lyndon, Scranton and on to Topeka. J. T. Wright, Independence, secretary. [E. R. J., May 24, '13.]

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Waterville, Fairfield & Oakland Railway, Waterville, Maine.—This company is building a 1-mile addition from Grove Street, Waterville, south to the gravel pit leased from J. E. Poulin.

Winnipeg (Man.) Electric Railway.—The municipality of Fort Garry is negotiating with this company to extend its Park line through Fort Garry.

Worcester (Mass.) Consolidated Street Railway.—The directors of this company have approved the contract made with the Milford & Uxbridge Street Railway for a joint use of parallel tracks in Uxbridge. The railroad commissioners have approved of the arrangement. The directors also approved the work already begun on Boynton and Franklin Streets in Worcester.

Grand Rapids, Holland & Chicago Railway, Holland, Mich.—It is reported that this company is building a 10-mile extension from Holland to Saugatuck, via Castle Park.

St. Paul Southern Electric Railway, St. Paul, Minn.—Grading has been completed and the laying of the rails will soon be begun by this company on its line between St. Paul and Hastings. It is planned to have this line in operation by Sept. 1. The line will eventually extend to Cannon Falls, Zumbrota, Pine Island and Rochester.

Laurel Electric Light & Power Company, Laurel, Miss.—Work will be begun by this company at once laying rails on its line between Laurel and Ellisville. The trestle over Tallahouma Creek has been completed.

Moberly, Huntsville & Randolph Springs Railway, Moberly, Mo.—A contract has been awarded by this company for grading from Randolph Springs to Moberly, 12 miles, to the Jennings Construction Company, Joplin, Mo. The company has also awarded a contract for the concrete work on the same section to Edward Freed, Moberly. John J. Mundinger, Huntsville, chief engineer. [E. R. J., July 5, '13.]

***Billings, Mont.**—Surveys have been made and construction will be begun shortly by the Highland Homes Company to build an electric railway from Billings to the Polytechnic Institute.

Omaha & Council Bluffs Railway, Omaha, Neb.—This company has authorized the immediate construction of extensions on West Center Street and on Commercial Avenue, which will be an extension of the Sherman Avenue lines north in Omaha.

Long Island Railroad, New York, N. Y.—The double-tracking of this company's North Shore division has reached Cold Spring Harbor and it is expected to extend the double track to Huntington within the next two months.

Cape Breton Electric Company, Sydney, N. S.—The management of this company has authorized the expenditure of a considerable sum upon improvements of its lines in and around Sydney and Glace Bay, N. S., the work to be done this year and during 1914. Among the more important are the building of an addition to the Sydney carhouse, the construction of a second track on Townsend Street, and the putting in of additional turnouts so as to establish a fifteen-minute service on the Pier line.

Cape Breton Electric Company, Sydney, N. S.—This company plans to extend its line to New Waterford and Florence, but it has not decided just what course the line will follow.

Toronto, Ont.—Preliminary surveys have been completed for the 45-mile electric railway between Toronto and Port Perry. It is expected to begin work in the near future. Adam Beck and F. S. Gaby, chief engineer of the Hydro-electric Power Commission, are interested. [E. R. J., July 5, '13.]

Clackamas Southern Railway, Portland, Ore.—Preliminary arrangements are being made by this company for the construction of its line into Portland. At present grades have been completed and rails laid part of the way on about 8 miles of a projected route up Beaver Creek from Oregon City into southeastern Clackamas County. This line is to pass through the Mollala country as far as Mount Angel, about 30 miles from Oregon City. At present this line will be operated by steam except the section between Portland and Oregon City, which will be operated by electricity. Grant B. Dimick, Oregon City, is interested. (E. R. J., June 14, '13.)

West Penn Railway, Pittsburgh, Pa.—This company has announced that cars would likely be running between Bagalet and Whitney, on the new Latrobe extension of that company's traction lines, some time during July. A mile of track has been laid towards Whitney from the present terminus of the Latrobe Street Railway, at Baggaley. Some bridge work remains to be done.

Regina (Sask.) Municipal Railway.—This company's lines will be extended in Regina at a cost of about $28,000, made up as follows: $12,000 for steel rails; $1,692 for ties; $11,000 for cement; $2,192 for poles and $844 for wires and overhead materials.

Saskatoon (Sask.) Electric Railway.—The ratepayers of Saskatoon recently passed a by-law authorizing the expenditure of $100,000 upon extensions of electric railways in Saskatoon.

***Cumberland Valley Railroad, Nashville, Tenn.**—Plans are being perfected to incorporate this company to build an 80-mile electric to connect Nashville, Gladesville, Liberty, Sparta and McMinnville. Among those interested are: J. H. Cartwright, and W. H. Myers, Gladesville; O. L. Omohundro, C. A. Rice, Horace Ozment, J. J. Jewell and J. M. Bradley.

Southern Traction Company, Dallas, Tex.—Two routes have been surveyed by this company for its line from Waco, through Temple to Austin. One of the surveys is by way of Belton and Georgetown, and the other by way of Bartlett and Taylor.

Texas Traction Company, Dallas, Tex.—Plans are being made by this company to extend its line on South Willow Street to St. Vincent's Sanitarium in Sherman.

SHOPS AND BUILDINGS

Illinois Traction System, Peoria, Ill.—Work will be begun about Oct. 1 by this company on its new depot at Ninth Street and Adams Street in Peoria. The structure will be 158 ft. x 50 ft. and will include a waiting room, ticket office and baggage room.

Tri-City Railway & Light Company, Davenport, Ia.—This company has purchased property in Davenport on which it plans to build a new union interurban station, power plant and city railway waiting room. It is not expected to begin construction before next year.

Interurban Railway & Terminal Company, Cincinnati, Ohio.—This company's carhouse at Blue Ash Avenue and Deer Park, Cincinnati, together with five passenger and two express cars, were destroyed by fire recently. The loss is estimated at $15,000.

Southern Traction Company, Dallas, Tex.—Work is now under way at Fourth Street and Washington Street in Waco upon the conversion of the terminals of this company's into a passenger and freight station for the Waco-Dallas-Corsicana interurban line, which contemplates entering Waco the later part of the summer.

POWER HOUSES AND SUBSTATIONS

Interborough Rapid Transit Company, New York, N. Y.—This company is asking for bids for three 30,000-kw turbo-generators for its Seventy-fourth Street power house in New York.

Northwestern Electric Company, Vancouver, Wash.—It is stated that this company plans to build a new substation at the corner of Albina Avenue and Railroad Street in Lower Albina.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis.—This company has purchased from the Terry Steam Turbine Company the following apparatus for its Racine power plant: Two 60-hp. turbines to drive circulating pumps; two 200 gal. per minute boiler feed pump sets; two 10,000 cu. ft. stoker blower sets; one 20,000 cu. ft. stoker blower set. The company has also purchased from the Terry Company the following machines for its Kenosha plant: One 100 gal. per minute boiler feed pump set; one 1000 gal. per minute hot water pump set.

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Manufactures and Supplies

ROLLING STOCK

Wisconsin Electric Railway, Oshkosh, Wis., is in the market for a number of motor cars.

Decatur Railway & Light Company, Decatur, Ill., is preparing specifications for four double-truck cars.

Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., is in the market for twenty-five city cars.

Georgia Railway & Power Company, Atlanta, Ga., has remodeled thirteen of its cars to the pay-as-you-enter type.

Gadsden, Bellevue & Lookout Mountain Railway, Gadsden, Ala., is reported as expecting to purchase several new cars.

New York State Railway, Rochester, N. Y., has ordered one long broom snow sweeper from the J. G. Brill Company.

Long Island Railroad, New York, N. Y., is considering the purchase of twenty-five steel motor cars for 1914 delivery.

Saginaw-Bay City Railway, Saginaw, Mich., has placed an order with the G. C. Kuhlman Car Company for two ten-bench open cars.

Charleston Consolidated Railway & Lighting Company, Charleston, S. C., has ordered one single-truck, semi-convertible motor car from the Cincinnati Car Company.

Halifax (N. S.) Electric Tramway, noted in the ELECTRIC RAILWAY JOURNAL of June 14, 1913, as expecting to purchase six closed cars, has ordered these cars from the Nova Scotia Car Works.

Monongahela Valley Traction Company, Fairmont, W. Va., has ordered four additional passenger and baggage cars for interurban service from the Jewett Car Company, equipped with Westinghouse type 306 multiple unit control.

Maryland Electric Railway, Annapolis, Md., noted in the ELECTRIC RAILWAY JOURNAL of July 5, 1913, as expecting to purchase a number of cars, has placed an order with the Wason Manufacturing Company for twelve interurban cars.

Cape Breton Electric Company, Sydney, N. S., noted in the ELECTRIC RAILWAY JOURNAL of July 5, 1913, as expecting to purchase a number of cars, has ordered three 31-ft. 4-in. semi-steel, double-truck cars from the Cincinnati Car Company.

San Diego (Cal.) Electric Railway, noted in the ELECTRIC RAILWAY JOURNAL of June 7, 1913, as expecting to purchase thirty-five pay-as-you-enter, center-entrance cars, has ordered these cars, through the Eccles & Smith Company, from the McGuire-Cummings Manufacturing Company.

Chicago (Ill.) Railways, which it was announced in the ELECTRIC RAILWAY JOURNAL of July 5, 1913, had purchased 100 cars from the Southern Car Company, is reported to have ordered fifty of these cars from the Southern Car Company and the remaining fifty from the American Car Company.

Springfield (Ohio) Railway, noted in the ELECTRIC RAILWAY JOURNAL of May 24, 1913, as having ordered ten closed pay-within, double-truck cars from the Cincinnati Car Company, has specified the following details for these cars:

Seating capacity.....40	Car trimmings.....Dayton
Weight (car body only), 16,250	Curtain fixtures, Nat. L. W. Co.
Bolster centers, length, 20 ft. 0 in.	Curtain material...pantasote
Length of body....28 ft. 0 in.	Destination signs....Hunter
Length over vestibule, 40 ft. 0 in.	Life guards.....H. B.
Width over sills....8 ft. 0 in.	Gongs .....Dedenda
Width over all.....8 ft. 2 in.	Hand brakes.....Peacock
Height, rail to sills, 2 ft. 8¼ in.	Heaters .....Cons.
Sill to trolley base, 8 ft. 6⅞ in.	Headlights ...Crouse-Hinds
Body .....composite	Sanders .....Ohio Brass
Interior trim....mahoganny	Sash fixtures.....Edwards
Headlining .....agasote	Seats, style.... H. B. & W.
Roof, type.....turtle back	Seating material, mahogany slat constr.
Underframe .....steel	Step treads.....Universal
Bumpers .....Hedley	Trolley catchers or retrievers .....Keystone
	Trolley base.....U. S.
	Trucks, type.....Baldwin

Lookout Mountain Railway, Chattanooga, Tenn., which recently ordered ten combination passenger and baggage cars from the American Car Company, has specified the following details for these cars:

Seating capacity.....40	Curtain fixtures. Cur. Sup. Co.
Bolster centers, length, 17 ft. 8 in.	Curtain material ..pantasote
Length of body...28 ft. 8 in.	Destination signs..American
Length over vestibule, 41 ft. 9 in.	Gears and pinions.....West.
Width over sills..8 ft. 2½ in.	Gongs .....Brill
Width over all.....8 ft. 8 in.	Hand brakes.....American
Height, rail to sills. 2 ft. 9 in.	Headlights .....G. E.
Sill to trolley base, 9 ft. 7⅜ in.	Journal boxes.....Brill
Body .....wood	Motors, type and number, 4 West. outside hung
Interior trim.....bronze	Paint .....American
Headlining .....agasote	Sanders ...Nicholas Lintern
Roof, type.....monitor deck	Sash fixtures.....Brill
Underframe .....composite	Seats, style..Brill (winner)
Axles .....Brill	Seating material.....rattan
Bumpers .....American	Springs .....Brill
Cables .....West.	Step treads.....Universal
Car trimmings.....Brill	Trolley base.....West.
Couplers .....Ohio Brass	Trucks, type.....Brill
	Varnish .....Murphy
	Wheels .....Griffin

TRADE NOTES

J. G. Brill Company, Philadelphia, Pa., has received an order from the Monongahela Valley Traction Company, Fairmont, W. Va., for two sets of 27-MCB-1 trucks.

Clarence M. Morfit, Engineer, Baltimore, Md., is in the market for approximately 1150 ties, to be delivered f.o.b. Baltimore, Md. Specifications may be had on application.

Ohio Brass Company, Mansfield, Ohio, has received an order to equip a five-car train of the Metropolitan West Side Elevated Railway with Tomlinson automatic air-connecting couplers.

General Electric Company, Schenectady, N. Y., has received an order from the United Railways & Electric Company, Baltimore, Md., for sixty quadruple 40-50-hp. motor equipments.

Gold Car Heating & Lighting Company, New York, N. Y., has received a recent order from the New York Railways to equip 175 of its cars with heaters and also another from the Bay State Street Railway to equip 55 of its cars.

Bemis Car Truck Company, Springfield, Mass., has appointed Theodore S. Adams to travel, mostly in the New England States, in the interests of the company. Mr. Adams was previously connected with the Public Service Railway, Newark, N. J.

F. N. Boyer, formerly assistant district manager of the General Electric Company at Chicago, and before that district manager of the supply department at Chicago, has been appointed district manager of the company at St Louis to succeed George Rosenthall, deceased.

Standard Roller Bearing Company, Philadelphia, Pa., has received recent roller bearing orders from the following railways: Manila Electric Railway & Light Company, Third Avenue Railway, Milledgeville Railway, Pennsylvania Railroad and the Bangor & Aroostook Railway.

Cleveland Armature Works, Cleveland, Ohio, has found it necessary to increase its floor space by the addition of a new building which nearly doubles its capacity. This firm has been exclusively in the repair business for eighteen years and its business in this line reaches to all parts of the United States, Canada and Mexico.

Pyrene Manufacturing Company, New York, N. Y., has received recent fire extinguisher orders from the following: Interborough Rapid Transit Company, New York State Railways, Pittsburgh Railways, Pennsylvania Railroad, Harrisburg Railways, Rockford & Interurban Railway and the Otsego & Herkimer Railroad.

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Associated Manufacturers, London, Eng., with headquarters in the Westminster Palace Hotel, has recently been formed. This association has grown out of the Associated Manufacturers of Tramway & Railway Material, it being found that no hard and fast line be drawn since tramways and railways were purchasers of every conceivable manufacture, whereby the limitation of title was undesirable. J. Sutherland Warner, chairman of the Warner International & Overseas Engineering Company, Ltd., is chairman of the council of this new association.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has appointed H. F. Garbutt head of the line-material division, located at East Pittsburgh, to succeed C. H. Davis. Before accepting this position Mr. Garbutt had been in the sales department of the Chicago office in this particular line of work since April, 1909. Previous to that time he was connected with the Indianapolis Brass Company as a salesman, promoting the sale of its line material. Before going with this latter company Mr. Garbutt was with the Terre Haute, Indianapolis & Eastern Traction Company for a period of seven years in the overhead department.

U. S. Metal & Manufacturing Company, New York, N. Y., has recently added to its line of railway specialties the sale of the Lincoln arc welding and cutting machines, products of the Welding Materials Company. These machines will weld cracks and seams in locomotive fire boxes, flues in the sheet, engine frames, mudrings, wheel spokes and other work of similar character incidental to steam railroad material, also broken motor cases, truck frames, broken and worn armature shafts, gear cases, brake levers, worn and disintegrated frogs and crossings; steel, grey iron and malleable castings, and will cut off heads, risers, mis-rims, rails, and wreck steel structures, cut-up scrap boilers, etc.

Electric Service Supplies Company, Philadelphia, Pa., has placed on the market a new type of illuminated "Safety First" sign. It consists of a steel frame joined at the top in the shape of a hood under which is placed a weather-proof socket for an incandescent lamp. The hood is given a coat of aluminum paint on the inside and acts as a reflector as well as a protector to the lamp. Standard enameled steel signs are attached to this frame by means of six machine screws, the standard size of the sign proper being 10 in. x 12 in. It may be fitted with weather-proof condulets or bushings to protect the leading-in wires which enter the end of the hood and to insure the proper operation of the sign after a maximum of rough usage. These signs are very effectively used in power plants and along railways at any point where human life is endangered by exposed electric wires, switches, third rails, etc.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has just introduced a line of direct-reading instruments for general testing and laboratory work, particularly on alternating current. The type PC volt-meters and wattmeters operate on the moving coil principle. The movement is mounted as a unit and can be removed complete after taking off the face-plate, which makes a dust-proof joint with an inner aluminum mounting plate. The meters have a laminated iron shield riveted to the aluminum mounting plate, protecting the movement both from dust and from stray magnetic fields. The weight of the moving element is in all cases low, preserving the pivot jewels from wear, and the torque is relatively high. The meters attain their highest accuracy on alternating current, and are free from temperature, frequency and wave shape errors. On direct current the meter may be subject to slight errors due to residual magnetism of the laminated iron shield, but this can be entirely eliminated by taking the average of reversed readings. A contact switch operated by a button on the front of the instrument is provided on each voltmeter. The voltmeters are entirely self-contained, all necessary resistors to obtain the calibrated scale readings being contained in the case, which is well ventilated. The wattmeters which have double current or double voltage range are provided with a switch operated by a knob on the face-plate, which makes the proper series or series-parallel connection of coils when the knob is turned to the proper position. Only two current and two voltage binding posts are, therefore, necessary. The meters are mounted in hardwood carrying cases having hinged covers that are easily removable, and flexible sole-leather handles. The scale covers an arc of 90 degrees, giving large, open divisions. The company has also placed on the market a gasoline blow torch, which embodies a number of new features. The burner is made particularly heavy so that it will retain its heat and keep the torch burning in cold or windy weather. The drip cup is made especially deep so that it will start the torch under bad weather conditions. These features, however, do not detract from the use of the torch for indoor work. Another feature of the torch is the self-cleaning burner valve. The needle at the end of the valve stem cleans the hole automatically when the valve handle is turned. The valve seat need therefore never be injured by picking at the opening to clean it. The valve seat is a separate replaceable plug. The handle of the valve is of fiber, which does not get hot nor does it need a long valve stem for cooling as does an iron handle. The pump valve works in a cylindrical guide which assures the perfect seating of the valve.

ADVERTISING LITERATURE

Veeder Manufacturing Company, Hartford, Conn., has issued a small catalog illustrating and describing the several different types of Veeder counters, and also the new setback and locked wheel counters which the company is just starting to manufacture.

Goulds Manufacturing Company, Seneca Falls, N. Y., has issued a small booklet entitled "Guaranteed Service," which illustrates and describes its different types of pumps for every kind of service. The booklet also contains several views of installations recently made.

Railway Improvement Company, New York, N. Y., has issued in very attractive form catalog No. 1, which contains a great deal of information in regard to its coasting time record and also contains a large number of reprints of orders received from railways in various parts of the United States and Canada.

Ackley Brake & Supply Company, New York, N. Y., has issued Bulletin D on the Anger improved automatic brake adjuster, for which it is sole United States agent and manufacturer. The bulletin contains several diagrams and photographs of the adjuster, together with a full description of its method of operation and advantages.

Railway Utility Company, Chicago, Ill., has issued catalog No. 100 describing its several types of ventilators and containing a number of illustrations of them installed on different types of cars, together with several sectional view, line drawings, showing the direction of air currents. The catalog also contains several test charts made by different electric railways, showing the number of cubic feet of air discharged per minute as the velocity of the car increases.

W. N. Matthews & Brother, St. Louis, Mo., have issued five new pages for their catalog No. 8. Two of these replace old pages on the Matthews type B fuse switch and their holdfast lamp guard. The others are extra pages on Matthews telepipe and telcheight, which is a new line they have recently added. The company has also issued a folding postal card in regard to its fuse switch, the fuse of which is designed to blow when wires become crossed or short circuited. The Matthews easy lamp changers and the Matthews boltless guy clamps are also described in separate circulars.

W. F. Goltra Tie Company, Cleveland, Ohio, has issued another pamphlet on tie and timber preservation entitled "Some Facts About Treating Railroad Ties," by W. F. Goltra, president of the above company. Parts I, II and III, included in the first pamphlets which were described in the ELECTRIC RAILWAY JOURNAL some time ago. Part IV contains a comparison of zinc chloride with creosote for preserving cross ties and Part V a history of wood preservation in Europe and America. Part VI contains a list of treating plants, showing their location, managing companies, year built, capacity, kinds of wood treated, kinds of material treated, preservatives used, processes employed, together with a map showing the forest regions and locations of timber treating plants in North America. These three pamphlets which contain a total of 200 pages may be had for $1.50 per set.

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ZONES OF TRAFFIC DENSITY

The existence of a district of extreme traffic density just outside of the main business center of Chicago is pointed out in a report of the Board of Supervising Engineers, Chicago Traction. This situation undoubtedly exists in a smaller degree in several other cities. In Chicago the traffic movement is mainly between three outlying sides of the city and a congested retail center. The heart of this center is bounded by the Union Elevated loop. Beyond the union loop there is a second boundary line on two sides of the city, which is formed by the Chicago River. Beyond the river and extending in fact in a line practically around three sides of the city there is a string of railroad passenger and freight terminals and tributary trackage. Close to the railroad property, partly within and partly beyond, there is a wholesale and smaller retail district to which the board points as a traffic district of importance. For the proper care of this traffic the board recommends that short lines be operated. These lines can avoid the most congested center and provide for traffic which now uses the cars that go to and from that center. The natural criticism of this suggestion, from a traffic standpoint, is that cars which are not operated to the terminal are always boarded by some passengers who want to go there. It is scarcely practicable to avoid the operation of some short lines, but the more of such lines there are operated, the more passengers there are likely to be who will object when they are required to transfer. Objections are stronger if passengers who boarded a car when seats were plentiful are asked to change to another car at a point where seats are scarce. The interference at street crossings in Chicago is very serious and, as it now unduly impedes the progress of cars, even if the suggestion of the board is adopted as a temporary expedient, the final solution will not be found until a terminal subway is built.

THE NEWARK TERMINAL REPORT

We confess that we cannot see the force of the arguments presented by Dr. Delos F. Wilcox in his Newark report against the proposed interurban terminal station at Newark. He lays great stress upon through routing and distributed terminals. But Newark is unfortunately situated for through routing. Most of the streets in the older part of the city are very narrow, and as the railroad tracks and yards constitute a serious menace to the maintenance of a regular schedule on the east the schedule of the west or suburban routes would suffer. On the other hand, the proposed suburban and interurban terminal station, which is one block north of Market Street, will effect the removal of many of the cars from this thoroughfare. Such a step, all observers agree, is absolutely essential to any form of relief. The present congestion is indicated by the fact that the rush-hour schedule calls for the passage of 528 cars per hour past the Market and Broad Streets crossing. The proposed terminal, whose selected site is close to the business center of Newark and only one block away from the Hudson & Manhattan terminal, should greatly relieve this condition. At the same time it should prove as convenient to suburban and interurban passengers as similar terminals have at Indianapolis, Denver, Milwaukee, Vancouver and other cities. The railway company is certainly vitally interested in the reduction of street congestion, and its carefully considered plan for doing so should receive greater weight than one which confessedly has been prepared after a superficial examination. The city should co-operate rather than oppose this measure of reform.

EASING THE CONDUCTOR'S LOAD

In these sweltering summer days, when the rush period extends from early morning to late night, every possible means should be used to ease the work of the conductor. It is he who literally must bear the impact of a none too patient public and politely answer the exasperating and frequently needless questions of passengers, many of whom ride infrequently except during warm weather. Among the many good qualities which are necessary to make up an efficient conductor none, perhaps, is more apparent at this time of the year than good nature. Nevertheless, the railway management can do something to ameliorate his annoyances. Its good will can be shown by permitting both the motorman and conductor to wear suitable warm weather uniforms, and in cases of long runs, by furnishing opportunity for a drink of ice water at the terminals where the men have no time to leave the cars. It can also find a large field for more positive good by relieving the conductor of unnecessary questions on the part of passengers. For instance, many queries would be avoided if the route and destination signs were as comprehensive as suggested in a

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recent editorial in this paper. Many more questions would disappear if the important transfer regulations were impressed upon the passenger, say, by means of a prominent vestibule sign, on or before paying fare. On a certain route in one large city, where parts of two lines are operated over the same tracks, at least a score of testy debates occur daily because many passengers do not know before boarding the car that each line grants transfers only to certain of the intersecting routes and not to the others. In this case, an expenditure of $50 for signs at the more important interchange points would relieve the local conductors of a good share of their worries without prejudice to the legal standing of the company's transfer rules.

RECEIVERS' CERTIFICATES

A suit between the Farmers' Loan & Trust Company and the Père Marquette Railroad about to be taken to the United States Supreme Court on a writ of certiorari brings up a question of very great importance to holders of bonds of companies that get into financial stringencies. This question is whether receivers' certificates should be issued to pay for new construction as distinguished from the conservation of the property as it stands until a reorganization can be effected, and also whether receivers have authority to raise money by means of such certificates for expenditures that should be met out of current income and to devote the income to the payment of interest on the bonds, thereby preventing the trustees from taking possession of the property. As a financial matter, the use of receivers' certificates is of great moment to bondholders, as they are usually considered to be a prior lien. Practically, the court has power to place them ahead of one mortgage or behind another, as the case may require, to obtain a market for them, but usually the bondholders' mortgage is deposed to make room for the certificates. The bondholders' security is thus reduced and the value of the bonds diminished. On the other hand, to conserve the property in the case of a long receivership so as to have the bondholders' security unimpaired, it is often necessary to issue certificates to make repairs. But to provide for betterments, extensions or any reconstruction beyond what is necessary for such preservation and thereby to charge the railroad and its appurtenances with liens which are to supersede older ones without the consent of the holders of these is apparently to exceed the receivers' authority. In like manner for receivers to meet expenditures by means of such financing instead of from income means that indirectly they are providing for the payment of interest by an issue of certificates which become a lien prior to the mortgage, or, in other words, its lien would be displaced by new obligations on the mortgaged property for the purpose of paying interest on the bonds and preventing the property from rightly passing to the mortgagee.

The difficulty in these cases is that it is not easy to draw the line between necessary repairs and new constructions or extensions and to determine to what extent expenditures would have been made from current earnings so as to conflict with interest payments if the certificates had not been used. Facts have varied in the several cases decided, and as a legal point the question is still open, for the courts have practically unlimited authority and have exercised it in different ways.

Another disturbing factor to the unanimity of decisions has been the spread of the public service commission idea. These bodies are disposed to make varying orders requiring railways, including those in receivership, to build extensions and increase facilities for the public benefit, and the courts are in general reluctant to oppose them. It would be an important step if the public service commissions would adopt some uniform system in regard to the permitting or requiring of such certificates, and also if the Supreme Court in the Père Marquette case would lay down a decision that would serve as a good precedent in making a line of demarcation beyond which receivers cannot go, or else state definitely the power of the bondholders to block such issues through withholding their sanction.

MR. MELLEN'S RESIGNATION

The resignation of Mr. Mellen as president of the New York, New Haven & Hartford Railroad was brought about by public criticism and is a tribute to the power of that force in corporate affairs to-day. From a financial standpoint the New Haven system expanded too rapidly, but in the main it has been the public that got the real benefit of the improvements made on the property. Much of the development work on the lines has been electrical in nature, and we are foremost to recognize the technical and public value of Mr. Mellen's policy in these respects and to give due credit to him and to those whom he associated with him to carry on this work. The New Haven policy has been in advance of, not behind, the times in its electrical progress, and its initiative sets a standard for the other steam railroads of the country. Whether, at the time these results were conceived, they could have been accomplished with any other than a daring financial policy to support them we do not know, but it is certainly very doubtful if they would have been undertaken had the financial policy of the company continued in that conservative state in which Mr. Mellen found it when he went with the property.

Mr. Mellen's ideas for physical development were large and broad and creditable. Much of the criticism that was directed against the property did not represent wholesome public opinion, but was founded on political and personal grounds. The real public did not take the trouble to analyze the motives of some of those who attacked the property. The demoralization that resulted was effective in ridding the railroad of its executive and in creating agitation that will be extremely difficult to overcome in the future, but so far it has not destroyed the largeness of conception of the plans for development to which the road is committed. We trust that electrical progress will continue in spite of a change in administration and that in time to come Mr. Mellen will receive full technical and public credit for the wonderful physical rehabilitation for which he was directly responsible. If he erred in disregarding public opinion owing to the training of earlier years, this was but an incident, small compared with his other qualities as a great railroad executive.

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STANDARDIZATION OF CAR-BODY DESIGN

Standardization of the fundamentals in car design is a problem which must be solved in the near future if the managers of the larger companies are to obtain the maximum results at the minimum cost and the operator of smaller properties is to have some sort of guide for his car purchases. On the surface, standardization in car-body design may appear ridiculous to some, yet careful consideration of the subject will develop the fact that there is no legitimate reason why standards covering the principal features in design could not be developed. Structural design in car bodies is in every way similar to the design of bridges and buildings of structural steel. In each of these two classes of structures there are certain fundamental types which, after years of experience, have been adopted generally as the most economical. Once in a while freak structures appear, but investigation will show that the purchaser has paid the manufacturer more per pound for the fabrication than would have been necessary if he had conformed to a standard type.

A careful investigation of the different types of car bodies now in use develops the fact that bodies of the same over-all dimensions and design for a similar service vary in weight more than 100 per cent. It does not require a thorough investigation to draw the conclusion that one of these designs is entirely wrong from an engineering standpoint. Whether a car body is of all-steel, semi-steel or all-wooden construction, under similar traffic conditions, it must conform to certain standards as regards loading per square foot of floor area. Recently the question has been raised as to what consideration should be given to the body design in taking care of impact loads coming from collisions. Some engineers have taken the stand that this precaution is unnecessary, a collision being an extraordinary occurrence, and experience with accidents of this character in the modern light-weight car has shown that certain damage results regardless of whether impact is taken into consideration in the design or not. If this is true, it certainly is not economical to add this additional weight to a car body when as a factor of safety it has little value.

A satisfactory solution of the problem of standards in car-body design could without doubt be brought about by the appointment of a committee from the American Electric Railway Engineering Association to investigate the subject thoroughly. Tests as to the load capacity of certain designs could be investigated in engineering test laboratories, both as to uniform and impact loads, and actual service tests could be made on properties where car bodies of the same over-all lengths were required to meet service conditions. Certainly car-body section dimensions could be standardized, except where the track centers in city streets interfered. The best arrangement of the members in underframes could be selected as a result of tests, whether they are designed to carry the load equally on all sills, on center sills only or on a combination of the two with side girders up to the belt rail. There can be but little doubt that the problem is a pertinent one which should not be left to the whims and fancies of the inexperienced engineer. Managers, master mechanics and manufacturers alike are continually raising the question of standardization, and no definite move has been made. We believe the time now is ripe for concerted action and hope that the Engineering Association will see fit to appoint a committee of the best talent in the country to make a thorough investigation of standardization of car-body design and report its recommendations.

THE INTERSTATE STREET RAILWAY

Various expedients have been adopted by some of the railways to remove their affairs from the jurisdiction of the Interstate Commerce Commission. These have followed the lines of legal dismemberment of properties, or the actual abandonment of sources of business, and hence of revenue, which would have constituted interstate commerce, and would therefore have made the companies subject to the interstate commission. The courts, however, have not always held the opinion of the authority of the interstate commission that which it has itself maintained.

The recent decision of the United States Supreme Court in the Omaha & Council Bluffs Street Railway Company case, for instance, does not follow the lines of policy that have been laid down by the Interstate Commerce Commission in its treatment of street railways. The attitude of the Interstate Commerce Commission has been that a carrier which transported passengers or freight from a point in one state to a point in another state thereby engaged in an act of interstate commerce and was therefore subject to the law governing interstate commerce.

The Supreme Court makes a distinction between a street railroad organized as a street railroad company to carry passengers as part of the street traffic of a community and a railroad constructed on private right-of-way and extending on to connections with other companies and thus providing long uninterrupted avenues of traffic for both passengers and freight. It holds in effect that while a movement of a passenger on a street railway within the limits of a general community composed of several distinct municipalities may be a movement from one state to another this is not interstate commerce in the meaning of the act; that is to say, that the daily community traffic between home and work is not the one against which Congress sought to legislate.

The court recognizes the fact that interurban development introduced a class of line distinct from the street railway, but it does not discuss this question, holding that the case before it is not one involving that issue. Most of the electric lines which have been held to be subject to the authority of the Interstate Commerce Commission are interurban, and probably few would come within the characterization of street railroads as defined in this decision.

There are, however, some lines which are engaged in the same class of business as the Omaha & Council Bluffs properties, whose routes connect groups of communities that are interdependent industrially and socially, although in separate States. Unless there are particular circumstances which relieve such lines from the scope of the decision of the court in this case, the effect of the decision should be to release them from a jurisdiction of the Interstate Commerce Commission to which they have been ruled to be subject in the past.

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Repair Shop Practice at Portland

The New Shops of the Portland Railway, Light & Power Company, of Portland, Ore., Are Unusually Well Equipped for the Manufacture of Repair Parts as Well as for Carrying on Routine Repair Work for the Rolling Stock—A Comprehensive System of Records Is Maintained

BY F. P. MAIZE, MASTER MECHANIC PORTLAND RAILWAY, LIGHT & POWER COMPANY

The Portland Railway, Light & Power Company operates the street railway lines in the city of Portland, Ore., together with a number of interurban lines extending to the surrounding towns. The normal traffic requirements keep approximately 550 cars in service, the number varying according to the season, over some 285 miles of track. In addition the railway hauls from 100 to 200 freight cars a day and interchanges with the steam roads which handle foreign cars. There are six large electric locomotives for carrying on this work as well as for the regular freight traffic of the company. A small "rip track" is provided for making general repairs on this freight-car equipment.

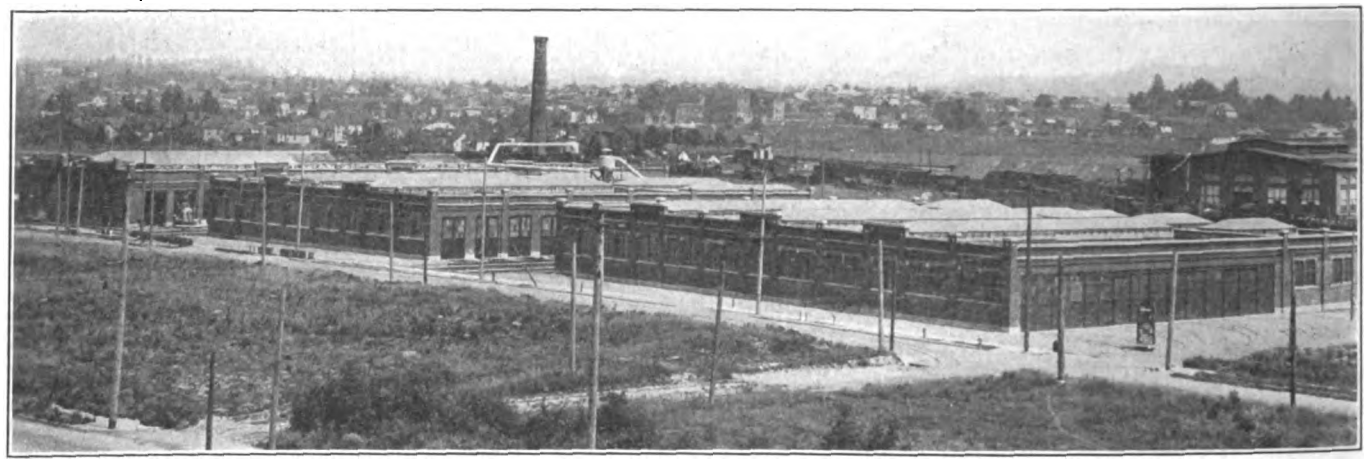
For handling the motor-car equipment there are four carhouses situated in different sections of the city, one large repair shop, one small shop for repairing freight cars and a small iron and brass foundry. The carhouses are known as "Piedmont," "Savier" and "Ankeny," which accommodate narrow-gage cars, and "Selwood," which accommodates standard-gage cars. All of the eastern and northwestern sections of the city have narrow-gage track, 3 ft. 6 in. between rails. The southwest section has the standard 4-ft. 8½-in. gage. The carhouses are fairly well distributed in the four sections of the city.

Each carhouse is equipped with a wheel grinder for grinding wheels under the cars, a screw car hoist with swinging crane for changing wheels, emery wheel, grindstone and small power drill press. On account of the distance to and from the shops, it was found more economical and quicker to change armatures and wheels, controllers and small parts at the carhouses instead of taking them to the shop. In many cases it is necessary when a car comes in about noon with a grounded armature to change the armature so that the car will be ready for the run that same night.

All work of fitting up and repairing parts, such as turning armatures, fitting bearings, general repairing, controllers, circuit-breakers, contactors, etc., is done at the Center Street shops, and parts are distributed every day by delivery car, which exchanges the repaired part for one that is out of order. Carhouses are not allowed to change an armature in the box type of motor, but a complete motor is furnished, and in case of any trouble the whole motor is changed and the damaged motor is sent back to the shops for repair. No general overhauling or heavy repair work is done at the carhouses, as cars are overhauled on the mileage basis at the Center Street shops, and only light repairs and changing of parts which may burn out in the meantime are allowed at the carhouses. All cars have a seven-day inspection at the carhouses, and when the mileage has reached the limit the cars are called in to the Center Street shops for general overhauling.

MAIN REPAIR SHOPS

The Center Street shops, which were occupied for the first time last October, are made up of a group of four main buildings as shown in the accompanying layout. One of these buildings contains the motor and truck department, air room, armature room, machine shop and blacksmith shop. Another contains the carpenter and mill rooms, and a third contains the paint shop. The fourth building, just completed, is the storehouse.



Portland Shops—General View Showing Truck Shop, Carpenter Shop and Paint Shop

The accompanying illustration of a corner of the armature room shows the small cabinet with testing outfit and also the overhead cranes used for putting armatures on horses for repairs. All of the armatures are kept on small wagons so that they can be hauled from the armature room to the motor shop by one man. After they reach the armature room and motor shop they are handled exclusively by cranes. The tests applied to armatures are a 1200-volt to 2400-volt break-down test, a transformer short-circuit test, a leakage test and a bar-to-bar short-circuit test. The fields are tested with a transformer test and measured with a Leeds & Northrup special machine. The armature room is equipped with the usual banding machine, lathe for turning commutators and boring bearings, etc. All armatures are finished in the armature room, ready to put in the motors.

The machine shop is equipped with lathes, planer, drill presses, shapers, molding machine, turret lathe, circular cold saws, bolt cutters and all tools necessary to make up a general machine shop. This machinery is necessary on account of the company's policy of manufacturing most of its own repair parts. A large part of the track special work is also made in the machine shop and cast in the company's own foundry.

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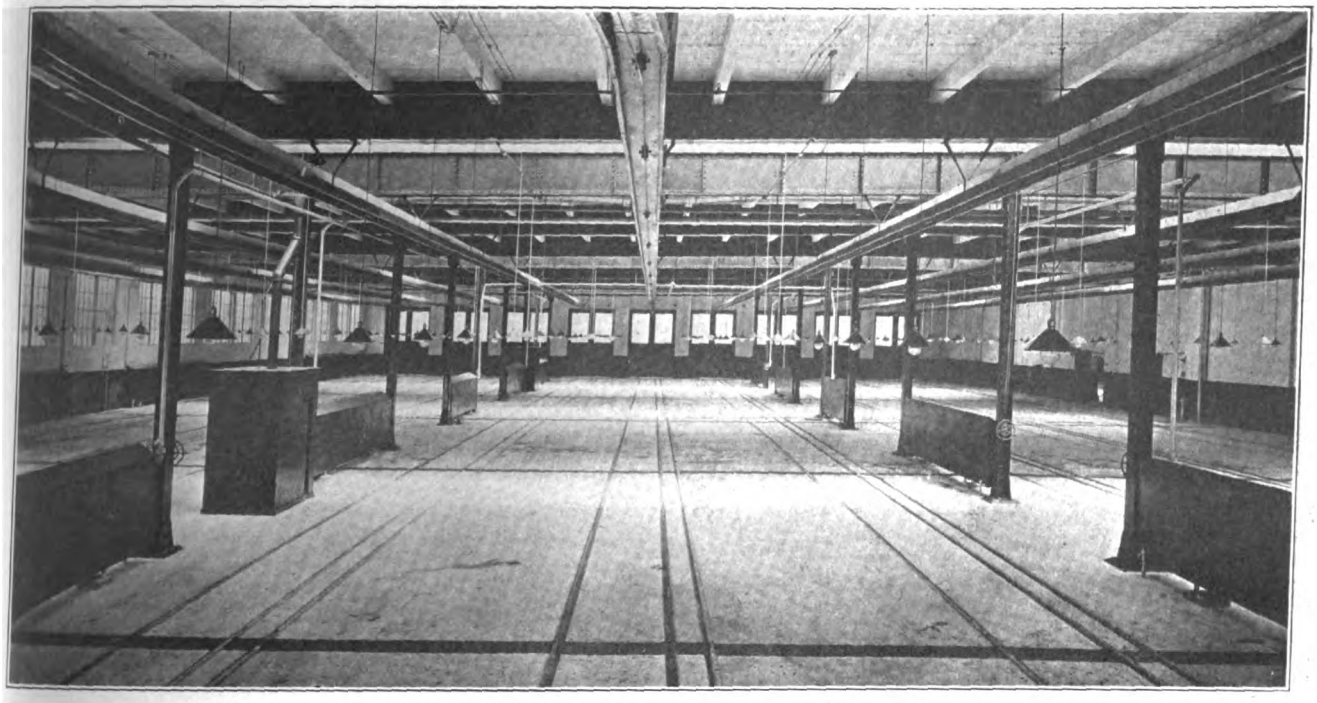
The illustration of the blacksmith shop shows the hammers and forging machine, as well as several of the fires. This shop is equipped with the Buffalo down-draft system, having direct-connected motors to blowers as well as to suction fans. There are six Buffalo down-draft forges and three air forges, as well as an oil forge for case-hardening and melting babbitt.

men overhaul the trucks. The motors are then replaced on the trucks and receive a running test after they have been put under the car. An inspector also tests them out in the yard before they leave the works.

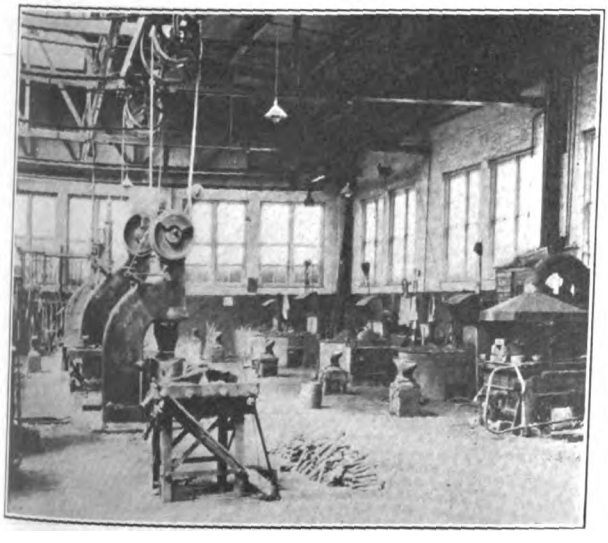
At one end of the motor and truck shop is the wheel shop. This contains one axle lathe, two wheel presses, one 100-ton and one 300-ton; one Niles wheel-boring ma-



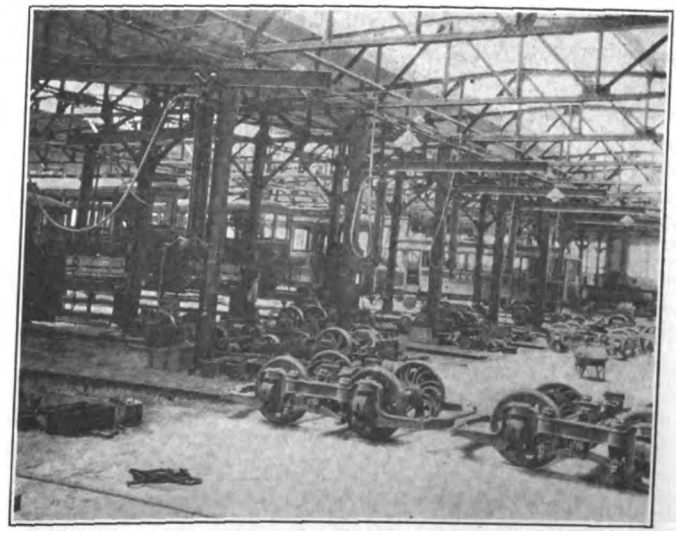
Portland Shops—Interior View of Paint Shop Showing Track Arrangement for Standard and Narrow-Gage Cars

The main truck and motor shop adjoins the machine shop and armature room. Each pit in the shop is equipped with a home-made screw hoist for hoisting car bodies, as well as a swinging and traveling crane with air hoist attached. All cars brought in for overhauling are taken into this shop. The body is raised off the trucks with the

chine and one Niles 42-in. steel tire lathe. There is also a wheel grinder for grinding flanges. All flat spots are ground out at the carhouses underneath the cars, but it is often found that wheels with chipped flanges can be re-ground when the flanges are deep and then can be used over again.



Portland Shops—Power Hammers and Down-Draft Forges in Blacksmith Shop



Portland Shops—View in Truck Shop Showing Cranes and Air Hoists for Handling Truck Parts

screw hoist and the truck run from under the car with its own motors. The controller for running the motor which operates the screw hoist has a double-throw switch, and current can be thrown into a bus line which has taps along the side of the pit so that the crew can plug in and run their trucks out from underneath the car by power. The motors are then taken off and overhauled while two

The carpenter shop is situated next to the machine shop and separated from it by a transfer table, as shown in the illustration on page 132. This building is of the same design as the main room in the carpenter shop. All of the shops are equipped with three-rail tracks as shown in the interior view of the paint shop, so as to accommodate both standard and narrow-gage cars. The mill room and car-

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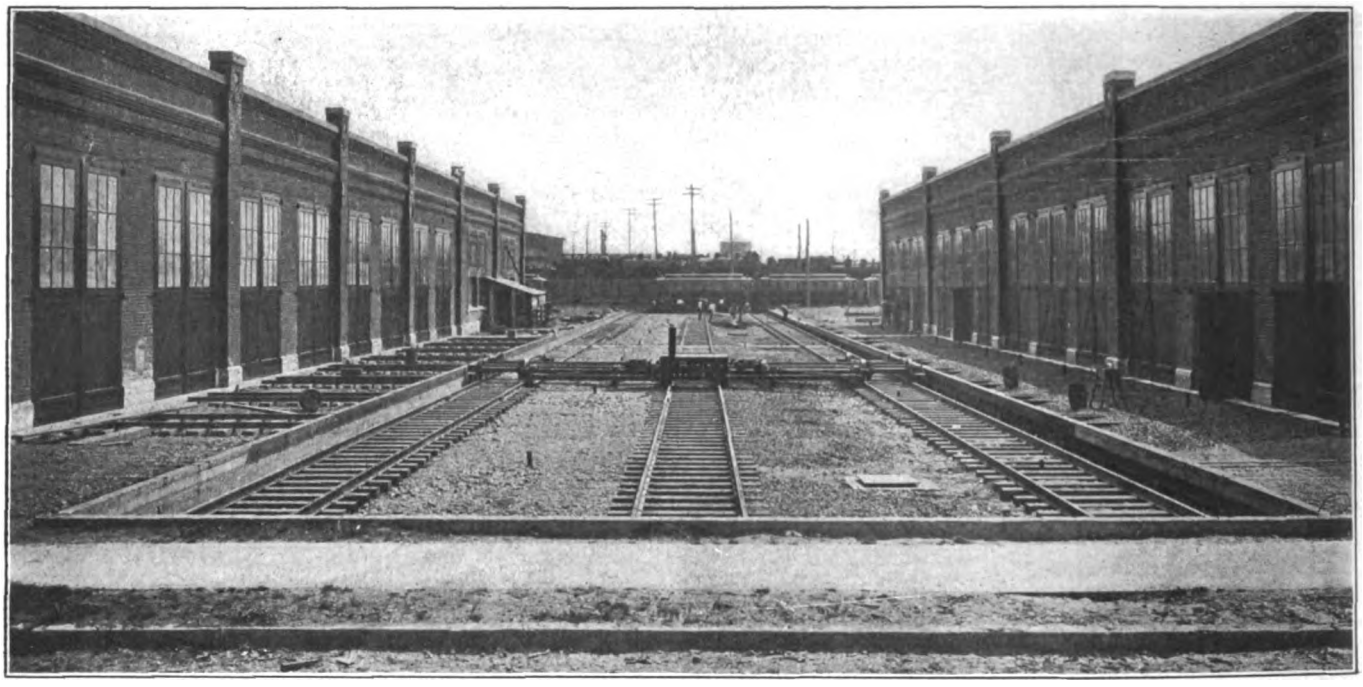
penter shop, which is partitioned off from the erecting shop, is equipped with all necessary tools for building cars and is situated over a basement so that all machinery (such as motors, pulleys, belts, etc.) can be placed in the basement.

Shavings are taken away from the machines by a blower system and are blown over to the fuel room at the boiler house.



Portland Shops—Transfer Table Between Carpenter and Paint Shops

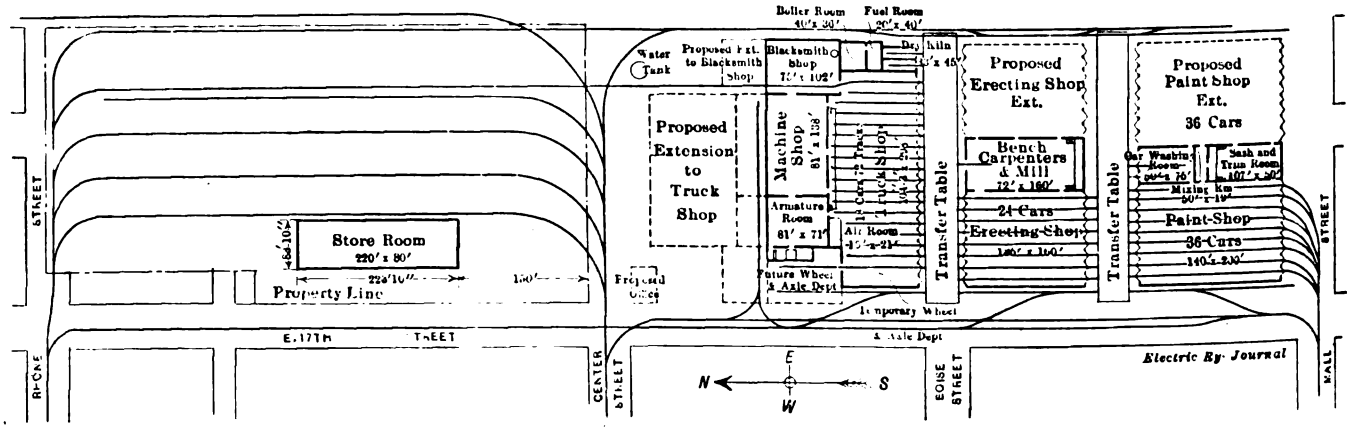
In each of the buildings there is a balcony, on which are the toilets and lockers for the men, and throughout the shops the company has installed sanitary drinking fountains at convenient points.

Next to the carpenter shop and also separated from it by a transfer table is the paint shop, with tracks running all the way through and connecting with curves to the outside, as shown in the general layout. On one side of the paint shop is a small storage room for paints and the sash room. The layout of the buildings is such that additions can be made to the erecting and paint shops.

EMPLOYEES' ASSOCIATION

In June, 1912, the men of the mechanical organization decided to form an association for the benefit of the employees in this department. Since this organization has been effected it has brought the employees in closer touch with the officials of the company and enabled them to bring their grievances before them, so that all little differences have been settled satisfactorily to both employees and company, and a spirit of co-operation has developed which is a benefit to both. During the hard winter of 1912-13 the association was able to do very good work, as there was much sickness and it was necessary to look after a number of families whose main support had been withdrawn.

The men have their meetings once a month in the association hall, one section of which is shown in the illustration on page 134. This hall is equipped with a kitchen for serving refreshments, and a short entertainment is given and light refreshments are served at each meeting.



Portland Shops—General Layout Showing Arrangement of Buildings and Tracks

The shops are equipped with sprinkler system throughout, as well as necessary hose and fire extinguishers. A number of fire hydrants are scattered along the outside of the building for outside protection, and there is in addition a hose house. This has automatic opening doors and is near to the office so that it can be put into action at a moment's notice.

The members have also had several dances and entertainments during the winter.

As the Center Street shops are in a section of the city that is not built up, it is impossible to get meals anywhere near the shops, so the association obtained permission to use the kitchen as well as the utensils and has hired help to serve dinner for about 150 men each day. These meals

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are furnished at cost, and only the best of food is served. They have proved a great convenience.

The association also has a loan department for the benefit of members. In case of sickness in the family or other cause that necessitates a loan for a short time, a member can borrow from $5 to $100 for six months. This, it is found, keeps the men from the "loan sharks" when they are in hard circumstances.

MECHANICAL DEPARTMENT RECORDS

The clerical force of the mechanical department consists of a chief clerk, reporting to the master mechanic; a statistical clerk, an equipment mileage clerk, a car record clerk, a cost clerk, a pay roll clerk, a stenographer, two shop clerks and one carhouse clerk, all reporting to the chief clerk.

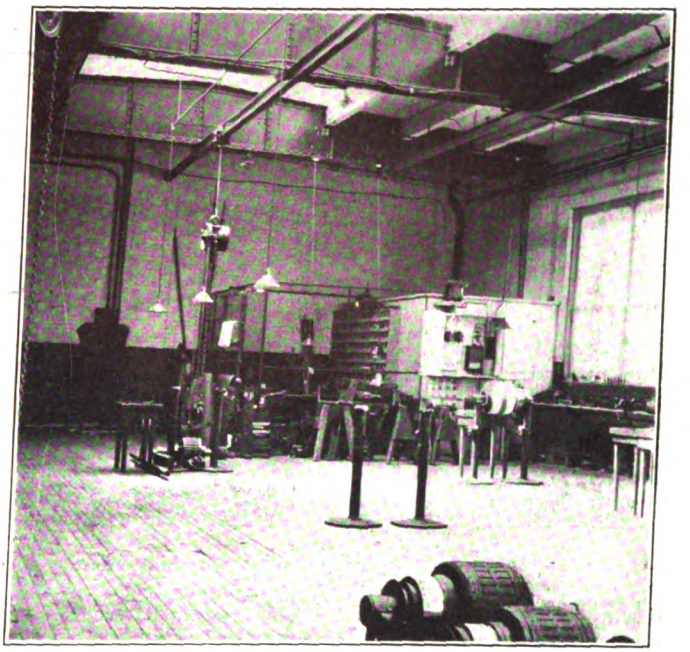
All work performed at the shops and carhouses, including changes of parts of equipment, repairs of all kinds, wheels ground, cars overhauled and cars painted, are recorded by the shop clerks on the daily shop report sheet. Parts of equipment, such as armatures, wheels, compressors, controllers, fields, gears and pinions, are numbered individually and are identified by their number on the shop report. This report is turned in each day to the car record clerk, who enters the report in full on the car record card, of which there is one for each car owned. The report is then given to the equipment mileage clerk, who enters the changes on the individual record of parts of equipment, of which there is one sheet for each numbered part in use by the company.

Mileage is computed for each car daily from the conductor's trip sheets and is entered daily on the car mileage card, of which there is one for each car operated. When any part is reported as removed from a car, the mileage of that part since it was placed in the car is taken from the car mileage card and entered after the record on the equipment record sheet for that part, and it is included in the monthly report showing the average mileage of parts repaired. When the part is removed from a car and reported

Portland Shops—View of Wood Mill Showing Balcony for Lockers at Right-Hand Side

as scrapped, the mileage is computed as above, the equipment record sheet is removed from the live files, and the mileage of the part is included in the monthly report which shows the average mileage of all of the different parts scrapped in the operation of the line.

By referring to these records and reports, the master mechanic can locate the principal sources of trouble and can determine the relative merit of different grades of material without considering the confusing element of personal opinion. These records are also used to determine when a car is due for a general overhauling. At present the company is overhauling cars on a basis of 60,000 miles. When the car mileage card shows that a car has attained that mileage, a tab is placed on the mileage card for that



Portland Shops—Armature Room with Traveling Hoists and Cabinet for Testing Outfit

car and marked with the date. The car is then called in as soon as possible and overhauled.

The accounting for the system is taken care of by the accounting department at the general office under the direct supervision of the auditor. The system of accounting, however, does not give sufficient detail to enable the master mechanic to keep in close touch with the costs in the shops, and it was found necessary to install a supplementary accounting system in the master mechanic's office. A system of shop orders was established, by means of which the cost of different jobs or on different cars can be segregated by the cost clerk and reported to the master mechanic as soon as the work is finished.

Shop orders are issued for cars overhauled and painted and for repairs due to collisions. When a car comes to the shop for any of these reasons a shop order is made out addressed to each of the foremen who will work on the car, and all work performed on that car is charged to the same number. The shop order is divided into different classes by the addition of a letter—i. e., "a," indicating work on the car body; "b," work on trucks; "c," work on motors, etc. This applies both to labor and material charges. Shop orders are also issued for the manufacture of material used in maintenance work.

The time card used is a combination clock record and daily work report and furnishes the record from which the pay rolls are prepared and the distribution is made to the various maintenance accounts and work orders. These cards are made out by the employees in detail, showing exactly the work performed during the day, including the car number where work was done on a car and the shop order number. The cards are punched in in the morning and at noon, and they are punched out at night. They are then left in the racks where the night watchman collects them and replaces them with new cards. The next morning the time is entered in the time book, and the cards are then turned over to the pay roll clerk, who verifies the shop order numbers and enters the proper charge, as indicated

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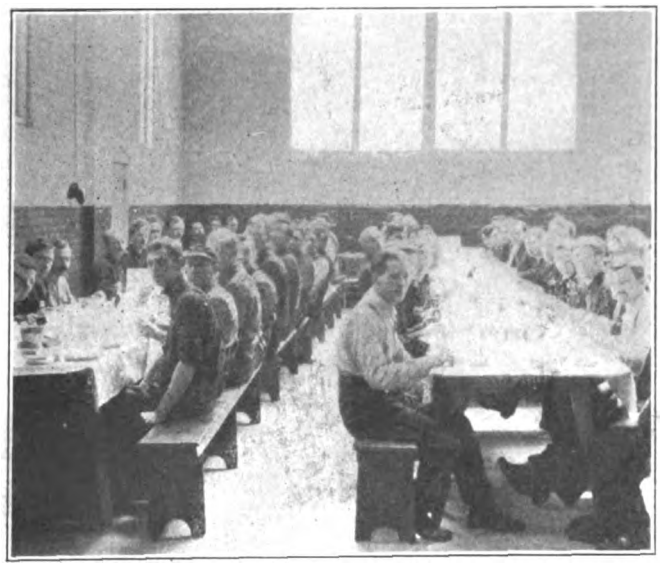
by the work performed, in the charge column. He then enters the rate of pay on the card and makes the extensions. The cards are then turned over to the cost clerk, who enters the code numbers used in connection with the Hollerith system. Requisitions for material used the previous day are brought to the cost clerk before being



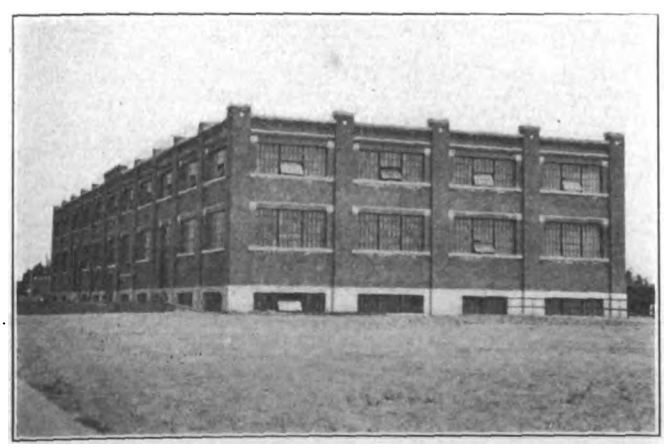
Portland Shops—Shopmen at Noonday Meal

Portland Shops—A Corner of Association Hall

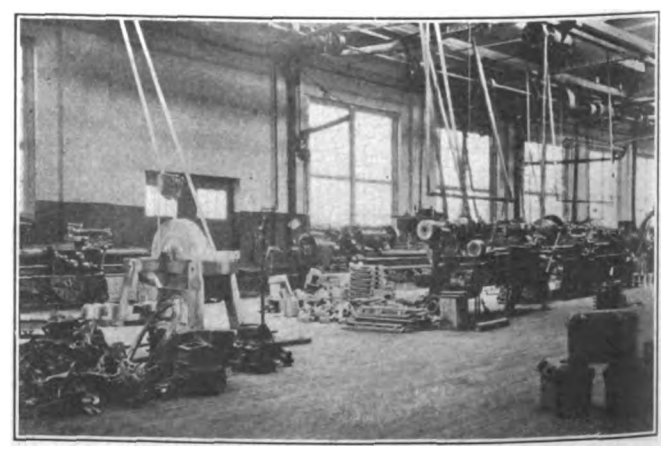
sent to the accounting department, and he verifies the charges and enters the code numbers.

As the company uses the Hollerith tabulating machines, described in the Electric Railway Journal for May 10, 1913, page 853, both time cards and requisitions are sent to the Hollerith machine clerk at the general office and cards are punched to correspond. After these cards are punched they are run through the sorting and tabulating machines and a report is made up and sent back to the cost clerk, showing the totals charged to each shop order, maintenance account or work order. This is further divided according to code numbers to show the department where the charges originated and the class of work—i. e., overhauling, painting, maintenance, manufacturing, construction, etc. The cost clerk then enters these amounts on a cost data sheet.

As each foreman finishes his work on a car he turns in his shop order to the cost clerk, marking thereon the date



Portland Shops—Exterior View of Storehouse on East Seventeenth Street



Portland Shops—Manufacturing Department in Machine Shop

of completion. As soon as all the orders are turned in, the car is reported "O. K." to the carhouse to which it is assigned, and it is taken away. The cost clerk then closes the shop order, totals up the cost sheet, and transfers the totals to the permanent card record. This record is then turned over to the master mechanic for examination and investigation of any excess charges. At the end of the month the charges on all shop orders for cars are totaled up, and the figures thus obtained are included in the monthly report on operating expenses.

The costs on grinding wheels and changing armatures, also on cars washed at the carhouses, are taken direct from the time cards. At the end of the month these costs are compared with the report showing the number of armatures changed, wheels ground and cars washed, and a unit cost is obtained.

MANUFACTURING RECORDS

For material manufactured in the shops for supplies the following system is used. The storekeeper puts in an order on the regular purchase requisition, sending a copy to the purchasing agent and the original to the master mechanic, specifying on the order that the material is to be manufactured by the mechanical department. Upon receipt of this order, properly approved, the cost clerk issues a shop order on the foundry, machine shop or blacksmith shop as the case may be. Charges are made on the time cards and requisitions as explained heretofore. As soon as the shop order is completed the manufactured articles are turned in to the storekeeper, who receipts for them on the shop order blank. This shop order is then turned in to the cost clerk. All charges are totaled by the Hollerith machine clerk and are entered by the cost clerk on the manufacturing data card.

When completed, the shop order is closed up, the card is totaled up and the totals transferred to the permanent record sheet. Successive reports for the same article are en-

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tered on the same sheet, thus giving a comparison of the cost of manufacture at different times. The cost clerk then reports to the stores department, giving the total charges against the shop order and the cost per piece. This cost is then entered in the stores department as the price of the article.

Statistics in the form of monthly reports to the general manager are compiled from the different records, showing work performed in the shops during the month, including both maintenance and construction; showing mileage made by cars and parts of equipment, and showing the reasons for increases or decreases over the same month in the preceding year. The data secured from the different reports are shown also in the form of graphic charts. These are made up from month to month during the year and show the maintenance charges to the different accounts, the mileage of different parts of equipment and other data of interest.

The master mechanic keeps in close touch with the work going on in the department by means of a daily report compiled by the statistical clerk and placed on the master mechanic's desk at 8.30 o'clock each morning, showing the bad-order cars at the carhouses, cars returned to service on the previous day, the number of wheels ground, and the number of pull-ins for the previous day, with the cause assigned for each. Each carhouse foreman also submits a daily report of cars inspected, by whom inspected and the number of cars washed.

MERIT AND DEMERIT SYSTEMS APPLIED TO MANAGEMENTS

Since the original promulgation of the Brown merit system as applied to employees, it has had a constant development, and refinements have been introduced on the different roads. The advocates of the system are many, but until recently no definite proposal had been made to apply the system to the managements of the companies. Nevertheless, this idea was suggested and elaborated in a paper read before the National Municipal League in Los Angeles last summer, and the paper is now available in printed form. It is entitled "A Suggested Sliding Scale of Dividends for Street Railways, Determined by Quality of Service."

The author, James W. S. Peters, Kansas City, Mo., who believes that street railway companies should be liberally rewarded when they provide good service, suggests that if 6 per cent on capital investment is a "fair and reasonable" return for the interest on the capital and hazard of the enterprise, 25 per cent ought to be added for "perfect" service. This means, however, 100 per cent efficiency, which the author sorrowfully considers will never in practice be obtained. Hence, for the perfect management 7½ per cent return would be permitted, with graded returns of 7 per cent to the management with 90 per cent efficiency, 6½ per cent to the management with 80 per cent efficiency and a reduction of ½ per cent in permitted return with each 10 per cent drop in the quality of the service.

Of course a system of this kind requires a systematic method of grading managements, but Mr. Peters is prepared to show that this is not so difficult a problem as might appear at first sight. Briefly, he proposes to divide the service into five parts and suggests the following divisions and their relative importance: First, operation and management, value 40 per cent; second, maintenance of plant against depreciation and obsolescence, value 20 per cent; third, economy and efficiency of management, value 15 per cent; fourth, safety and comfort of the traveling public and of the citizens, value 15 per cent; fifth, accuracy and publicity of accounts and system in preserving the funds intact, value 10 per cent. In turn, the author believes that each of these divisions should be further subdivided to assist in establishing an accurate standing of the different managements and suggests the following schedule:

A. Service in management and operation; value, 40 per cent.	
Up-to-date equipment	100
Extensions	100
Transfer regulations	25
Shelter stations	25
Running of cars	75
Speed of cars	100
Ventilation of cars	50
Lighting of cars	50
Seats	100
Frequency	100
Courtesy of employees to public	100
B. Service of maintenance of plant against obsolescence and depreciation; value, 20 per cent.	
Repair of tracks	75
Repair of cars	100
Repair of overhead equipment	50
Repair of power plants	100
Repair of car barns and other buildings	50
Repair of tools	25
Insurance premiums	20
C. Service as to economy and efficiency; value, 15 per cent.	
Economy in purchase of supplies	100
Economy in use of supplies	100
Economy in schools of conductors and motormen	50
Economy in contracts	75
Economy in supervision, administration, etc	100
Economy relative to employees	25
Economy to prevent accidents	75
Settlement of damage claims	50
Interest on balances	50
D. Service in safety and comfort of general passengers; value, 15 per cent.	
Noise	50
Dust	50
Ventilation	50
Repair of pavement	100
Distance between tracks	25
Fenders and wheel guards	100
Location of tracks as to curb	25
Watchmen at crossings	75
Headlights	25
Relocation of tracks for comfort of street traffic	25
Gongs	25
Cars passing each other	20
Smoke from powerhouse	20
Treatment of persons injured	75
E. Service in accounting and preservation of funds; value, 10 per cent.	
Public reports	100
Segregation of accounts	75
Integrity of funds	50
Preservation of records	25
Simplicity of bookkeeping	50
Integrity of capital account	100
Traffic statistics	100
Distribution of labor accounts and overhead charges	75
Car value costs	100

The author admits that the responsibility for grading the managements on this suggested plan is large and that it would be well to have the work in each department done by committees composed of experts on the subjects considered, their conclusions to be subject to review by a single public service commission. Any citizen, however, should be permitted to register complaints, either with the original committee or the sub-committees, and the hearings on these complaints should be open to the public and press. Mr. Peters is still in doubt as to whether all of the bonus in the way of increased dividends permitted for good management under this graded system should be allowed as an increased reward to the capital invested or should be shared in part with the employees of the corporation, who would be responsible, at least in part, for the good results obtained. On the whole, however, he concludes that at least two-fifths of the reward should go to the employees and that at the end of the fiscal year this amount should be prorated among them, from the president to the day laborer, in proportion to the amount of salary received by each during the year.

Mr. Peters is certainly entitled to the credit of originality for his suggestion.

Proposals are requested until Aug. 27, 1913, for building an electric tramway, estimated cost $45,775, in the suburbs of Vigo, Spain. If successful in bidding against La Compania Anomina Tranvias Electricos de Vigo the concessionaire must pay $682 for the project with interest of 5 per cent from the date the project was filed. The concession and construction of an electric tramway from Reus to Tarragona, Province of Tarragona, Spain, has been awarded to Mariano de Cárcer, owner of the approved project. The rolling stock is to comprise at least four electric cars, ten trailers, five electric freight cars, twenty trailing freight cars, and ten flat cars. The contractor may be addressed in care of La Jefatura de Obras Públicas de la Provincia de Tarragona, Tarragona, Spain.

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Fifth Annual Convention of the Pacific Claim Agents' Association

A Full Report of the Session of the Pacific Claim Agents' Association, Held in Vancouver Under Auspices of British Columbia Electric Railway

The Pacific Claim Agents' Association this year held its annual convention in Vancouver, B. C., on July 10, 11 and 12, as guests of the British Columbia Electric Railway. Abstracts of some of the papers presented at these meetings were published in last week's issue of the ELECTRIC RAILWAY JOURNAL, and additional ones are produced elsewhere in this issue.

At the opening session of the association on the morning of July 10, Mayor Baxter of Vancouver, made an address of welcome on behalf of the city and spoke in high terms of the work claim agents could do in bringing about harmony between their companies and the public. The object of claim agents should be, he said, to settle claims, not to fight them.

F. R. Glover, of the board of management of the British Columbia Railway, welcomed the delegates on behalf of the only electric railway outside the United States which is connected with the association. He stated that his company had a remarkably low record of claims in proportion to earnings. In fact, he thought it was possibly the lowest on the coast.

In the address of the president, next on the program, George Carson spoke of the beneficial effects he had noted as the association became more unified. He also said that the index bureau which was established a year ago had proved useful in the work of exposing fraudulent claimants and that probably the number of subscribers to the bureau would be doubled within the next twelve months. In further reviewing the work of the association within the past year, Mr. Carson emphasized the fact that the conviction of the notorious Myrtle Johnson had been secured largely through its efforts.

In the report of the secretary-treasurer it was noted, among other matters, that in the large number of cases where information was secured regarding professional fraudulent claimants, circular letters were sent to all association members advising them of the circumstances.

E. H. Odell, of Tacoma, whose membership in the association had been terminated by virtue of his retirement from service with the railway company, was elected an honorary member by unanimous vote.

The convention program committee had selected and assigned a number of topics in such a way that on each subject independent papers were prepared by several members. Thus, on the subject "Required Legislation for the Modification of Court Procedure in the Trial of Personal Injury Cases," papers were prepared by Harrison Allen, attorney Portland (Ore.) Railway, Light & Power Company; C. H. Winders, attorney Northern Pacific Railway, Seattle, Wash., and A. J. Falknor, attorney Puget Sound Traction, Light & Power Company, Seattle, Wash.

"Workmen's Compensation and Insurance Laws" was the subject of papers by H. K. Relf, claim agent Spokane, Portland & Seattle Railroad, Portland, Ore.; E. H. Odell, Tacoma, and J. T. Rupli, assistant claim agent Puget Sound Traction, Light & Power Company, Seattle, Wash.

On the subject of "The Value of Safety Committees, How They Are Organized and Put to Work," George Carson, claim agent Puget Sound Traction, Light & Power Company, Seattle, Wash., and T. G. Aston, claim agent Washington Water Power Company, Spokane, Wash., read papers.

Papers were read on "The Value of an Index Bureau in Dealing with Fraudulent Claims," by B. F. Boynton, claim agent Portland (Ore.) Railway, Light & Power Company, and S. A. Bishop, claim agent Pacific Electric Company, Los Angeles, Cal.

Papers were also prepared and read on "The Unreported Accident or Blind Case," by J. H. Handlon, claim agent United Railroads of San Francisco, and C. F. Young, Puget Sound Traction, Light & Power Company, Seattle, Wash. Most of the papers mentioned in the last three paragraphs were the ones abstracted in last week's issue of the ELECTRICAL RAILWAY JOURNAL.

During the session devoted to papers and discussion on workmen's compensation matters, there were present at the convention F. L. Daggett, J. F. Gillies and A. B. Ernst, of the Industrial Insurance Commission of the State of Washington, who took part in the discussion of the papers. Mr. Daggett also read a paper explaining the working of the workmen's compensation law in the State of Washington. It was pointed out that this State had taken a pioneer position in the establishment of insurance laws for workmen.

By request from the Chairman of the Industrial Insurance Commission, it was voted to supply the commission with ten printed copies of the minutes of the convention.

Mr. Handlon suggested that a very beneficial preventative effect might result from advertising the work of the index bureau. Acting on his suggestion, it was voted to have made, for use in the offices of members, small metal placards bearing the words "Members of the Pacific Claim Agents' Association, and Subscribers to the Pacific Claim Agents' Index Bureau."

Spokane, Wash., was set as the place of meeting for the convention in 1914. The following officers were elected for the year 1913-14; President, J. B. Handlon, United Railroads of San Francisco; first vice-president, T. H. Aston, Washington Water Power Company, Spokane, Wash.; second vice-president, A. M. Lee, Northern Pacific Railway, Seattle, Wash.; third vice-president, G. N. Smith, Oregon-Washington Railroad & Navigation Company, Portland, Ore.; secretary-treasurer, E. H. Odell, Tacoma, Wash.; executive committee, W. H. Moore, San Diego Electric Railway, San Diego, Cal.; H. C. Winsor, Tacoma Railway & Power Company, Tacoma, Wash.; A. E. Beck, British Columbia Electric Company, Vancouver, B. C.; H. K. Relf, Spokane, Portland & Seattle Railroad, Portland, Ore; T. A. Cole, Los Angeles Railway Corporation, Los Angeles, Cal.; S. A. Bishop, Pacific Electric Company, Los Angeles, Cal.

The convention entertainment program was in charge of A. E. Beck, of the legal department of the British Columbia Electric Railway, who had prepared a schedule of sightseeing for the ladies of the party during each morning and afternoon. On Thursday evening an informal banquet at the Hotel Elysium was attended by about fifty members and guests. Messrs. Carson, Daggett, Odell, Faulkner, Handlon and others spoke, emphasizing the fact that the Pacific Claim Agents' Association recognized no international line and looked forward to a greatly increased scope of activity.

Friday afternoon the association members and guests visited New Westminster, whence they went by boat to the mouth of the Fraser River and visited the salmon canneries then in operation, returning to Vancouver by special

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car over the lines of the British Columbia Electric Railway. The business of the convention was concluded Saturday morning, and the afternoon was devoted to a trip by launch to the Lake Buntzen plants of the British Columbia Electric Railway.

LEGISLATION CHANGING COURT PROCEDURE IN THE TRIAL OF PERSONAL INJURY CASES.

BY C. H. WINDERS, ATTORNEY NORTHERN PACIFIC RAILWAY, SEATTLE, WASH.

In my opinion there should be additional legislation, or a repeal of existing statutes, giving to trial courts the same right as is now possessed by federal courts to comment in appropriate cases upon the weight to be given to certain classes of testimony, to restrict the appeal by unbridled argument to the passion and prejudice of the jury, and to require higher qualifications for trial jurors.

But something more than mere legislation directed towards a modification of court procedure is needed. Continuous frauds in the nature of personal injury and damage suits are being perpetrated upon public service corporations, and the almost uniform prejudice that pervades the minds of a jury in the trial of an injury case arises largely not from want of legislation but from the fact that the courts refuse to enforce rules, laws and canons of ethics which are already in existence and in theory are supposed to be observed. What we need is legislation that will give us more intelligent and fearless judges, men of experience who are not only well versed in the law and possessed of common sense and judgment, but courageous in giving effect to the law and present rules of procedure without fear of newspaper criticism or of their political future.

A fair trial in cases of disputed questions of fact rests and always will rest largely with the trial court. No remedial legislation can be passed that can interfere to any considerable extent with the broad discretion so vested. The abuses of giving every instruction asked by either side, of straddling every question and of shirking responsibility in matters of a new trial should be corrected, and if this is done no changes in matters of procedure will be necessary. We might theorize on commissions, on the elimination of women from juries and upon many other matters, but this will get us nowhere. Existing conditions, many of which cannot be changed without constitutional amendment, are with us to stay, and relief lies only in affording protection to the courts and above all in removing them from politics.

We all recognize that a judge should enter upon his duties without the slightest obligation or feeling of obligation to any person by reason of his elevation to such position, and as long as a political campaign is necessary there is of necessity obligations which are unconsciously felt. The legislation, therefore, which in my opinion is necessary before we will accomplish any good, must be directed toward raising the standard of the men who preside at the trial of these cases, giving them a longer term of office, a higher salary, and affording protection by means of legislation against the demagogue and the editors of the yellow press who criticize every opinion which may be directed towards the protection of the property and property rights of a public service corporation.

Claim agents are busy men, and while they are ever ready to cry out against the character of men who do make the laws and against the libelous and slanderous attacks upon our judges, apparently they lack the initiative or interest to avoid this condition by getting out and sacrificing a little of their time in arousing interest in their respective communities towards the choice of men who are in fact good citizens. With such men in their legislatures it would be but a short time until laws were passed that would afford protection to the trial and appellate courts, and without vesting the courts with any more authority and without any constitutional amendments, obtain for every litigant a fair and impartial trial.

I have found in my experience that by the close co-operation between the claim department and legal department many of the members of the profession who make a business of filing suits of doubtful character have either ceased bringing suits against our company or have been willing to take the claim agent's judgment as to the law and facts. In that way the legal department is saved from the trial of a great many more cases, and a great deal more time and expense than is necessary. This has nothing to do with legislative enactments or constitutional amendments, but in my opinion it has a great deal more to do with the accomplishment of actual results than anything that added legislation can do.

COMMISSION FOR THE TRIAL OF PERSONAL INJURY CASES

BY A. J. FALKNOR, ATTORNEY PUGET SOUND TRACTION, LIGHT & POWER COMPANY, SEATTLE, WASH.

The principle of progress, change, improvement and betterment that underlies our law warrants a study of existing defects of trials relating to personal injury cases. It is easy to condemn the efficiency of the present jury trial. Indeed the Supreme Court of the State of Washington has, in a somewhat recent case, judicially recognized the failure in many instances of jury trials in personal injury cases, when it said: "The common law system of making awards for personal injuries has no such inherent merit as to make a change undesirable." One cannot, however, but view with gratification the progress that has been made in the past relative to trials, and whatever defects may be pointed out in the present system, one can easily recognize that law is a progressive science. When one compares ancient methods of trial with our present jury trial this progress is certainly marked. From the trial by wager of battle and wager of law in ancient time when woman was little more than a chattel we have come down through the development of the early jury trial in the hands of the English to the time when in the State of Washington women predominate on our juries and are the upholders of the "bulwark of our liberties."

Undoubtedly the present jury is the best and freest from improper influences and more nearly approximates justice in its verdicts than any jury in prior history. I believe that the average juror means to do right between the parties, and I further believe that our present jury trial with the present safeguards is about as capable, efficient and honest a jury trial as is to be hoped for under the present conditions of society. Law is a progressive science, however, and notwithstanding the good intentions, efficiency and safeguards, as said by the Supreme Court of the State of Washington, "No one knows better than judges of courts of *nisi prius* and of review that the common law method (trial by a jury) of making such awards, even in those instances to which it is applicable, proves in practice most unsatisfactory. All judges have been witnesses to extravagant awards made for most trivial injuries and trivial awards made for injuries ruinous in nature; and perhaps no verdicts of juries are interfered with so often by the court as verdicts making awards in such cases. . . . The test of reasonableness means but little to the ordinary juror."

A practice so unsatisfactory ought not to continue. A system that results in extravagant awards for most trivial injuries and trivial awards for injuries ruinous in their nature ought to be changed. The injured should receive what is justly due him, no more and no less, and if law is a progressive science it ought to progress to that point

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where justice will be meted out to both parties, and if the present jury system, however sacred, however long standing, is insufficient to accomplish that end some system ought to be established that will work more substantial justice. It is but fair to say that the injured is jealous, and properly so, of the right of trial by jury. A right that has proved such a safeguard to individual rights ought to be changed or modified only after the greatest care and upon conclusive proof of the necessity for the change.

Within the past few years a law has been enacted in the State of Washington relating to master and servant wherein the servant's injuries are determined by three commissioners appointed by the governor, the majority of whom may make a decision. The plan appears to have worked out most satisfactorily. Undoubtedly more harmonious and even handed justice would be obtained in personal injury cases if all injury cases were tried by the commission, and it would probably be well and strengthening to the commission's opinion and to the public confidence therein that there should be associated with the judge trying the case two laymen, one of them a physician, the judge, of course, to declare the law, and in cases where a recovery is allowed a majority to announce a decision. Legislation expediting such trials and lessening appeals would also assist. The play of prejudice, sympathy, and any other improper influences which result in trivial awards for serious injury or extravagant awards for trivial injuries would be thereby lessened, or at least greatly minimized, and it is legislation if any with this ultimate point in view that is required out of sheer justice to all litigants in personal injury cases. Although the present jury system may be the best means yet devised of adjudicating personal injury cases, it does not entirely meet the requirements, and it is wholly unlikely that any further legislation concerning the selection or impaneling of jurors will accomplish the desired end, and justice to all litigants can only come through an experienced, honest, fearless commission such as or similar to the one outlined above.

THE WORKMEN'S COMPENSATION ACT OF THE STATE OF WASHINGTON.

BY J. T. RUPLI, ASSISTANT CLAIM AGENT PUGET SOUND TRACTION, LIGHT & POWER COMPANY, SEATTLE, WASH.

In 1911 the state of Washington passed a "Workmen's Compensation Act," which went into effect Oct. 1, 1911. This act has since been held constitutional by the Supreme Court in a decision in 1911, which said, "that the act violates no provision of either the State or Federal Constitution." In its more popular sense and practical application, the law is simply a compulsory insurance with the State by employers of employees engaged in certain kinds of hazardous work. Although this point of hazardous work is a basic one in the act, yet in specifying various kinds of workmen protected by the act, the law is very liberal in including a great many classes of workmen who in the ordinary acceptation of the word "hazardous" would be passed over, such as men engaged in jewelry making, in creamery work, printing, etc. This act provides certain, prompt and reasonable aid to the injured workman and his family or dependents, and abolishes the troublesome and annoying personal injury suits. The employer is no longer harassed by vexatious litigation arising in barretry and in its place we have the fair, certain and mutual adjustment by the state of the claims of all workmen engaged in hazardous work and injured in the course of their employment.

In addition to the forty-eight classes of industries engaged in hazardous work as defined by the act, which includes street and interurban railways, there is a class known as the elective non-hazardous industries, wherein any employer and his employees, engaged in work not deemed hazardous, may by their joint election, filed with the commission, accept the provisions and benefits of the law. These various industries contribute to an accident fund used in the payment of claims according to the fixed schedule of distribution, a certain per cent of their pay roll, this per cent fluctuating from 10 per cent charged in powder manufacturing to 1½ per cent charged in creameries, printing, jewelry making, etc., and 1.35 per cent charged in the elective non-hazardous class.

The fund created by assessments is used entirely in payment of awards, the law requiring the state to pay the entire cost of administration. This, to my mind, is one of the strongest and most substantial features of the law. It is obvious that this farsighted and wholesome provision not only relieves the personnel of the commission from any possible criticism or suspicion in the awards and distribution of the accident fund, but is a tribute to the munificence of the state and an evidence of its good will and kindly offices in the furtherance of the welfare of both employer and employee.

The next question for consideration is when and under what circumstances a workman coming under the law is entitled to compensation. This is readily answered by the statement that any workman when injured in the course of employment, either at or away from the plant of the employer, whatever the cause of the injury may be, as long as it is not wilful, is entitled to compensation.

The amount of compensation, however, varies logically with the nature, character and extent of the injury. In the event of death a burial expense of $75 is allowed and a sum of not to exceed $4,000, based upon the expectancy of life, as set out in the American Mortality Table, is set aside for the widow and children under sixteen years of age and is paid in monthly allowances of not to exceed $35. In case of temporary total disability, the awards are increased 50 per cent for the first six months of disability but in no case exceed 60 per cent of the monthly wage of the claimant. In case of permanent partial disability, a lump sum of not to exceed $1,500 is paid, the specific amount to be determined by the commission from the maximum sum of $1,500 for the loss of the major arm at or above the elbow, down to $25 for the loss of the little toe.

Probably no one feature of the law has caused so much criticism as the question of the sufficiency of these awards. It is urged, and with some show of reason, that $35 a month is not sufficient to provide adequately for a man and his family, especially if his family is large. But it was never intended by the framers of the law or its supporters, however, that the amount of awards should be equal to the earning capacity of the workman or fully support him and his family during his disability. The workman in all fairness to his employer and to himself cannot expect the employer to carry the entire burden of the cost of the accident, and although undoubtedly the employer should bear a greater portion thereof, it is only fair for the employee to contribute his mite thereto, especially when it is taken into consideration that from past experiences the majority of accidents are due primarily to the carelessness of the workmen. It might be of interest to state that the Industrial Commission in its first annual report recommended that no general increase of awards be made until the present act had been more thoroughly tested and statistics were available covering broader experience. The commission did recommend an increase in the maximum allowance to the widow and children of workmen killed, from $35 to $45, and also an increase to workmen totally permanently incapacitated from gainful labor.

Another feature of the law that has provoked considerable adverse criticism, especially from employees, is that it fails to provide first aid. The employer argues that at least a portion of the first aid expense should be borne by the employee in the shape of a very small assessment deducted from his monthly wage, whereas the employee is

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opposed to joint contribution to such a fund, for the reason that the employer owns and operates the dangerous agencies for his own profit. Under the present law the employee has to provide his own first aid, but here again a number of employers, in their fairmindedness and generosity, not only provide first aid for the faithful workmen injured in the course of their employment, but give them continued medical aid and hospital attention, if necessary, without charge to them. And aside from this, there are formed at this time a great many of employees' hospital associations, conducted by the employers for the benefit of the employees, where medical and hospital attention is provided for a nominal sum.

A striking and wholesome feature of the law provides that in case any workman is injured because of the absence of any safeguard required by the statute or ordinance, or if a miner improperly employed is injured, the employer is required to pay into the accident fund a penalty in addition to the regular assessment. On the other hand, should the workman remove a safeguard and become injured, his award is reduced 10 per cent. This section is intended solely as an accident preventive measure and assists materially the Industrial Commission in promoting an active safety campaign on lines similar to those conducted by a number of concerns throughout the country.

Of special interest is the section of the law providing "that if the injury to the workman occurring away from the plant of his employer is due to the negligence or wrong of another not in the same employ, the injured workman, or if death result from the injury, his widow, children or dependents, as the case may be, shall elect whether to take under this act or seek a remedy against such other." Several nice questions present themselves in connection with this proposition.

For example, what constitutes an election? It seems to me a claimant should not be allowed to speculate with his claim—blow "hot and cold," so to speak. If he advisedly and in good faith files and prosecutes his claim, and the commission make an award, and he then declines to take the award, institutes suit against the agency causing the accident and loses because of contributory negligence, is he still entitled to the award of the commission? It would seem that the act was never intended to give a claimant a dual remedy with which to speculate. He has the choice in the first instance and when he has made his selection he should be bound by it.

Again, what constitutes the plant of the employer? Let us take a street car company; is it the office building, the carhouse, the work shop, the power station? Is not the street car on the street as much the plant or at least part of the plant of the employer as the above mentioned places? And does not the same argument hold good as to the teamster with his team and wagon in the street, as to the laborer who works for the contractor who is grading the street? Supposing a contractor has the contract to pave a street and it is the only work he is doing. His plant would certainly not be in the shed where the tools are kept or in his office. As a matter of fact he may not even have an office. It would seem to me a reasonable construction in such cases would be that the plant is where the work is being done.

If this, then, is the proper interpretation and the workman is injured through the agency of a third person, is he not obliged to take under the act? The law is very clear that he has the right to elect only when injured away from the plant, through the agency of a third person. Some argue that it was never intended to destroy the right of action against a third person responsible for the injury. This may have been the intent of the legislature, but it does not seem to be so expressed in the law, and only the judicial construction that we are awaiting will definitely clear up this point.

The method of procedure for the collection of compensation by workmen is really very simple. Suitable blanks for the employer, employee, physician and witnesses are provided by the commission. After due but prompt investigation the claim is either allowed or rejected. As I understand the law, it is the duty of the physician attending the injured workman to inform him of his rights under the act and to lend every assistance in making his application for compensation, but we have let it be known among our employees that the claim department is willing at all times to fill out their blanks and advise them as to their rights, and do anything in its power to facilitate the bringing of the claims to a speedy adjustment.

Every accident to our employees, however trivial, if covered by the act, is promptly reported to the commission, and a complete record is kept of all steps in the progress of the claim. Although here and there there has been a disgruntled employee, on a whole there has been but little criticism.

COURT PROCEDURE IN THE TRIAL OF PERSONAL INJURY CASES

BY HARRISON ALLEN, ATTORNEY PORTLAND RAILWAY, LIGHT & POWER COMPANY, PORTLAND, ORE.

The actual trial of a personal injury action often consists in the mere placing on the table of the cards that the damage lawyer has stacked in advance, and it may properly be said that we have at present sufficient forms and rules of procedure for use in this. The trouble that serves as a basis for a plea of modification lies rather in the administration of the law before and during the trial. The thing most highly desired is a reform in the actions of the bench or bar in the average personal injury case.

The discussion of the subject divides itself under four heads: first, the abolition of the contingent fees; second, compulsory examination of the claimant by a board of physicians controlled by neither party; third, the abolition of the confidential relation between the physician and the patient who brings the action, and fourth, orderly procedure during the trial.

The contingent fee is a subject arising prior to the bringing of the action and has perhaps the most important bearing on the subsequent trial of the case. It is well known that most of the personal injury cases tried to-day are taken by members of the bar under a contract that the attorney is to receive a percentage of the amount recovered, if successful, and nothing if no recovery is had. Whether expressed in the contract or not, it is generally understood between the parties that the attorney shall advance the costs. Under the common law it was an offense to make such an agreement between attorney and client, and it was also unlawful for any other person to encourage another by rendering assistance in a suit. Such offenses were known as maintenance, champerty and common barretry.

It is an undisputed fact that at the present time many lawyers who make a practice of bringing personal injury actions continually violate these three precepts of the common law. They even have in their offices, or at some convenient place adjacent thereto, what are commonly known as "ambulance chasers." These men watch the newspapers, haunt the hospitals and public institutions and endeavor in various other ways to come in contact with injured persons at the very time when they are receiving first aid. Within many of our large hospitals are nurses who act as agents for personal injury lawyers in soliciting cases from the injured for a portion of the amount recovered. In extenuation of such practices these lawyers set forth the ridiculous claim that "first aid" means the contract to bring an action on a contingent fee before medical aid is rendered or any knowledge of the evidence is had.

Numerous examples of the fraudulent and illegal practices hidden under the use of a contingent fee may readily be found. The common law offenses of champerty, main-

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tenance and barretry should be revived by statute in every state, for the contingent fee is an incentive to the bringing of causes which have no merit, the training of witnesses in falsehood to the dishonor of the profession, the enrichment of the ambulance chaser, and the prostitution of justice.

The second subject to be discussed is compulsory examination of the claimant by a board of physicians. Often the trial of a personal injury case is largely influenced by the failure of the jury to understand the nature of the injury. This results nearly always in an excessive verdict for the reason that the more obscure and rare the attending physician can make the case, the more it appeals to the mind of the average juror and the larger the verdict. On account of the leniency of the rules of pleading the description of the injuries contained in the complaint seldom advises what the plaintiff proposes to rely upon to prove his case. Lawyers who are employed to defend these cases often demand an examination of the plaintiff by physicians appointed by the court or selected by the defendant. This application, however, may be granted or not, at the discretion of the trial judge, and on account of the late hour at which the order is made, if at all, the story of the plaintiff has been already well rehearsed under the coaching of his private physician and the examination is often quite unsatisfactory.

It is held in some states that the defendant is not entitled to have the plaintiff examined until medical testimony has been offered in the case as to the plaintiff's condition. Even then the selection by the court of the physicians to make the examination is a problem. They are sometimes selected by the court from among the personal acquaintances of the trial judge, and may or may not be of recognized standing or skilled in the particular branch necessary to effect the capture of the malingerer. Relief from such a condition can be readily afforded by the enactment of a statute compelling every claimant to submit to a physical examination by a board of physicians who have not been selected by either of the parties. These physicians should be selected from a list of those in good standing recommended to the court by the local medical society, and the names of these physicians might be enrolled with the clerk of the court, to be selected in the same way as jurors. Or it might be left to the court to select from the list in his custody a committee of examiners who are specialists in the departments of medical science and surgery dealt with in the case. The plaintiff and defendant at the time of the trial should each have the privilege of calling to his assistance a physician to conduct the examination of the medical witnesses. This is suggested from the fact that the average attorney cannot acquire a satisfactory and enlightening technical knowledge on a subject of such complex nature as the case may disclose.

Laws have been enacted in some jurisdictions requiring as a condition precedent to any right of action that the claimant should file with the adverse party a claim giving the date, circumstances and character of the injuries received. These laws, however, generally apply only to municipal corporations. Similar statutes should be enacted having reference to all cases. Upon receiving the statement aforesaid the person liable to be sued could, at his discretion, make an application to the court for a physical examination by the board of physicians under the plan hereinabove suggested, and the defendant would thereby be protected from the blind or the fake case.

Another point of marked importance in any movement to modify the trial of personal injury claims is the abolition of the confidential relation between the physician and the patient. There is a contrariety of opinion among the courts as to the privileged communication in the trial of an action for damages, but it is generally provided by statute that the privileged communication is waived when the plaintiff takes the witness stand to testify as to his physical condition. The bringing of an action should in itself be sufficient waiver of the privileged communication concerning the physical injury, and should be deemed a consent to the examination of the attending physician. This should be done for the purpose of enlightening the jury as to the exact injuries received and what the patient disclosed to his doctor as to the circumstances of the injury.

Important as the three points outlined above have been, however, the question of orderly procedure in court during the trial is of no less weight. The most unsatisfactory part of the practice of law and the trial of the personal injury action is the administration of the law in the trial of the case. The fault in my opinion lies largely with the judges. In the conduct of the trial, particularly where a corporation is the defendant, it is the fashion nowadays for the courts to make themselves partisan but to shirk responsibility. The law of every state provides, and rightfully, that when a case is presented that is not sufficient to be sent to the jury, the court, upon the defendant's motion, may so decide. Under conditions existing at present it has become almost impossible to induce a trial judge to do his duty in this regard. In fact, so seldom will a judge grant a nonsuit or direct a verdict that when such is done it not only is the occasion usually of public comment but is considered a justification for resolutions of condemnation by various organizations and the recall of the judge. Candidates for judicial offices now line up on the stump along with the candidate for constable and publicly announce that, if elected, they will never grant nonsuits or direct a verdict; this pledge they keep.

The members of the bar are largely to blame for existing conditions in the trial of personal injury cases; those who represent claimants in personal injury cases, for their spirit of unfairness; those who represent the public service and other corporations, on account of their cowardice. If laws were enacted through their united effort that would make the ambulance chaser a criminal, and would send the lawyer who suborns perjury to the penitentiary, and would deal summarily with the judge who forgot the square deal, then the position of claim agent would be a desirable one, and the legal department of every public service corporation would be as pleasurable as any other branch of the service.

CONTROLLING DIMENSIONS OF TROLLEY WHEELS

At the meeting of the standardization committee of the Central Electric Railway Association, which was held on May 31, 1913, and previously referred to in the ELECTRIC

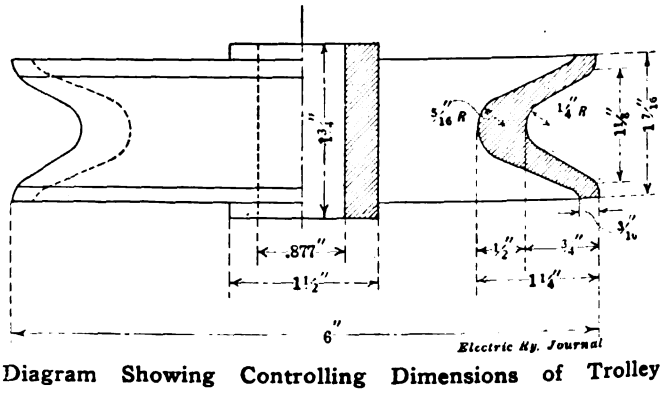

Diagram Showing Controlling Dimensions of Trolley Wheels

RAILWAY JOURNAL of July 5, 1913, one of the subjects discussed was the controlling dimensions of trolley wheels. It was voted at that time to recommend to the association that the dimensions shown on a diagram submitted by the committee be adopted as recommended practice. This diagram is reproduced herewith.

The Ohio Electric Railway, Cincinnati, Ohio, has contributed $10,000 to the $2,000,000 flood protection fund which is being raised through private subscription at Dayton, Ohio.

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Feeder Tests on the San Diego Electric Railway

By Readings of the Current Passing Through the Automatic Sectionalizing Switches the Company Has Been Able to Determine the Adequacy of Its Different Feeders—The Apparatus and Methods Used Are Described

BY H. MACNUTT, SUPERINTENDENT OF MOTIVE POWER SAN DIEGO ELECTRIC RAILWAY

The overhead lines on the San Diego Electric Railway are sectionalized, and each section has a separate feeder from the power house, but the sections are connected at different points by automatic sectionalizing switches. The exchange of current through these switches is sometimes

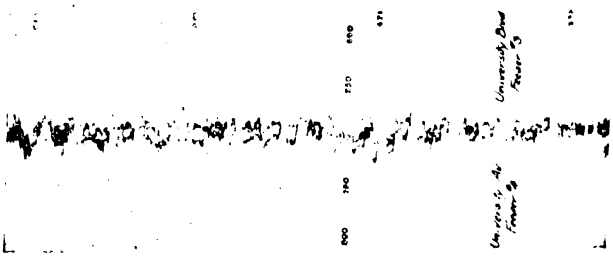

Fig. 1—San Diego Tests—Flow Between Feeder 3 and Feeder 4

in one direction and sometimes in the other, the direction depending upon the location of the load. Traffic on the system is growing rapidly, and it became clearly apparent recently that some simple method of determining the increase in the loads carried by the different feeders would be very desirable as it would show which feeders should be reinforced. The plan decided upon was to conduct a series of tests to show the interchange of current through the sectionalizing switches, the voltage and the total current supplied from each feeder panel in the power house.

The tests were made with graphic recording meters and covered a period at each sectionalizing switch of twenty-four hours. With a meter in the power house indicating the total current being supplied over any feeder, the meter at the sectionalizing switch indicates the amount of current supplied to that section by another feeder or the amount which that section is furnishing to some other section and thus the distribution of the load.

The accompanying charts are typical of those obtained during the test.

Fig. 1 is a short portion of the chart obtained of the current flowing through the sectionalizing switch between Feeder 3 and Feeder 4, at the corner of University Avenue and University Boulevard. It shows an almost even

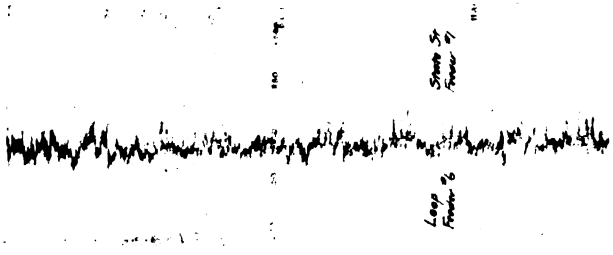

Fig. 2—San Diego Tests—Flow Between Feeder 6 and Feeder 1

exchange of current, with an average slightly in favor of Feeder 3. Fig. 2 is a short portion of another chart. This chart shows the exchange of current between Feeder 6 and Feeder 1 and indicates that the flow of current is almost continuously from No. 1 to No. 6. Fig. 3 is another chart and shows the exchange of current between Feeder 6 and Feeder 5. It indicates a large and continuous flow of current from Feeder 6 to Feeder 5, proving that the additional copper should be supplied to Feeder 5 and not necessarily to Feeder 6, as might be inferred from Fig. 2.

Three voltmeter charts are also shown. Fig. 4 was taken at the power station while the records already described were being taken on the line and indicates a very even maintenance of potential. Fig. 5 is a record taken while the tests were being made 1 mile from the station and at the section switch between Feeders 6 and 8. The voltmeter reading shown in Fig. 6 was taken at the end

TABLE I—TOTAL CURRENT IN FEEDERS AT POWER HOUSE

Feeder Number	Maximum	Average	Minimum	Section
1	400	200	100	State Street
2	530	240	130	First and Third Streets
3	650	380	230	Fifth Street
4	350	200	150	University and Adams Avenue
5	725	350	220	Brooklyn and City Heights
6	1250	900	420	Downtown Loop
7	500	300	160	M Street
8	550	330	130	Logan Heights

of the main line between Feeders 3 and 4 and 5 miles from the station. A chart showing the lay-out of the distribution system in the city is also published. The accompanying Tables I, II and III give in a general way the results obtained.

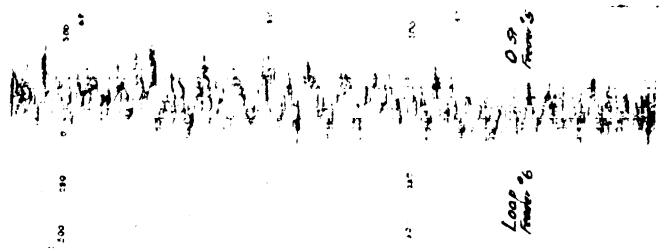

Fig. 3—San Diego Tests—Flow Between Feeder 6 and Feeder 5

The switches are numbered according to the feeders which they connect, and the order of the numbers indicates the general flow of current.

TABLE II—CURRENT THROUGH SECTIONALIZING SWITCHES

Switch Number	General Direction of Current	Average Current	Maximum Current Plus	Minus	Location
16	1 to 6	+100	+310	—110	State and D Streets
62	6 to 2	+125	+340	— 75	Third and D Streets
63	6 to 3	+175	+480	— 75	Fifth, bet. A and B Streets
65	6 to 5	+175	+480	— 80	Seventh and D Streets
68	6 to 8	+175	+550	—160	Fifth and H Streets
87	8 to 7	+ 25	+400	—200	Sixteenth and M Streets.
45	4 to 5	+ 20	+200	—130	Thirtieth and Univ. Avenue
43	4 to 3	+ 20	+225	—225	Univ. Ave. and Univ. Blvd.
23	2 to 3	+125	+325	—175	Fifth and Univ. Avenue
34	3 to 4	+ 20	+130	—130	Adams Ave. and Park Blvd.

The average voltage at the power house is 600, and special attention is directed to the voltmeter chart taken at

TABLE III—VOLTAGE AT SECTIONALIZING SWITCHES

Switch Number	Maximum	Average	Minimum
16	600	585	570
62	600	580	550
63	600	575	550
65	600	575	550
68	600	570	520
87	590	550	480
45	600	550	450
43	600	540	450
23	600	550	450
34	580	500	400

the power house (Fig. 4) and to the small voltage variation shown on it.

With this set of tests, including voltage charts at differ-

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ent points in the city, the calculations for new copper to relieve the weak points may be made. As the feeders practically work in multiple because of the sectionalizing switches, the problem is one of proportioning the resistances over the two or three different circuits from the power house to the point to be relieved. The information obtained was so useful that we expect to make similar tests at least once a year, and from their results to rearrange our copper if conditions change or to install additional copper where necessary.

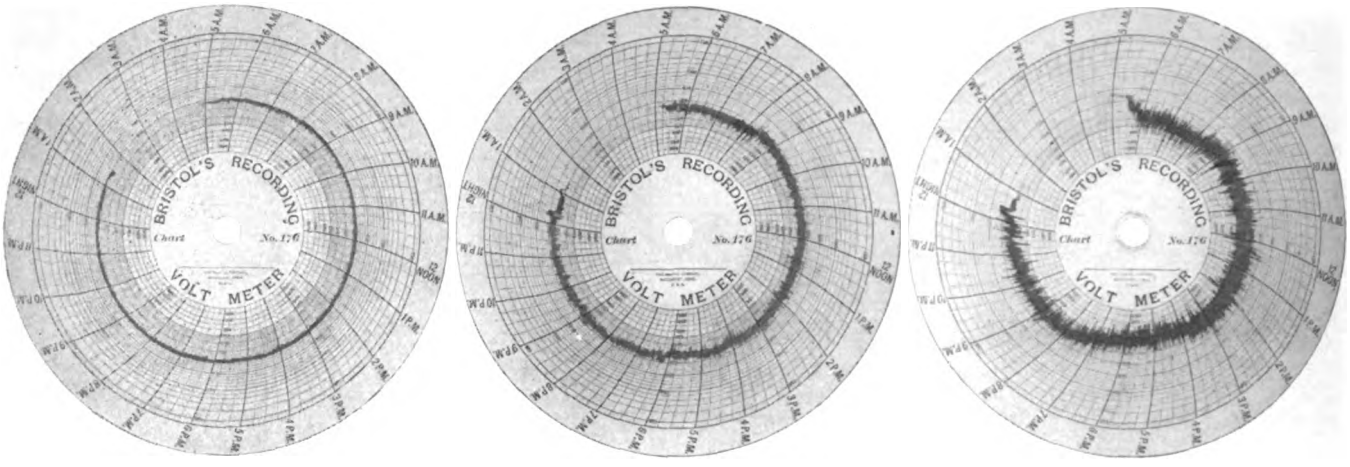
INSTRUMENTS

For recording the current which passed through the sectionalizing switches a General Electric type C-5 curve-drawing ammeter was used. The instrument has the zero mark at the center of the scale and registers 500 amp on each side of zero. The paper, operated by clockwork, travels at the rate of 3 in. per hour. The ammeter is designed for use with a shunt. For convenience in handling and to prevent possible injury to the public, the instrument and all accessories were mounted on a stand and inclosed in such a way that no bare parts would be visible. For obtaining the voltage a Bristol recording voltmeter was used. In the power house a Westinghouse graphic recording wattmeter was used on the feeders to obtain the total current of each feeder.

SECTIONALIZING SWITCHES

The sectionalizing switches used are automatic, single-pole and solenoid-operated and were made by the General Electric Company. All parts, including contactor, relay, resistance, control switch and fuses, are mounted complete in a wooden box, ready for installation on a pole. Fig. 8 shows the connections. The switch is connected across the section insulator by taps G and H. Circuit breaker B, when closed, energizes section B, and the current passes through tap G, switch blade Y and contactor operating coil X to the contact stud on the relay, which is then open-circuited.

When circuit breaker C is closed section C is energized and current passes through tap H, switch blade Z and relay operating coil W to ground, closing the relay disk V. This in turn completes the circuit through the contactor operating coil X, causing the contactor to close. This completes the circuit across the insulator, thus placing the two feeders from the power house to the switch in multiple. It will be seen that these switches are controlled from the power house and that both sides of the switches must be energized in order to close them. To open only one side will not open them and to close only one side will not close them.



Figs. 4, 5 and 6—San Diego Tests—Voltmeter Readings at Section Switches

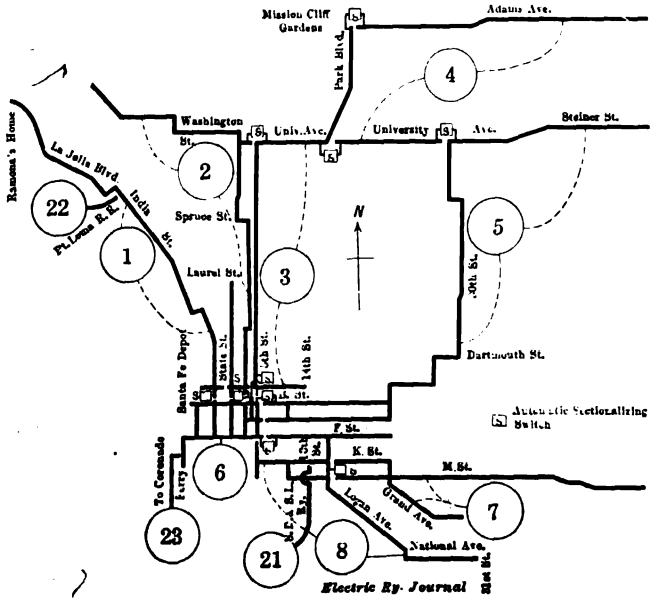


Fig. 7—San Diego Tests—Feeder Diagram Showing Location of Sectionalizing Switches

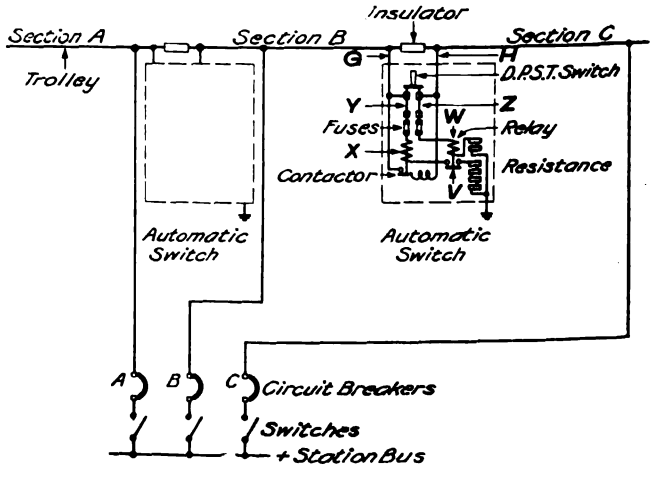


Fig. 8—San Diego Tests—Diagram Showing Connections of Automatic Sectionalizing Switches

NUMBER OF CARS ON THE SYSTEM

Table IV shows the number of cars on each route, the length of the round trip in miles, running time for round trip, headway and the average speed. This table represents the conditions during the early part of this year. The system is growing rapidly and calling for more cars,

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and this is the reason that a method of calculating the service furnished by each feeder was considered especially desirable.

TABLE IV—STATISTICS OF OPERATION

Route Number	Number of Cars on Each Route	Running Time in Minutes for Round Trip	Length in Miles for Round Trip	Headway in Minutes	Average Speed in M.P.H.
1	15	90	13.56	6	9.04
2	8	80	12.58	10	9.44
3	4	80	10.13	20	7.61
4	6	60	8.44	10	8.44
5	5	100	12.41	20	7.45
6	4	40	5.14	10	7.72
7	1	20	1.98	20	5.94
8	3	45	8.30	15	11.05
9	1	20	2.21	20	6.63
10	1	20	2.21	20	6.63
Adams Avenue	3	36	....	12	....
City Heights	1	15	....	15	....
No. 1 swing	6	..	....	6	....
No. 2 swing	5	..	....	10	....

No. 1 swing cars run from Fifth and D Streets to University Avenue and University Boulevard.

No. 2 swing cars run from Fifth and D Streets to Thirtieth Street and University Avenue.

POWER HOUSE LOAD

At the time that these tests were made, the maximum energy output during one hour was 2300 kw-hr., the average power output per hour was 1350 kw and the maximum momentary demand was 3000 kw. The average integrated energy output for a day's run of twenty hours was 27,000 kw-hr.

INTERURBAN CAR AXLES

The elimination of the failure of axles in interurban car service constitutes one of the most important problems of the time. While it is true that very few serious accidents occur through such failures, defective axles are always a source of danger. The number of axle failures in electric railway service is very large compared with that on steam railroads. This is due to the entirely different nature of the stresses to which the axles are subjected.

Not only does a defective axle endanger life and property with attendant financial loss, but service is apt to be interrupted owing to the difficulty of removing a disabled interurban car from the track. Very few electric railways are equipped with wrecking apparatus which will permit the removal of a car with a broken axle from the track, so that it must be at least partially repaired in place. That defective axles are common is illustrated by the experience of the Beebe lines in central New York, which have scrapped 124 axles in the last three years. Only three of these were actually broken, but cracks developed to such an extent as to make their further use dangerous. This is quite in contrast to the experience of the Pennsylvania Railroad and other steam roads. A few years ago a study of axle records was made at Altoona, and it was found that out of a total of 691,000 car and engine truck axles purchased by the Pennsylvania Railroad during the preceding five years only thirty-five had failed. Twenty-three of these failures were from heating troubles, while twelve were from axle defects. Attention has been recently directed to this matter by an accident on the Rochester & Eastern Rapid Railway. In this case a car was derailed at low speed and the passengers were considerably shaken up by the sudden stop.

The failures in interurban car axles generally occur on the gear end between the gear set and the wheel seat. They cannot be accounted for by the torque of the axle gear, as this is small compared with the torsional strength of the axle. The effect may be due to the vibrations set up by the gears, this being the principal additional cause of stress imposed on electric as compared with steam car axles. Whatever the cause, the effect is present in the form of minute circumferential cracks which gradually extend into the metal.

R. A. Dyer, Jr., third vice-president Syracuse, Lake Shore & Northern Railway Company, has during the past four years made a systematic study of interurban car axles. In 1906 a lot of sixty axles of unknown specifications were purchased from a company which forged them from purchased steel. These axles have averaged 300,000 miles of severe service before being scrapped, and a number of them are still in use. They were so satisfactory that in ordering the next lot from another company the endeavor was made to secure as nearly as possible the same quality of steel. The standard specifications of the Pennsylvania Railroad for open-hearth hammered-steel axles were called for. The results were quite disappointing, as out of a lot of seventy-five only three made 300,000 miles while twenty-seven have been discarded on account of cracks found on inspection after being in service. This experience indicated that conditions in electric operation are quite different from those of the steam railroad.

In 1911 sixty carbon steel heat-treated axles, of excellent mechanical properties, were put into service. The results in this case were also disappointing. One of these axles broke in a very peculiar manner, the fracture showing that the final break occurred over an area not larger than a silver dollar, the remainder of the surfaces of the break being quite smooth. Test samples from this axle at the point of fracture showed an ultimate strength of 104,000 lb. per sq. in., 53,000 lb. elastic limit, 21 per cent elongation and 45 per cent reduction in area. On account of the danger of using these axles all of them were taken out of service and they were replaced with others having the following physical properties: ultimate strength, 75,000 lb. to 97,000 lb. per sq. in.; elastic limit, 45,000 lb. to 57,000 lb.; elongation, 23 per cent to 30 per cent; reduction, 47.5 per cent to 67.3 per cent. Although these axles showed considerable variation in physical properties, they are doing well, having made 100,000 miles with but one failure.

Experiments are now being made with special alloy steels. In the fall of 1912 sixty chrome-vanadium steel axles were put into service. These are divided into several lots having different physical properties ranging within the following limits: minimum tensile strength, 85,000 lb. to 97,000 lb. per sq. in.; corresponding elongation, 22.5 per cent; reduction, 54 per cent to 64 per cent; maximum tensile strength, 106,500 lb. to 120,100 lb. per sq. in. These axles have not been in service long enough to show failures, but they are being carefully watched. The 1913 experiment will consist of a study of eight chrome-nickel axles of quite different physical properties. One lot of four will have tensile strength of 105,000 lb. and an elastic limit of 80,000 lb., with 20 per cent and 50 per cent elongation and reduction respectively. The other lot will have a tensile strength of 90,000 lb. and an elastic limit of 55,000 lb. to 65,000 lb., with 24 per cent elongation and 60 per cent reduction.

The above axles are 6 in. in diameter and are in use on high-speed interurban cars weighing about 43 tons without passenger load. Last year a number of these cars made more than 100,000 miles each, the record being 112,700 miles. The record for one month was 11,235 miles. The axles are inspected for cracks every time they are in the shop to have wheels turned, averaging about 50,000 miles, after which length of run the wheels are removed and a thin cut is taken from the axle over the surface in which a fault is liable to develop. This cut is not more than 1/64 in. in depth. A crack is evidenced by a break in the chip and is also quite conspicuous on the fresh surface of the steel. Inspection by cleaning the surface has not been found to give satisfactory results. The cutting away of the metal at the part of the axle where it is most needed is objectionable, and Mr. Dyer proposes as an alternative a plan in which a number of very small axial V-grooves will be made of several points on the surface. The breaking of the chip will show a flaw. There may seem to be an objection to removing wheels for the purpose of inspection of the axle on the ground that they will become loose in

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service. Mr. Dyer made experiments to determine whether or not this is the case. He found that there is a slight reduction in the force necessary to put a wheel back after it has been removed, but that this is not serious. For example, if a wheel requires 85 tons force to put it on the first time, 80 tons will be required the second time, 75 tons the third time, and after this the force is practically constant. This depends largely, however, on how smoothly and truly the wheel was bored.

Realizing the seriousness of the axle situation, Mr. Dyer is experimenting with a device for reducing the danger resulting from an axle break. In several cars sleeves of chrome-nickel steel 1½ in. thick and weighing about 150 lb. each have been placed on the axles and the wheels and gears mounted upon the sleeves. The sleeve is counterbored 1/16-in. except under the wheel fit. The steel used has the following physical characteristics: Tensile strength, 129,000 lb. per sq. in.; elastic limit, 115,500 lb. per sq. in.; elongation, 21 per cent; contraction, 65.2 per cent. This is a very expensive steel, and it is quite possible that a cheaper grade would be satisfactory for the purpose. The object of the sleeve is, of course, to support the broken ends of an axle, and it is counter-bored so that a break will probably occur inside the sleeve rather than at the end. To determine the effectiveness of the device a scrapped axle was sawed through at the usual point of fracture and was equipped with the sleeve and placed in a car. The car containing it was subjected to rough handling on a test track. While the two wheels on the broken axle operated independently, there was little tendency for the axle to pull apart and the sleeve evidently performed its function in a satisfactory manner.

Whenever wheels are removed or applied a careful inspection of axles is to be made. After wheels are removed the axle is to be thoroughly cleaned and gear and wheel seats coated with kerosene. The axle is then to be carefully inspected for cracks or defects. A strong magnifying glass is to be used in making these inspections. In case there is any doubt after this inspection a hammer test is to be made. When a sprung axle is straightened, hammer test is to be made. If checks, cracks or other defects are discovered in a number of axles of a given lot, the entire lot is to be removed and scrapped.

FEATURES OF SAFETY CAMPAIGN IN MEMPHIS, TENN.

In addition to employing the usual forms of publicity and safety committees in its safety campaign, the Memphis Street Railway Company has gone a step further in requiring its men to report occurrences that might have led to accidents. Whenever anyone is apparently careless of his welfare or the protection of the property of his employer, the trainmen are required to fill in a special report form known as a "near-accident" report. Following the receipt of this report, C. B. Proctor, claim agent of the company and chairman of the safety committee, writes a letter to the firm or person employing the careless individual, advising the employer of the details of the "near-accident" and saying further: "This company is using every effort possible to prevent accidents of all descriptions, particularly between its cars and vehicles. A committee of about 100 men has been appointed whose duty is to report to the management everything coming under their observation of an unsafe or dangerous character. A report was handed to me by a member of this committee, and I write this asking your hearty co-operation, as I know you are as anxious to prevent accidents to your property as we are." This letter is signed by the chairman of the safety committee.

Replies to these letters are always forthcoming and indicate that the employers or parents of the careless person mentioned in the letter approve of the plan and appreciate the letter.

Another formality which tends to increase the efficiency of the various members of the safety committee is that all reports to the chairman are acknowledged by a form letter. Heretofore the reports from the trainmen and members of the safety committee were not acknowledged, and it was believed that they became reticent or indifferent because they did not know what was done in regard to their report after it had been received by the chairman of the safety committee. The form letter has eliminated this taciturn spirit or lack of interest on the part of the men, and all are now enthusiastic on the subject.

Accidents, like any other part of a street railway company's operation, may be classified, and special stress can be laid on those that occur most frequently. In order to study all accidents and their causes, C. B. Proctor, claim agent of the Memphis Street Railway Company, has had a comparative accident form report prepared which divides all accidents into twenty-two classifications and charges them against the different lines on which they occur. Going a step further, this form gives a record of the classified accidents for the previous year, and finally it arrives at a basis of comparison between lines and between car-houses on accidents reported per car mile.

Each class of accident has assigned to it a code number, and these code numbers are used in recording the accidents on the monthly report. The code numbers follow:

1—Falling, boarding or leaving open cars.
2—Falling, boarding or leaving closed cars.
3—Passengers injured due to gates or doors.
4—Passengers injured due to electric appliances.
5—Passengers injured due to derailments.
6—Miscellaneous accidents to passengers.
7—Fights and ejectments.
8—Persons on foot, on bicycles, or riding animals, struck by cars.
9—Live stock struck by cars.
10, 11, 12—Vehicle collisions.
13, 14, 15—Street car collisions.
16—Collisions at steam road crossings.
17—Miscellaneous accidents to the public.
18—Employes injured on cars or at car houses.
19, 20, 21, 22—Other employees injured.

The form of report itself measures 19 in. x 19 in. and is cross-ruled. The names of the routes are printed in the left-hand vertical column and the code numbers for the class of accident in the upper horizontal columns as headings. This arrangement provides spaces for entering the number of each class of accident during the month and for the year to date. There are also columns for the car miles run and car miles per accident reported.

ANNUAL MEETING OF VIRGINIA ASSOCIATION

The annual meeting of the Public Service Association of Virginia, which is composed of a large number of street railway, electric, gas and water companies, was held at the Hotel Chamberlin, Old Point, Va., on July 18. The object of the meeting was to exchange views on matters pertaining to the operation of public utilities and service to the public in general. Among the subjects of general interest discussed were transportation, pay-as-you-enter cars, and problems of electric central stations as well as those confronting gas companies.

The following officers were elected: President, J. W. Hancock, manager Roanoke Railway & Electric Company; first vice-president, J. F. Rison, president Danville Traction & Power Company; second vice-president, B. B. Ferguson, general manager Portsmouth Gas Company; third vice-president, J. N. Shannahan, manager Newport News & Old Point Railway & Electric Company, Hampton; secretary-treasurer, W. J. Kehl, assistant treasurer Virginia Railway & Power Company, Richmond.

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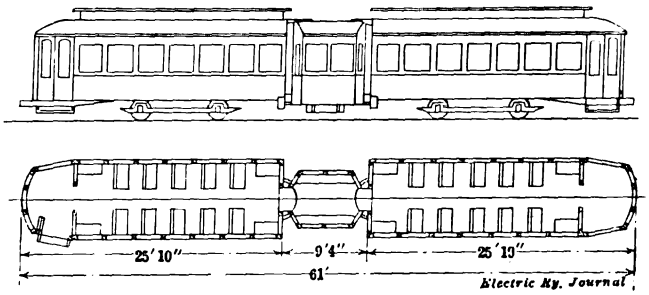
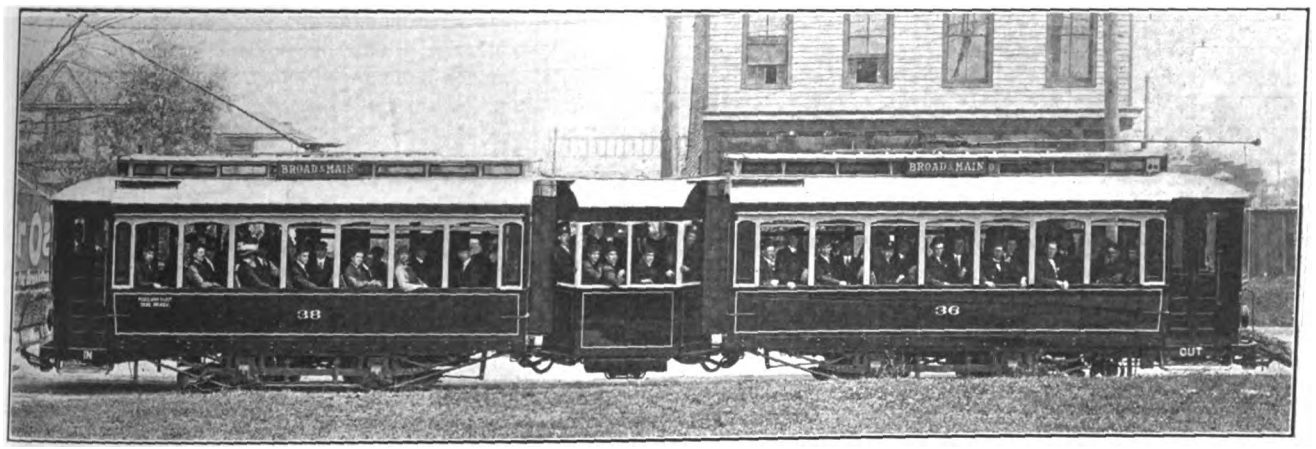
ARTICULATED CARS IN RICHMOND, VA.

The Virginia Railway & Power Company, Richmond, Va., is now building ten articulated cars at its shops on Robinson and Cary Streets in Richmond. These cars were originally 21-ft. Brill convertible cars but have been changed to the semi-convertible type and the long side steps have been removed. They are now equipped with folding doors and arranged for prepayment service with fare box stands on the rear platform. The seating arrangement consists of ten cross-seats and four longitudinal end seats in each car, with the addition of two longitudinal seats in the center passenger-carrying compartment, thus giving a total seating capacity of sixty-four passengers.

The equipment consists of Brill 21-E trucks, four GE-67 motors and K-6 controllers. The cables pass under the center of the center compartment. The car is also equipped with CP-27 air compressor with two 6-in brake cylinders. One is located underneath at the end of each car and connects with the present hand brake levers. The car fully equipped and ready for service weighs 45,000 lb. The cost of rebuilding these cars, exclusive of the air brake equipment, is approximately $800.

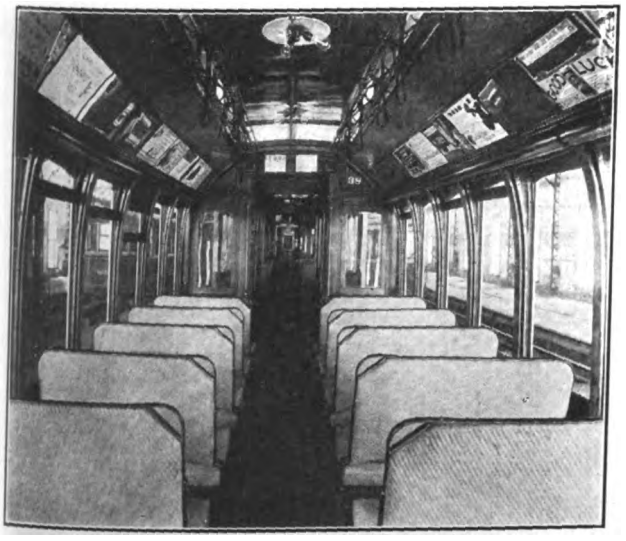


Richmond Articulated Car—Plan and Elevation



Richmond Articulated Car—General View Showing Arrangement of Car

One of the novel features of this car is that the floor is built on the same plane, and there is a continuous aisle the entire length of the car. Where the end compartments are



Richmond Articulated Car—Interior View Looking Toward Center Compartment

connected with the center compartment, there is a sheet-iron radius plate connected to the end compartment by a steel plate securely screwed to the end sills. The radius plate laps over the steel plate and is fastened to it by a bolt passing through both plates and a coil spring. This spring presses against the steel plate and the washer and nut on the bolt, thus allowing for any vertical movement of the car due to uneven track and sudden changes in grade. This radius plate is made to a radius to correspond to the movement of the center compartment and it extends under the curtains, hence it closes the openings between the end compartments and the center compartment. This radius plate is also provided with a shield which forms a groove for the end of the plate to work in, making it impossible for passengers to stumble or strike the edge of this plate in passing from one compartment to the other.

At the hood or roof of the car there is a steel plate hinged to the end compartments resting on a steel channel securely fastened to the roof of the center compartment. This prevents wear on the canvas roof and very effectively prevents rain from entering at this point. The car is provided with two trolley poles, one being hooked down in service as on double-truck cars.

There are no doors for entrance or exit in the center compartment except through the end compartments, the car being loaded and unloaded at the ends, the same as the present double-truck cars.

The Metropolitan Street Railway Company, Kansas City, Mo., has purchased two gasoline-driven portable stone crushers for crushing old brick and concrete on the streets instead of hauling it to a crushing plant. Heretofore the old material was either crushed by hand or hauled to a crusher and, when considered of no value in the new work, it was thrown away. The use of these two crushers saves transportation, and all material which can be used either in the crushed stone track foundations or in concrete is crushed for that purpose. When these crushers are not required in track repairs they are transported to the rock cuts on the company's suburban lines where they are used to crush stone for ballast.

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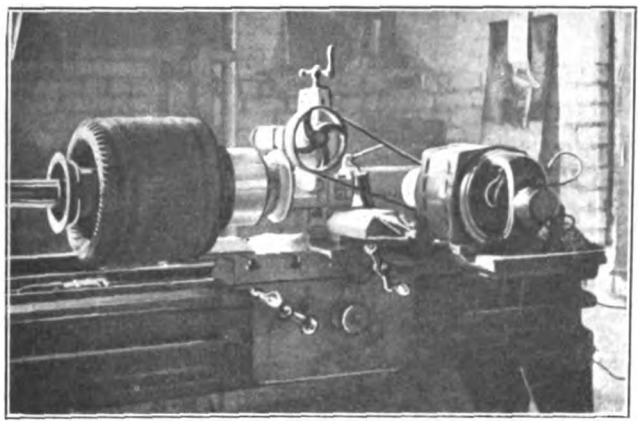
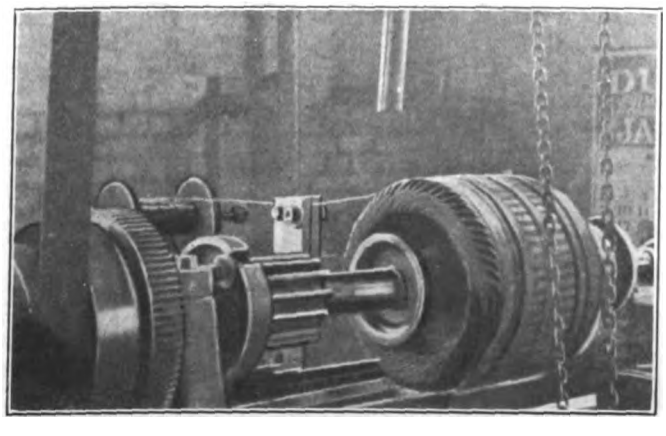
USEFUL APPLICATIONS OF AN ENGINE LATHE

On the Hudson River & Eastern Traction Company's lines the grades are severe and the motors have to be operated under arduous conditions. Hard brushes are used which keep the motors running but are hard on the commutators, and some time ago H. E. Kay, master mechanic, came to the decision that it would be desirable to slot the commutators to overcome the rapid wear.



Engine Lathe Equipped for Slotting Commutators

In consequence, a commutator slotter, as shown in the accompanying illustration, was made up in the shop from materials easily procured and at a practically negligible cost. With this Westinghouse No. 49 motors having 117 slots in the commutator can be slotted in forty minutes. The slotting equipment, which is applied to one of the standard engine lathes in the shop, consists of a piece of board bolted to the T-slots on the lathe carriage, upon which is clamped a small motor, the clamps permitting easy alignment for the belt. An iron bracket bent at right angles is bolted in the slot in the tool carriage, from which the tool post is removed, and to the vertical side of this bracket is bolted an old slide rest set vertically, thus permitting the raising or lowering of the bearing for the saw arbor, which is bolted to the old slide rest in place of the original tool post. The arbor or shaft which carries the saw is equipped with a pulley on the opposite end, and over this is run a belt to the pulley of the small motor.



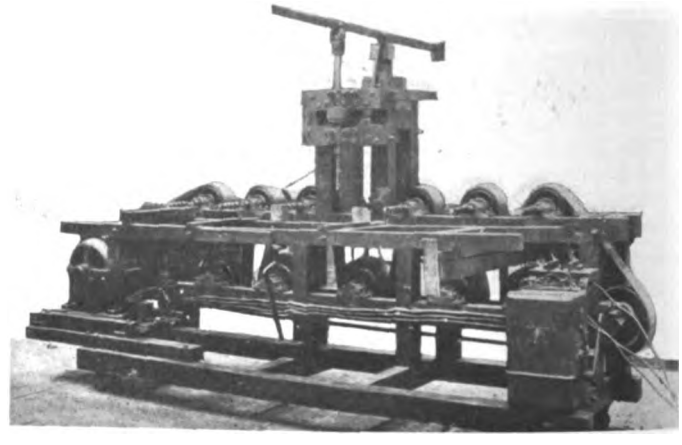
Engine Lathe Equipped for Banding Armatures

The slotter permits horizontal adjustment of the saw by moving the tool carriage of the lathe in or out in addition to the vertical adjustment obtained through the use of the vertical slide rest. It is also possible, by shifting the tail stock, to follow with the saw any segments which are not in perfect alignment with the armature shaft.

The same lathe is also used for a banding machine, as shown in another illustration, by running the lathe at the lowest speed, or 11 r.p.m., tension being put upon the wire by means of a slotted stick of maple with bolts through the end to clamp the wire between the two sides of the slot. This stick rests against the rear of the lathe bed. The wire is carried on an ingenious home-made reel. This was cast in iron, using a bell-cord spool for a pattern. After the ends of the spool were faced off and centered a small hole was drilled through the core so that the wire could be attached when the process of winding was begun. Two 7/8-in. bolts were then pointed to match the centers in the spool ends and screwed into tapped holes in angle-iron brackets, which in turn were mounted on the wall back of the winding lathe. As the pointed bolts have set nuts to lock them after insertion in the spool center, they act as a brake to keep the spool from unwinding too rapidly, and they can be adjusted to give any desired tension.

HOME-MADE CROSS-ARM BORING MACHINE

The Nashville (Tenn.) Railway & Light Company has effected a considerable saving in the cost of cross-arms by the purchase of material for them in mill sizes and lengths. The holes for pins and lag screws are then bored in the wood mill. The machine used for this purpose was designed by G. W. Swint, master mechanic, and was built complete in the company's shops. It consists of six horizontal spindles set on 14-in. centers, with a 25-in. space



Nashville Cross-Arm Boring Machine

in the center, and one vertical spindle located in the middle of the 25-in. space. The use of fixed spindle positions is permitted by the fact that all of the company's cross-arms are standardized, two-pin and four-pin arms having the same distances between pins as the six-pin type.

The horizontal spindles are driven by a single belt which passes over the pulley on each spindle and then down around the idler pulleys between each pair of spindles, finally passing over the pulley of a 5½-hp motor which runs the machine. The vertical spindle is belted in the usual manner from an extra pulley on the middle idler shaft.

A cross-slide carriage is provided, and the stop for the travel is at such a point that when it is reached the cross-arm carried on it is in proper position for having the lag screw hole bored by the vertical spindle. The latter is fed down by hand.

The overhead equipment of the Turin-Modane section of the Italian State Railway system is now being erected. The three-phase locomotives to be run on this section are constructed for 25-cycle operation, and as the available power is furnished at 50 cycles, transformer stations with frequency-changing sets are being installed. These machines will be provided with heavy flywheels to reduce the peak loads on the generating station.

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AMERICAN RAILWAY TOOL FOREMAN'S CONVENTION

The fifth annual convention of the American Railway Tool Foreman's Association was held in Chicago, July 22-24, 1913. During the course of the meeting a number of papers and reports of committes were read, among which were several dealing with the reclamation of scrap tool steel. In one of these a case was cited where 6500 lb. of tool steel had been purchased at an average cost of 50 cents per pound. All of this material was worked into tools, and having served the desired purpose it was found that the total weight of the parts turned in as scrap amounted to 2600 lb., 40 per cent of the original quantity purchased. At the original purchase price this had a value of $1,300.

The tool steel was, in accordance with the usual custom divided into four grades and was stamped in accordance with the following classification. Grade No. 1 embraced all "high-speed steel," being identified by a line of red paint the entire length of bar and stored in a section painted red on the outside. Grade No. 2 embraced all the higher grade, 1.20-per cent carbon steel, from which were made taps, reamers and formed tools. Grade No. 3 was a 1.05-per cent carbon steel, from which chisels, punches, punch dies, rivet sets and shear blades were made. Grade No. 4 was a grade of 0.90-per cent carbon steel, used for tools for boilermakers, blacksmiths and trackmen.

In the plant referred to all tools were issued from the tool room and returned there when requiring attention. All lathe and planer tools were made from bars having standard dimensions, and as tools became too short or unfit for further service they were placed in a scrap bin provided for each grade corresponding to the number on the tool. When a sufficient quantity of scrap tools had accumulated they were sent to the smith shop, weighed, receipted for and placed in bins in the steel workers' section. This department was equipped with a furnace that would maintain a temperature of 2500 deg. Fahr. with a preheating chamber attached suitable for annealing purposes. There was also a 1200-lb. steam hammer for the work of the department.

When a sufficient quantity of scrap of grade No. 1 had accumulated it was placed in the preheating chamber of the furnace and allowed to heat slowly and uniformly to a dark red, or about 1000 deg. Fahr. The steel was then transferred at the convenience of the tool smith to the other chamber and brought to a bright red heat, or about 1550 deg. Fahr., and forged to the next smaller standard size. After forming and dressing for service the steel was placed in the annealing box and allowed to cool to relieve the forging strains before hardening. From 600 lb. of scrap steel thus treated there were 500 lb. of serviceable tools delivered to the tool room, at a reclamation cost of 5 cents per pound, and from the service rendered these were the equal of tools made from the original bar. Hence the reclamation value of the steel after deducting the cost of reclaiming, 5 cents per pound, was 45 cents per pound, or $225.

Of grade No. 1, 315 lb. were also worked into cutters for Davis boring bars, to bore 7-in. wheels. After these cutters had served to the limit there remained 250 lb. of scrap steel, and this was annealed and redressed for 6½-in. cutters for boring bars of the same make at a reclamation cost of 5 cents per pound, representing a reclaimed value of $112.50. After having served to the limit for the 6½-in. wheels there was 180 lb. of scrap, which was again redressed and used for 6-in. wheels, with a reclaimed value of $81. After the limit in boring tools was reached, there were on hand 150 lb. of pieces ⅞ in. x 2 in. x 2½ in., which were sent to the smith shop and forged into turning tools ½ in. x 1 in. x 7 in. long, with a reclaimed value of $56.25. Chaser dies for a 1½-in bolt cutter were annealed and reworked for a 1-in. machine at a reclamation cost of 2 cents per pound. After this service the scrap dies were worked into tool holder bits at a reclamation cost of 5 cents per pound.

From 786 lb. of grade No. 2 scrap placed in service at an original cost of 17 cents per pound 437 lb. of scrap was reworked at a reclamation cost of 2 cents per pound, with a reclaimed value of $65.55, the tools consisting chiefly of taps and reamers which were reduced to the next smaller size. On some taps the threads were removed and they were used for reamers. From 1147 lb. of grade No. 3 scrap, put in service at 12 cents per pound, there was reclaimed 534 lb. at 2 cents per pound, or a reclaimed value of $53.40, the tools consisting of punches, punch dies, rivet sets and flue expander pins. These were handled by the use of a punch post and nut made to fit the spindle of a lathe. All punches were dressed to a smaller size on point. All punch dies of standard dimensions were rebored and faced to any convenient size needed. Expander pins were re-turned to next smaller size. Rivet set deformed due to drawing of the temper and losing shape in the cup were redressed, hardened and placed in service with satisfactory results.

BOLT CUTTER DIES

The committee on bolt cutter dies submitted a report containing a description of the shop practice of the National Machinery Company which stated that chasers were sent out generally with an angle or rake of 12 deg. on the cutting face. If, however, the chasers were for cutting copper, brass or the like, this angle would be zero, or would coincide with a line passing through the axis of the work. Similarly, for cutting bar iron, the angle would be 6 deg., and for threading tough steel, such as alloy steel, steel pipe, and the like, the angle was increased to 22 or 23 deg., making a "hooked" die. After this operation the chasers were stamped for size and numbered to designate their relative position in the cases and die head and then secured in the cases and placed in the die head to be "hobbed" or threaded. Before starting the hobbing operation, however, a reamer was passed through the blank chasers, removing all the surplus metal by concaving the cutting edge of the blank and leaving but about 0.001 in. to be removed by the bottom of the tap.

After being reamed, a hob or master tap was placed in the vise of the machine and run through the dies from two to five times, depending upon the size of the tap. With the large size taps the dies were generally cut in two or three passes, while with the smaller taps, which could not be subjected to such heavy strains, as high as five times were necessary. After being hobbed the chasers were removed from the cases and carefully looked over to insure the removal of all burrs. They were then hardened or tempered.

After being tempered, the throat or entrance of the die was ground on the die sharpener. In a threading die of this type the cutting was all performed in the throat and the thread was completed by the first full teeth encountered by the work, the remaining teeth merely serving to feed the work and maintain the lead. Hence it was important that the throat or entrance should have the correct angle as well as proper clearance.

When these chasers became dull they could be resharpened by being ground at the throat. The average set of chasers could be ground or resharpened from fifteen to thirty times, depending largely upon the method of grinding. It was possible to resharpen the die until but a full thread or two remained, after which the die was generally annealed and rehobbed to a larger size.

There should be ample clearance on the heel of the chaser to eliminate drag or rubbing which would produce unnecessary heating. This clearance on the die was secured by using a hob 3 per cent undersize. In hobbing with an undersize tap it was necessary to adjust the die head so that the dies would set in sufficiently so that the undersize tap cut a full thread thereon. After this hobbing was ac-

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complished and the head adjusted for the full size, the heel of the die would clear the work and would not drag or rub.

FORGING MACHINE DIES

A paper on forging machine dies stated that the nature of the work to which they were put determined the material of which dies should be made. Cast iron, being the cheapest and most easily worked material, was very desirable but could only be used where the demand for product was not very great. Where many forgings were required, standard dies were of cast steel. Oftentimes the forgings might be done in such a way that more wear took place on one part of a die than on another, and in such a case sectional dies were used, made of cast iron and so designed that where the excess wear came it was borne by inserts made of tool steel. These inserts were removed when worn beyond a certain limit and replaced by others of standard size, so that the entire die did not have to be scrapped.

The material of which plungers for upsetting the stock were made depended both upon their size and the nature of their work. Nickel steel was the material to be used for heavy work, while common tool steel or special plunger steel would do for lighter operations. Where a punching operation was required, the brunt of the work should be borne by inserts made of air hardening steel. Provision had to be made in the design of dies for the overflow of excess metal when the die recess was full, and a vent should be made varying in size according to the weight of forging. This vent, of course, became unnecessary when enough pieces had been made to enable the foreman to calculate the exact amount of material required. Wherever upsetting was done by means of a hollow plunger a vent should be placed at the bottom of the recess, to allow the escape of the air which would otherwise be confined. Heating of dies from the hot stock did not affect their design. On large work so much time was consumed in heating stock that the die cooled itself. This practice would not do in the case of small dies, however, as they were worked too rapidly. There were two ways of cooling—either with a jet of water or by swabbing off the surface with oil. The former method should be avoided wherever possible as it caused the die face and plunger to check, thus decreasing their life.

This paper was accompanied by a number of photographs showing some typical forgings and the dies by which they were produced. Among these was one for the manufacture of castellated nuts in two operations. The first operation consisted in upsetting and forming the round bar stock by means of the plunger working in a recess in the dies. The first operation left the stock in the form of a hex-head bolt. The forging was completed by placing the stock in another recess where another plunger punched out the center and formed the castellation The center which was punched out was thus used in the forming of the next nut, so that there was almost no waste. Only one heat was required for both operations.

TELEPHONE LOAD DISPATCHING AT BOSTON

An interesting article on the use of the telephone in the operation of the power generating and distributing system of the Boston Elevated Railway Company appears in the current issue of *New England Telephone Topics*, a monthly organ published for the employees of the New England Telephone & Telegraph Company. With the installation of the new South Boston generating plant the headquarters of the power distribution service was transferred to a balcony on the third floor of the station from the former operating center at the Central power station, on Harrison Avenue. The load dispatcher uses a two-position telephone desk of the order table type, somewhat modified in design, and the desk has a capacity of forty lines, eighteen circuits at present extending to the various generating stations and substations of the system.

The usual diagrammatic method of keeping track of high-tension switches open or closed is followed, with a blackboard and plugs. A log sheet is kept on which are entered hourly reports from all outside stations as to loads, equipment in use and out of commission. Complete detailed plans of all feeder circuits with the location of sectionalizing switches are on file and the issuance of emergency instructions to crews on the street and at special stations is handled from this office. The company has had practically no trouble from induced currents from its 13,200-volt system, the telephone lines being carried mainly in conduits and on poles owned by the New England company. About a year ago a new company telephone switchboard for general service was installed at its Milk Street offices, there being nearly 150 lines in service and about 6000 daily calls.

A NEW TROLLEY CATCHER

The Ohio Brass Company, Mansfield, Ohio, has placed on the market a new trolley catcher for which it has just applied for a patent.. The operating mechanism, which is shown in the accompanying illustrations, consists of three dogs, mounted on the back of the reel, which are thrown outward by centrifugal force when the trolley wheel jumps.

One of the aims of the designers was to eliminate stepping up or climbing of the trolley pole after the rebound which follows the sudden stopping of a flying pole. This is accomplished by means of the guide *A-B*. One dog rides over the guide *A-B* and engages the stop at *B*. The dog which engages the stop at *B* rides over this guide and

Exterior and Interior Views of Trolley Catcher

cannot be pulled back toward the center by its spring until the rope has been wound in sufficiently to allow the dog to travel backward on the guide to the point A. Exhaustive service tests proved that the rebound will never be sufficient to cause this to happen. Should the trolley pole be thrown downward upon striking a cross span wire the locking dog will become disengaged and the catcher will re-operate and another dog will become engaged with stop *B*. The pole will then be held at approximately the lowest point to which it rebounds.

Under normal conditions these dogs are held in toward the center by rugged coiled springs, which are enameled to prevent rusting. In operation, the coiled springs are only slightly extended, insuring long life. The main operating spring is inclosed in the extreme back part of the case. All parts are made sufficiently rugged to withstand the abuse which such a device usually gets in service. The case is made of malleable iron, enameled. A large opening is provided at the bottom to drain off moisture. A separate base casting is bolted directly to the car dash, and the catcher can be quickly inserted in the base and held in place by a spring operated catch. For double-end operation a base is installed on each end of the car, and one catcher is used.

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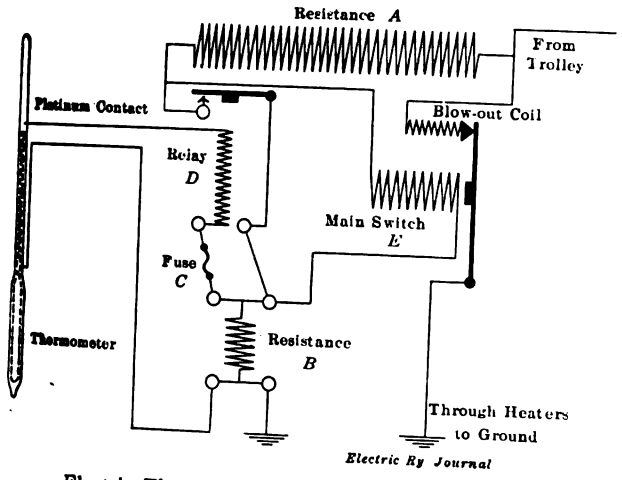
A SIMPLE ELECTRIC THERMOSTAT

The problem of heating surface cars is one which is affected by many indefinite factors. Variations in temperature are caused by the opening of doors, by the changes in the number of passengers within the car and by the variations in outside temperature. Automatic control of heaters has in consequence been generally recognized as a desirable condition if it can be obtained without excessive complication. The reasons are, obviously, increased comfort of passengers, the elimination of disputes between passengers and conductors as to whether heaters should be turned on or off and the saving in current for the heaters which can be effected by using heat only when it is needed.



Electric Thermostat Control for Car Heaters

A simple thermostatic system for the regulation of electric heaters has been developed by the Railway Utility Company of Chicago in order to meet these conditions. Its action is dependent primarily upon the use of a thermometer with two platinum contact points fused into the glass by means of which the mercury column can be made to make or break a control circuit as the mercury rises above or falls below the upper platinum point. The thermometer is otherwise similar to any accurate mercury thermometer except that a special grade of glass is used for the tube so that it will not expand away from the platinum points and destroy the vacuum within the tube. For surface car service the upper point is usually set at 50 deg. Fahr., although this may be set at any desired point and may, indeed be duplicated to permit changes in the standard temperature if that should be considered necessary. This thermometer is obviously free from any tampering by car crews or passengers, as the contacts are sealed in the tube in a vacuum. This construction also eliminates all trouble from dust or corrosion on the points, and the small cross-section of the mercury column is not affected by vibration.

The operation of the control circuit is electrical throughout and is explained in the accompanying line cut. Normally current flows through resistance *A*, the magnet coil of switch *E* and resistance *B* to ground, and switch *E* is held closed. Current then flows direct from the trolley through the blow-out coil and the contacts of switch *E* and then through the heaters to the ground. As the car warms up, the column of mercury in the thermometer rises. When it touches the upper platinum contact, a current of very low voltage is shunted around resistance *B*, through fuse *C*, the coil of relay *D* and the thermometer, to ground. Relay *D* is thus energized and its contacts close. This short circuits the magnet coil of switch *E*, and that switch opens by gravity, cutting current off the heaters. When the temperature falls so that the mercury of the thermometer leaves the platinum contact, the thermometer circuit is broken, and relay *D* is no longer energized. Therefore its contacts open, breaking the shunt around the coil of switch *E*. The latter is then energized and closes, turning current on the heaters. A rise and fall of less than 1 deg. is sufficient to turn the heaters off or on as required. Tests of 100,000 contacts with a single thermometer have been made without damage of any kind and without any loss of accuracy of regulation. This is probably equal to nearly twenty years' service.

The design of the regulator has been worked out with an unusual degree of care. All parts are readily removable as they are held in place by clip contacts wherever possible, and the only contact which breaks a current of any magnitude is that of the main switch *E*. This is provided with a removable contact block and makes its connection with a most ingenious wiping motion obtained by jointing the contact arm and attaching it through a spring to the arm of the relay, thus making it slide on the contact piece after the contact is made and before the relay arm reaches the end of its stroke. The contacts of the other relay work only through a shunt and therefore do not open a full circuit at any time.

NEW TYPE OF FARE BOX

The accompanying illustration shows a new type of fare box which has just been placed on the market by The International Register Company, Chicago, Ill. The money-counting mechanism of this machine is the same as in the International coin register which was put out by this company last year and, as described at that time, had a complete fare register mounted on a column above the machine and connected with the money-counting mechanism.

Registering Fare Box

In the fare box the trip register, direction indicator and bell are omitted, and the totalizer is located just above the money-counting mechanism where it can be plainly seen by passengers paying fares or by inspectors entering or leaving the car. The figures are ½ in. high and read in dollars and cents. The fare box is mounted on brackets on the platform and counts and registers nickels, dimes and pennies. The money is deposited by the passenger in a glass-inclosed hopper where it is inspected by the conductor, after which it falls through a trap door on a revolving pan which has a capacity of 150 fares. The coins then pass to the sorter, which sorts the money and brings it under the counting mechanism, after which it is delivered into the conductor's receptacle to be used in making change. The counting mechanism advances the totalizer 5 cents for each nickel, or 1 cent for each penny counted, or 10 cents for each dime counted.

The use of metal furniture in the offices of street railway and other public utility companies appears to be gaining favor. Furniture of this kind is not much more expensive than wooden furniture of good quality, but it is more substantial, fireproof and serves materially to reduce the rate of insurance. It is especially adapted for the storage of unimportant records.

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News of Electric Railways

Strike on County Traction Company Settled and Lines Sold to New Interests

The strike on the lines of the County Traction Company and Suburban Railroad, serving suburbs of Chicago, was settled on July 18. At the same time that the settlement was made an arrangement was perfected for the sale of the properties to new interests. The properties are to be acquired by Willard M. McEwen and associates. Conferences looking to this end had been under way for several days between representatives of the former owners of the properties, the new interests and the striking trainmen. Under the arrangement for the sale of the properties it is proposed that the new interests shall acquire and operate all of the lines of both companies with the exception of the line in Evanston, Ill.

According to the terms of the settlement of the strike the employees receive an increase to the rate of wages which prevails on the Chicago lines. It was decided that the employees shall be allowed back pay from Aug. 1, 1912, at the rates paid on the Chicago lines, and that of this amount the new interests in the company shall contribute one-half and the union of the employees shall make up the balance. A special committee to be composed of the president of the local union and employees of the lines concerned will be created to discuss questions which arise between the officers of the company and the trainmen.

A tentative agreement with the men was prepared and the strike was declared off and operation of the lines, with the exception of the line in Evanston, Ill., was resumed on July 19. In some cases operation will be conducted upon temporary permits from the suburbs traversed, leaving the subject of franchises open for future negotiations. Frank L. Butler will be the general manager of the lines at present, and J. W. Whitsell will continue as superintendent. The new interests will take up the work of rehabilitation of the property as soon as suitable franchises are secured, and will construct extensions. The offices of the company have been moved to Lake Street and Cuyler Avenue, Oak Park, Ill.

Detailed Detroit Figures to the City

When it submitted its formal answer to the proposed Marx ordinance the Detroit (Mich.) United Railway offered through General Manager Brooks to open its books to the public to prove that 3-cent fares in Detroit would result in a deficit. The company has since turned over to Alfred Lucking, attorney for Mayor Marx, the detailed figures upon which the claim of a deficit and cost of extensions is based.

Fifty new double-truck prepayment cars have been put into service on Woodward Avenue to take the place of cars of an older type which will be distributed among other lines. Within another month this line will be completely equipped with cars of the new type.

Private Right-of-Way Plan Opposed in Cleveland

Residents along a part of the proposed new cross-town line at East Seventy-ninth Street have organized to oppose the plan of the company to use a private right-of-way for a part of the distance. They claim that the property is restricted by title from use for street railway purposes. Options have been obtained on property desired for a right-of-way.

The grievance committee of the Cleveland Federation of Labor has completed an investigation of complaints of motormen and conductors employed by the Cleveland Railway to the effect that they have been compelled to remain on duty long hours in order to get a reasonable day's work, and a demand has been made for a conference with Street Railway Commissioner Witt and city officials in an effort to secure better conditions.

Charles H. Clark, engineer of maintenance of way, says that much of the improvement work planned for this year will have to go over until 1914, because of grade crossing troubles and the scarcity of labor. Some work is being done on the Euclid Avenue and other lines.

The twentieth annual outing of the Railway Employees' Beneficial Association, composed of employees of the Cleveland (Ohio) Railway, was held at Chippewa Lake on July 16. The trip to the lake was made on a special train on the Baltimore & Ohio Railroad. Prizes offered for the three employees longest in the service of the road were awarded as follows: Patrick Goff, forty-four years and seven months; John Wagstaff, thirty-seven years, and William Krueger, twenty-six years.

Omnibus Applications in New York

Four companies have applied to the Board of Estimate and Apportionment of New York City for franchises to operate bus lines in the city streets, namely: the Fifth Avenue Coach Company, the New York Motor Bus Company, the Manhattan Motor Bus Company, and the People's Five-Cent Bus Line. The first-named line has been in operation for many years. The People's Five-Cent Bus Line, which is controlled by George W. Loft and prominent bankers, proposes to charge only a nickel a ride. About twenty routes have been laid out and applied for by the People's Line. It is proposed to run two or three bus lines across the Park and one line up through it, if the necessary franchises can be obtained. The same company is also trying to obtain routes through the business and financial sections and through the residential sections well uptown. If it succeeds in securing any of the franchises sought this company says it will put in service a fleet of single-deck storage battery cars of the four-motor four-wheel-drive type which has been used with some success in trucking service in Philadelphia and elsewhere, the rights to which are controlled by the Electro-Coach Corporation of New York. These trucks are made at the plant of the Commercial Truck Company in Philadelphia, Pa. The Board of Estimate has adjourned until July 31, when hearings will be held on the applications.

At the recent session of the Legislature of New York the omnibus companies were brought under the jurisdiction of the Public Service Commissions.

Rules Concerning Overhead High Tension Wires

The Railroad and Warehouse Commission of Illinois has promulgated a set of rules governing the instaliation of electric wires or other forms of metallic conductors carrying electric currents over railroad tracks. These rules are as follows:

1. The trolley wire of any electrically operated railroad, crossing the tracks of any railroad shall be equipped with a trolley guard of an approved pattern, and such trolley wire shall have a minimum vertical clearance of not less than 22 ft. above the top of the rails.

2. Telegraph wires, telephone wires, or any other form of metallic conductors (except trolley wires) carrying electric current less than 700 volts, shall not be permitted to cross the tracks of any railroad under a minimum vertical clearance of 25 ft. provided such wires and conductors are suspended from messenger wires at intervals not greater than 15 ft.

3. When not suspended from messenger wires, all telegraph, telephone and other wire or cable conductors (except trolley wires) carrying less than 700 volts, and spanning any railroad tracks, shall have a minimum vertical clearance of not less than 30 ft.

4. If in crossing the tracks of any railroad with electric wires or other forms of metallic conductors carrying less than 700 volts, the conductor wires of any telegraph, telephones or electric railroad company are also crossed, the minimum vertical clearances of 25 ft. and 30 ft. above referred to shall be increased so as to give a minimum clearance of 5 ft. above the wires so crossed.

5. The minimum clearance of all metallic conductors (except trolley wires) crossing any railroad tracks and carrying 700 volts or over shall not be less than 30 ft., pro-

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vided such wires or conductors are suspended from messenger wires at intervals not greater than 15 ft.

6. All electric wires or metallic conductors (except trolley wires) spanning any railroad tracks and carrying 700 volts or over shall have a minimum vertical clearance of 35 ft., when not suspended from messenger wires.

7. If in crossing any railroad tracks with electric wires or other forms of metallic conductors carrying 700 volts or over the conductor wires of any telegraph, telephone or electric railway company are also crossed, the minimum vertical clearances of 30 ft. and 35 ft. applicable to electric wires and other forms of metallic conductors carrying 700 volts or over shall be increased when necessary so as to give not less than 7 ft. vertical clearance above any wire conductors so crossed.

8. In any case, when crossing any railroad tracks where telegraph or telephone wires are crossed overhead, the electric wires or other forms of metal conductors carrying electric current shall be equipped with a slatted platform, or some other approved type of protection, suspended in such a manner that upon breakage an electric wire or metallic conductor shall not come in contact with any telegraph or telephone wires so crossed.

9. In case any such electric wire or metallic conductor crosses underneath any telegraph or telephone wire in order to cross any railroad tracks, such electric wire or metallic conductor shall be equipped with a slatted platform, or some other approved type of protection, so that upon breakage a telegraph or telephone wire shall not come in contact with the metal conductors crossing underneath such telephone and telegraph wires.

10. In any case where electric wires or other metallic conductors carrying 700 volts or over span the tracks of any railroad, each pole supporting such electric wires or other metallic conductors which may be located upon or immediately adjacent to the right-of-way of any railroad tracks crossed shall be provided with a warning sign, with letters not less than 4 in. in height reading:

"Danger—Electric wires (or cable as the case may be), —— volts" (giving the normal voltage of each wire or metal conductor).

11. The minimum vertical clearances herein specified shall mean to be the least clearance permitted under the most unfavorable conditions with respect to loading and temperature of electric wires or other forms of metallic conductors which span the tracks of any railroad or any telegraph or telephone wires located on the right-of-way of any railroad.

12. No electric wires or any other form of metallic conductors carrying 700 volts or over shall be permitted to cross the tracks of any railroad or any telegraph or telephone wires located on the right-of-way of any railroad until plans shall first have been presented to the commission in duplicate and duly approved by it in the form of an order.

13. Whenever conditions are such as to make it desirable to use vertical clearances less than those above specified, application may be made to the Railroad and Warehouse Commission, stating reasons why it is desirable or necessary to deviate from above rules. Such application shall be accompanied by duplicate plans showing both map and profile of such crossing. If approved, the plans will be so marked, and one will be returned to the petitioner with the order of the commission.

Chicago Union Terminal Plans

The City Club of Chicago objects to the selection of John F. Wallace by the city to advise the city on the subject of railway terminals. The directors of the City Club have offered to furnish funds for an investigation by a committee of three or five engineers. It has made a formal written order to the committee on railway terminals of the City Council, in case that committee cannot secure sufficient funds for the employment of a larger number of engineers, to guarantee the payment for one member of a committee of three or for two members of a committee of five, such members to be chosen by the City Club. The club says that it objects to Mr. Wallace because he "had such special relationships with the Pennsylvania Railroad as might impair the public value of a report made by him alone." Alderman Geiger, chairman of the committee on railway terminals of the City Council, expresses the opinion that work will be started on the passenger terminal project proposed by the Pennsylvania Lines and other companies interested with it in the proposed new Union Station before Nov. 1.

The City Council of Chicago at its meeting on July 14 referred to the committee on railway terminals the letter submitted by the City Club of Chicago urging that the city select a committee of three or five engineers instead of one engineer to advise it on the subject of railway terminals. As the committee on railway terminals will not meet until Oct. 1, the engineering investigation in the hands of Mr. Wallace will go forward.

Flood Damage Repairs on the Ohio Electric

The Ohio Electric Railway, Cincinnati, Ohio, which was the most seriously damaged of the electric roads in the State of Ohio by the March floods, is about to complete repairs which will make it possible again to resume all schedules on the system. Probably the most serious effects of the floods of March last were found between Dayton and Hamilton, Ohio, where several miles of track and a number of important bridges were washed away. By Aug. 1 this company expects to complete a temporary trestle over the Miami River on this division of the system where a permanent structure was practically destroyed. This structure will enable it to reach 4 miles of track and roadway which also was washed out by the flood. Repair work has been seriously delayed on account of failure to obtain timber to rebuild the damaged bridges. Immediately following the flood the steam roads obtained all the available bridge timber and placed large orders with the mills for rush deliveries of lumber. The electric railways not having access to timber areas or to shipments of timber over their lines found it necessary to wait until the steam roads were fully supplied.

The bridge over the Muskingum River between Zanesville and Putman, Ohio, which also was carried away by the high water, will be replaced with a temporary structure by Aug. 1. This structure is being rebuilt by the county and by a subscription given by the Ohio Electric Railway. It forms a connecting link between Zanesville and a suburban district lying west.

Public Utility Act for District of Columbia

Daniel E. Garges, acting secretary to the Public Utilities Commission of the District of Columbia, has prepared a condensed statement concerning the organization, powers and purposes of the commission. Mr. Garges' statement follows in part:

"The Public Utilities Commission of the District of Columbia was created by an act of Congress approved March 4, 1913. The commission consists of the Commissioners of the District of Columbia, the powers contained in the law being additional to their powers and duties as commissioners of the District of Columbia, without additional compensation.

"The Commissioners of the District of Columbia consist of two residents of the District of Columbia, with a salary of $5,000 per annum each, appointed for a term of three years, and an officer of the Corps of Engineers, United States Army, detailed by the President of the United States for the duty, whose rank is above that of captain. This engineer officer receives a sufficient addition to his salary as an army officer to make it equal $5,000 per annum.

"The term public utility as embraced in the law includes every street railroad, express company, common carrier—except steam railroads—the Washington Terminal Company, the Norfolk & Washington Steamboat Company and all companies engaged in interstate traffic upon the Potomac River and Chesapeake Bay; gas corporation, electric corporation, water power company, telephone corporation, telegraph corporation and pipe line company. It contemplates supervision over the transportation of passengers, freight or property or service from one point to another within the District of Columbia, but does not cover interstate commerce. Every public utility is required to fur-

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nish adequate service and facilities, and the charges to be made by it shall be reasonably just and non-discriminatory. The commission is authorized to permit and require the joint use of tracks and appliances for a reasonable compensation.

"The commission is directed to make, as soon as practicable, valuation of all public utilities under its supervision. This valuation is to be made from three separate standpoints as follows:

"1. The amount of money expended in the construction and equipment, including the amount of money expended and to be expended for rights-of-way, or any property used in or useful to the business of the public utility and to replace all the physical properties belonging to such public utility.

"2. The outstanding stocks, bonds, debentures and indebtedness, amounts, date, to whom sold, the price paid in cash, property or labor, disposition of the proceeds, by whom the indebtedness is held, the amount due, the floating indebtedness and credits due other property, the judicial or other sales, property or franchises and the amounts paid, in which manner paid and the taxes paid thereon.

"3. The gross and net income of the public utility from all sources, the amounts paid for salaries to officers and the wages paid to its employees, and the maximum hours of continuous service required of each class.

"The commission also is required to keep itself informed of all new construction, extensions and additions of the property of all public utilities, and to prescribe the necessary regulations and instructions for the keeping of construction accounts, in which the law declares a distinction shall be made between operating expenses and new construction.

"A public utility, with the consent of the commission, is authorized to prescribe a sliding scale of rates and dividends according to the Boston sliding scale, or other financial device, but if such arrangement or device is found by the commission, after investigation, to be unlawful or unreasonable or unjust it is given power to cause its abandonment. The commission is further authorized to determine and order such rates, charges and regulations as may be necessary to give effect to such arrangement, with the reserved right to make other and further changes in rates, charges and regulations as it may determine to be necessary and reasonable.

"Under provision of the public utilities law, and also a law passed by Congress on the same day, known as the 'anti-merger law,' public utilities are prohibited from assigning their franchises without the approval of the commission, and it is made unlawful for any public utility to acquire the stock or bonds of any other public utiiity engaged in the same line of business unless authorized by the commission. The 'anti-merger law' prohibits any foreign public utility corporation, or foreign or local holding corporation or any local public utility corporation to own, control, hold or vote the stock or bonds of any public utility corporation authorized by Congress to do business in the District of Columbia, except as expressly authorized by Congress. In case a violation is claimed of this law, the allegation filed in court must show to the satisfaction of the court that the ownership includes at least 20 per cent of the capital stock of the local public utility. In case a violation of the law is proved, the court has jurisdiction in equity to dissolve any such local public utility corporation which is exercising a franchise under any act of Congress, and to require a foreign public utility corporation, or foreign or local holding corporation to sell or dispose of stock or bonds held contrary to the provisions of the law and to refrain from voting such stock or bonds.

"It is provided that the boards of directors of every public utility shall consist of not more than fifteen, nor less than seven members.

"Public utilities are prohibited from issuing evidences of indebtedness, or reserving any money, property or services in payment of the same until there shall have been recorded upon the books of the public utility corporation a certificate of the commission authorizing such issue, and the public utilities are prohibited from issuing any evidence of indebtedness, payable in more than one year from date without the authority of the commission. Public utilities are prohibited from declaring any stock, bond or scrip dividend, or to divide the proceeds of the sale of any such among its stockholders. A penalty is provided for violation of this provision of not less than $1,000 nor more than $10,000 for each offense. The giving or acceptance of rebates also is prohibited under penalty."

Proposed High-Speed Line Between Buffalo and Niagara Falls

It is said that more than 90 per cent of the right-of-way has been secured for the Frontier Electric Railway, which proposes to construct a new electric railway from Buffalo to Niagara Falls. Harry T. Ramsdell, cashier of the Manufacturers' & Traders' National Bank, Buffalo, is president of the company, and ex-Congressman James S. Simmons, Niagara Falls, is one of the vice-presidents. Mr. Cohn of Cohn, Chorman & Franchot, attorneys, Niagara Falls, said recently that the directors of the Frontier Electric Railway have been negotiating with E. G. Connette, president of the International Railway, and the directorate of that line, for permission to use the Niagara Falls freight and passenger terminal in Niagara Falls and Buffalo. It is proposed to have cars of the new line stop between Buffalo and Niagara Falls only at North Tonawanda. At present the cars of the International Railway stop all along the line and the running time between Buffalo and Niagara Falls is almost an hour and a half. It is planned to have the cars of the Frontier line make the 22 miles in about forty-five minutes.

New Northern Ohio Cut-Off

The new cut-off on the line of the Northern Ohio Traction & Light Company, Akron, Ohio, has recently been placed in service. This is a double-track road 7½ miles long between Chittenden, just north of Cuyahoga Falls, and Fells, just north of Northfield, on what is known as the Akron, Bedford & Cleveland line. The track is laid on private right-of-way the entire distance and the actual work of construction has been in progress for two years. The new track shortens the distance between Cleveland and Akron 1 mile. The heaviest grade is one-half of 1 per cent. The right-of-way is 66 ft. wide. The business between Cleveland and Akron is heavy and the company desires to offer the best service. The schedules will not be changed, however, until the possibilities of the improvement are established. Local trains will be continued on the old section of the road.

Report on Self-Propelled Cars by Edinburgh Committee

The deputation sent by the Edinburgh Town Council to investigate the merits of self-propelled cars visited Morecambe, where cars driven by petrol engines are in operation. The members also visited Birmingham, where they inspected the Tilling-Stevens petrol-electric omnibuses. At Coventry they inspected a self-propelled railway coach built by the Daimler Company. They also examined the petrol-electric tramcars being operated experimentally by the London County Council. After a full description of the various types of cars examined, with the cost of operation, the report states that the deputation is of the opinion that the self-propelled tramcar is reliable and suitable but a little dearer in first cost. The first cost, however, is offset by substantial savings in construction of the track, absence of central generating station, absence of wires or conduits, and by the advantage that each car is an independent unit in case of breakdown. According to the report the cost of operation cannot be arrived at with exactness yet owing to the limited experience, but the guarantee of the makers would show that the vehicles can be operated in close comparison with the cable or ordinary electric tramcar. The members also state that they are inclined to believe that the petrol-electric combination is an improvement upon the direct-driven petrol engine, giving ease of locomotion, simplicity of control and drive and silence of working, and, finally, that the success already obtained with the self-propelled car justifies its introduction experimentally in Edinburgh.

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President Griffith's Policies

F. T. Griffith, who on July 1, 1913, succeeded B. S. Josselyn as president of the Portland Railway, Light & Power Company, Portland, Ore., is quoted as follows in regard to the plans and policies of the company:

"This company wants to give the best service possible to get the best results for the people and the company. We need the co-operation of the people. I want to convince residents of Portland and the territory we serve that we are doing and intend to do all we can for the prosperity and upbuilding of this community. We are going to strive to get people interested in our affairs and to know more intimately the inside workings of the public service corporations serving them.

"Portland, with its commission form of government, has adopted corporation methods. These methods will banish politics from the relations between the public service corporatins and the city. Relations between public service corporations and the city should be purely business relations. Personally, I do not know intimately a single member of Portland's new commission, nor the Mayor. They start out with the confidence of the people and are entitled to it.

"We, of this company, believe that we are entitled to just as much confidence. We want an opportunity to convince the people that we are striving to serve them—that our actions are dictated only by business considerations and the welfare of the community. Another matter that I am going to give my earnest attention is the welfare of our employees. It will be our policy, so far as possible, to administer to the needs of those we employ. In exceptional cases only will we fill positions of responsibility from outside our ranks. Wherever and whenever possible we will promote our own employees to vacancies in the organization as they occur.

"There is no wastebasket in the complaint department. Every communication to the company made in good faith will receive earnest consideration. We invite our employees, too, to give us their ideas for the betterment of the service. Frequently we get some of our best suggestions, however, from outside the service. We want the people to use our complaint bureau liberally. There is no one connected with the management of this company who does not welcome suggestions."

Birmingham Strike Declared Off.—The strike against the Birmingham Railway, Light & Power Company, Birmingham, Ala., has been declared off by the men who participated in it. The collapse of the strike was referred to previously in the ELECTRIC RAILWAY JOURNAL.

Municipal Ownership Being Considered in Pekin.—The members of the City Council of Pekin, Ill., are considering the advisability of purchasing the property of the Pekin & Petersburg Interurban Railway and operating it as a municipal railway under the law which went into effect on July 1.

Report on Electricity for the London & Port Stanley Railway.—A. M. Warfield, who was employed by the City Council of London, Ont., as an expert to give an independent report upon the proposal to electrify the London & Port Stanley Railway has filed his report. The report of Albert Eastman, manager of the Windsor, Essex & Lake Shore Railway, on the proposal of Hon. Adam Beck to electrify the London & Port Stanley Railway, has also been submitted. Mr. Eastman was engaged by the city.

Minnesota Utilities Committee Adjourns.—The committee on public utilities of the Senate of Minnesota has adjourned to meet on Aug. 18, when a public hearing will be given to persons interested in public utilities legislation. J. M. Hackney, chairman of the committee, is quoted as follows: "The duty of our committee is to investigate the public utilities question as handled in other States and to draft a public utilities commission bill. Just how we will go about the task I am unable to say, for we have not discussed the matter since the session closed."

Installation of Fire Extinguishers Ordered.—The Long Island Railroad and the New York Consolidated Railroad have been ordered by the Public Service Commission for the First District to equip each of their electrically operated cars with one or more chemical fire extinguishers of such a type that the contents thereof cannot act as an electrical conductor. The cars must be so equipped by Sept. 15, 1913, and if any other kinds of fire extinguishers are used, such other extinguishers must be conspicuously labeled that they are not to be used until the current has been shut off. This action was taken following an investigation into a recent accident upon a trestle at Jamaica where a car of the New York Consolidated Railroad caught fire and was destroyed. It was found that the car carried no fire extinguishers.

Hearing on Kansas City Terminal Plans.—The Board of Public Works of Kansas City, Mo., held a hearing on July 18 in regard to the plan of the Kansas City Terminal Railway to build a terminus for street cars on the plaza in front of the station and to re-route cars. The franchise of the Terminal Company provides that in all physical matters pertaining to the station or terminals in which the public or public streets are involved the plans must first be submitted to the board of public works for approval. All cars are to arrive at and leave the station from the north, south, east and west by McGee Street, Grand Avenue and Broadway along Twenty-third and Twenty-fourth Streets by way of the terminals to be built in the plaza. This plan would eliminate service on Walnut and Main Streets and Baltimore Avenue, it was claimed.

Buffalo Testimony Concluded.—The International Railway, Buffalo, N. Y., and its employees have concluded the presentation of testimony before the board of arbitration named to settle the question of wages and hours, and the board now has fifteen days in which to hand down its decision. Burt L. Jones, vice-president and general manager of the Great Gorge Route, represents the International Railway on the board; Assemblyman Edward D. Jackson represents the men, and Mayor Louis P. Fuhrmann of Buffalo is the third member of the board. William B. Fitzgerald summed up for the men, and Thomas F. Penney, formerly president of the International Railway, and now a member of the law firm of Norton, Penney, Spring & Moore, counsel for the corporation, summed up for the company. The men demand a flat rate of 32 cents an hour, time and a half for all over time and improved working conditions.

Decision in Seattle Fare Case.—The Supreme Court of the State of Washington has affirmed the decision of the King County Superior Court in dismissing the case against W. R. Crawford and Samuel Walker, officers of the Seattle, Renton & Southern Railway, Seattle, Wash., for charging more than a 5-cent fare within the corporate limits of Seattle in supposed violation of the provisions of the Washington public service commission law of 1911. Messrs. Crawford and Walker were found guilty in a King County justice court of charging a 10-cent fare for a passenger riding within the city limits of Seattle over the Seattle, Renton & Southern Railway, and each was sentenced to serve thirty days in jail. They appealed to the Superior Court and their contention was sustained. The State then appealed to the Supreme Court and the decision handed down rules that the law is invalid. The court points out that to enact such a statute might mean confiscation of property; that the only relief of a company would be to have the statute declared unconstitutional and that it would not dare take the risk of testing out the law because of the accumulative penalties. The provision of the law in regard to the 5-cent fare was drawn to meet instances where the city limits were extended.

PROGRAM OF ASSOCIATION MEETING

New England Street Railway Club

The annual outing of the New England Street Railway Club was arranged to be held at Plymouth, Mass., on July 24, 1913. The trip to Plymouth from Boston was to be made by boat, leaving Rowe's Wharf, Atlantic Avenue, Boston, at 10 a. m., and returning from Plymouth at 3:15 p. m. After reaching Plymouth the party was to be conveyed over the Brockton & Plymouth Street Railway to the beach, where a clam bake was to be served. In the event of rain the outing was to be held the next pleasant day.

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Financial and Corporate

Stock and Money Markets

July 23, 1913.

The movement of trading on the New York Stock Exchange to-day was irregular, with the leading issues generally showing slight losses at the close. There was some selling of Brooklyn Rapid Transit and that stock declined ⅝ to 87⅜. Third Avenue Railway advanced 1 point to 35⅞. The tone at the close was irregular. Railway and other bonds were also irregular. Rates in the money market to-day were: Call, 2@2½ per cent; sixty days, 3¾@4 per cent; ninety days, 4¼@5¼ per cent; four months, 5¼@5½ per cent; five months, 5½@5¾ per cent; six months, 5¾@6¼ per cent.

In the Philadelphia market trading was quiet to-day and fractionally lower levels ruled on the exchange.

In the Chicago market the volume of transactions was smaller and price movements were generally within narrow limits to-day. Bonds were fairly active and firm.

The railroad issues were dealt in sparingly in the Boston market to-day. Small sales were recorded of Boston Elevated, Massachusetts Electrics and West End.

In the Baltimore market United Railways issues were the leaders to-day. The sales of stock totaled 402 shares, while the sales of bonds totaled $32,500.

Quotations of traction and manufacturing securities as compared with last week follow:

	July 16	July 23
American Brake Shoe & Foundry (common)	87¼	87¼
American Brake Shoe & Foundry (preferred)	130	129
American Cities Company (common)	37⅜	37
American Cities Company (preferred)	66	66¾
American Light & Traction Company (common)	340	340
American Light & Traction Company (preferred)	104	104
American Railways Company	38	38½
Aurora, Elgin & Chicago Railroad (common)	39½	39½
Aurora, Elgin & Chicago Railroad (preferred)	85	82½
Boston Elevated Railway	89½	89½
Boston Suburban Electric Companies (common)	7½	7½
Boston Suburban Electric Companies (preferred)	50	55
Boston & Worcester Electric Companies (common)	*8	*8
Boston & Worcester Electric Companies (preferred)	42	42
Brooklyn Rapid Transit Company	87⅜	87½
Capital Traction Company, Washington	119¼	117½
Chicago City Railway	165	*165
Chicago Elevated Railways (common)	*26	25½
Chicago Elevated Railways (preferred)	*75	*75
Chicago Railways, ptcptg., ctf. 1	95	*95
Chicago Railways, ptcptg., ctf. 2	25	25½
Chicago Railways, ptcptg., ctf. 3	7½	*7½
Chicago Railways, ptcptg., ctf. 4	*2½	*2½
Cincinnati Street Railway	110	110
Cleveland Railway	103	102¾
Cleveland, Southwestern & Columbus Ry. (common)	6	6
Cleveland, Southwestern & Columbus Ry. (preferred)	29	29
Columbus Railway & Light Company	18	18
Columbus Railway (common)	69½	69½
Columbus Railway (preferred)	88	88
Denver & Northwestern Railway	107	107
Detroit United Railway	70	70
General Electric Company	139½	139¾
Georgia Railway & Electric Company (common)	115⅜	114¾
Georgia Railway & Electric Company (preferred)	82¼	82½
Interborough Metropolitan Company (common)	15⅜	15½
Interborough Metropolitan Company (preferred)	56¾	58⅜
International Traction Company (common)	*30	*30
International Traction Company (preferred)	*95	*95
Kansas City Railway & Light Company (common)	18	18
Kansas City Railway & Light Company (preferred)	36	36
Lake Shore Electric Railway (common)	9	9
Lake Shore Electric Railway (1st preferred)	90	90
Lake Shore Electric Railway (2d preferred)	25	25
Manhattan Railway	125	126
Massachusetts Electric Companies (common)	14½	14½
Massachusetts Electric Companies (preferred)	70	71
Milwaukee Electric Railway & Light Co. (preferred)	*90	*90
Norfolk Railway & Light Company	25	*25
North American Company	67	69½
Northern Ohio Light & Traction Company (common)	a75	a75
Northern Ohio Light & Traction Company (preferred)	a100	a100
Philadelphia Company, Pittsburgh (common)	39	39
Philadelphia Company, Pittsburgh (preferred)	39	39
Philadelphia Rapid Transit Company	21½	22½
Portland Railway, Light & Power Company	58	58
Public Service Corporation	107	108
Third Avenue Railway, New York	32¾	35⅝
Toledo Railways & Light Company	a12	a12
Twin City Rapid Transit Co., Minneapolis (common)	102¼	104
Union Traction Company of Indiana (common)	4½	4½
Union Traction Company of Indiana (1st preferred)	80	80
Union Traction Company of Indiana (2d preferred)	30	30
United Rys. & Electric Company (Baltimore)	26½	26¾
United Rys. Inv. Company (common)	18	18½
United Rys. Inv. Company (preferred)	32	35
Virginia Railway & Power Company (common)	51	51
Virginia Railway & Power Company (preferred)	89	89
Washington Ry. & Electric Company (common)	89¼	89¼
Washington Ry. & Electric Company (preferred)	87½	87⅝
West End Street Railway, Boston (common)	70½	71
West End Street Railway, Boston (preferred)	85	86
Westinghouse Elec. & Mfg. Company	59	61½
Westinghouse Elec. & Mfg. Company (1st preferred)	106	108

*Last sale. a Asked.

ANNUAL REPORTS

Philadelphia Rapid Transit Company

The income account of the Philadelphia (Pa.) Rapid Transit Company for the years ended June 30, 1913, and 1912 follows:

	1913	1912
Earnings:		
Gross passenger earnings	$23,020,932	$21,727,468
Receipts from other sources	906,246	973,223
	$23,927,179	$22,700,691
Expenses—Maintenance and renewals:		
Maintenance	2,495,512	2,681,022
Reserve fund for renewals	1,093,564	724,081
Total appropriation	$3,589,076	$3,405,103
Operation of power plants	1,454,122	1,531,573
Operation of cars	6,129,119	5,765,413
General	1,807,948	2,087,968
Taxes	1,225,488	1,158,772
	$14,205,755	$13,948,831
Net earnings from operation	$9,721,423	$8,751,860
Fixed charges:		
Interest	1,728,222	1,509,473
Rentals	7,363,618	7,392,876
Sinking fund, city contract	120,000	.....
	$9,211,840	$8,902,350
Surplus, 1913	$509,582	*$150,489

*Deficit.

The balance of surplus account as at June 30, 1913, was $676,849.

The statement of reserve funds for renewals contained in the report follows:

Appropriation from current assets Dec. 31, 1910, as per requirement of the Stotesbury Management to meet the then estimated deficit of the following three-year period		$1,500,000
Appropriation from income (being the unexpended balance of 15 per cent of gross earnings charged to operation for maintenance and renewals)		
Year ended June 30, 1911		604,728
Year ended June 30, 1912		724,082
Year ended June 30, 1913		1,093,564
Proceeds—Sale of obsolete equipment, etc		93,215
		$4,015,589
From which deduct:		
Deficit year ended June 30, 1911	$415,559	
Deficit year ended June 30, 1912	150,490	
Renewal expenditures:		
50 per cent of the total cost of the first fifty near-side cars and disbursements to June 30, 1913, on account of the 20 per cent down payment required under the car trust plan covering the purchase of 1450 near-side cars*	961,530	
50 per cent of the cost of standard track reconstruction	159,155	
Miscellaneous	87,629	1,774,363
Credit balance in fund at June 30, 1913		$2,241,226

*NOTE—20 per cent of the cost of the near-side cars acquired under the Car Trust Agreements is paid directly from the renewal fund, the remaining 80 per cent represented by car trust certificates maturing in equal semi-annual instalments during a twelve year period. Car trust certificates equaling 30 per cent of the cost of these cars mature during the next four or five years and will be paid from the renewal fund, thus making total payments of 50 per cent of the cost of near-side cars from the renewal fund in accordance with the established policy of the company.

In his statement to the stockholders of the company made July 21, 1913, T. E. Mitten, chairman of the executive committee, said in part:

"The Stotesbury management assumed charge and control of the affairs of your company on June 5, 1911, undertaking within a five-year period to furnish to the public an adequate system of transportation, to recognize the efforts of the motormen and conductors in the way of cooperation by such wages as the resulting increased efficiency makes possible and to build up the property of the company and produce to its owners a return upon the $30,000,000 of capital stock actually paid in.

"The company under date of April 10, 1911, asked permission from the city of Philadelphia to borrow $10,000,000, the proposed application of the proceeds thereof being duly set forth and including 1300 cars of the most modern type to be furnished during the five-year period ending June 30, 1916. In order to be able to render adequate service to the public it has been demonstrated that a greater number of cars are necessary and this within the much shorter period of two and one-half years ending Dec. 31, 1913. Application was, therefore, made to the city government during February, 1913, to sanction a larger plan of financing providing for the issuance of car trusts to cover the purchase of new equipment then secured or contracted

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for or to be later provided, thus releasing a portion of the $10,000,000 bond issue to finance the additional power development and expenditures for larger carhouses which this policy of expansion entailed. The enabling ordinance being approved by the city, car trust agreements have been executed providing for the issuance of car trust certificates maturing in equal semi-annual instalments during a twelve-year period and covering approximately 80 per cent of the purchase price of 1450 near-side and eighty elevated cars. The first fifty near-side cars purchased in July, 1911, are not covered by the car trust agreements, thus making a total of 1500 near-side and eighty elevated cars, of which 1070 near-side and thirty elevated cars have been received to June 30, 1913, the remaining 430 near-side and fifty elevated cars being on order for delivery prior to Dec. 1, 1913. Six hundred and fifty of the near-side and fifty of the elevated cars were ordered by the company during the fiscal year ended June 30, 1913.

"In accordance with the Stotesbury requirement, 15 per cent of the annual gross earnings are set aside for maintenance and renewals, this in order that the physical integrity of the property may be maintained out of earnings. Following the established policy of the company, 50 per cent of the total cost of the new near-side cars, representing the cost of the small four-wheel cars replaced, will be paid through the medium of the renewal reserve. The car trust plan, therefore, provides that the down payment representing 20 per cent of the cost of these cars be met out of the reserve fund for renewals, as shall also the payments on account of the retirement of the car trust certificates maturing during the next four or five years to an amount equaling 30 per cent of the cost, thus making a total of 50 per cent of the cost of these cars which shall be paid for out of the renewal fund. The car trust certificates representing the remaining 50 per cent of the cost of these cars will commence to mature four or five years hence and will then be refunded by the issuance of capital obligations.

"The sum of $765,742.45 expended for cars under the head of additional property represents expenditures to June 30, 1913, on account of eighty elevated cars and additional freight, utility and miscellaneous equipment, all of which is new and additional property and therefore properly chargeable, in its entirety, to capital account.

"The expenditures for standard track reconstruction during the two-year period ending June 30, 1913, amounted to $318,309, of which $159,154, being 50 per cent thereof and representing the cost of the lighter and obsolete type of track replaced, was charged to the reserve fund for renewals, this also being in accordance with the conservative policy of this company as above set forth.

"The company is enlarging its Beach Street power house and installing approximately 20,000 hp of additional power generating machinery. This increased supply of power, together with 6500 hp of additional purchased power, contracted for delivery from the Philadelphia Electric Company commencing Nov. 15 next, will serve to insure the continuity of the power supply and also make possible the operation of the additional service to be provided during the coming winter.

"A new concrete carhouse, having capacity for 336 near-side cars, has been built at Tenth and Luzerne Streets, and an additional new carhouse at Fifty-eighth and Callowhill Streets capable of housing over 300 near-side cars is now in the course of construction.

"The contract of July 1, 1907, between the city of Philadelphia and the company, provides for the establishment of a sinking fund which will enable the city to acquire, through the purchase of the capital stock, the property and franchises of the company at the expiration of the contract in 1957. This sinking fund is to be built up by certain graduated payments made by the company from its earnings throughout the balance of the term of the city contract. These payments began in July, 1912, and during the past year aggregated $120,000, as shown in the income account. In accordance with the terms of the city contract, the company has made payments monthly to a commission composed of the Mayor of the city, the president of the company and the president of the board of directors of city trusts.

"Fire insurance policies were taken out as of June 21, 1913, to an amount of $22,500,000 at a rate of 35 cents per $100, representing an annual premium of $78,750, as against protection of $21,000,000 secured June 21, 1912, at the rate of 45 cents per $100, calling for the payment of an annual premium of $94,500. The rate of premium during the year commencing June 21, 1911, was 50 cents per $100.

"The company has vigorously carried on its campaign for the prevention of accidents, enlisting towards that end the co-operation of the Board of Public Education, the Department of Public Safety, the county coroner's office and the permanent public safety committee. The good results obtained from this safety crusade are evidenced by the following comparative statistics: The number of passengers carried during the year ended June 30, 1912, increased more than 6 per cent over the year ended June 30, 1911, while the number of accidents showed a decrease of 4.7 per cent as compared with the previous year. During the year ended June 30, 1913, the number of passengers carried again increased over 6 per cent as compared with the preceding year ended June 30, 1912, while the number of accidents showed a further decrease of 8.7 per cent as compared with the previous year.

"This management has earnestly co-operated with the courts in the trial of all cases in which this company is defendant. At the incoming of the Stotesbury management 4367 suits were pending in the courts. The number of suits pending as at June 30, 1913, was 2783, being a decrease of 36 per cent. An analysis of court records shows that there were 3393 cases in which this company was defendant ordered for trial during the court year from Oct. 1, 1912, to June 30, 1913, of which 1358 or over 40 per cent were disposed of by trial or settlement; 1364 or 40 per cent were ready for trial but not reached by the courts; 501 or 15 per cent were continued by the request of the plaintiff; leaving but 170 or 5 per cent which were continued for good legal reasons at the request of this company.

"A general rerouting of the car lines has been undertaken by the company, with a view to providing more direct rapid transit and to make possible the operation of a larger number of cars during the rush hour in the downtown district. The changes throughout the city are so designed as to have the car lines follow closely the direction of greatest travel, as shown by the traffic check made by the company's experts covering two years past, and to provide for the patrons of the several lines the most direct access to the business district which is most essential, as for residential or home-building purposes the distance to the business center is not measured in miles but in minutes."

Extended references are contained in the report to the Co-operative Beneficial Association, the co-operative purchasing plan for employees and to the co-operative plan under which 22 per cent of the gross passenger earnings is set aside in a separate fund for the payment of wages, pensions and death benefits to motormen and conductors.

United Light & Railways Company

The United Light & Railways Company, Grand Rapids, Mich., addressed to the stockholders of the company recently a letter in part as follows showing the growth of the company from June 1, 1912, to March 31, 1913:

"We beg to acquaint you with the growth of your organization from the twelve months' period ending June 30, 1912, up to and including the twelve months' period ending March 31, 1913; this being the period during which your company acquired a large number of properties. No additional properties have been acquired since March 31, 1913.

"Below is a statement of earnings of the subsidiary companies of the United Light & Railways Company. The item 'interest and dividend charges' also includes interest on notes outstanding at the respective periods and all charges are figured on the assumption that the principal amount of the securities were outstanding for the entire twelve months' period.

For Year Ended	Gross	Net	Interest and Dividend Charges	Net Profit
June 30, 1912	$4,480,570	$1,825,276	$934,322	$890,954
September 30, 1912	4,542,246	1,872,797	.....	.....
December 31, 1912	4,672,054	1,952,798	.....	.....
March 31, 1913	5,497,598	2,282,981	1,037,858	1,245,123
Increase, per cent	22.7	25	11	39.8

"On June 30, 1912, your company had outstanding its own securities, namely, first preferred, second preferred.

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common stock and bonds of a total of $18,319,597. On March 31, 1913, additional securities having been issued for the purchase of properties and the liquidation of debt, the amount outstanding was $21,706,890, an increase of 18.5 per cent.

"The interest and dividend charges of the United Light & Railways Company between the two periods mentioned above increased 21.6 per cent, while the surplus remaining after all dividend disbursements (figuring common stock dividends at 4 per cent on the amount outstanding for the respective periods) increased from $38,543 to $208,555, an increase of 447 per cent.

"Your company had on its books on Jan. 1, 1911, 267 stockholders, which number was increased to 500 on Jan. 1, 1912, and on July 1, 1913, stands at 1800."

Plans for Sale of Rhode Island Properties

It was reported in Boston on July 19 that a syndicate to include members of the firms of Kidder, Peabody & Company, Stone & Webster and interests identified with the Boston Elevated Railway and the Boston Consolidated Gas Company was being organized to take over the electric railway properties of the New York, New Haven & Hartford Railroad in Rhode Island, the Interstate Commerce Commission having recommended in its recent report that the company divest itself of these and other interests outside of the railroad field. Credence was lent to the report on account of the fact that Stone & Webster contemplate the construction of an interurban railway between Boston and Providence. This work has been delayed for some time owing to the inability of the company to secure a suitable entrance to Providence and a franchise in that city. Charles A. Stone, of Stone & Webster, is quoted by the Boston *Herald* as saying that there is nothing to the report in regard to the purchase of the Rhode Island properties. An official of Kidder, Peabody & Company is also quoted by the *Herald* to the effect that the report is incorrect. Marsden J. Perry, who was interested in the promotion of the Rhode Island Company, is reported to have said that he had heard of no such syndicate and that he "took no stock in the report." Benjamin F. Jackson, president of the United Traction Company, Providence, is reported to have said that the organization of the syndicate was news to him.

Reorganization Plan for Buffalo & Lake Erie Traction Company Involving Through Service Between Rochester, Buffalo, Niagara Falls and Erie

Application has been made to the Public Service Commission of the Second District of New York by the committee representing the holders of the Buffalo & Lake Erie Traction Company first and refunding mortgage 5 per cent, thirty-year gold bonds for the consideration of a proposed plan for the reorganization of the Buffalo & Lake Erie Traction Company and the acquisition by the reorganized company of the capital stock of the Buffalo, Lockport & Rochester Railway and of the capital stock of an electric company to be organized to acquire a certain contract of the Electrical Development Company, Ltd., for the delivery of electrical energy at the international boundary. The Buffalo & Lake Erie Traction Company was unable to pay the interest which matured on Nov. 1, 1912, on its first and refunding mortgage 5 per cent bonds, of which there are outstanding $7,066,000 par value. A protective committee was organized under an agreement dated Oct. 25, 1912, to represent the aforesaid bondholders, and 80 per cent of the bonds have been deposited with the committee.

The plan formulated by the bondholders' committee is, briefly, as follows: The mortgage securing the said first and refunding bonds of the company will be foreclosed and the property of the company acquired by the committee for the bondholders. A new company will be organized to take over the property at the foreclosure sale. The new company will issue in payment of the said property $6,000,000 of its mortgage bonds, which will be secured by a mortgage on the property of the company, and $448,000 of its capital stock. This mortgage will provide for the issue of additional bonds in the future for extensions, improvements and betterments. Messrs. Bertron, Griscom & Company, New York, will surrender to the committee for cancellation $1,066,000 of the said first and refunding mortgage bonds of the committee and will also surrender to the committee for cancellation the unsecured indebtedness of the company, amounting to about $435,000, and will also reimburse the committee for the moneys borrowed by it to advance to the first and refunding mortgage bondholders the interest which accrued on Nov. 1, 1912, on their bonds. These bankers will also pay the expenses of the reorganization and provide working capital for the new company.

In pursuance of this plan the unsecured indebtedness of the company will be paid and the bondholders will receive in place of existing bonds the bonds of the new company, dollar for dollar, thus making a reduction in the amount of bonds outstanding against the property of the company of $1,066,000. The new bonds to be received by the old bondholders will not commence to draw interest until Jan. 1, 1915. They will draw interest for the year 1915 at the rate of 2 per cent per annum, for the year 1916 at the rate of 3 per cent, and for the year 1917 and the years thereafter at the rate of 5 per cent per annum. The new company will acquire more than 80 per cent of the $4,000,000 of the capital stock of the Buffalo, Lockport & Rochester Railway, and will issue in payment therefor $866,700 of its capital stock. The western terminus of the Buffalo, Lockport & Rochester Railway is at Lockport and in order to connect the new company with the Buffalo, Lockport & Rochester Railway and obtain an entry to Niagara Falls the new company will lease the Lockport division of the International Railway and obtain contracts over the International Railway and the tracks of the railway to be built on the frontier right-of-way between Buffalo and Niagara Falls. In this way a through service will be established between Rochester, Buffalo, Niagara Falls and Erie, Pa. It is contemplated that the new company will also acquire the capital stock of an electrical company to be organized to take over an existing contract with the Electrical Development Company, Ltd., of Ontario, and the Toronto Power Company, Ltd., for the delivery of 46,000 hp at the international boundary, thus assuring an ample supply of power for the lines of road between Rochester and Erie, and leaving a large surplus of power for distribution in the territory served by the above-mentioned lines.

The commission has set a hearing on this application for July 31, 1913, at Buffalo.

Conference in Regard to Proposed Toronto Purchase

Mayor Hocken of Toronto, Ont., made the following announcement recently in regard to the proposed purchase of the property of the Toronto Railway and Toronto Electric Light Company:

"Sir William Mackenzie and I have reached agreement with the exception of one thing. We will have another conference on July 17, and at that time I hope to arrange everything to the satisfaction of the citizens. If the outcome of the conference on July 17 is satisfactory I will notify the experts at once, and the work of valuing the properties will be commenced."

Following the meeting of July 17 the Mayor is reported to have said:

"The first thing we have to do is to put the experts to work, and if their report is satisfactory, it will be put into the hands of the solicitors to prepare a formal document on the basis laid down. According to the tentative agreement which has been arranged we will get what we thought we ought to get, and concede to the companies the things that we thought they were entitled to. I am prepared to recommend to the Council the basis as agreed upon for adoption, assuming that the report of the experts is favorable and the consent of the Ontario Hydroelectric Power Commission is obtained. The experts appointed to value the railway and electric properties will start work at once, and will probably finish by Aug. 15."

American Water Works & Guarantee Company, Pittsburgh, Pa.—L. L. McClelland, of J. S. & W. S. Kuhn, Inc., Pittsburgh, has addressed the clients of that firm in part as follows: "Upon the closing of the First-Second National Bank, Pittsburgh, of which W. S. Kuhn was president, it was deemed advisable by the officers of both the American

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Water Works & Guarantee Company and of J. S. & W. S. Kuhn, Inc., to apply to the courts for receiverships in order to conserve the assets of these two corporations for the protection of creditors, bondholders and stockholders against the possible results of any impairment of credit which might be caused by the closing of such a large institution, with which the Messrs. Kuhn had been identified. Neither the bonds, loans nor any other financing of the American Water Works & Guarantee Company, nor of J. S. & W. S. Kuhn, Inc., caused the closing of the First-Second National Bank. The receiverships of these two corporations were asked for primarily as protective measures. In my judgment, everything that is possible is being done looking to the protection of your interests and those of all concerned."

Chicago & Oak Park Elevated Railroad, Chicago, Ill.—A decree was filed by Judge Kohlsaat in the United States District Court at Chicago on July 17, ordering the sale of the property of the Chicago & Oak Park Elevated Railroad at public auction unless certain obiigations were met within the next ten days. These aggregate $5,080,984. As the syndicate which owns the other elevated lines of the city holds the debts against the Oak Park, it will probably buy the property. The bid must be sufficient to cover the receivers' certificates both as to principal and interest. The minority stockholders who have been opposing the receivership are said to have agreed to have the affairs of the corporation settled.

Chicago, Waukegan & Fox Lake Traction Company, Chicago, Ill.—The Chicago, Waukegan & Fox Lake Traction Company is reported to have arranged to take over the property of the Woodstock & Sycamore Traction Company, which has been operating McKeen gasoline motor cars between Marengo, Genoa and Sycamore.

Columbus Railway & Light Company, Columbus, Ohio.—At a meeting of the reorganization committee of the Columbus Railway & Light Company and its underlying properties on July 15 it was decided to extend the time of depositing securities until Sept. 15. More than the required two-thirds of the stock of all the companies, except the Columbus Light, Heat & Power Company, has been deposited.

Dayton (Ohio) Street Railway.—The Dayton *News* says: "Negotiations have been inaugurated which will probably result in the merger of all the local street railways. In the event that the plans are successfully consummated it will mean that the properties of the City Railway, the Oakwood Street Railway, the People's Railway, the Dayton Street Railway and the city lines of the Ohio Electric Railway and the Dayton, Springfield & Xenia Southern Railway will be operated under one management. The negotiations, so far as they have advanced, have been conducted by Adam Schantz, the largest stockholder in the Dayton Street Railway, and William A. Keyes, president of the Dayton Street Railway, representing the local interests, and C. L. S Tingley, Philadelphia, second vice-president of the American Railways, of which the People's Railway is a part."

Hudson & Manhattan Railroad, New York, N. Y.—At the annual meeting of the Hudson & Manhattan Railroad on July 17 the following were elected directors, in accordance with the new financing plan of the company: C. W. Davison, vice-president of the Central Trust Company; J. J. Hanauer, of the firm of Kuhn, Loeb & Company; Alexander J. Hemphill, president of the Guaranty Trust Company; John W. Platten, president of the United States Mortgage & Trust Company, and W. H. Williams, vice-president of the Delaware & Hudson Company. The new directors replace William G. McAdoo, who resigned from the board to become Secretary of the Treasury of the United States; F. A. Briggs, deceased; William H. Barnum, F. B. Jennings, and J. G. McCullough, who resigned. The following remain members of the board: L. L. Clarke, Pliny Fisk, Wilbur C. Fisk, E. H. Gary, R. W. Meirs and W. G. Oakman. The plan for the readjustment of the company's debt, which has been formally approved, provided for the management of the company for a period of five years at least by a voting trust. Three voting trustees have been named: Charles Francis Adams, treasurer of Harvard University; Felix M. Warburg, of Kuhn, Loeb & Company, and Albert H. Wiggen, president of the Chase National Bank.

Mankato (Minn.) Electric Traction Company.—An initial dividend of 5 per cent has been declared on the $28,850 of outstanding preferred stock of the Mankato Electric Traction Company.

Middle West Utilities Company, Chicago, Ill.—The Middle West Utilities Company proposes to issue $2,000,000 of three-year 6 per cent collateral notes out of an authorized issue of $3,500,000. According to the official announcement the "proceeds of the issue will be used to complete payments on properties heretofore contracted for, to provide funds for the development of subsidiary companies, and to fund the floating debt of the company."

Nebraska Traction & Power Company, Omaha, Neb.—The Omaha & Lincoln Railway & Light Company has been incorporated in Nebraska with a preliminary capital stock of $750,000, presumably by the McKinley interests, as the successor to the Nebraska Traction & Power Company, the property of which was purchased recently at receiver's sale by W. B. McKinley, president of the Illinois Traction System. The purpose of the company, as stated in the articles of incorporation, is to construct an electric railway from Omaha to Lincoln. The incorporators are W. L. Loomis, E. W. Bradford, R. E. Borkenhagen, S. J. Howell and Justin Refrigier.

New York, New Haven & Hartford Railroad, New Haven, Conn.—A special meeting of the stockholders of the New York, New Haven & Hartford Railroad will be held in New Haven on Aug. 22 to vote to authorize $67,552,400 of 6 per cent debentures convertible into stock at any time after five years from their date until, but not later than, fifteen years from their date at the rate of one share of stock for each $100 of debentures. The stockholders also will vote to authorize an increase in the capital stock by issuing 675,524 additional shares of $100 each, as necessary for the conversion of the debentures. The present amount of capital stock outstanding is $180,013,200. Mr. Mellen in explaining the issuance of the debentures said that $40,000,000 was for indebtedness maturing on Dec. 1, 1913, and $5,000,000 maturing on Feb. 1, 1914, and that the balance was to be used in completing the electrification to New Haven, and for new steel cars, passenger equipment and other necessary improvements, such as the elimination of grade crossings.

Northern Ohio Traction & Light Company, Akron, Ohio.—Application has been filed with the Public Service Commission by the Northern Ohio Traction & Light Company for authority to issue $360,000 of preferred capital stock and $2,680,000 of general mortgage bonds to provide funds to double-track the line between Akron and Canton and to make other improvements.

Ocean Shore Railroad, San Francisco, Cal.—The Ocean Shore Railroad applied to the Railway Commission of California for approval to issue first mortgage bonds to secure a proposed loan of $250,000. It appeared that, prior to the filing of the application, legal proceedings were begun and are pending against the company, involving, among other questions, the legality of the authorization of the bonds. Accordingly, further proceedings were ordered suspended until the court having jurisdiction shall have rendered its decision.

Public Service Company of Northern Illinois, Streator, Ill.—Out of an authorized issue of $3,500,000 of three-year 6 per cent collateral gold notes of the Public Service Company of Northern Illinois $2,500,000 are being offered by Lee, Higginson & Company, Russell, Brewster & Company, and N. W. Halsey & Company. The price is 97.34 and interest, yielding 7 per cent. The issue is secured by a deposit with the Illinois Trust & Savings Bank, trustee, of $3,125,000 par value of the company's first and refunding 5 per cent bonds and the notes are convertible into these securities at 95. The date of the notes is July 1, 1913, and they are in denominations of $1,000, $500 and $100, being callable as a whole at 100½ on any interest date. The ratio of security is 100 to 125, and bonds against which the notes are issued are in turn secured by a lien on all the property now owned or to be acquired by the company, subject in part to $18,587,100 prior lien bonds of which 18 per cent, or $3,434,000, are pledged under the mortgage. The purpose of the issue is to provide funds to pay

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the remaining $1,500,000 of the purchase of the Northwestern Gas Light & Coke Company, to fund floating debt and to provide for construction to be completed during the current year.

San Diego & Southeastern Railway, San Diego, Cal.—The Railroad Commission of California has authorized the San Diego & Southeastern Railway to issue bonds to the amount of $543,000, the proceeds of which will be used in making additions and betterments to the company's property.

Springfield (Ohio) Railway.—Application has been made to the Public Service Commission of Ohio by the Springfield Railway for authority to issue $1,244,000, par value, of first mortgage bonds and 3568 shares of preferred stock. The company also asks for permission to retire $500,000 of first mortgage bonds, pay the floating debt and purchase ten new cars.

Dividends Declared

American Railways, Philadelphia, Pa., quarterly, 1¾ per cent.

Auburn & Syracuse Electric Railroad, Syracuse, N. Y., quarterly, 1½ per cent, preferred.

Brazilian Traction, Light & Power Company, Ltd., Toronto, Ont., quarterly, 1½ per cent.

Cumberland County Power & Light Company, Portland, Me., quarterly, 1½ per cent, preferred.

Grand Rapids (Mich.) Railway, quarterly, 1½ per cent, preferred.

Monongahela Valley Traction Company, Fairmont, W. Va., 2½ per cent, preferred.

Ottumwa Railway & Light Company, Ottumwa, Ia., quarterly, 1¾ per cent, preferred.

Railways Company General, New York, N. Y., quarterly, 1 per cent.

United Power & Transportation Company, San Francisco, Cal., $1.26.

West Penn Railways, Pittsburgh, Pa., quarterly, 1¼ per cent, preferred.

York (Pa.) Railways, $1.25, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

Period			Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
AMERICAN RAILWAYS COMPANY, PHILADELPHIA.							
1m.,	June,	'13	$446,471	.....	.....	.....	.....
1 "	"	'12	417,804	.....	.....	.....	.....
12 "	"	'13	5,130,840	.....	.....	.....	.....
12 "	"	'12	4,869,391	.....	.....	.....	.....
CLEVELAND, PAINESVILLE & EASTERN RAILWAY, WILLOUGHBY, OHIO.							
1m.,	May,	'13	$37,245	*$20,559	$16,686	$10,421	$6,265
1 "	"	'12	34,804	*19,668	15,136	9,927	5,209
5 "	"	'13	147,551	*84,864	62,687	52,149	10,538
5 "	"	'12	135,050	*86,344	48,706	49,452	†746
KENTUCKY TRACTION & TERMINAL COMPANY, LEXINGTON, KY.							
1m.,	May,	'13	$67,540	$32,539	$35,000	$19,206	$15,794
1 "	"	'12	61,006	35,984	25,923	17,298	7,725
11 "	"	'13	702,624	368,449	334,175	206,122	128,053
11 "	"	'12	650,427	386,815	263,612	190,953	72,659
LAKE SHORE ELECTRIC RAILWAY, CLEVELAND, OHIO							
1m.,	May,	'13	$116,371	*$72,344	$44,026	$35,079	$8,947
1 "	"	'12	107,140	*63,553	43,587	34,689	8,988
5 "	"	'13	498,932	*330,362	168,570	174,971	†6,400
5 "	"	'12	466,336	*294,237	172,099	173,737	†1,638
NEW ORLEANS RAILWAY & LIGHT COMPANY, NEW ORLEANS, LA.							
1m.,	May,	'13	$556,492	$308,277	$248,214	$206,995	$41,219
1 "	"	'12	547,040	290,254	256,786	183,244	73,542
5 "	"	'13	2,905,265	1,499,843	1,405,422	987,786	417,637
5 "	"	'12	2,819,639	1,430,758	1,388,881	915,488	473,392
NORTHERN OHIO TRACTION & LIGHT COMPANY, AKRON, OHIO							
1m.,	May,	'13	$279,992	*$167,697	$112,295	$45,214	$67,081
1 "	"	'12	255,104	*142,804	112,299	43,821	68,479
5 "	"	'13	1,205,720	*750,103	455,616	225,510	230,106
5 "	"	'12	1,100,375	*638,342	462,033	219,108	242,925
UNION RAILWAY, GAS & ELECTRIC COMPANY, ROCKFORD, ILL.							
1m.,	May,	'13	$395,679	*$209,549	$186,130	$97,724	$88,406
1 "	"	'12	275,795	*168,231	107,564	68,086	39,478
12 "	"	'13	4,463,916	*2,536,657	1,927,259	1,113,143	814,116
12 "	"	'12	3,387,666	*1,963,606	1,422,060	781,884	642,176
VIRGINIA RAILWAY & POWER COMPANY, RICHMOND, VA.							
1m.,	May,	'13	$424,549	$206,983	$217,567	$128,302	$89,265
1 "	"	'12	386,854	206,218	180,535	119,588	61,047
11 "	"	'13	4,524,297	2,219,111	2,305,186	1,372,292	632,894
11 "	"	'12	4,234,382	2,215,063	2,019,320	1,302,606	716,714

*Includes taxes. †Deficit.

Traffic and Transportation

Through Elevated Routes and Extension of Loop Platforms Authorized in Chicago

The City Council of Chicago passed on July 21 the ordinance providing for through routes on the elevated lines, for extension of the union loop platforms and for other elevated improvements. It eliminated, however, the section providing for a downtown terminal subway for the elevated lines.

The extensions of platforms at the stations on the union loop, which the companies have tried for a number of years to get the city to permit, are not to be uniform in length. At Randolph and Washington Streets the platforms may be extended south approximately 6 ft. At the station in Fifth Avenue near Randolph Street the platforms may be extended south approximately 336 ft. The platforms may be extended south approximately 9 ft. at Fifth Avenue and Madison Street. At Fifth Avenue and Quincy Street the platforms may be extended north approximately 50 ft. At Van Buren and La Salle Streets the platforms may be extended east approximately 48 ft. At the Metropolitan line station at Van Buren and Franklin Streets the platforms may be extended 140 ft. west. The width of each platform extension shall not exceed the width of the platform to which it is an extension except in one instance.

The ordinance also provides for the construction of additional stairways at certain loop stations. Transfer bridges above the tracks are to be built at some of the loop stations. Necessary changes in the alignment of tracks and necessary alterations in or additions to the structure, designed to permit cars of the Northwestern company to pass to the track of the South Side company and the South Side cars to pass to the Northwestern track are authorized, except that no additional columns shall be erected in the streets.

Each of the four operating companies is authorized to construct additions to its station platforms outside of the union loop so as to make the total length of each platform not more than 330 ft. in order that it may accommodate a seven-car train.

A connection between the Chicago & Oak Park line and the Metropolitan line, at the point where one crosses over the other, is authorized.

The Chicago & Oak Park line is authorized to construct a third track upon its structure between certain points. A definite time for completion of the various changes is prescribed. After the completion of the work so many of the trains of the Northwestern line shall be through-routed over the union loop and over and upon the tracks of the South Side company and so many of the trains of the South Side company shall be through-routed over the union loop and over and upon the tracks of the Northwestern company "as shall be reasonably necessary to give adequate transportation service, subject to the supervision of the City Council." Each of these companies may operate into stub terminals or around the union loop any of its trains not so through-routed. Any passenger may transfer from any one of the four operating companies to any other one of the four operating companies at any union loop station where provision is made for transfer or at any other joint station where the cars of both companies shall stop without the payment of additional fare.

Ruling in Regard to Free Transportation in Missouri

The Southwest Missouri Railroad filed a petition with the Public Service Commission of Missouri recently requesting a construction of Section 35 of the Public Service Commission Law, relating to the subject of free transportation of passengers by common carriers, and particularly with reference to the authority of that company to continue to carry free of charge certain persons named in the petition to whom free transportation had theretofore been issued. In 1898 the Southwest Missouri Electric Railway owned and operated an electric railway in Jasper County, Missouri, running from Carthage through Carterville and Webb City to Joplin. Pursuant to a resolution adopted by

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the board of directors in 1898, certain certificates, under the seal of the company, were issued to the directors, purporting to entitle them to free transportation over the lines of that company, its successors and assigns during their natural lives. The consideration for such transportation, as recited in the resolution, was alleged promotion services rendered by the said directors without compensation. The Southwest Missouri Railroad subsequently acquired the property of the Southwest Missouri Electric Railway and has honored the certificates of free transportation, but upon the enactment of the Public Service Commission law, being in doubt as to its authority to continue so to do, asked for a construction of the law as to its duty in the premises.

In its finding the commission says in part:

"The purpose of the law was to prevent discrimination and to secure to all the same rights and privileges. Construing similar statutes the courts have held that as to persons not excepted in the act, nothing but money and that in amount as fixed by the published schedules on file shall be received as compensation by the carrier for transportation. In the case before us alleged services were recited as a consideration for the issuance of the free passes. In others such passes have been issued in consideration of a right-of-way granted to the carrier, or in settlement of a claim for damages, or to enable the passenger to render service in the cause of religion, science, education or charity, and doubtless many others could be enumerated, but whatever the consideration upon which such transportation has been issued in the past, the Legislature, in the interest of the public welfare, has ordained that henceforth, with the exceptions expressly noted in the law, the payment of the regular fare in money will alone authorize the carrier to transport passengers. No other or different compensation will answer and unless the person claiming the privilege of free transportation can bring his case within one of the classes of exceptions to the law against free passes, he must pay the fare in cash.

"In the case of Railroad Company v. Mottley, 219 U. S. 467, the Supreme Court of the United States had before it a provision of the Interstate Commerce Law almost identical with that under consideration, and the decision in that case may be regarded as the last word upon the subject. Construing that law, the Court (l. c. 479) said:

"'It solved the question when, without making any exceptions of existing contracts, it forbade by broad, explicit words any carrier to charge, demand, collect or receive a "greater or less or different compensation" for any services in connection with the transportation of passengers or property than was specified in its published schedules of rates. The court cannot add an exception based on equitable grounds when Congress forbore to make such an exception. Yturbide v. United States, 22 How. 290, 293. The words of the act therefore must be taken to mean that a carrier, engaged in interstate commerce, cannot charge, collect or receive for transportation on its road anything but money.'

"Although the contract under which the free transportation was issued was a valid contract at the time it was entered into, that fact does not change the rule, for, as said in the Mottley case, supra:

"'"If one agrees," said Mr. Parsons, "to do a thing which it is lawful for him to do and it becomes unlawful by an act of the Legislature, the act avoids the promise."'"

"It follows that under the facts alleged in the petition, even assuming that the transportation at the time it was issued was for a valid consideration, it is our opinion that on and after July 31, 1913, it would be unlawful for the petitioner to continue to carry the persons named in the petition upon the certificates of free transportation described."

The Recent Vote on the Co-operative Plan in Philadelphia

Co-operative Bulletin No. 20, issued by the Stotesbury management of the Philadelphia (Pa.) Rapid Transit Company under date of July 18, 1913, refers to the third step in the rerouting plan of the company, the prevention of accidents, the result of the recent vote on the co-operative plan, the change in the pay period, the audit of the 22 per cent fund, and the co-operative benefit association. As stated in the ELECTRIC RAILWAY JOURNAL of July 12, 1913, the vote to continue the co-operative plan in force for another year, taken on July 7, 1913, was 4320 in favor of the plan as compared with 2028 against it. In this connection the management says in part:

"Upon the invitation of the management to its men, 6355 motormen, conductors and trainmen, comprising more than 93 per cent of those entitled to vote, went to Horticultural Hall on July 7, for the purpose of expressing their desire as to a continuation of the present plan of co-operation between the management and its men as individuals.

"The number of men who, by voting 'No,' expressed their desire that the company deal with organized labor, instead of with the men as individuals, is less than one-half of the number who expressed themselves in favor of a contract with organized labor at the vote in Nov., 1911. As a result of this vote, the co-operative plan with the men, as individuals, as now in force, will be continued for another year.

"The work of the co-operative committee and of the management in their co-operative effort to increase the wages and improve the working conditions of the men is thus shown to have borne good fruit. There now remains but a small minority of the men who, as yet, fail to realize the great advantage to be secured by a continuation of the co-operative plan with the men as individuals.

"The co-operative committeemen should now endeavor to determine what measure of reason or justice is behind this difference of opinion as expressed by the small minority. If this attitude is based upon a just cause for complaint, every effort should be made by the co-operative committeemen and the management to remove the cause of this disaffection. If, on the other hand, these men are being misled or misinformed by those whose interest it is to interfere with the progress now being made, every effort should be made by the co-operative committeemen to destroy the effect of such misrepresentation, to the end that all men may see the light and join in the good work by putting their shoulders to the wheel."

Newark-Trenton Passenger and Milk Tariff

The proposed increased schedule of passenger rates on the Trenton Terminal Railroad, now operated by the Public Service Railway between Newark and Trenton, has been approved by the Board of Public Utility Commissioners, in so far as it relates to the through rates between Trenton and New Brunswick. The board had already approved the continuous service rate between Newark and Trenton, and its latest order sanctions all the charges proposed by the line. The board has also approved in effect a proposed increase in the charge of the same company for the transportation of milk from various points on its lines to Trenton. It disapproves, however, a proposed minimum charge of 15 cents for a single can, regardless of size. To fix this minimum, the board held, would constitute an unjust discrimination against the small shipper. The board announced that if the company would agree to eliminate this minimum charge feature the milk schedule would also be approved. Under the new passenger schedules, which may now take effect immediately, the single fare between Trenton and New Brunswick will be 50 cents and the excursion, or round trip fare, 85 cents.

The new milk tariff which the board has expressed its willingness to approve, with the elimination of the minimum single can charge, is 7½ cents for a twenty-quart can; 11½ cents for a thirty-quart can; and 15 cents for a forty-quart can. The rates also include the return of empty cans. They are made irrespective of distance, the maximum haul being about 20 miles. Under the present schedule the milk tariff is 5 cents for a twenty-quart can and 7½ cents for a thirty-quart can and 10 cents for a forty-quart can. In its memorandum the board pointed out that the proposed advances in the milk schedule seemed to be fairly in line with charges of other companies for comparable service. In refusing to sanction the minimum charge for a single can, the board remarked that if a car was stopped at any station to take on or put off a single passenger without extra charge, it should do the same for a single can of milk.

The through service between Newark and Trenton was established recently.

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Annual Report of Montreal Tramways Mutual Benefit Association

The tenth annual pamphlet report of the Montreal Tramways Mutual Benefit Association, composed of employees of the Montreal (Que.) Tramways, has been issued. It is for the year ended April 30, 1913, and was submitted at the annual meeting of the members, held on June 28, 1913. The following is a summary of the relief work done during the year as compared with the preceding year:

	1912-13	1911-12
Number of members disabled through sickness or injury	1,205	1,173
Number of visits made by physicians to disabled members	695	626
Number of consultations given by physicians to disabled members	7,690	7,587
Number of prescriptions issued	5,769	5,811
Amount paid for sickness and injury	$10,065	$10,274
Amount paid for medicine	$1,840	$1,725
Amount paid for pensions	$408	$354
Amount paid for withdrawals	$508	$296
Amount paid for death and burial insurance	$7,083	$12,533

J. E. Hutcheson, the president of the association, concluded his report as follows:

"It will be of interest to members to learn that since the organization of the association the following amounts have been paid out in benefits:

Death and burial claims	$67,643
Sickness and injury benefits	83,765
Medicine	14,648
Medical attendance	19,982
Pensions	1,755
Refunds	1,089
Total	$189,292

"Your committee of management gratefully acknowledges the special Christmas donation of $4,000 received from the Montreal Tramways. This makes the total contributions received from the company $18,318, and this amount added to the fees and dues received from the members, viz., $16,651, and the proceeds of the picnic, and the interest on investments and bank deposits amounting to $15,506, make a total revenue for the year of $50,476. As the expenses were $28,795, the surplus is $21,680."

Automatic Blocks Recommended for Venice Short Line

On his arrival in Los Angeles on June 15 Paul Shoup, president of the Pacific Electric Railway, Los Angeles, Cal., made a statement in part as follows in regard to the accident on that line near Venice on July 13, referred to in the ELECTRIC RAILWAY JOURNAL of July 19, 1913, page 121:

"I have recommended the immediate installation of automatic block signals on the Venice Short Line as a beginning. To-day we begin the establishment of a temporary block system manually operated until the other is built. I am informed that between Vineyard and Venice there has never been a fatality from a collision heretofore though millions of people have been handled by that line.

"During the year ended June 30, 1913, the Pacific Electric Railway carried 78,796,000 passengers, and of these one was killed in an accident resulting from collision and derailment and free from other causes.

"We ask the public to bear with us in this hour of trial, and not to forget that this company has tried faithfully for many years to serve and build up this community and, I think on the whole, that it has done so to your satisfaction. I arrived home only this morning. The testimony as to the accident is not yet so complete that I care to comment on it. We should like to hear from every passenger who can aid us in gaining full information."

Rules Governing Operation in Washington, D. C., Modified

New regulations governing the equipment and operation of cars in the District of Columbia have been adopted by the Public Utilities Commission. The rules, framed originally by the District Electric Railway Commission and promulgated, with a number of changes, by the new commission, will become operative as soon as copies have been furnished the companies. Probably the most drastic change provided for is one under which the companies may operate trailers of any type, provided separate conductors are supplied when cars are operated in pairs. The former railway board abolished the use of single-truck "trailers."

The rules say that before any new car may be placed in operation, plans for the type proposed to be installed must be submitted to the commission for approval. A provision in the order clearly defines the city and suburban sections as traversed by each railway line. As a result, motormen will know exactly when they may increase the speed of the cars upon reaching the suburban sections. It is stipulated that cars must stop within 20 ft. of crossings and not start until cars going in the opposite direction have passed over the street. Passengers are prohibited from standing on running boards. Air brakes must be installed by Dec. 1, 1914, on all cars weighing sixteen tons or more. Each car must have an illuminated front-end sign and also a sign indicating the route to be followed. Additional requirements are contained in the new regulations with respect to wheel guards.

Three-Cent Ordinance in Jacksonville.—An ordinance introduced into the Council of Jacksonville, Fla., by C. L. Bonney, providing for a 3-cent fare on the electric railways in Jacksonville, has been referred to the committee on public service.

Permission to Discontinue Car Denied.—The Public Service Commission has denied the application of the Cincinnati, Georgetown & Portsmouth Railway, Cincinnati, Ohio, to take off a car running between Cincinnati and Batavia in the evening.

Berkshire Street Railway Asks Freight Rights.—The Berkshire Street Railway, Pittsfield, Mass., has petitioned the Public Service Commission for authority to act as a common carrier of baggage and freight in Lenox, the authorities of that town failing to act within the prescribed time.

Agreement Between Company and Employees in Providence.—D. F. Sherman, vice-president of the Rhode Island Company, Providence, R. I., has announced that the differences between the officers of the company and the employees in regard to wages and terms of service have been adjusted.

Schenectady Fare Case.—The hearing on the application which is before the Public Service Commission of the Second District of New York to require the Schenectady Railway to sell six tickets for 25 cents has been continued until Sept. 15. The testimony is being presented before Commissioner Decker.

Request in Regard to Route Signs in Buffalo.—Business men's associations and other civic organizations in Buffalo, N. Y., have sent a communication to Edward G. Connette, president of the International Railway, Buffalo, N. Y., asking that the route of the car be placed on the rear of the new near-side cars. At present the route is displayed only in the front window of the car.

Reduction in Fare During Summer.—The Orange County Traction Company, Newburgh, N. Y., has reduced the local one-way ticket fare in both directions between Newburgh and Orange Lake Park, for passage between the hours of 7 p. m. and 12 midnight, to 5 cents. The reduction is from 15 cents cash fare or 10 cents commutation fare and is effective from July 7, 1913, to Aug. 31, 1913.

Insurance for Third Avenue Railway Employees.—F. W. Whitridge, president of the Third Avenue Railway, New York, N. Y., has addressed a circular to the members of the benefit association organized among the men giving the particulars of the insurance plan for the men to which Mr. Whitridge referred in his report in regard to the operations of the company for the six months ended June 30, 1913, which was abstracted in the ELECTRIC RAILWAY JOURNAL of July 19, 1913, page 116.

British Columbia Electric Railway Folder.—The British Columbia Electric Railway, Vancouver, B. C., has issued a traffic folder, "Trips for Tourists," in which the interurban trips over the company's lines are described. The folder is on white paper printed in black and red, and in the center there is a double-page bird's-eye view which conveys an excellent idea of the extent of the territory covered by the company's lines. There are many excellent half-tone en-

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gravings made from photographs of places of interest in the territory through which the company operates.

Complaint Against Buffalo Southern Railway.—Devoe P. Hodson, of the Public Service Commission for the Second District of New York, has directed John J. Snyder, Ebenezer, N. Y., to file a formal complaint against the Buffalo Southern Railway, operating between Buffalo, Orchard Park, Armour and Hamburg, N. Y., because it does not stop its East Aurora express at two of the principal points in Ebenezer, but runs through from the city line of Buffalo to the city line of Ebenezer.

Conference in Cincinnati in Regard to Transfers.—W. Kesley Schoepf, president, and Walter A. Draper, secretary of the Cincinnati Traction Company, conferred with the committee on street railways of the City Council on July 18 in regard to the question of universal transfers. The officers of the company expressed their willingness to issue transfers at points where there is a demand for them and where they are not now issued, but they are opposed to the measure now before the Council to require the company to issue universal transfers. There will be a public hearing on the question at an early date.

Staten Island Transfer Arrangement Discussed.—The proposed arrangement between the New York (N. Y.) Railways and the city for a combined service between the Staten Island municipal ferries and the cars of the company at South Ferry was discussed recently in the office of Mayor Gaynor by the members of the special transit committee of the Board of Estimate for the city and Frank Hedley, general manager, and James L. Quackenbush, counsel for the New York Railways. Mr. Quackenbush said that the company from the first had maintained that it was impossible for it to consent to carry the passengers from the ferry for less than 3 cents.

Plea for Commutation Rates Dismissed.—The Railroad Commission of California on May 24, 1913, handed down a decision in a commutation case in favor of the San Diego Electric Railway, San Diego, Cal. This company, operating an electric railway and ferry between the city of San Diego and Coronado, a residential suburb, accords to residents of Coronado a special family commutation rate. A resident of Coronado urged, upon the ground of "justice and equity," that the failure of the company to accord a like privilege to residents of the city of San Diego is a discrimination, and asked that the discrimination be removed by requiring the company to put in a joint commutation ticket similar in character applying between San Diego and Coronado and return. On the ground of different circumstances and conditions in the traffic to and from Coronado and to and from San Diego, however, the complaint was dismissed.

The Seat-for-Every-Passenger Idiocy.—The St. Louis *Star* said recently in an editorial: "The *Star* gave no encouragement to the 'seat for every passenger' idiocy. Anyone except a newspaper editor or other person unfamiliar with practical railroad operation knows that a seat for every passenger during rush hour is impractical. The appearance of Robert McCulloch, general manager of United Railways, before the sanitation committee of the Council and the talk he made to that committee show very clearly that he and the men he represents in the operation of the system are setting to work with honest intent and effort to correct the physical deficiencies of the system. Captain McCulloch announces that 200 new cars have been ordered and promises to have them in service by winter; he likewise announces that all of the cars of the company are being equipped properly with ventilators and that when the winter comes the legally designated temperature will be maintained. These are facts and they concern the public directly. Captain McCulloch is entitled to be taken at his word when he announces that he is trying to provide better facilities and better service in St. Louis. There is little doubt that he is doing approximately the best he can and as quickly as he can do it with the resources at hand. This newspaper believes it will be doing the riders of St. Louis better service by keeping United Railways and its operating management cognizant of their promises than by the silly and stupid methods of attack indulged in by some of the other newspapers of the city."

Personal Mention

Mr. James Furey has been appointed roadmaster of the Hartford & Springfield Street Railway, Warehouse Point, Conn., to succeed Mr. Henry K. Greenwood.

Mr. William Bradley has been elected president of the Cumberland County Power & Light Company, Portland, Maine, to succeed Mr. Charles O. Bancroft.

Mr. Robert J. Waller has been appointed chief engineer of maintenance of way of the Otsego & Herkimer Railroad, Cooperstown, N. Y., to succeed Mr. C. S. Lee.

Mr. Lee Skipwith has been appointed purchasing agent of the Hot Springs (Ark.) Street Railway to succeed Mr. S. E. Dillon, who continues as general manager.

Mr. H. W. Ridgway has been appointed superintendent of motive power of the Denver & Interurban Railroad, Denver, Col., to succeed Mr. H. C. Van Buskirk.

Mr. J. J. Spindler has been elected treasurer of the Omaha & Council Bluffs Railway & Bridge Company, Council Bluffs, Ia., to succeed Mr. E. E. Harte.

Mr. Frank Mather has resigned as superintendent of the Walden Avenue carhouse of the International Railway, Buffalo, N. Y. No successor has been appointed.

Mr. H. N. Crandall, who has been treasurer of the Aroostook Valley Railroad, Presque Isle, Me., has in addition been appointed claim agent of the company.

Mr. William Roberts has been appointed superintendent of motive power of the Canton-Akron Consolidated Railway, Canton, Ohio, to succeed Mr. W. E. Salber.

Mr. Frank L. Butler, receiver of the Alton, Jacksonville & Peoria Railway, has been appointed general manager of the County Traction Company, Oak Park, Ill.

Mr. William A. House, president of the United Railways & Electric Company, Baltimore, Md., has been elected a director of the Fidelity Trust Company, Baltimore, Md.

Mr. James E. Dick has been appointed chief engineer of power station of the Hanover & McSherrystown Street Railway, Hanover, Pa., to succeed Mr. R. B. McKinnon.

Mr. Thomas M. Leahy has been appointed assistant secretary and assistant treasurer of the American Light & Traction Company, New York, N. L., to succeed Mr. E. A. Smith.

Mr. J. E. Adams has been appointed traffic manager of the Stockton Terminal & Eastern Railroad, Stockton, Cal., to succeed Mr. J. A. Nesbitt, who continues as auditor of the company.

Mr. Robert E. Nihan, formerly electrical engineer of the Indiana Utilities Company, Angola, Ind., has been appointed superintendent of the company to succeed Mr. C. W. Morse.

Mr. J. W. Steacy, formerly vice-president of the Hanover & McSherrystown Street Railway, Hanover, Pa., has been elected president of the company to succeed the late W. H. Lanius.

Mr. W. Wallace, formerly special agent for the Cincinnati (Ohio) Traction Company, has been appointed division superintendent of the Eighth Street division, succeeding Mr. N. Wickersham.

Mr. T. F. Swayze, superintendent of the Welland, Lake Erie & Niagara Electric Railway, Welland, Ont., has resigned to accept a position with the Niagara, St. Catharines & Toronto Railway, St. Catharines, Ont.

Mr. P. J. Conley has been appointed roadmaster of the Chicago, South Bend & Northern Indiana Railway, South Bend, Ind., and the South Michigan Railway. He succeeds Mr. A. Hitchcock with the latter company.

Mr. J. E. Farrell has resigned as superintendent of the Cold Spring carhouse of the International Railway, Buffalo, N. Y., and has been succeeded by Mr. George Baker, formerly superintendent of the Hertle Avenue carhouse.

Mr. W. C. Swisher, who for the last two years has been actively engaged in the investigation and settlement of claims against the Denver (Col.) City Tramway, has been appointed to the position of claim agent of the company.

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Mr. James S. Larkin has resigned as a member and chairman of the Public Service Commission of West Virginia and has been appointed a member of the State Board of Control. Mr. Lee Ott, of Thomas, will succeed him on the commission.

Mr. M. L. Sperry, who has been local manager of the Savannah (Ga.) Electric Company, has been transferred by Stone & Webster, who control the property at Savannah, to the New London Gas & Electric Company, New London, Conn.

Mr. E. W. Underwood has been appointed general manager of the Corning & Painted Post Street Railway, Corning, N. Y., to succeed Mr. Franklin G. Robbins. Mr. Underwood also succeeds Mr. Robbins as general manager of the Elmira, Corning & Waverly Railroad.

Mr. H. C. Foss, who has been general superintendent of the Savannah (Ga.) Electric Company, has been appointed acting manager of the company to succeed Mr. M. L. Sperry, who has become connected with the New London Gas & Electric Company, New London, Conn.

Mr. A. Taurman, heretofore master mechanic of the Richmond Division of the Virginia Railway & Power Company, Richmond, Va., has been appointed superintendent of rolling stock with supervision over cars, equipment, shops and carhouses of the Richmond, Petersburg, Interurban, Norfolk and Portsmouth Divisions.

Mr. N. Wickersham, formerly division superintendent of the Eighth Street division of the Cincinnati Traction Company, has been appointed division superintendent of the Walnut Hills division, succeeding Mr. D. S. Ross, whose appointment as assistant superintendent of transportation is mentioned elsewhere in this issue.

Mr. Theodore Deinst, who has been superintendent of the Parsons Railway & Light Company, Parsons, Kan., has been transferred to the Gilmer division of the Texas Public Service Company, successor to the Gilmer Light & Power Company, Gilmer, Tex. The properties at both Parsons and Gilmer are owned by Mr. Albert Emanuel.

Mr. J. S. Alexander, who has been superintendent of the Houghton County Electric Light Company, Houghton, Mich., has been appointed general superintendent of the Savannah (Ga.) Electric Company to succeed Mr. H. C. Foss, who has been appointed acting manager of the company. Both properties are controlled by Stone & Webster.

Mr. D. S. Ross, formerly division superintendent of the Walnut Hills division of the Cincinnati (Ohio) Traction Company, has been appointed assistant superintendent of transportation, succeeding Mr. A. J. Ostendorf, whose appointment as superintendent of transportation was mentioned in the issue of the ELECTRIC RAILWAY JOURNAL for July 5.

Mr. Thomas Elliott, chief engineer of the Cincinnati (Ohio) Traction Company, has been elected vice-president of the Cincinnati Car Company, and since May 1 has been in active charge of the operation of the car company's plant. In taking over these new duties Mr. Elliott has not resigned his position with the Cincinnati Traction Company but still retains the title of chief engineer.

Mr. Henry T. Jones, division superintendent of the Fillmore and Turk Street system, has been promoted to the position of general superintendent of the United Railroads, San Francisco, Cal., to fill the vacancy due to the recent death of Elwood D. Hibbs. Mr. Jones went to San Francisco in 1900 from Los Angeles, where he acted as assistant superintendent of the Los Angeles Cable Company for two years.

Mr. Walter L. Eyke, who has been electrical engineer of the Muskegon Traction & Lighting Company, of Muskegon, Mich., has been appointed general superintendent of the company to succeed Mr. J. T. Young, resigned. From 1898 to 1903 Mr. Eyke worked as motorman, lineman and line foreman. He then entered the engineering department of the University of Michigan and was graduated with the degree of B. S. in 1907.

Mr. Floyd O. Jellison has resigned as claim agent of the Chicago, South Bend & Northern Indiana Railway, South Bend, Ind., and is now engaged in the general practice of law, having recently become associated with the law firm of Howell, Jones & Devine, South Bend. During the last year the company relieved Mr. Jellison of the details of the claim department so that he could complete his law course at Notre Dame University. He secured his degree from that university last month.

Mr. Norman Read has resigned as electrical engineer of the Denver (Col.) City Tramway to become assistant general manager of the Central Colorado Power Company in charge of all Colorado properties. The power department of the Denver City Tramway will hereafter be included in the engineering department, reporting to the chief engineer. The position of electrical engineer will remain unfilled for the time being. Mr. J. F. Warner, superintendent of power station, will have charge of the operation and maintenance of the generating station. Mr. W. E. Casey, electrician, will have charge of the maintenance and operation of the substations.

Mr. W. T. Maddox has resigned as assistant general manager of the Utah Light & Railway Company, Salt Lake City, Utah, and has announced that he will retire from active work and live on his ranch near Gardena, Cal. Mr. Maddox has been engaged in railway work about thirty years. He was with the Missouri, Kansas & Texas Railroad and the Missouri Pacific Railroad for nineteen years as operator, agent, clerk to the superintendent, train dispatcher and chief train dispatcher. He then entered the employ of the Pacific Electric Railway, Los Angeles, Cal., and served that company and the Los Angeles & Redondo Railway as train dispatcher, trainmaster, general freight and passenger agent and as superintendent of the Southern Division.

Mr. Robert E. Lee, retiring superintendent of the Cincinnati (Ohio) Traction Company, had a farewell banquet tendered to him by more than 175 of his friends at the Scottish Rite Cathedral, Cincinnati, on the evening of July 12. Mr. Eugene L. Lewis acted as toastmaster and responses were made by Mr. Thomas Kite, thirty-third degree Mason, of the Cincinnati Valley; Mr. W. F. Robertson, president of the Court House Savings Bank, of which Mr. Lee is a retiring director; Mr. William B. Melish; Mr. Thomas W. Sullivan, president of the Railway Employees' Association; Dr. J. D. Buck, Postmaster Monfort, Judge Jacob H. Bromwell, Dr. E. S. Kiefer, County Prosecutor Thomas L. Pogue, Dr. Thomas M. Stewart, Judge Lueders, Mr. William Armstrong, Mr. William Leiman, Judge J. G. O'Connell and the guest of honor. Several of the speakers presented Mr. Lee with gifts, among which were a silver dish for Mrs. Lee, a gold chain, a diamond pin and a shrine emblem.

OBITUARY

Anthony N. Brady, chairman of the board of directors of the Brooklyn (N. Y.) Rapid Transit Company, died on July 23 at the Hotel Carlton in London, Eng., following an attack of acute indigestion. Mr. Brady was born in Lille, France, on Aug. 22, 1843, but came to this country with his father and mother when he was a little boy. He was first employed in the Delavan House at Albany, N. Y. Subsequently he entered the tea business in Albany. He next turned his attention to granite and gained control of large granite quarries and began building sewers and laying pavements. He then assisted in organizing the Albany Gas Light Company, this marking his entrance into the public utility field. He was also one of the organizers of the Metropolitan Street Railway. At the time of his death Mr. Brady was a director and officer in many gas and electric lighting corporations and in electric railways, notably in Greater New York, Albany and Troy. Among the companies with which he was affiliated as a director are the Brooklyn Rapid Transit Company and its subsidiaries, New York Edison Company, Kings County Lighting Company, Consolidated Gas, Electric Light & Power Company, of Baltimore, Hudson & Manhattan Railroad, the Hudson Companies, United Electric Light & Power Company, of Baltimore, and the Westinghouse Electric & Manufacturing Company. Mr. Brady was best known perhaps through his connection with the Brooklyn Rapid Transit Company and the New York Edison Company, in both of which he is said to have been very heavily interested.

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Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Olympian Springs (Ky.) Railway.**—Application for a charter will soon be made by this company to build an electric railway from Olympia Station on the Chesapeake & Ohio Railway to the Olympian Springs Hotel, about 3 miles from the railway. Power for this line will be supplied from the Olympian Springs Hotel Company.

***Omaha & Lincoln Railway & Light Company, Lincoln, Neb.**—Incorporated in Nebraska, presumably in the interests of the McKinley Syndicate and as a successor to the Nebraska Traction & Power Company, to build an electric railway between Lincoln and Omaha and operate other public utilities. Capital stock, $750,000. Incorporators: W. L. Loomis, E. W. Braford, R. E. Borkenhagen, S. J. Howell and Justin Refrigier, all of Omaha.

Cumberland Valley Railroad, Nashville, Tenn.—Application for a charter has been made in Tennessee by this company to build an 80-mile electric railway to connect Nashville, Gladesville, Liberty, Sparta and McMinnville. Capital stock, $10,000, with the privilege of increasing it to $1,000,000 or more. Incorporators: J. H. Cartwright, Homer Hancock, W. G. Beard and J. W. Jenkins. [E. R. J., July 19, '13.]

***Dallas Southwestern Traction Company, Dallas, Tex.**—Incorporated in Texas to build a 90-mile electric railway from Dallas to Glen Rose, via Cleburne, with a branch from Eagle Ford to Irvin. Capital stock, $500,000. Incorporators: E. P. Turner, Cullen F. Thomas, W. Poindexter, B. N. Cain, John T. Witt and E. L. Sargent.

***Kelso & Eastern Railroad, Kelso, Wash.**—Incorporated in Washington to build an electric or steam railway from Kelso eastward toward Mayfield. Capital stock, $500,000. Incorporators: John L. Harris, J. M. Ayres, G. L. Buland, F. L. Stewart and F. M. Broadbent.

FRANCHISES

Fresno, Cal.—The Fresno Traction Company has received a franchise from the Supervisors for a line from the city limits of Fresno to the San Joaquin River, near Riverside Country Club.

Chicago, Ill.—The Chicago & Northern Interurban Railway has received a perpetual franchise over certain streets in Chicago. This line will connect Chicago, Palatine, Crystal Lake, Richmond and Lake Geneva. [E. R. J., Jul. 19, '13.]

Bettendorf, Ia.—The Tri-City Railway, Davenport, has received a twenty-five-year franchise from the Council in Bettendorf.

Des Moines, Ia.—The Chesterfield Improvement League, Des Moines, will ask the City Council that a provision for the extension of the Scott Street line be made in the new city railway franchise.

Boston, Mass.—The Boston Elevated Railway has received a franchise from the Council to double-track its line on L Street from East Fourth Street to East First Street in Boston.

Fitchburg, Mass.—The Fitchburg & Leominster Street Railway has received a franchise for an extension of its line in Water Street, Fitchburg.

Anoka, Minn.—The Minneapolis & Northern Suburban Railway has asked for a franchise over certain streets in Anoka.

Liverpool, N. Y.—The New York State Railways has received permission from the Public Service Commission to double-track and extend some of its lines in Liverpool.

Niagara Falls, N. Y.—The International Railway, Buffalo, has received a franchise along Willow Avenue to its proposed new carhouse in Niagara Falls.

Fort William, Ont.—The property owners at Fort William, Ont., have decided to petition the Council for an extension of the municipal electric railway on Victoria Avenue. A connection would be made with the present line, thus practically forming a belt line.

Portland, Ore.—The Portland Railway, Light & Power Company has asked for a franchise to build a double-track crosstown line on the East Side in Portland. A branch of the Woodlawn line is also asked to extend from East Thirteenth Street to East Twenty-fourth Street.

Philadelphia, Pa.—The Philadelphia Rapid Transit Company has received a franchise from the Council to extend several of its lines in Philadelphia.

Anderson, S. C.—The franchise has been accepted for the proposed electric railway extension from Greenville and North Main Streets in Anderson to the property of the North Anderson Development Company, by M. M. Mattison, J. H. Anderson, J. D. Brown, John W. Linley and G. N. C. Boleman. It will be over 1 mile long and will be constructed and operated by the Greenville Traction Company. [E. R. J., July 12, '13.]

Dayton, Tenn.—J. W. Adams, Chattanooga, and associates have received a franchise from the Council in Dayton. This is part of a plan to build an electric railway between Chattanooga, Dayton and Knoxville. (E. R. J., Jun. 14, '13.)

Knoxville, Tenn.—The Maryville-Knoxville Interurban Railway has received a thirty-year franchise from the Knox County Court for its electric line between Maryville and Knoxville. John H. Frantz is interested. (E. R. J., July 12, '13.)

Dallas, Tex.—The Southern Traction Company has received a twenty-five-year franchise from the Council to bring the Waco-Corsicana interurban lines into Dallas.

***South Tacoma, Wash.**—A. R. Exley, president of the Albion Land Company, has asked the Council for a franchise for an elevated railway to extend from the southernmost limits of South Tacoma to Point Defiance Park.

Seattle, Wash.—The Puget Sound Traction, Light & Power Company recently withdrew its application for a franchise on Avalon Way. The proposition was favored by the City Council but was vetoed by Mayor Cotteril, who insisted on a common user clause in the franchise. The line will continue operating through Youngstown.

TRACK AND ROADWAY

Alabama Traction Company, Montgomery, Ala.—This company will proceed with the construction of its line in Montgomery, as the result of a court ruling, it is stated. The company was organized with $1,000,000 capital stock three years ago and received a franchise from the city. It has already begun work along Lee Street.

***Vancouver, B. C.**—Edward Bath and associates are considering plans to build an electric railway from Bella Coola, B. C., to Red Deer, Alta. Application for a charter will be made at the next session of the Dominion parliament.

Northern Electric Railway, Chico, Cal.—Obstacles to the construction of this company's line between Vacaville and Fairfield in the right-of-way difficulties have been settled by compromise and grading will be begun at once.

Fresno (Cal.) Traction Company.—The citizens of Calwa have asked this company for an extension of its J Street line through the main street in Calwa, a distance of about 2½ miles.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—Surveys have been completed by this company for an extension from its present main line at Danville to Livermore and thence to San José.

Crescent City Railway, Riverside, Cal.—This company will build an extension from the present terminus on Cedar Avenue to the Southern Pacific Company's tracks at Bloomington station.

Pacific Gas & Electric Company, San Francisco, Cal.—This company will build an extension to the Hammond Mill, provided the city improves Date Street.

Southern Pacific Company, San Francisco, Cal.—It is reported that this company plans to extend its Porterville & Northeastern branch, which now has its terminus at Springville, on to Lindsay.

Tidewater & Southern Railroad, Stockton, Cal.—This company announces that the poles have been placed between Stockton and Modesto and that wire stringing will be started at once. It is the expectation of the company

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that the line will be electrified within a few months and the old steam equipment disposed of. Work has been started on the bridge across the Mormon channel at Pilgrim Street.

Sacramento Valley West Side Electric Railway, Willows, Cal.—This company has applied for an extension of the Commission's previous order authorizing an issue of stock from Aug. 1, 1913 to Aug. 1, 1914.

Albany (Ga.) Transit Company.—Work will be begun at once by this company on its extension to the Wetherbee addition in the southwestern part of Albany.

Georgia Railway & Power Company, Atlanta, Ga.—Work will soon be begun by this company relaying its rails on Ivy Street in Atlanta.

Valdosta (Ga.) Street Railway.—During the next few weeks this company will award contracts to build 4 or 5 miles of new track in Valdosta.

Chicago (Ill.) Railways.—Work will be begun at once by this company on the extension of its Armitage Avenue line in Chicago.

Springfield (Ill.) Consolidated Railway.—Plans are being considered by this company to use the tracks from the city limits west from Washington Street, which were owned by the Springfield, Clear Lake & Rochester Interurban Railway, which ceased operating.

Interstate Interurban Railway, Arkansas City, Kan.—Surveys have been completed and construction will soon be begun by this company on its 50-mile line between Arkansas City, Kan., Ponca City, Okla., via Blackwell, Tonkawa, Chilocco and Billings. S. K. Titus, Arkansas City, chief engineer. [E. R. J., Oct. 19, '12.]

Hutchinson & Northern Railway, Hutchinson, Kan.—Work will be begun by this company within the next two months on its 14-mile line between Hutchinson and Burton. W. S. Thompson, Hutchinson, is interested. [E. R. J., June 28, '13.]

Joplin & Pittsburg Railway, Pittsburg, Kan.—This company is asked to consider plans to build an extension from Columbus to Hattonville, Miami and Baxter Springs.

Topeka (Kan.) Railway.—Work will be begun at once by this company on the extension of the West Eighth Street line in Topeka.

***Jenkins, Ky.**—The Consolidated Coal Company is considering plans to build an 8-mile electric railway from McRoberts to Dunham, Jenkins and Burdine. Power will be furnished from the central power plant of the Consolidated Coal Company, located at Jenkins, Ky.

Louisville (Ky.) Railway.—This company is laying steel ties, carrying on experimental work which it began some time ago. The first ties were put down over a year ago in the construction of its Bardstown Road extension, and recently it laid down steel ties on Oak Street and Fourth Avenue.

Shreveport (La.) Traction Company.—It is reported that this company will extend its Fairfield line in Shreveport from the present terminus to the center of the South Highlands tract, a distance of 1 mile.

Michigan United Traction Company, Lansing, Mich.—Plans are being considered by this company to build three extensions of its lines in Battle Creek.

Marquette City & Presque Isle Railway, Marquette, Mich.—This company has awarded a contract to George D. Sherman to lay the concrete foundations for the line on Front Street in Marquette.

Hattiesburg (Miss.) Traction Company.—This company has completed the extension of its Mobile Street line to Boule Street in Hattiesburg.

***St. Louis Belt, Illinois & Eastern Traction Company, St. Louis, Mo.**—This company is being organized and will be a consolidation of the St. Louis County Belt Railroad with the Wood River, East Alton & Bunker Hill Traction Company. It is planned to build a bridge over the Mississippi River just below the mouth of the Missouri River. An eastern extension of this line will be made to Mattoon, Ill. It will parallel the Big Four Railroad and connect with lines extending into Indiana. James G. Houseman, Roe Building, St. Louis, is the promoter of this line.

Atlantic Coast Electric Railway, Asbury Park, N. J.—This company has just completed 2016 ft. of double track through the camp ground at Sea Girt.

Brooklyn (N. Y.) Rapid Transit Company.—The New York Municipal Railway Corporation, which is controlled by the Brooklyn Rapid Transit Company, has purchased from the Alco Building Company a strip of land in Mapleton Park for the purpose of extending the Sea Beach tracks from Nineteenth Avenue to Twenty-second Avenue (Bay Parkway) and to Sixty-fourth Street, in Brooklyn. The property was purchased for the purpose of four-tracking the Sea Beach line to Coney Island.

Hornell (N. Y.) Traction Company.—Work will be begun at once by this company on its line between the Shawmut depot through North Hornell to the Canisteo River.

Frontier Electric Railway, Niagara Falls, N. Y.—This company, which plans to build an electric railway over private right-of-way from Niagara Falls to Buffalo, has secured franchises in the cities of Niagara Falls, Tonawanda and North Tonawanda and it expects to secure the entire right-of-way within the next sixty days and will begin construction of the line the early part of 1914. James S. Simmons, vice-president. [E. R. J., June 28, '13.]

New York & North Shore Traction Company, Roslyn, N. Y.—It is reported that this company is considering plans to build a line between the railroad station and Great Neck village.

***Dayton, Ohio.**—Plans are being considered by the Dayton Chamber of Commerce to build an electric railway between Covington and St. Mary's, to connect with the Dayton, Covington & Piqua Traction Company at Covington. The Miami Valley Development Commission is making a survey between Dayton and Washington C. H., with a view to the future construction of an electric line and it also plans to build another line between Dayton and Cincinnati, via Loveland.

Berlin & Waterloo Street Railway, Berlin, Ont.—During the next six weeks this company will award contracts to build 3,600 ft. of double track and 2,400 ft. of single track in Berlin.

Windsor, Essex & Lake Shore Rapid Railway, Kingsville, Ont.—During the next few months this company plans to do some paving in Windsor and in Essex.

Imperial Traction Company, Ottawa, Ont.—This company has been authorized by the railroad committee of the House of Commons to proceed with the construction of its line from Smithville to Bridgeburg and from Hamilton to Toronto. Work will be begun at Smithville. L. B. Howland, Toronto, is interested. [E. R. J., May 17, '13.]

Pacific Power & Light Company, Astoria, Ore.—This company announces that it will extend its line to the eastern limits of Astoria and to the Hammond Lumber Company's mill, provided the city will improve Date Street for a distance of 3,000 ft.

***Milwaukee, Ore.**—The East Milwaukee Improvement Association is considering plans to have an electric railway built through East Milwaukee, Harmony, Ardenwald, Clackamas and Reed College territory. C. B. Hanson, president, and N. B. Harvey, secretary.

Bloomsburg, Millville & Northern Railway, Bloomsburg, Pa.—This company advises that during the next two months it will not award any contracts for the construction of new track, but after that it will award contracts to build 10 miles of new track. The company plans to purchase some attractions for its park.

Johnstown (Pa.) Traction Company.—This company plans to spend more than $20,000 in double-tracking part of the Windber branch at Kring's Station in Johnstown and the elimination of a number of curves there. It is stated that other improvements will be made during the year. The rails at all curves are to be replaced and practically the whole line will be made new.

Chambersburg, Greencastle & Waynesboro Street Railway, Waynesboro, Pa.—This company plans to build 5,000 ft. of paving in Waynesboro this fall.

Wilkes-Barre and Wyoming Valley Traction Company, Wilkes-Barre, Pa.—Work has been begun by this company on the construction of its new viaduct near Duryea.

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San Antonio & Austin Interurban Railway, Austin, Tex.—Surveys have been completed by this company for its 27-mile line between San Antonio and Austin, via San Marcos, Kyle, Buda, Manchaca, Hunter, New Braunfels and other towns. The work of securing the right-of-way and the necessary franchise is now in progress. Vories P. Brown, San Antonio, president. [E. R. J., May 24, '13.]

***Dallas Northwestern Traction Company, Dallas, Tex.**—This company is being formed and will soon apply for a charter to build an electric railway from Dallas to Krum, via Denton, a distance of 46 miles. Among those interested are: E. P. Turner, B. B. Cain, John T. Witt and E. L. Sargent.

Lynchburg Traction & Light Company, Lynchburg, Va.—This company plans to build 6 miles of new track this year. Orders for the material have been placed.

SHOPS AND BUILDINGS

Georgia Railway & Electric Railway, Atlanta, Ga.—This company plans to construct a new building at Gilmer Street and Phoenix Street in Atlanta. The structure will be one-story and of brick and wood construction. The cost is estimated to be about $4,500.

Quincy (Ill.) Railway.—This company has awarded a contract to build a new carhouse in Quincy. The structure will be 60 ft. x 120 ft. of galvanized corrugated or frame construction.

Oskaloosa Traction & Light Company, Oskaloosa, Ia.—During the next few weeks this company will award contracts to build a new carhouse in Oskaloosa. The structure will be 60 ft. x 120 ft.

Public Service Railway, Newark, N. J.—This company has awarded two contracts to Thomas J. Reynolds & Sons, Newark. One contract is for the mason work on the new office and operating building at River and Canal Streets and the other is for the rebuilding of a brick stable in Commercial Street, Newark.

Bloomsburg, Millville & Northern Railway, Bloomsburg, Pa.—During the next few months this company plans to build a new carhouse in Bloomsburg.

POWER HOUSES AND SUBSTATIONS

Oskaloosa Traction & Light Company, Oskaloosa, Ia.—During the next few weeks this company expects to purchase one 300-hp boiler for its plant in Oskaloosa.

Kentucky Southwestern Electric Railway, Light & Power Company, Puducah, Ky.—Plans have been prepared by this company for the construction of a central power plant in Paducah.

Elmira Water, Light & Railway Company, Elmira, N. Y.—This company is now building a new steam power plant with a capacity of 30,000-kw in Elmira.

Niagara Gorge Railroad, Niagara Falls, N. Y.—This company has purchased an additional 500-kw rotary converter for its substation at Lewiston.

Interurban Railway & Terminal Company, Cincinnati, Ohio.—This company's temporary power plant at Rossmoyne was destroyed by fire on July 17.

Northwestern Pennsylvania Railway, Meadville, Pa.—This company has contracted for two new substations, one to be located at Edinboro and the other at Richley's Grove, Pa. Equipment for these substations, one 500-kw rotary converter in each, has been purchased from the Westinghouse Electric & Manufacturing Company.

Chambersburg, Greencastle & Waynesboro Street Railway, Waynesboro, Pa.—This company has awarded a contract to the Electric Storage Battery Company, Philadelphia, to renew the storage battery of its plant.

Austin (Tex.) Street Railway.—This company is in the market for one additional unit for its power plant, and will ask for bids for one 800-hp and also 1,000-hp compound-condensing engine and direct-connected 500 to 550-volt generator.

Southern Traction Company, Dallas, Tex.—This company has decided to build its new substation in Corsicana where the railway crosses the road at Trinity and Brazos Valley road north of Corsicana. The equipment will be furnished by the General Electric Company.

Manufactures and Supplies

ROLLING STOCK

Winona Interurban Railway, Warsaw, Ind., expects to purchase two box cars and two flat cars.

Windsor, Essex & Lake Shore Rapid Railway, Kingsville, Ont., is in the market for one passenger car.

Bloomsburg, Milleville & Northern Railway, Bloomsburg, Va., is in the market for two passenger cars.

Chicago (Ill.) City Railway has decided to buy a number of additional cars this year. Not less than fifty will be bought. No decision as to the details has been made.

Northwestern Pennsylvania Railway, Meadville, Pa., has placed an order with the Niles Car & Manufacturing Company for two 51-ft. combination cars and two 51-ft. passenger cars, each to be equipped with four Westinghouse 306 motors.

New York, New Haven & Hartford Railroad, New Haven, Conn., is asking for bids on about 175 cars. The pending orders are scheduled to include 100 steel passenger cars, 10 steel smoking cars, 10 steel combination baggage and smoking cars, and 10 steel baggage and mail cars.

Chicago (Ill.) Railways, noted in the ELECTRIC RAILWAY JOURNAL of July 19, 1913, as having ordered fifty cars from the American Car Company, has specified that these are to be 32-ft. 5-in. pay-as-you-enter closed cars, mounted on Brill 39-E trucks. In addition to this the company will build 100 cars of the same type in its own shops.

British Columbia Electric Railway, Vancouver, B. C., is building three interurban cars and three combination mail cars in its own shops at New Westminster. The company has also placed an order with the Seattle Car Company for fifty freight cars and fifty freight box cars.

Toledo Railways & Light Company, Toledo, Ohio, noted in the ELECTRIC RAILWAY JOURNAL of June 21, 1913, as having ordered thirty double-truck, single-end prepayment cars from the McGuire-Cummings Manufacturing Company, has specified the following details for these cars:

Type .....semi-conv.	Roof ..... arch
Length over bumpers, 44 ft. 10 in.	Headlining ..... agasote
	Bumpers .....angle iron
Length over corner posts, 33 ft. 3 in.	Curtain fixtures, Cur. Sup. Co.
Length front platform, 4 ft. 6 in.	Destination signs...Keystone
	Hand brakes.....Peacock
Length rear platform, 6 ft. 6 in.	Air brakes.....G. E.
	Trucks ..... Standard
Width of window rail, 8 ft. 3½ in.	Motors .....West. 310 C
	Controllers K-36-J

TRADE NOTES

General Electric Company, Schenectady, N. Y., has opened a branch office at Madison, Wis.

J. G. Brill Company, Philadelphia, has received an order from the Charleston Consolidated Railway & Lighting Company, Charleston, S. C., for twelve 27-G-1 trucks.

St. Louis Surfacer & Paint Company, St. Louis, Mo., had its entire plant destroyed by fire of mysterious origin on July 22. The company has placed the estimated loss at $80,000.

Barney & Smith Car Company, Dayton, Ohio, which went into the hands of receivers last month, has been authorized by the courts to spend $175,000 for plant improvements.

Bryant Electric Company and the Perkins Electric Switch Manufacturing Company, Bridgeport, Conn., announce the opening of a New York sales office, located at 51 East Forty-second Street.

Western Steel Car & Foundry Company, Chicago, Ill., is preparing plans for the enlargement of its plant at Hegewich, Ill., and will erect a new shop building 120 x 360 ft. at a cost of about $60,000.

Osgood-Bradley Car Company, Worcester, Mass., expects to erect three eight-story buildings for store and manufacturing purposes, on the site of the old plant, which will cost between $800,000 and $900,000.

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National Railway Equipment Company, Toledo, Ohio, has been incorporated with a capitalization of $10,000 by Charles Weirich, Frank W. Coughling and others, to manufacture locomotive parts and railway equipment.

Car Works Company, Peoria, Ill., has been incorporated with capital stock of $50,000 to manufacture and deal in street railway cars. The incorporators are George L. Fickenson, H. V. Finkelstein and Frank T. Miller.

Haskell & Barker Car Company, Michigan City, Mich., suffered considerable loss from the disastrous fire which occurred on July 12, 1913, at that place. The approximate amount of damage is between $700,000 and $800,000.

C & C Electric & Manufacturing Company, Garwood, N. J., has issued Bulletin No. 513J which illustrates and describes its electric arc welding apparatus, and also contains several views of welds that have been made by this process.

General Railway Signal Company, Rochester, N. Y., has appointed Prof. V. I. Smart general manager of its Canadian company. Professor Smart was formerly connected with the department of railway engineering at McGill University.

Robert W. Hunt & Company, Chicago, Ill., have been appointed to inspect all the structural steel work in the new thirty-eight-story Equitable Life Insurance Building, New York, N. Y., which contains approximately 36,000 tons of structural steel.

National Carbon Company, Cleveland, Ohio, has taken over the entire output of the Helios Manufacturing Company of Philadelphia, makers of the "Helios" Storage battery, which has been used for ignition, signaling, balancing. station reserve, and interlocking service.

National Lock Washer Company, Newark, N. J., has appointed Frank B. Archibald eastern manager of the company. Mr. Archibald, who was formerly connected with the sales department of the company, will retain his present offices at 50 Church Street, New York, N. Y.

National Tube Company, Pittsburgh, Pa., has issued a very attractive catalog describing and illustrating in two colors all of its products. The catalog also contains reprints of several letters received from users of "Kewanee" products, telling of the good results received from their use.

J. S. Morrison, Pittsburgh, Pa., has been appointed district sales manager, with offices in the Oliver Building, by the following concerns: Taylor-Wharton Iron & Steel Company, Wm. Wharton, Jr., & Company, Tioga Steel & Iron Company, and the Philadelphia Roll & Machine Company.

Independent Pneumatic Tool Company, Chicago, Ill., has moved its motorcycle department to Chicago, from Aurora, Ill., in order to allow more space for the manufacture of Thor air and electric tools. This change will increase the output of the plant to 1500 air tools and 500 electric tools per month.

American Automatic Switch Company, New York, N. Y., states that as the result of a recent decision of the United States Patent Office, it has the undisputable right to manufacure and sell the automatic electric track switch known as Type 15. In this switch the contactor has a swinging movement with an electrical selection which operates the switch in one direction or the other according as the car passing under it has its current on or off.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has sold to Kuhn, Loeb & Company, New York, N. Y., $3,250,000 six per cent, two-year notes due August, 1915, to provide for the retirement of the $4,000,000 of 6 per cent three-year notes due August, 1913. The remaining $750,000 will be paid out of the treasury of the company. A cash payment of $10 for each $1,000 note will be paid to the holders of the old notes who exchange them for new notes.

Philadelphia Commercial Museum, Philadelphia, Pa., announces that it decided to comply with the invitation of the British committee of the Anglo-American Exposition, which will be held in London in 1914, from May to October, to undertake the organization of the American industrial section of that exposition. The object of the exposition is to celebrate in a fitting manner the one hundred years of peace and progress between English-speaking peoples since the Treaty of Ghent in 1814. The exposition offers an opportunity to reach the buyers of Great Britain and her colonies, as well as those of many other countries.

Union Switch & Signal Company, Swissvale, Pa., has received a contract for installing 26.4 miles of automatic block signaling with continuous alternating current track circuits on the New York State Railways from Utica Park to Frankford Junction and from the Herkimer "Y" to Little Falls, these being sections of double track which handle a very heavy traffic, especially in connection with amusement parks. In the first named section the average length of block is 5900 ft. and in the second section 14,500 ft. There will be eighteen blocks, eighteen three-position style T-2 semaphore signals and twelve semaphore type switch indicators. The contract also includes the electric lighting of the switch stand lamps in the signal territory.

General Electric Company, Schenectady, N. Y., is about to announce further advances in the direction of higher efficiency of the incandescent lamp. The new lamps contain especially shaped tungsten filaments and are filled with inert gas, such as nitrogen, at the pressure of about an atmosphere. The types which it is expected to first develop are adapted to comparatively high current consumption, 6 amp. and above, and operate at an efficiency of half a watt per candlepower. This is fully twice as high an efficiency as the most efficient incandescent lamps heretofore available. The company says that the new lamps promise to be of particular value in a field not heretofore covered by incandescent lamps, and should greatly broaden the applications in which they can be used advantageously, particularly in the direction of very large candlepower units.

ADVERTISING LITERATURE

Brookfield Glass Company, New York, N. Y., has issued a folder illustrating and describing forty-three designs of glass insulators.

Walter A. Zelnicker Supply Company, St. Louis, Mo., has issued Bulletin No. 141 describing and giving prices of a number of extra heavy, high pressure tanks.

Jovian Order, St. Louis, Mo., has issued a small booklet entitled "The Reason," which contains a brief review of the purpose and progress of the Jovian Order together with its constitution and by-laws.

Railway Improvement Company, New York, N. Y., has issued Bulletin No. 2, of its series of four bulletins, which deals with its coasting time recorders for subway and elevated cars. The bulletin contains several letters from railways operating these types of cars, which show the large saving in power to the railways since their installation.

Goldschmidt Thermit Company, New York, N. Y., has issued "Reactions" for the second quarter of 1913. The issue contains several very interesting articles, among them being the following: "Electrolysis and Reinforced Concrete," "New Pipe Facing Machine," "Carbon-Free Cobalt Now Produced by the Thermit Processs" and "Important Repair for Mining Company."

Electric Service Supplies Company, Philadelphia, Pa., has issued the *Keystone Traveler* for July, 1913, containing much interesting information regarding its products. The chapter on prepayment cars contains interesting statistics compiled by the Detroit (Mich.) United Railway, showing the decrease in accidents due to its installation of prepayment cars. A very interesting letter is also reprinted in connection with the chapter on automotoneers, which states that one of these devices played a very important part in a damage claim proceedings and resulted in the plaintiff's $25,000 suit being decided in favor of the operating company.

Edward B. Smith & Company, Philadelphia, Pa., have issued a booklet giving a brief history of the J. G. Brill Company, illustrated with many photographs of early horse, cable and electric cars. The history also contains a concise description of the investment position of the preferred stock of the company, which is said to be the largest manufacturer of electrically propelled cars and trucks in the world. The company has no bonded debt, and for the year ended Dec. 31, 1912, had $1,054,851 available for dividends. Beginning with the sum of $1,300 its assets have now reached a reported total of $12,353,478. Its annual output is valued at nearly $8,000,000.

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IS TRAILER OPERATION PROFITABLE?

Trailer operation has been adopted for rush-hour service by a dozen electric railways to-day. Almost invariably it has met with approval from the officials who have had to do with conducting it. We ourselves are much inclined to the belief that it is a money-maker. Yet is there anything tangible, anything more than a lot of indefinite opinions, to show that it does not cost more than it saves? The Newark two-car train tests showed at least that double units lost some time—first, because of the greater number of boarding passengers; second, because of the consequent number of stops; third, because of the delays due to unequal loading and the transmission of bell signals, and, fourth, because of the time spent in coupling up the train. As a slower schedule increases practically every operating charge in direct proportion, this result of trailer operation involves the possibility of a very serious offset to its advantages. There may be a necessity in some cases for trailers merely to relieve street congestion regardless of cost of operation, but certainly it is hardly safe to adopt the plan without knowledge of the price which must be paid in slower speed for the increased service.

INFORMATION FOR PASSENGERS ABOUT DELAYS

The recent statement that the Lehigh Valley Railroad is preparing to give information to passengers concerning the cause and probable length of delays to trains upon which they are riding brings forward again the possibilities of such a procedure upon electric railways. On city lines especially the information could be singularly valuable to passengers, and the method of transmission by passing the word from car to car along the line of stalled equipment would apparently be extremely easy to carry out. It is a matter well worthy of consideration for every operating official, for nothing is more readily seized upon by disgruntled passengers as a cause for complaint against the management than a long wait without any knowledge of the probable duration of the delay. It is, of course, difficult always for anyone to determine exactly the length of the stop, and some captious passengers might object if the period was greatly exceeded. But if proper care was taken to explain that the time stated was purely estimated and approximate, it would be much more satisfactory to most of the waiting passengers than the usual curt "Don't know" from the conductor.

LOOP IMPROVEMENTS IN CHICAGO

The traffic reforms on the elevated lines of Chicago promised by the ordinance which has just been passed by the City Council will be of marked benefit to the public. The companies will find that operation of the union loop will be made simpler by the partial through-routing of trains which will be introduced as soon as possible after the necessary physical changes have been completed. This is one of the main advantages that will compensate the companies in part for the possible effect on revenue from the increased length of haul obtainable for one fare under the provisions of the ordinance. Another advantage is the lengthening of loop platforms. The companies have wanted to make this improvment for many years in order to operate longer trains and to have more satisfactory platform capacity to meet the traffic needs properly at the loop stations. The stations on each side of the loop provide for the trains of two operating companies, and it is desirable to make it possible for two long trains on one track to stop at adjoining platforms and have ample room to receive and discharge passengers. Undoubtedly the companies have calculated that the great bulk of the traffic, composed of the daily movement between homes and work, will not be affected materially by the opportunity of a longer ride for a single fare, but will continue with substantially the same length of haul. There will be a heavier through-route business on Sundays and holidays and of course an increase in such traffic during the non-rush hours on weekdays. The revenue per mile on this traffic will probably be low, but some of it will be received when the full capacity of the equipment is not in use for regular traffic, and thus may render this investment more productive.

THE RESPONSIBILITY OF DIRECTORS

The legal principle that the director of a corporation may be held liable for damages resulting from the neglect of his duties was definitely established in a recent decision of the New York Supreme Court, Appellate Division, in the case of Childs vs. White. The plaintiff had been induced to buy stock in a corporation which a few months later went into bankruptcy. Action was brought against one of the directors on the ground that he, knowing

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the company to be insolvent at its inception, became a director to facilitate the sale of the company's preferred stock by giving the company the benefit of his name and financial reputation, and also on the ground that he either knew the sale of stock to be accompanied by false circulars, reports and other deceitful methods or that his duty as director demanded that he keep himself informed as to the possible existence of such practices, in order to prevent the defrauding of stockholders. The court declares that directors owe a certain amount of duty not only to existing stockholders but also to those from whom the corporation may solicit subscriptions, and that unless diligence and care are used they are liable for negligence. The decision is entirely fair. When one invests in a corporation and thus divests himself of the immediate control of his property, he has the right to expect that the directors chosen to take his place in the management and control of this property will exercise ordinary care and prudence. Moreover, when one voluntarily takes a position as director in order that his name may be used to increase the prestige of the company, good faith and exact justice demand that he exercise the powers attributable to him and prudently conserve the interests of all stockholders, especially those whom his name may induce to come into the company. This decision more than intimates to directors that henceforth, strange as it may seem, they must actually direct, and we cannot but feel that the system of accommodation directorships and of dummy directorships has received a shock. It is not improbable that numerous stock and bond holders will look on this decision with glad eyes and that certain types of directors may now take steps to find out a few facts concerning things for which they might be held responsible under the law by minority stockholders.

COMPLAINTS AND SERVICE IMPROVEMENT

In another column of this issue is given a résumé of the experience of the Rochester lines of the New York State Railways in the effort to eliminate the numerous causes of friction between the railway and the public. These causes are in general of a trivial character and are based on misunderstandings. The Rochester management has founded its program on the fundamental assumption that, in general, the public intends to be fair. Unless this condition exists there is no possibility of co-operation. The railway company has wisely encouraged the formulation of all complaints because if the complaints are unfounded they become ridiculous when given formal utterance, while if just they give a basis for remedial measures by the company. Satisfactory public service demands on the part of public service employees, high and low, the right attitude of the servant toward the master. This attitude is difficult to define, as it is one of deference but not of cringing servility. It is one that can be maintained with self-respect and dignity by the independent American citizen. It is difficult at times to maintain in the face of unreasonable and irritating conduct on the part of passengers. Proper self-discipline and company discipline will, however, do much to assist in fostering a proper spirit. Such discipline requires first-hand knowledge of the attitude of the public toward the railway and its employees. As an important result of discipline there should be no argument between passengers and car crews regarding difference of opinion on transportation matters. The employees have certain rules which they must enforce. Assuming that the rules are understood by both sides, there is little danger of disagreement. In case there is disagreement, however, which cannot be removed by the conductor's polite explanation, the matter must be taken up by the department of diplomacy and the cause of irritation removed before it produces infection. An honest complainant, accorded just and courteous treatment, becomes a friend and a "booster." This is the experience in Rochester and other cities where human nature is studied and conciliatory means are used in lubricating the human machinery involved in the supply of transportation.

MAINE PUBLIC UTILITY REFERENDUM

A striking test of what is really the consensus of public opinion in regard to regulation of utility companies by public service commissions is soon to be made in Maine. The Legislature of that State recently placed on the statute books a law providing for a commission of three members to have general supervision over all public utility corporations. No sooner had the Legislature adjourned, however, than opposition to the act began to develop, one of the principal grievances being that the opponents of the measure looked with disfavor upon the Governor's appointment of three lawyers to the board instead of at least one engineer. The wheels of the referendum machinery were accordingly set in motion, and now the question is to be submitted to the people in a general election within six months from the date of the proclamation suspending the law. This move is rather surprising, as far as theory goes, when one considers the basic principles underlying both public utility legislation and the referendum. The public service commission system has been adopted in most of the states, but such action has always been due to legislative effort, put forth, we have supposed, as a result of general and widespread popular insistence. That a law so manifestly in favor of the people should have to be practically resubmitted to public approval might be considered a travesty upon the theory of public utility acts and the working out of the referendum. In actual practice, however, such a procedure may have its advantages. The almost wholesale passage of public utility laws in the last few years in many states, inculcating in the hearts of remaining legislatures a desire to fall in line, has undoubtedly resulted in some cases in a lack of proper consideration of local conditions and administrative details. There are fashions in legislation, just as there are in dress, and during the last few years public service regulation has been strictly the mode. We believe in a wise policy of public utility regulation, but no one should forget that regulation has great powers for evil as well as for good. It is like a powerful explosive which in proper hands can be of great benefit to all, but if improperly or carelessly handled is apt to cause a great deal of injury. The powers intrusted to commissions are vast and far-reaching, and unless they are intelligently as well as conscientiously administered they are apt to make the resulting conditions worse than those which preceded the appointment of the commissions.

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MUNICIPAL RESPONSIBILTY FOR LOSS OF BUSINESS DUE TO STRIKES

Elsewhere in this issue we publish at length a digest of the arguments presented by Wells Fargo & Company before the United States District Court at Newark to secure a judgment against Jersey City for strike damages in accordance with a jury award previously granted. The decision of the jury was treated editorially in our issue of May 17, 1913, but only now have we been able to obtain a complete summary of the issues involved in the case. Of the two fundamental points concerned, municipal responsibility for actual physical damages and municipal responsibility for an intangible loss of business, the first was easily determinable and gave little opportunity for extended conflict. This is a statutory obligation in New Jersey, but the cases quoted from other states indicate that such statutes are general and quite similar in wording to that in New Jersey and that the courts generally are ready to enforce them. Moreover, as they are "remedial" in character and intended to discourage mob violence, the courts are disposed to construe them liberally in favor of the plaintiff and have so expressed themselves on a number of occasions.

The second aspect of the case, however, the liability of the municipality for damages due to loss of business, was fiercely contested. Basing its argument upon the right of state or municipality to tax under the unit theory intangible property within its bounds, by an exhaustive citation of pertinent cases the company demonstrated that its intangible property or "business" actually had its situs in Jersey City and merited protection. Consequently a deprivation of the use of the tangible property was also a deprivation of the use of the intangible property with which it was inextricably mingled, and the measure of the damage to the business because of the deprivation was the use value of the property or the revenue which would have been received from the use of the property in the company's business.

The points made by the express company were well fortified by Supreme Court decisions, and unless on appeal the reasoning should be denied and the jury award set aside, electric railways and others who suffer strike losses have cause for much encouragement. Prior cases have arisen where awards have been made against municipalities for lack of adequate protection in case of strikes, but the Jersey City case is noteworthy because of the direct recognition given to the intangible loss of business resulting therefrom. This, of course, is the most important question in a street railway case of this nature. Often, no doubt, city administrations have failed to take decisive steps to suppress violence simply because of political reasons, or because of a belief that even if the threat of the damaged company to sue were carried out, awards could be obtained at the most only for the small damages to the tangible property. Now, however, a much larger factor is brought into the case, and the quantity of possible damages may offer a better inspiration for action. It is true some companies have had a fear that they would become unpopular if they filed damage claims in cases of this kind. But we believe they would win more respect by standing up for their obvious legal rights, and the recent actions of the Buffalo and Jamestown companies show that they are beginning to protest in the courts against the pure indifference or deliberate partiality on the part of municipal authorities at the time of strikes. In such cases the position occupied by Wells Fargo & Company will serve as a good vantage point for the future.

EXECUTIVES WANTED AT CONVENTIONS

The letter addressed to executives by President Harries of the American Electric Railway Association urging them to attend the annual convention is both a cordial invitation and a timely admonition. In the pioneer days of the street railway industry most of the delegates at the national conventions were presidents, vice-presidents and managers, who were capable of discussing almost every phase of the business from franchises to fares. Eventually the development of electric traction and the merging of properties led to the formation of affiliated bodies of specialists in accounting, engineering, traffic, claim adjustment, etc., but it was made clear at the time of the reorganization that the parent body would reserve to itself the broader problems of proper return on investment and public policy. Each of the affiliated bodies is doing very important and necessary work, but the duty of a railway company—and even its self-interest—does not end when it sends its department heads to a convention. One reason for this is that no matter how valuable the work of such men may be in their individual fields, they have no authority to act as spokesmen for the owners of the properties on such topics as valuations, present tendencies of public utility laws and regulations, electric railway securities from the investor's standpoint and profit sharing with employees. Yet all of these subjects are to be discussed at the next convention, and all of them are of vital concern to the industry and to the financial interests which own the different properties.

It would be a very helpful sign if the Atlantic City convention of 1913 should show a larger aggregate attendance of the prominent men who are the actual owners of the properties and dictate their financial policy than has been present in previous years. At no time in the history of the industry has it been more important that those who have large financial interests at stake in this business should familiarize themselves with the problems with which those actually in charge of the operation of the company are struggling, and they can do this by attendance at the meetings much better than in any other way. By mingling personally with the men in charge of operation they will become acquainted with the needs of the field and will be able to view the state of public opinion from various angles as they could not do in any other way. Moreover, such personal contact as this is very desirable to establish the solidarity of large railways or other organizations.

But the class of men to whom we refer should have another and more important object in attending the convention than that simply of learning about their own properties and the status of the industry. Their advice and suggestions should be of great benefit to those who have in charge the actual conduct of the various enterprises. The great coming struggle of the electric railway industry is to conserve the enormous investments that are being seriously jeopardized by an unrestrained program of demagogic

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regulation which threatens the very being of every public utility in this country. It is one of the main purposes of the American Electric Railway Association properly to educate the public against the erroneous ideas current in regard to public service corporations, but it can attain this object more readily if it has the personal and active support and assistance of those who either for themselves or as trustees have large interests at stake and believe that they have the same right to usufruct upon their investment as if it had been placed in a manufacturing or agricultural business.

TURBO-GENERATOR FIRE HAZARDS

The production of new types of electrical apparatus is always of interest from the standpoint of fire protection because such equipment cannot in most cases be wholly divorced from the development of heat in considerable quantities under many conditions except at a disproportionate manufacturing cost. Turbo-generators illustrate this point, and the large amount of money frequently tied up in a single machine lends more than ordinary significance to a recent paper by G. S. Lawler on "The Fire Hazard in Turbo-Generators," read before the American Society of Mechanical Engineers.

The author points out that the chief causes of increased fire hazard in such machines as compared with the older types of electric generators are that the volume occupied by turbo sets is relatively small per unit of capacity; that the combustible insulation is more concentrated and much of it is exposed even to a slight arc or fire; that the end connections between slots form a large proportion, sometimes nearly one-half, of the total length of conductors, with the small number of poles required; that the capacity of many turbines is great, involving the development of an enormous amount of energy on short-circuit; that the methods of air cooling employed tend to fan fire occurring within the machine; that the interior is inaccessible to rapid work in case of fire, and that the gradual deterioration of insulation is likely to lead to short-circuit in time and resulting ignition of the oily or gummy insulation required in high-voltage units.

By way of making his criticisms constructive, Mr. Lawler emphasizes the value of power-limiting reactances in turbo-alternator circuits and suggests that all exposed coils be provided with a non-combustible outer covering, the stator end connections being especially vulnerable. This would, in his judgment, greatly delay the spread of fire, and even if no other protective means were taken would doubtless prevent serious damage. It is essential to filter the cooling air so as to free it from dirt and oily vapor and thus preserve the integrity of any such covering, but at present no suitable material for such coverings appears to be available. An excellent suggestion involving only nominal expense is that means could be provided for cutting off the air supply in case of fire in generators by placing dampers in inlet ducts designed to be normally held open by fusible links, and a further possibility is the piping of carbon dioxide gas into the machine in emergencies, with arrangement of valves for operation in connection with the inlet dampers.

It is certain that better protection of turbo-generators against internal fires can be secured, and the problem of finding a suitable fireproof outer covering for stator coils is probably no more difficult than the search for many other special materials which has been crowned with so much success in the research laboratories of the great manufacturing companies. The chief danger from short-circuits is not in the rotor, since asbestos is largely used in the insulation of these revolving field coils, nor in the slots of the stator, which are necessarily deep and natural barriers to the spread of hot gases. The ends of the coils in the stator are the problem for the designer to consider from this viewpoint, and the outlook is improved by reason of the fact that the issue is the insulation of stationary conductors. Whatever may be the material ultimately adopted for this purpose, the use of reactances to limit short-circuit current and thus prevent distortion of the coils and injury to their coverings is generally recognized as a necessity. The filtration of air is thoroughly practicable for turbine ventilation, and its successful use is only a matter of intelligent installation. With turbines individually costing a respectable fraction of a half million dollars in service, and more to come, there can be no question that anything which can be done to reduce the fire risk inherent in such machines warrants liberal expenditure by both manufacturers and purchasers.

THE ANALYSIS OF TEST RESULTS

To say that tests to determine the relative efficiency of two different types of apparatus should be made, if they are made at all, under conditions which are fair to both types is admittedly a truism. This may also be expressed by stating that in any series of comparative tests all variable factors in the final result must be determined beforehand and either equalized arbitrarily during the tests or else accounted for by estimate. Without this allowance the results are apt to be, and usually are, misleading.

Again, there seems to be a prevalent belief that a certain length of service will determine whether a new piece of apparatus will be satisfactory. Nothing could be further from the truth unless the test is made only to see whether the new device can be made to work. The mere fact that apparatus is capable of operation is no indication that it is of the slightest value. Nor is it a fact that two different types of apparatus or two different types of car have had their relative values determined in a service test because one showed better results in the opinion of the motorman or of the official who watched the operation.

This custom of making service tests at perhaps considerable expense and then permitting the conclusion to be based largely upon opinions unsupported by figures or else supported by figures obtained under conditions which were not strictly comparable is the curse of every engineering industry of the present time. Every technical library is, indeed, fairly loaded down with data, utterly misleading in character, which have been obtained by running off a series of tests on material whose operation depended to a large extent upon factors utterly neglected by or perhaps unknown to the investigators.

It is this sort of procedure which brings testing in general into disrepute. The question whether test results are

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going to be any good after they are obtained is a perfectly logical one for the managers to ask because in nine cases out of ten they are actually worthless. Naturally, with a well-grounded distrust of test data, the only other resource, when something new is proposed, is to do a lot of theorizing and, if the new device creates a favorable impression, to put it in service and forget about it. It may be grossly inefficient, but even this is hardly likely to make as much difference in the ratio of net to gross earnings of the property as an increase or decrease in business, so that the real result stands little chance of ever coming to light to embarrass the sponsor. Theorizing is an exceedingly interesting pastime, but when it is done by men who are in position to put such theories off-hand into practical use it contains distinct elements of danger for stockholders. This statement, however, is by no means intended as an argument for rule-of-thumb methods, for they are another and perhaps a still more vicious form of the same lack of desire for exact fact which induces theorizing.

The only way to solve any problem in engineering whose solution lends itself to the test method is to approach the problem with an entirely open mind, make the conditions, if two devices are to be tested, as nearly alike as possible, and then make proper allowance for those which cannot be eliminated from the equation during the progress of the test. Then the results obtained may be applied with comparative freedom to those particular surroundings, but the greatest caution should be used in any attempt toward their extrapolation.

UNSUCCESSFUL MUNICIPAL TRAMWAYS IN ENGLAND

A current issue of the London *Spectator* publishes data concerning the success—or non-success—of some of the British municipal tramways which, in view of the agitation for city-owned lines in Detroit, Toronto and other American cities, is of considerable interest. We have always maintained that the conditions in Great Britain were much more favorable to the success of municipal public utility enterprises than here, largely because politics there have not been allowed to enter so largely into the administration of municipal affairs. Hence the operating managers of the British municipal properties, taken as a whole, are a remarkably able set of men. But from the information contained in the *Spectator* it would seem that not even the British system has proved immune to the dangers to be encountered in undertakings of this character.

According to the Barking District Council, the Barking municipal tramways have been a persistent failure since their institution, there being a loss of £5,000 and £7,200 in the last two years. In Ilford the municipal lines are losing, on an average, £65 a week. And in regard to London, too, the figures are not encouraging. Considerable controversy exists, it is true, as to the actual financial results of the London County Council Tramways, but according to a report recently presented to the London County Council by the highways committee it appears that during the last financial year the surplus from operation was £202,000 less than the estimate, and that after deductions for fixed charges the only amount to be credited to renewals for the year was £497, whereas, in accordance with a resolution of the Council, provision should be made in the amount of £150,000.

In a mingling of apology and zeal the highways committee has ineffectively endeavored to explain this difference. It is due, it is said, to a necessity of contributing to the local tax rates and of being debited with a capital charge for the cost of street widening. According to the *Spectator,* however, the tramways only justly pay for the monopolization of a strip of the roadway, and the improvements committee of the Council is so controlled by the tramway spirit that little money is spent on improvements unless beneficial to the tramway service. At any rate, the charges for these two items amount to only £116,000, which obviously fails to counteract the £149,503 deficiency.

The *Spectator* considers this condition of affairs in London to be due largely to the competition of the motor omnibus lines, a form of transportation unforeseen when the idea of municipalizing tramways was spreading broadcast in England. With its advantages of light investment and adaptability of movement, the motor bus has offered an attractive field to private capital for furnishing additional facilities for local transportation when the city funds were tied up in municipal ownership undertakings, and a steady development of this new system has undoubtedly resulted in a decided drain on the coffers of the municipal lines.

This outcome gives strong emphasis to the statement that advocates of municipal ownership often pay too little attention to the hazards involved in the enterprise. In this case they saw that certain private companies were making large profits in tramways, and they thought they would obtain these sources of wealth for the ultimate benefit of the taxpayers. They forgot the risks that the original shareholders in tramways had to undergo, and they were blinded to the fact that new mechanical devices might impair the success of their venture. As a result, instead of the loss being on the shoulders of private parties who had voluntarily risked their funds as their investment, the loss is made compulsory upon every taxpayer, regardless of his means, position or interest in the service.

Now the chairman of the Barking District Council states that he would be glad to lease the tramways to some company, but none desires an enterprise that has proved to be a failure, which means presumably either an absolute sacrifice or maintenance at a loss, because with motor bus competition we presume an increase of fares is impracticable. These are vital points, and conditions in England certainly drive home the fact that cities contemplating the establishment of municipal railways here should realize to the fullest both the present and the future hazards of the undertaking and the possibility of a deficit as well as a surplus. We do not fear greatly the hazard of motor buses encountered in England, for reasons already discussed in these columns, but the proper charge for maintenance is largely unknown and that for obsolescence is still more uncertain. When to these factors and the increasing cost of materials is added the load of inefficient and expensive management to which municipal enterprises in this country will be particularly subject, the chances are pretty large in favor of a deficit for a municipal electric railway rather than a surplus.

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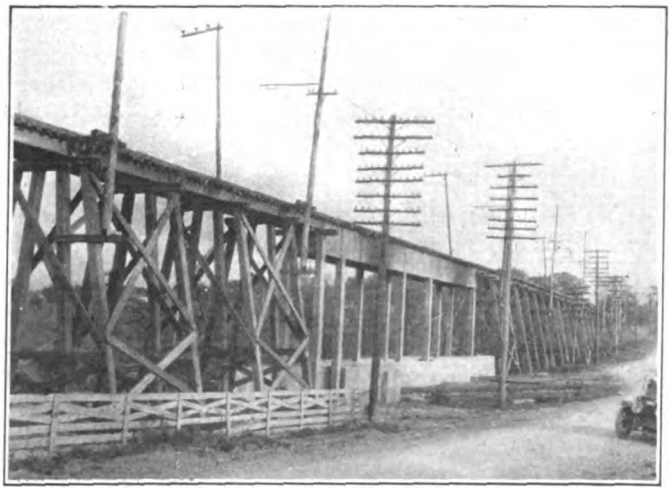
New 1200-Volt Line Between Nashville and Gallatin, Tenn.

A Line Possessing a Number of Novel Features in Track, Repair Shops, Substation, Cab Signal System and Rolling Stock

A new 1200-volt d.c. interurban line has recently been completed and put in operation between Nashville and Gallatin, Tenn. It traverses a densely populated, picturesque district, with antebellum characteristics, northeast of Nashville and bordering the Cumberland River valley for a distance of 27 miles. Except in a few places the entire line is



Nashville-Gallatin Railway—Viaduct Over L. & N. R. R.

built on a private right-of-way, paralleling the old Gallatin turnpike, which passes through what is known as the "Blue Grass" district of Tennessee. Throughout the entire length the territory is of an urban character, with a population averaging 800 people to each square mile on each side of the road. The Nashville-Gallatin Interurban Railway was financed and built by the Fidelity Securities Corporation of Nashville, with the assistance of local subscriptions for stock and right-of-way donations for the entire 27 miles.

The character of the territory traversed is ideal for an interurban line, and since beginning operation the earnings have far surpassed those anticipated by the promoters. Up to the present time the traffic has been strictly passenger, but express cars have been purchased and delivered, and the management has every reason to believe that a profitable package express and freight business will be developed in a comparatively short time. Nashville is served by another 10½-mile interurban line which enters the city from the south and is known as the Nashville Interurban Railway. This line, too, was built by the Fidelity Securities Corporation, but this company has recently withdrawn from its operation.

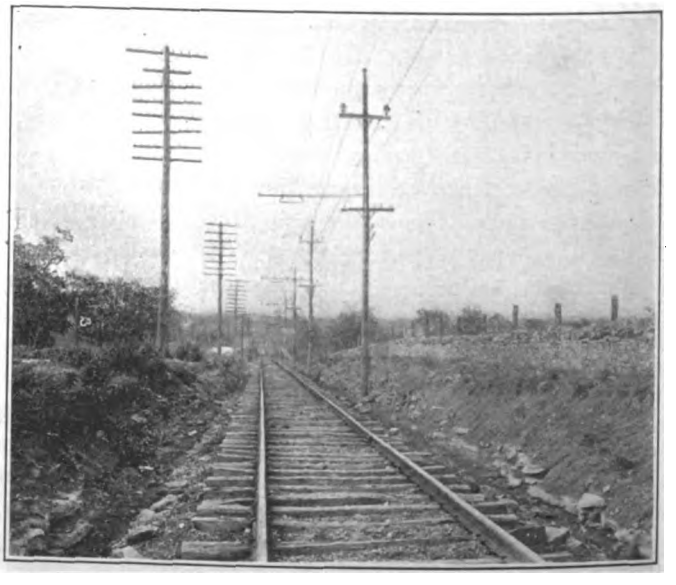
TRACK AND ROADWAY

The new 1200-volt line between Nashville and Gallatin immediately sprang into prominence as an interurban road owing to the fact that it is the longest in the State of Tennessee. It is built with 70-lb. rail laid on standard-size white oak ties spaced seventeen to 33 ft. The ruling grade is 3 per cent, and the maximum curvature 6 deg., except that portion of the city lines of the Nashville Railway & Light Company by way of which access to the business district of Nashville is obtained. Standard No. 9 turnouts with 72½-ft. leads are used in all side tracks, which are spaced at frequent intervals. Compressed terminal bonds are installed under the continuous joints, and cross-bonds of No. 0000 copper wire are spaced at 2000-ft. intervals. All bridges, both timber and steel, were designed for Cooper's E-50 loading, and all small waterways are provided with corrugated iron culvert pipe.

The private right-of-way averages approximately 50 ft. in width, except in places where this was not sufficient for heavy cuts and fills. To fix the alignment of all curves which are spiraled, 4-in. x 4-in. oak post monuments are set in concrete at all points of spiral, at points of compound curves and at points of tangency. These permanent monuments are set 7½ ft. from the center of the track and painted with black letters on a white background. They show the degree of curve and elevation of the outer rail, and the monuments at points of spiral and at points of compound curve give the lengths of each. Practically all the heavy excavation is in solid rock, which made grading exceedingly expensive. Standard roadway sections include a 12-ft. roadbed with 1 and ½ to 1 slopes on embankments and a 14-ft. roadbed in excavation. The standard slope in all rock cuts is ¼ to 1.

There are but few natural gravel deposits in this portion of Tennessee, and these are isolated deposits of glacial drift. This company's engineers were fortunate enough to find one of these deposits but a short distance off the main line northeast of Hendersonville. A spur track 2 miles long was built to this deposit, and gravel ballast for the entire line is being distributed as fast as the regular passenger service will permit. The standard depth of ballast under the ties conforms to general practice—that is, 6 in.—but in rock cuts a combination of loose rock and gravel 18 in. deep was used. This permitted the cut roadbed to be excavated to the depth of the ditches, and the loose rock under the gravel ballast supplied from the rock excavation furnishes excellent track drainage.

The overhead trolley and transmission lines are carried on



Nashville-Gallatin Railway—Interurban Section

a single line of 35 ft., 7½-in.-top chestnut poles set at 100-ft. intervals with the face 8 ft. from the center of the track. The 33,000-volt a.c. three-phase transmission line is carried on a 5-ft. two-pin cross-arm near the top of the pole, with the third phase on a pole-top insulator. This arrangement permits a 52-in. spacing between the three No. 4 conductors. This transmission line extends from the generat-

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ing station of the Nashville Railway & Light Company at Nashville to the substation at Hendersonville.

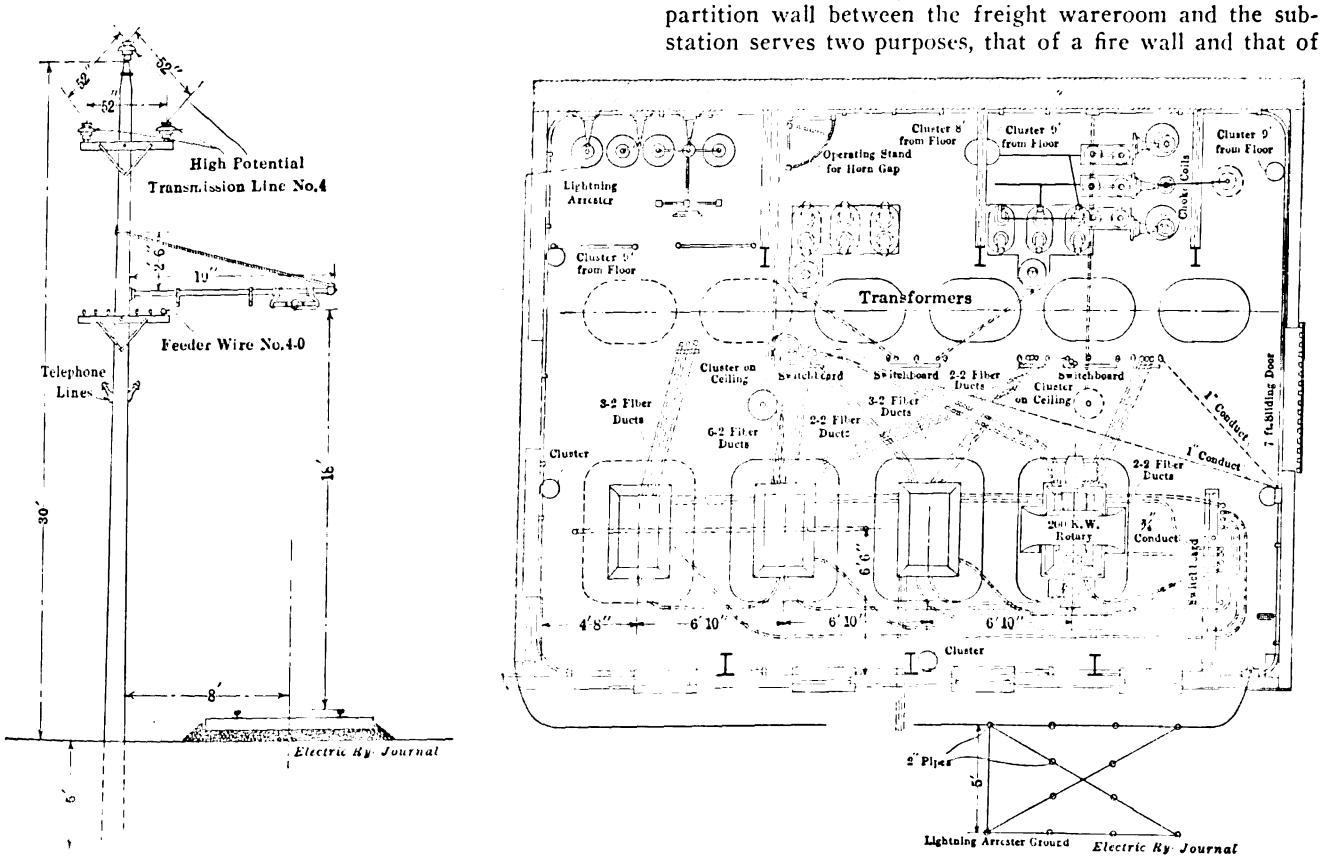
Standard General Electric pipe mast arms are attached to the pole below the transmission line so as to give 18 ft. clear head room between the top of rail and trolley. Just below the mast arm a standard cross-arm is applied which varies in length depending on the number of signal wires. This cross-arm also carries the feeder on the insulator nearest the trolley. The telephone circuits are on bracket insulator pins below this cross-arm. Both the trolley and feeder wire are of No. 0000 round copper, and the latter is strain-guyed every quarter of a mile and at approaches to all important curves.

When the overhead lines were built the usual procedure was reversed in that as soon as the grading was completed the overhead line material was distributed along the line with teams and the trolley wire fastened in position from tower wagons. This arrangement permitted the track to be laid and the transmission and telephone lines strung without the use of a steam engine and at the same time gave the transportation department an opportunity to break in its new rolling stock and trainmen.

The two most important bridge structures on the entire line are those over the Mansker Creek bottom and the grade separation over the Louisville & Nashville Railroad about midway between Nashville and Hendersonville. The former includes a well-built 1500-ft. trestle approach to a 100-ft. through truss span on concrete masonry. This large amount of waterway was required because of the proximity of the opening to the Cumberland River, which during spring floods backs up into the creek channel. The viaduct over the Louisville & Nashville Railroad is a combination of temporary and permanent structure. The spans over the railroad tracks are of reinforced concrete tower and girder construction, and the two approaches to this, each about 500 ft. in length, are frame trestles. Overhead lines on both timber structures were built with the pole butts supported on brackets of two 6-in. x 8-in. timbers bolted to the outside legs of the timber beats, approximately 9 ft. below the caps. At the elevation of the bridge deck two long ties project on each side of the pole, and a cross timber between these and bolted to them and to the pole fixes the position relative to the track.

HENDERSONVILLE STATION

At Hendersonville, the approximate center of this interurban line, the company built a combination passenger and freight station, shops and substation building. This structure is approximately 95 ft. by 108 ft. 6 in. in plan and is built of a timber frame with metal siding on concrete foundations. One corner of the building front is occupied by the separate waiting rooms for white and colored persons and by the office of the dispatcher and ticket agent. The substation room, 25 ft. x 35 ft. in plan, adjoins these rooms on the building front, and a large freight warehouse, 66 ft. x 68 ft. in size, occupies the space back of these. A brick partition wall between the freight wareroom and the substation serves two purposes, that of a fire wall and that of a point to which the insulators for the incoming high-voltage transmission lines may be attached.



Nashville-Gallatin Railway—Details of Line Construction —Floor Plan of Substation

The carhouse occupies the rest of the structure and is approximately 35 ft. x 108 ft. 6 in. in plan, or sufficient to house three tracks at 10-ft. 9-in. centers. Three concrete repair pits were provided, one extending the full length of one track and two 51 ft. in length, at the rear end of the carhouse under the other two tracks. The three entrances to the carhouse section are provided with double swinging doors, through which the tracks lead from a Y-connection to the main track immediately in front of the building.

SUBSTATION EQUIPMENT

Essentially, the substation equipment includes three G.E. 200-kw rotaries, two of which are connected in series to supply 1200 volts, and a spare foundation for the fourth rotary, together with transformers, oil switches and lightning arrester set. The 33,000-volt a.c. transmission lines enter the substation room by way of a wooden tower on the roof on which the horn-gap switches are mounted and thence pass through copper tube conductors and roof insulators to the interior of the building. The incoming transmission lines first pass through a set of air-gap switches, choke coils and oil switches to the transformers. This in-

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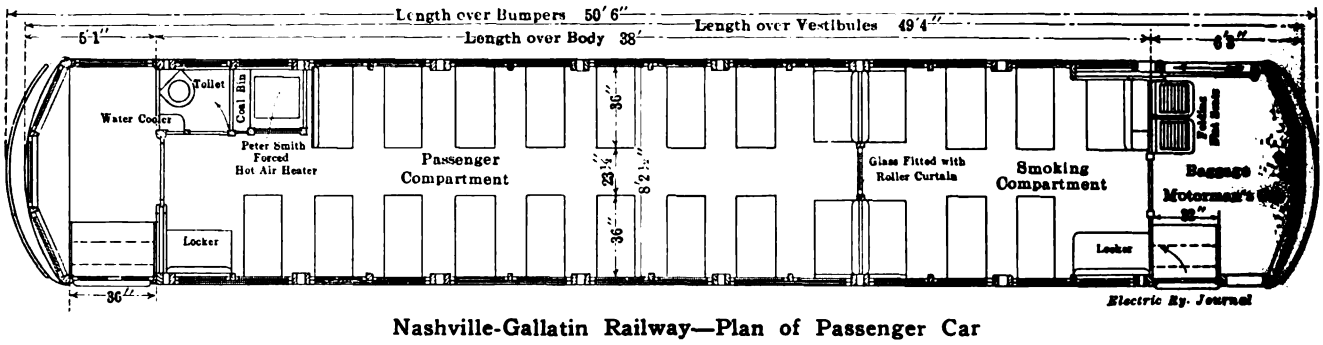
stallation includes four G.E. 135-kva, 33,375-volt, sixty-cycle a.c. transformers, which step down the pressure from 33,000 to 375 volts a.c.

All low-voltage circuits, both from the transformers to the rotaries and from the rotaries to the feeder panels on the switchboard, are installed in fiber conduit under the substation concrete floor. The four transformer switchboard panels are installed beside the transformers, and the feeder

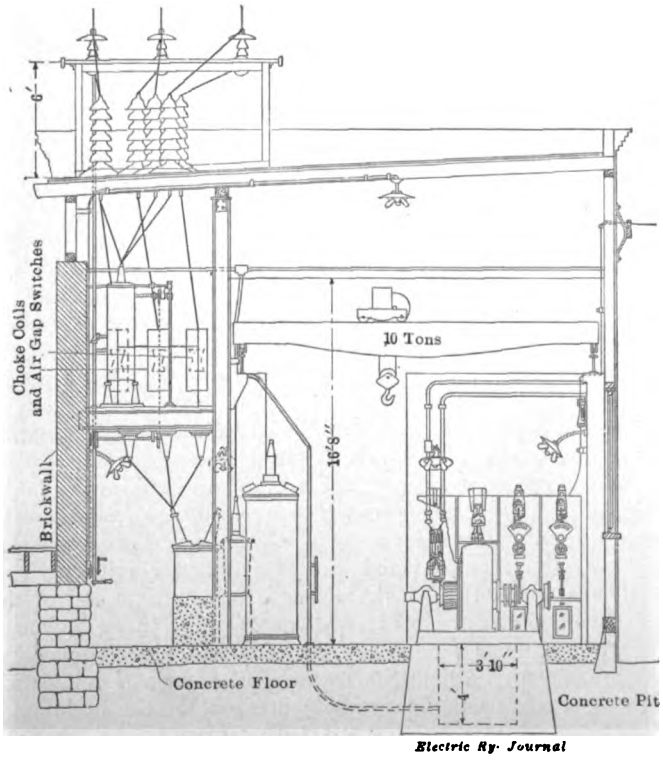
One of the novel features of the substation layout is the lightning arrester ground installation. This includes twelve 6-ft. sections of 2-in. pipe with 2 in. of the top tinned. Ground wire connections are made by wrapping No. 0 seven-strand copper cable around the tinned portion of the pipe and soldering it. Each pipe is driven 5 ft. into wet earth, and the attached copper cable is connected to the negative side of the lightning arrester.



Nashville-Gallatin Railway—Plan of Passenger Car

panels are grouped in a single board at one end of the substation. Two 1200-volt No. 0000 feeders lead from this substation, one to Gallatin and another to Nashville. All 1200-volt switchboard panels are specially insulated, every bolthead being installed in hard rubber as a precaution against short-circuits. Each feeder circuit is provided with a Thomson recording voltmeter, and the swinging bracket voltmeter at one end of the switchboard is provided with a plug so that the voltage on either of the two feeder sections may be obtained.

A 10-ton overhead bridge crane with a hand-operated trolley was provided in the substation and uses two rows of



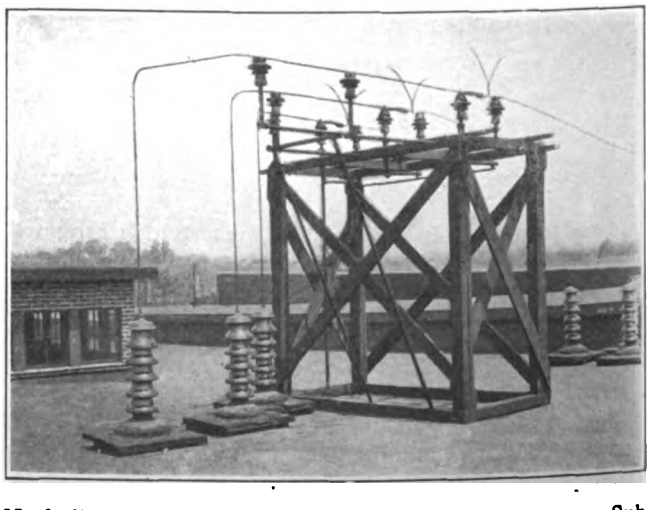
Nashville-Gallatin Railway—Cross-Section of Substation, Showing Entrance of High-Ttension Wires

columns for a runway, one in the front wall of the substation and the other back of the transformer set. The latter not only carries the crane runway but also serves as a support for the lightning arrester gallery. This bridge crane is equipped with a differential hoist of 5 tons capacity, which is sufficient to lift any part of the substation equipment.

SIGNAL SYSTEM

This new 1200-volt line is equipped complete with the Simmen system of signals. The third-rail installations provide protection for east-bound and west-bound train movements with a home and distant rail for each siding. Switch-boxes are installed at each turnout and automatically give a danger indication in the motorman's cab in case a switch is left open. A ten-lever dispatcher's board and auxiliary equipment are installed in the Hendersonville terminal station. The dispatcher's office equipment includes the storage battery on the main signal control circuits and a small motor-generator set for recharging the storage battery. The motor-generator set is a type K Holtzer-Cabot, with ⅓-hp motor, rated at 4-amp, 190-volt, 60-cycle and 1750 r.p.m.

An unusual feature in this installation of the Simmen system of signaling is that a telephone plug is provided in the relay box in the motorman's cab. This makes it possible for the dispatcher to talk to the motorman by way of the signal circuits, the third-rail and third-rail shoe. The third-rail shoe also is a departure from the original de-



Nashville-Gallatin Railway—Transmission Tower on Substation Roof.

sign in that it is not fixed but is what is termed a revolving shoe. The original design of the third-rail shoe being fixed, it was found after a period of service that the pressure on the third rails would wear a groove in the sliding contact surface. The new shoe is set lightly off the center of the third-rail. This tends to revolve when it comes in contact, and this action spreads the wear over the entire

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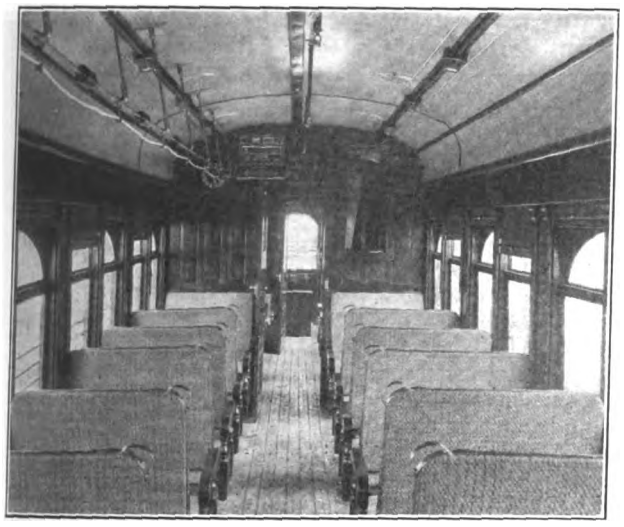
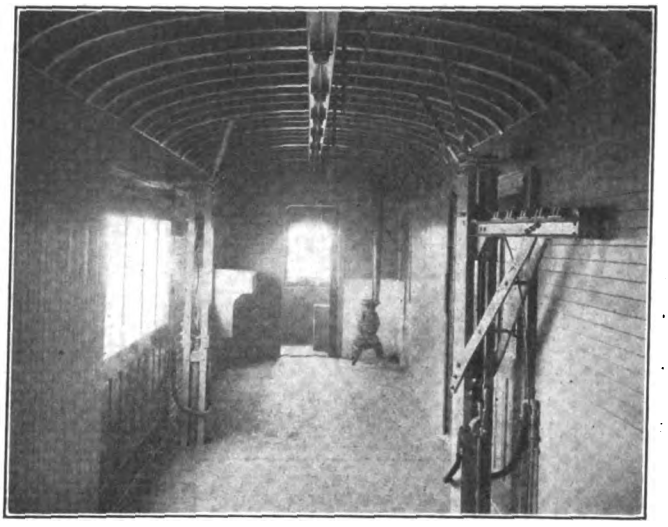
surface. After four months' service on the lines of the Indianapolis & Cincinnati Traction Company, it has been found that this type of shoe shows no appreciable wear, and it is believed that this difficulty has been entirely overcome.

ROLLING STOCK

The initial purchase of rolling stock for this 27-mile road included four interurban passenger cars and one baggage car. Each embodies the most modern practice in car construction and equipment. The passenger cars are 50 ft. 6 in. over-all length by 8 ft. 5¾ in. wide. The bodies are of arched-roof design for single-end operation with underframes of composite construction which are under and over trussed.



Nashville-Gallatin Railway—Interior of Passenger Car

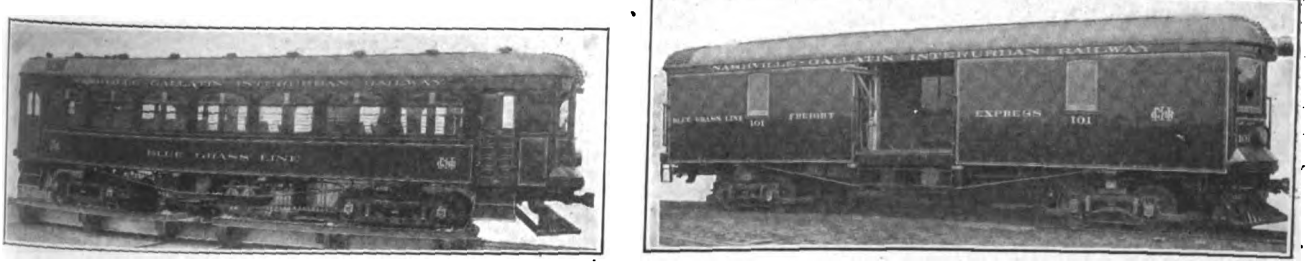


Nashville-Gallatin Railway—Interior of Express Car

The car body is divided into a passenger and smoking compartment, and the latter also serves as seating space for colored passengers. The motorman's cab is quite large, being 6 ft. 3 in. over all, to provide space for light baggage. A two-leaf folding door on the right side of the cab permits the colored passengers to enter the compartment reserved for them without passing through the car. A 42-in. sliding door on the opposite side of this vestibule serves for loading and unloading the baggage. The rear platform is equipped with a single 36-in. two-leaf folding door and a triple tread coach step on the right side. The total seating capacity is fifty-four with seats for sixteen passengers in the smoking and colored passenger compartment and thirty-six in the main compartment. The interior finish, including linings, moldings, doors and sash, is of cherry, mahogany finished, and the seats are upholstered in rattan with brass fittings.

The express and baggage car is arranged for double-end operation and like the passenger car is built with a composite under frame and an arched roof. The side sills, however, were increased in section, so as to provide additional carrying capacity. The principal dimensions of the baggage car are 45 ft. over-all length by 8 ft. 2 in. wide, with a clear head room in the body between the floor and the ceiling of 8 ft. ¾ in. The same type of trucks and motors as those used under the passenger cars and already described were included in the equipment of express and baggage car.

Probably the most novel feature in the auxiliary equipment of this express car is an installation of two small power cranes to facilitate the handling of heavy freight. The underframing of the car body was reinforced to carry the additional strains imposed by the operation of these cranes. The hoist standard is composed of two sections of channel iron fitted into castings on the car floor and just above the 7-ft. sliding doors. These castings form a pivot for the vertical member, which in turn supports a horizontal boom. Inside of the channels of each crane a 3-in. air cylinder with a 24-in. piston stroke has been installed with the cylinder at the bottom, which permits the piston to travel upward.



Nashville-Gallatin Railway—Standard Passenger Car and Standard Express Car

Four G.E.-205-B 600-volt motors mounted on Brill 27 M. C. B. 1 trucks were included in the car equipment. Two of the motors are connected in series for 1200-volt operation and are capable of 50 m.p.h. A change-over switch in the motorman's cab permits the motors to be operated in multiple when the car passes from the 1200-volt interurban line to the 600-volt street railway lines in the city of Nashville. Other car equipment includes automatic air brakes, Hedley anti-climbers, Tomlinson M. C. B. radial drawbars and Ohmer fare registers. The lighting circuits are installed in exposed conduit with cushion sockets. Heating and ventilation are provided by the installation of a Peter Smith Heater Company's forced-draft heater and eighteen globe ventilators in the arched roof, nine on each side over the center of each row of seats.

A sheave wheel is mounted just above this air cylinder and on a level with the horizontal member of the crane. This wheel and a second sheave wheel set in the end of the piston rod are employed in raising and lowering a load to and from the car. The horizontal boom is built of two

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plates placed so that a pulley may be set between them, five pairs of bearing notches being provided for this purpose. The location of the pulley on the boom depends on the weight of the load and its distance from the car door. With a normal air pressure on the car the hoist is capable of lifting 800 lb. Each hoist is pivoted beside the sliding doors so that it may be swung out through the door opening. A hose and pipe connection to the air-brake reservoirs supplies air to the hoist cylinder, which is operated by a straight-air valve attached to the side of the upright member of the hoist. Views of both the baggage and passenger cars are shown in the illustration. They were designed and built by the American Car Company of St. Louis, Mo.

ENGINEERING

The work of financing and constructing the Nashville-Gallatin Interurban Railway has been under the direct supervision of H. H. Mayberry, president, and R. A. Bailey, Jr., general manager of the operating company. The civil engineering problems were under the supervision of M. A. Stainer, chief engineer, and the construction of the overhead transmission and trolley lines as well as the substation installation at Hendersonville was supervised by D. J. McLane, superintendent of construction, who has since been appointed superintendent of operation.

SERVICE IMPROVEMENT IN ROCHESTER

The management of the Rochester Lines of the New York State Railways has for the past few years devoted much attention to service improvement and has developed a special department for the purpose of handling matters which relate to this subject.

In the issue of the ELECTRIC RAILWAY JOURNAL for Dec. 23, 1911, a detailed account of the workings of the complaint department showed that in past years complaints had been handled by the departments or persons to whom they were addressed. The final analysis indicated that in many cases the lack of system in handling the grievances prevented the desired co-operation with the public in the matter of better service.

At the time the complaint department was inaugurated it seemed a difficult task to correct the prevailing impression of the general public that a registered complaint would place the complainant on a blacklist of habitual fault-finders. In August, 1912, an effort to correct this impression resulted in changing the name of the complaint department to the "service improvement department," and by means of publicity through newspapers and constant reminders placed in all cars the patrons of the Rochester Lines came to realize that the company was earnestly endeavoring to handle intelligent complaints scientifically, with a view to satisfying the public and remedying any defects in its service. Investigation of the complaints received during 1911 indicated a lack of familiarity by the traveling public with the necessary rules and regulations of the company, this being particularly true of the instructions governing the use of transfers. Fifty-seven per cent of these complaints were, without question, attributable to the fault of the public in not knowing the extent of its own or the company's rights.

The records for 1912 show an increase in the number of complaints received of approximately 60 per cent over 1911. The increase can be attributed to the work of the service improvement department. Almost without exception the complaints for 1912 were rendered in an intelligent manner, containing sufficient data for an immediate investigation. The results could thus be placed before the complainant within a reasonably short time. In other words, the campaign of education conducted by the service improvement department during 1911 is now bearing fruit. By means of a personal visit to each complaining patron there has been instilled into the minds of those using the cars an appreciation of the rules governing operation and a knowledge of proper use of transfers and the correct method of rendering complaints. The department, by its prompt and systematic handling of complaints, has been the means of establishing better relations with the public, and the public, by appreciating the purpose of this department, has made it possible for the company to attain greater efficiency in the operation of its cars. A typical daily report of the department is shown below, the address of compainant and the number of conductor being changed:

NEW YORK STATE RAILWAYS
SERVICE IMPROVEMENT DEPARTMENT DAILY REPORT

Number of complaints received, 7. Feb. 4, 1913.

Complainant	Address	Complaint Against	Nature of Complaint
—— ——	39 Masseth St.	Motorman 210	Refusing to allow passenger to board car front way
—— ——	336 North St.	Unknown conductor	Short-changed passenger
—— ——	84 Vassar St.	Conductor 693	Insolence to passenger
—— ——	1010 Bay St.	Crew on car 319	Turned before reaching end of line
—— ——	Genl. Del.	Unknown employee	Insolence
—— ——	942 Ave. D	Company	Blocking crosswalk
—— ——	185 West Ave.	Conductor car 700	Dropped wrong coin in fare box

Complaints completed, 8.
Investigation shows public at fault, 3.
Investigation shows company at fault, 4.
Turned out to be a claim, 1.
Complaints on hand under investigation, 58.
—— —— made five calls.
—— —— made seven calls, two not in.
(Signed) .....

The accident-prevention organization centers in the claim department, the claim agent being chairman of a safety committee. This comprises also the electrical engineer, the engineer of maintenance of way, two superintendents of transportation and the master mechanic. The safety committee meets at intervals of two to four weeks to receive suggestions for improvement in equipment and service.

The working part of the organization is a group of five sub-committees, three for the city and two for the interurban lines. The city sub-committees consist each of eight trainmen and representatives from each of the four operating departments. The interurban committees are similar except that there are but four trainmen in each. The sub-committees meet occasionally, but their main duty is to keep suggestions flowing in to the central office. Boxes in which suggestions can be filed are provided at sub-committee headquarters, and these are turned in to the safety committee.

Although this plan has been in operation only since last August, some 250 suggestions have already been received and many have been acted upon. In some cases the suggestions take the form of carefully written reports, showing close observation and logical deduction. At present suggestions are coming in at the rate of two or three a day.

As a rule the safety committee turns the suggestions over to the head of the proper department at once, and if the matter is one not involving great expenditure it is attended to promptly and the claim department is so notified. Occasionally the suggestions relate to questions of policy which must be considered by the vice-president.

In Italy a scheme for a network of electric tramways covering 411 miles has just been approved by the Council of the province of Alessandria, and the first part of the undertaking, consisting of 298 miles, will be begun on the signing of the royal decree. The remainder will be commenced later, but a motor car service will be instituted in the meanwhile. The concession is for sixty years, and the province of Alessandria has agreed to give a yearly subsidy of $423 per mile for thirty years, while reserving to itself 4 per cent of the gross earnings, exclusive of the subsidy.

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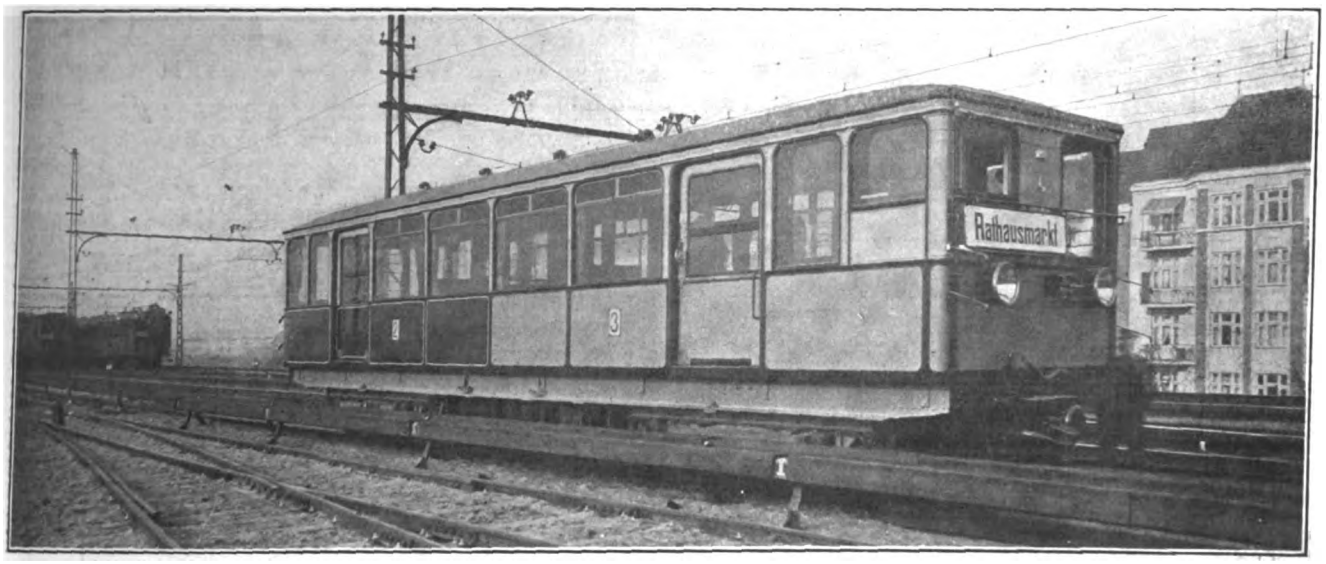
Hamburg Elevated & Subway System

This, the Fourth and Concluding Article on the Hamburg Elevated & Subway System, Describes the Principal Features of the Cars, Schedules, Rates of Fare and the Growth of Traffic

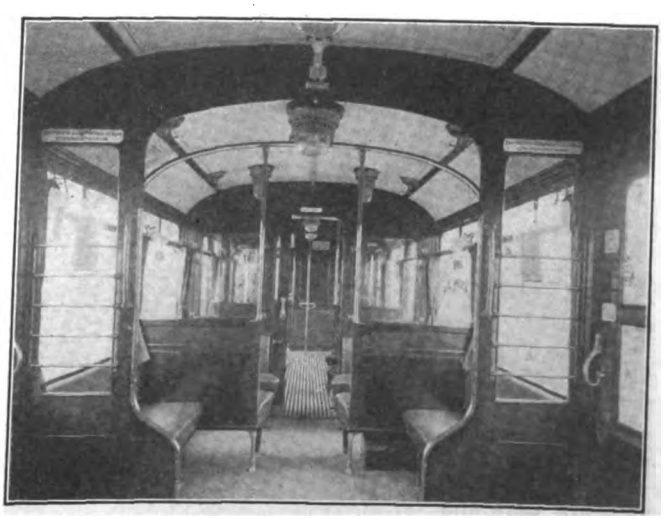
The rolling stock of the Hamburg Elevated & Subway System consists at present of eighty cars, but fifty others were ordered very recently on account of the rapid increase in business. This rolling stock consists of motor cars exclusively. While the equipments were furnished jointly by the Allgemeine and Siemens-Schuckert companies, they are nevertheless so standardized that the motors of one manufacturer may be used with the control of the other. A plan and elevations of the standard car are shown in an accompanying illustration. In general these cars are similar to those of the Berlin Elevated & Underground Railway, but one important difference is that they are 12 in. wider, and another is the absence of a gap between the car and station platforms despite the fact that some of the stations are on curves of 590 ft. radius. This end was attained by placing the center line of the side doors in line with the center point of the trucks and by so building the car that the step at each doorway overlaps the edge of the station platform. When the car is new and empty the difference in height between the top of the car floor and the station platform is 10 in., but it decreases to the permissible minimum of 5½ in. when the wheel tires have worn down and the car springs have become set.



Hamburg Cars and Traffic—Standard Elevated-Subway Motor Car, with Hamburg-Blankenese Single-Phase Cars in the Background

The increased width of this car made it practicable to install eight pairs of transverse seats in the center of the car. The seating near the doors is longitudinal so as to facilitate ingress and egress. This combination of seating with large open areas was provided to give the long-distance riders the comfort of cross-seat riding, while the short-distance passengers could sit near the doors or stand. The seating capacity of the car is therefore low in comparison with a surface car, but its combined seating and standing capacity varies from eighty-five to 100 passengers. Some of the cars are arranged for third-class seating exclusively, and others are equally divided for second and third-class. The exterior of the second-class portion is painted red and that of the third-class section yellow to avoid confusion when passengers are entering the car. All exposed woodwork of the car interior is of mahogany, but the upholstery varies, that of the second-class compartment being dark-green imitation leather whereas the seating of the third-class compartment is of plain wooden slats. The two doors on each side of the car are of the sliding type 45 in. wide and, as is customary abroad, are operated by the passengers. The plan of the car also shows that the single cab for the motorman occupies about two-thirds the width of the car, the open space alongside being used by the brakeman from which to observe the signals as a check on the motorman.

The over-all body length of the car is 39 ft. 8 in., the height above the rails is 10 ft. and the height of the body alone from the top of the floor line to the highest point of the roof is 7 ft. 7 in. A flat-arch roof was chosen in order to secure maximum head room. Ample ventilation is afforded by means of roof ventilators placed as shown in the drawings.



Hamburg Cars and Traffic—Seating Arrangement of Hamburg Car

Every car is equipped with two 100-hp, 800-volt commutating-pole motors, multiple-unit control and automatic

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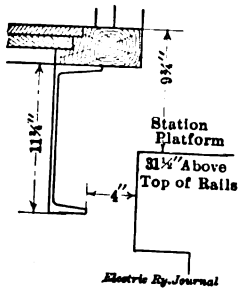
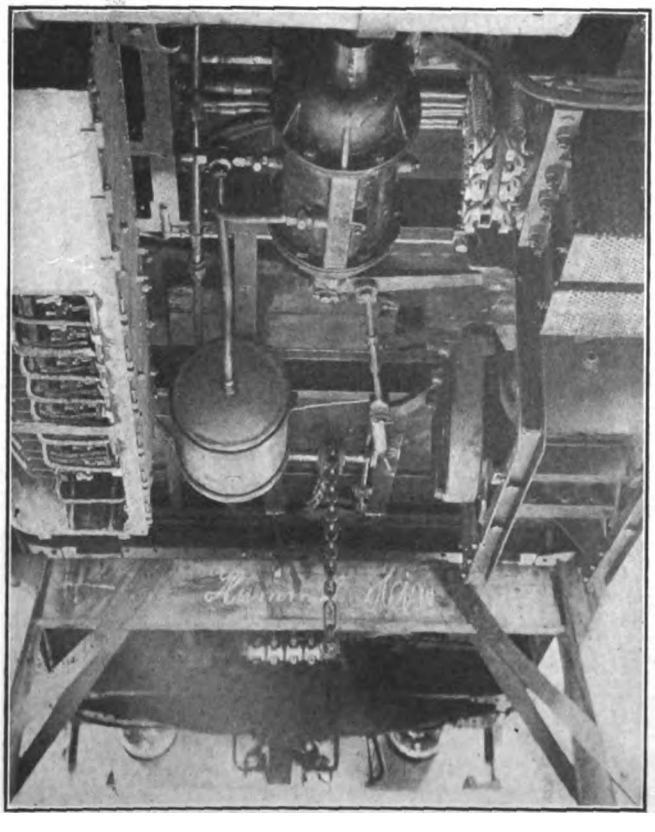
air brakes. Contactors and all heavy current cables are placed under the car body. On the Siemens-Schuckert cars, as illustrated in an accompanying drawing, the cables are placed in a reversed trough, the top and sides of which are of wood and the bottom of sheet iron, all lined with asbestos slate. On the Allgemeine cars the cables are carried from the car flooring in conduits with similar runways, the outer side being protected by a sheathing covered inside with a layer of asbestos slate. The cables on both cars are carried from the car floor in insulated sheet-metal grooves or runways.



Overhang at Platforms

The cars weigh empty 24 tons and loaded 30 tons. As they are heavily motored, they can be accelerated at the rate of 1.5 m.p.m.p.s. and can run at the high speed of 37.2 m.p.h., although in practice the speed on the elevated section does not exceed 31 m.p.h. The high schedeule speed attained is shown by the record made on the first division placed in operation. This section is 4.06 miles long and has ten stops. The average distance between the stations is 2385 ft. The running time was fourteen minutes, thus giving the remarkably high schedule speed of 17.36 m.p.h. The length of the average stop at the station platform, even for the complete belt line, is only fifteen to eighteen seconds. The schedule speed in the belt section is 17.68 m.p.h. where stations are 2493 ft. apart. The length of a complete trip



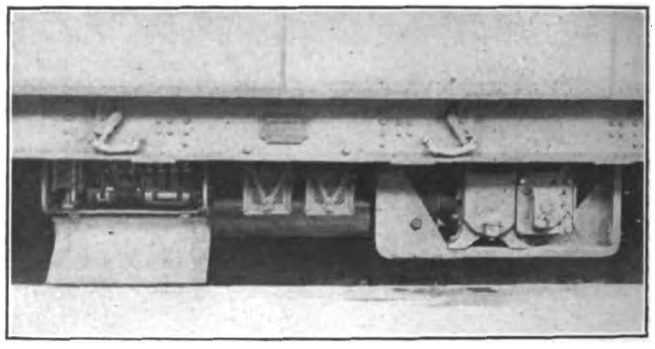
Hamburg Cars and Traffic—Under Side of Car, Showing Part of Air-Brake and Electrical Equipment

varies from about thirty-six minutes to thirty-eight minutes.

During the rush hours in the morning a two-and-a-half-minute service is given on the inner or short line and a five-minute service on the outer or complete line and vice versa in the evening. It is possible, however, to run forty and even more trains an hour each way if the conditions demand. At present the usual train consists of two cars, four cars being employed for the rush-hour service.

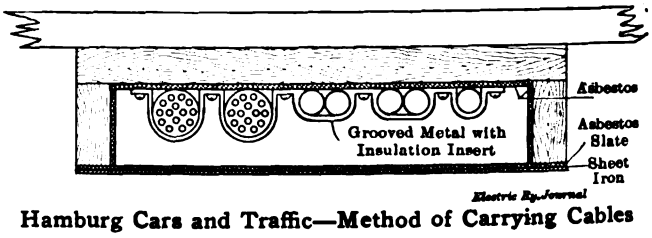
FARES AND TRAFFIC

It is an interesting fact that the company which operates the Hamburg system offered to follow the American plan of operating with one class of cars. This proposition was rejected in favor of the customary two-class cars. The experiences in Hamburg to date would indicate that the American plan with one class of cars would have given



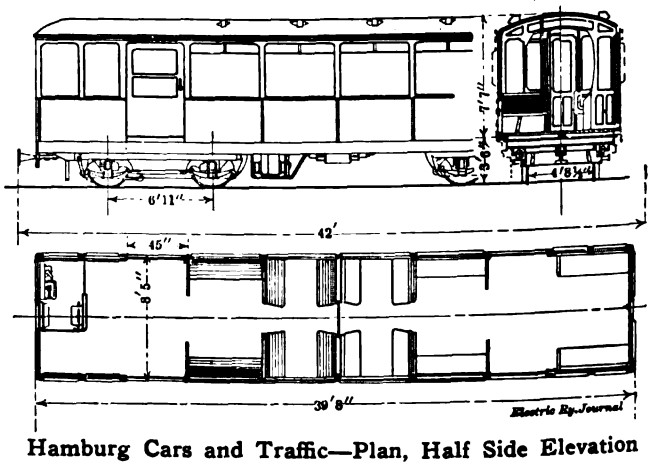
Hamburg Cars and Traffic—Side View, Showing Suspension of Apparatus

a better seat-use factor. On the ordinary two-car train, for instance, one-fourth of the space is reserved for second-class passengers, but not more than 10.25 per cent of the week-day travel is second-class. Even on Sundays, when there is a good deal of pleasure riding, the proportion of second-class riding does not rise to more than 15 per cent. The variations in these proportions are recorded



Hamburg Cars and Traffic—Method of Carrying Cables

daily on a special traffic curve (not reproduced). The necessity for careful supervision to prevent third-class riders from using the second-class compartments is shown by the fact that before special supervision was begun the sales of second-class tickets appeared to indicate that only 5 per cent of the week-day riders were using the second-



Hamburg Cars and Traffic—Plan, Half Side Elevation and Section of Car.

class compartments. A city ordinance assesses a fine of 75 cents for this misuse of tickets. The upholstery of the second-class compartments may be readily removed to permit their use as third-class compartments.

For straight ticket sales the fares on the Hamburg system are as follows: Five station stops, 2½ cents, third-class, and 3¾ cents, second-class; ten station stops, 3¾ cents, third-class, and 5 cents, second; eleven stops or more, 5

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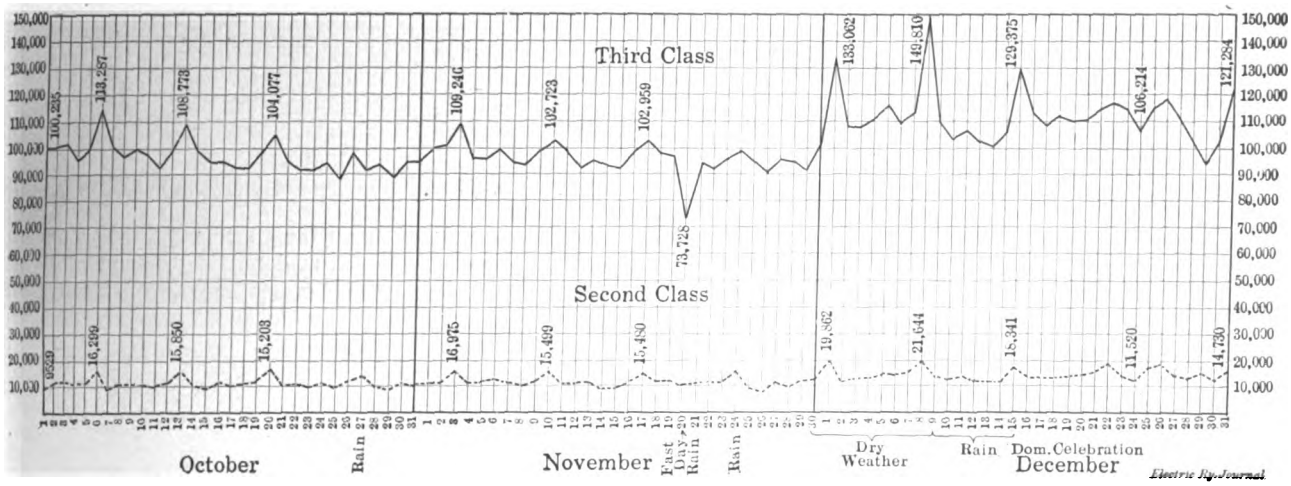
cents, third-class, and 7½ cents, second-class. Workmen's tickets for use before 7 a.m. are sold at 2½ cents, good for third-class riding for any number of stations, and, furthermore, the passenger may buy for 5 cents a non-transferable return ticket good for returning any time of the day. The weekly workman's card carrying the same privileges as the daily tickets is sold at the rate of 13¾ cents for one-way riding and 27½ cents for two-way riding. On March 26, 1913, the workmen's tickets numbered 21,000 out of 109,000 tickets.

Season tickets good for use any number of times during the calendar year are sold as follows: Eight stops, $20, third-class, and $27.50, second-class. A charge of $1.25 is made for every additional stop on a third-class ticket and of $1.75 on a second-class ticket. An annual ticket good for any length of ride costs $37.50 third-class and $50 second-class. A peculiar feature of the season ticket is that the price for each succeeding quarter decreases. Thus, in the case of a third-class ticket good for eight stops, the first quarter costs $7, the second $5.75, the third $4.75, and the fourth $3.75. 8he reduced prices are given only to purchasers who turn in the card for the preceding three months. The figures for January, 1913, show that 177 annual third-class, 211 annual second-class, 1498 quarterly third-class and 294 quarterly second-class tickets were sold. The season tickets are not punched or otherwise recorded, so that the management has no day-to-day statistics to show how often they are used, but it is estimated that the average is four times a day. Doubtless, these cards afford a great saving to those who are near enough to their business to go home to lunch and also to solicitors, collectors and others whose business requires much traveling within the city.



Hamburg Cars and Traffic—Portion of Day-to-Day Traffic Curve, Showing Proportions of Second-Class and Third-Class Travel and the Influence of Weather and Holidays

Hamburg Cars and Traffic—Reproduction and Translation of Ticket

About 10 per cent of the tickets are sold by electrically operated machines which print, cut and issue the tickets and also reject counterfeit coins. An accompanying illustration shows the actual size of a sample cardboard ticket on which the class and the number of stations permissible from the boarding station are indicated. The ticket is punched as the passenger walks by the ticket inspector and is taken up by another inspector as he leaves the alighting platform. This practice is like that used on the rapid transit lines of Berlin, London and Paris.

The accompanying traffic curve shows the increase in travel during the last three months of 1912, but it does not include the small proportion of commutation riders. This curve indicates that the total number of daily ticket passengers carried in December was about 3,600,000, with a daily maximum of 150,000 during the Christmas shopping season. The heaviest travel to date was on Easter Monday, March 24, 1913, when 197,000 daily ticket riders (or an actual estimated total of 205,000) were carried. This is a most extraordinary record, as only seventy-six cars were available for service. In order to handle this business, all cars were operated over the complete route in four-car trains, and a headway of two and one-half minutes was maintained so far as the supply of rolling stock permitted. As previously noted, additional generating equipment and fifty cars are now under way. In the first full year of service—July 1, 1912, to June 30, 1913—39,400,000 passengers were carried. The total car mileage was 4,588,000 miles and the annual performance per car 62,620 miles.

Hamburg Cars and Traffic—Title Page and Advertisement of Traffic Guide

The traffic curve previously mentioned shows the numbers of second-class and third-class passengers separately. It also shows all rainy days, holidays, religious festivals,

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unusually fine weather, etc., thereby recording the reasons for great variations in traffic.

BOOKLET OF INFORMATION, CAR COMPARISONS

For the convenience of their patrons the managements of the Hamburg d.c. and Blankenese-Ohlsdorf single-phase rapid transit systems publish jointly an 18-in. x 21-in. folder map in colors on which the lines of both systems are shown in their relation to the principal parks, buildings and streets of Hamburg and vicinity. The back of the map carries the schedules of both railways and the rates of fare, also a list of public buildings, amusement resorts, banks, cafés and principal business buildings, with the name of the station nearest each place. The cost of publication is covered by carrying some advertisements and by selling the folder at 2½ cents per copy. The artistic printing of this publication is apparent from the views on page 179, one of which is a reproduction of the front cover and the other of an advertisement of a moving-picture theater, including the name of the railway station near by. The originals are printed in color.

In connection with the description of the Hamburg cars, the following comparison of the Hamburg-Blankenese single-phase and the Hamburg and Berlin subway cars, as given by Gustav Schmipff in his new book on "Economic Aspects of City and Suburban Railways" (Wirtschafliche Betrachtungen über Stadt-und-Vorortbahnen) will be found of interest:

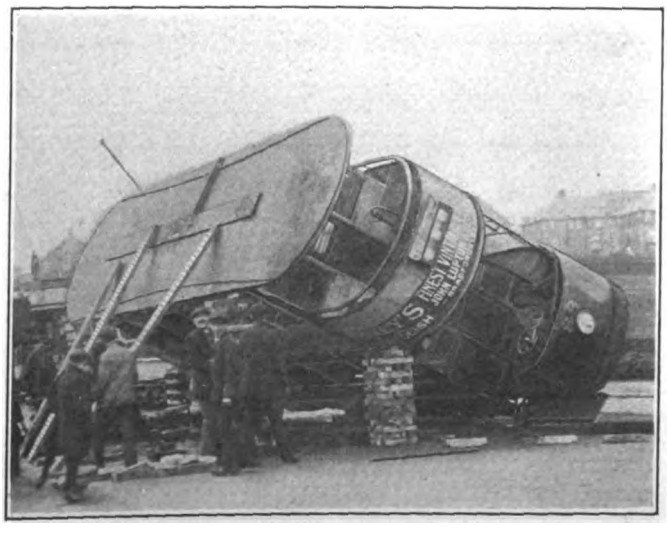
COMPARISONS OF HAMBURG AND BERLIN RAPID TRANSIT CARS

	Hamburg-Blankenese	Berlin Subway Motor	Berlin Subway Trailer	Berlin Subway Average	Hamburg Subway
Number of seats	128	31	38	34.5	34
Weight of car, metric tons	63	24	14	19.0	24
Weight per seat, lb...	1082	1702	812	1258.4	1553
Capacity of motors, hp	2x180	4x70	....	.....	2x100
Cost per car $22.750		....	....	$7.500*	$11.000**
Cost per seat	$177.75	....	....	$217.50	$323.50
Acceleration, m.p.h.p.s.	0.984	1.31	....	.....	1.53
Pressure per axle of loaded car, metric tons	14.0	7.0	....	.....	7.5

* Average price of all cars.
** Present estimate.

WIND OVERTURNS DOUBLE-DECK CAR

The accompanying illustration, furnished through the courtesy of the *Tramway and Railway World*, shows a double-deck car of the Leeds & Bradford Tramways after



Double-Deck Car at Bradford Blown Over by Gale

it was blown over in open country by a gale at Allerton, Feb. 7, at about 10:30 p. m. Fortunately no passengers were in the car at the time. The crew, who were inside examining the sand-boxes, sustained a few slight cuts but were able to leave the car without assistance. Nearly every window of the car was broken and the woodwork was jammed. At the Board of Trade inquiry it was decided that the fact that the car had an upper deck was not responsible for the accident. The general impression was that the car would have been overturned by the unusually severe wind even if it had been of the single-deck type. The board made no new rules but suggested that wind-measuring instruments should be fitted in a suitable place to give the tramway officers warning of high winds so that they could take the precaution of not running the cars in exposed positions. This car was operated on a 4-ft. gage, but a gage as narrow as 3 ft. 6 in. has been used elsewhere for double-deck cars.

CLEVELAND TESTS ON THE ILLUMINATION OF CARS

During 1911 and 1912 the Cleveland Railway conducted tests on three cars in all to determine the cost of illumination by means of mazda lamps and carbon lamps. These tests demonstrated the economy of the metallic-filament

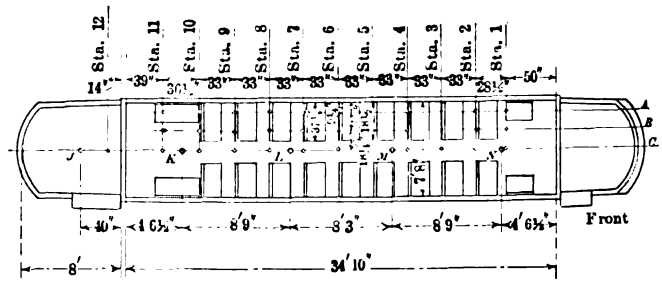


Fig. 1—Cleveland Lighting—Plan of 500-Type Car

lamp, but in January, 1913, arrangements were made for the luminometer tests hereinafter described in abstract.

CONDITION OF TESTS.

The tests were made on two 500-type monitor-deck cars, the plan view of which is shown in Fig. 1. The car bodies are finished in natural-cherry woodwork and have ceilings painted medium green. The seats are upholstered in rattan.

Car No. 537 was lighted with five 100-watt frosted-bowl mazda lamps in Holophane E-100 satin-finished reflectors mounted in a special shade holder. The lamps were mounted in what is known as the "H" position. An additional 100-watt lamp is so wired in connection with a selector switch that it can be instantly connected into the circuit in case of failure of any one of the five lamps regularly lighted. One circuit of 23-watt lamps provided light for the front vestibule, destination sign and headlight. Four of the 100-watt lamps were mounted on the upper-deck ceiling on the center line of the car as shown by the letters *K, L, M, N* in Fig 1. The height of these lamps was 7 ft. 8½ in. from floor level to tip of lamp. Lamp *J* was mounted on the ceiling of the rear vestibule at a height of 7 ft. 10 in.

Car No. 150 was alternately lighted with five circuits of 16-cp lamps, of which seventeen were in the car body, four in the rear vestibule, two in the front vestibule, one in the destination sign and one in the headlight. The lamps were not equipped with reflectors. The lamps in the car body were in four clusters as shown by the letters *K, L, M, N* in Fig. 1. The sockets were mounted on a bowl and held the lamps in a position approximately 45 deg. from the vertical. Cluster *L* contained five lamps and clusters *K, M* and *N* four lamps each. The height from the floor to the lamp bulb was 7 ft. 10½ in. The 23-watt mazda lamps were also tested on this car.

METHOD OF TESTS

The length of the car body was divided into eleven stations as shown in Fig 1. A set of luminometer readings was taken at three positions (*A, B, C* at each station). Position *A* was 9¼ in. from the side post, position *B* 27¾

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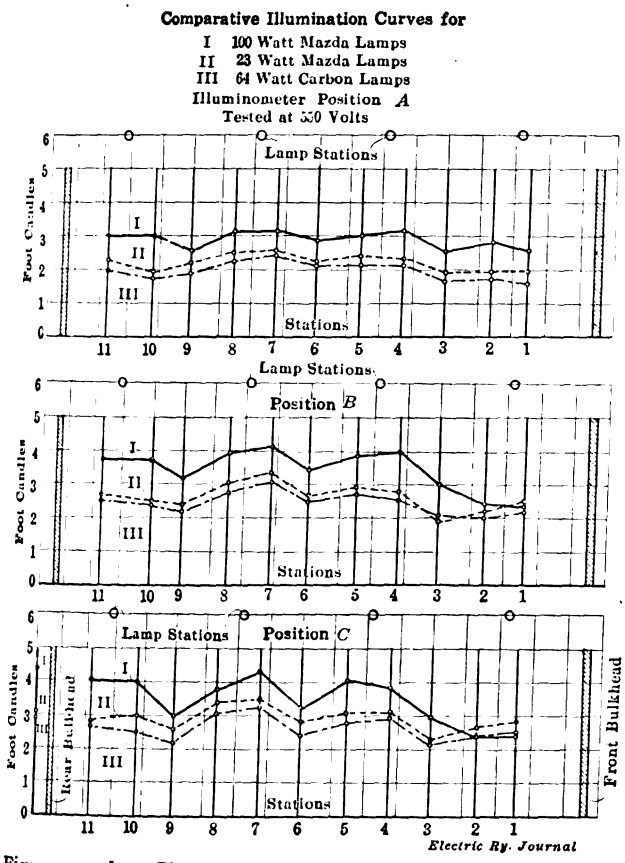
from the side post, and position *C* was on the center line of the car. *A* and *B* represent the position of seated passengers. All luminometer readings in the car body were taken at the height of the seat back (37 in. above the floor). Readings taken in the rear vestibule were at a height of 42 in. (slightly lower than the top of the fare box). Three check readings at each point were taken on a Weber luminometer, which was equipped with a Lummer-Brodhun screen to permit close readings. During this test the potential of the circuit was held constant at 550 volts, and the amperes input was read in order to obtain the watts required by the lamps.

The luminometer was calibrated with a photometer and standard lamps and the constant determined. This constant, divided by the square of the meter reading, gives the illumination in foot candles on the horizontal plane at the height at which the readings were taken. The luminometer constant was found to be 411.74.



Figs. 2, 3 and 4—Cleveland Lighting—Comparative Illumination Curves from Position Indicated on Plan of Car

TESTS

The lamps used on this test were rated as follows:

Lamp	Voltage Rating	Amperes Rating at 110 Volts Ave.	Max.	Min.	Amperes Rating at 115 Volts Ave.	Max.	Min.
100 watt mazda	114	0.8264	0.828	0.826	.....	....	....
23 watt mazda	115	0.2032	0.206	0.201	0.2085	0.212	0.206
64 watt carbon	115	0.567	0.576	0.552	0.593	0.604	0.579

The watts per candle at rated voltage were as follows:

100 watts mazda	1.114	watts per candle
23 watts mazda	1.34	watts per candle
64 watts mazda	3.94	watts per candle

The lamps were not operated at their highest efficiency in watts per candle-power. By running the lamps at a slightly lower efficiency the life is greatly prolonged. This fact is expressed approximately by the formula:

$$\frac{\text{Life at operating voltage}}{\text{Life at rated voltage}} = \left(\frac{\text{rated voltage}}{\text{operating voltage}}\right)^{d}$$

The value of *d* for mazda lamps has been found to be 13.8 and for carbon lamps 20.5.

This means that the life of the lamps operating five in series on a 550-volt circuit would be increased by percentages over the life obtainable when operating at the highest rated efficiency as follows: 114 volt, 100-watt mazda lamp, 63 per cent; 115 volt, 23-watt mazda lamp, 85 per cent, and 115 volt, 64-watt carbon lamp, 149 per cent.

The following figures show the illumination of the car body obtained at 550 volts with the three types of lighting. Readings are in foot candles.

	Car No. 537, 100-Watt Mazda Lamps	Car No. 510, 23-Watt Mazda Lamps	Car No. 510, 64-Watt Carbon Lamps
Position *A*:			
Maximum	3.16	2.58	2.47
Minimum	2.55	1.83	1.64
Average	2.87	2.17	1.98
Position *B*:			
Maximum	4.12	3.34	3.11
Minimum	3.00	1.96	2.01
Average	3.60	2.64	2.44
Position *C*:			
Maximum	4.28	3.52	3.28
Minimum	2.95	2.32	2.13
Average	3.63	2.96	2.66
Average for car body	3.31	2.52	2.30
Conductor's position rear vestibule	4.28	3.11	3.00

The curve sheets (Figs. 2, 3 and 4) show the illumination of the car with the three classes of lamps from three positions. Tests were also made at station 7-*C* at various potentials from 350 volts to 575 voltts, and these showed that the carbon lamps were most susceptible to changes in voltage.

The following table shows the watts expended in lighting the car body (at 550 volts), the watts per square foot of floor surface and the foot-candles illumination obtained per watt per square foot:

	Total Watts	Watts per Sq. Ft.	Average Foot-Candles	Foot Candles per Watt per Sq. Ft.
Car No. 537:				
100-watt lamps	364.5	1.365	3.31	2.42
Car No. 510:				
23-watt mazda	377.5	1.415	2.52	1.78
64-watt carbon	1063.0	3.980	2.30	0.58

The efficiency of illumination of the various systems based on 64-watt carbon lamps as 100 per cent is as follows: 23-watt mazda lamps, 307 per cent, and 100-watt mazda lamps, 417 per cent.

The following voltages on the three systems will give an average illumination in the car body of 2 ft.-candles, which is a good reading light: 100-watt mazda lamps, 487 volts; 23-watt mazda lamps, 506 volts, and 64-watt carbon lamps, 536 volts.

The foregoing tests were made by the mechanical department of the Cleveland Railway under the direction of T. Scullin, master mechanic, with the assistance of the engineering department of the National Quality Lamp Division, General Electric Company.

The Little Rock Railway & Electric Company, Little Rock, Ark., has been forced in several instances to pay claims for damaged clothing resulting from passengers leaning against the motorman's air-brake valve in the vestibule. In order to eliminate this source of claims a small leather cap, somewhat similar to a dice box, has been permanently attached to each motorman's valve. When the valve handle is removed the motorman places the cap over the valve, thus protecting the passengers' clothing from oil that may have accumulated on it. Another apparently small thing, which has materially added to the efficiency in air-braking on the cars operated by this company, is the application of a small set screw in the valve handle. As the socket in the handle shows wear it may be taken up by tightening this set screw. This adjustment permits better braking and lengthens the life of the valve handles.

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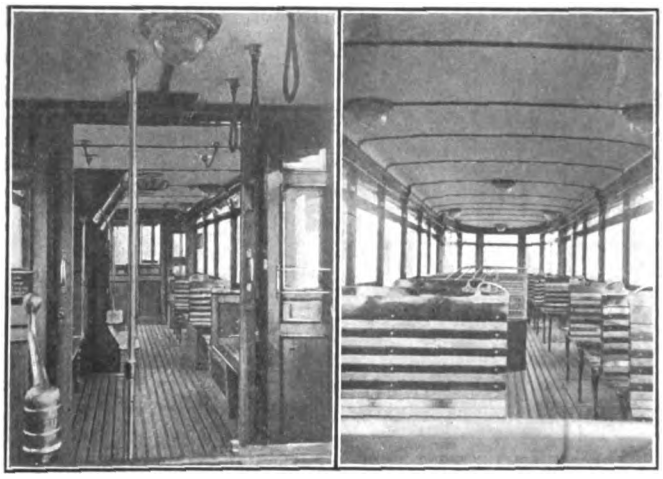
Single-Deck and Double-Deck Prepayment Cars for Vienna

The Article Describes Some Single-Deck Motor and Trailer Cars with Separate Exits and Entrances and a Double-Deck Drop-Platform Car with One Inside Stairway to the Upper Deck

In accordance with the design of Ludwig Spängler, manager, the Vienna Municipal Railways has recently placed in operation 262 new single-truck two-axle cars and one trial double-deck car of the types shown in the accompanying drawings and halftones. Both types of car are notable in Continental practice for the use of single-arch roofs and separate paths for entering and departing riders.



Vienna Cars—Inside Views of Double-Deck Car, Showing Bottom and Top of Inside Stairway

SINGLE-DECK CAR

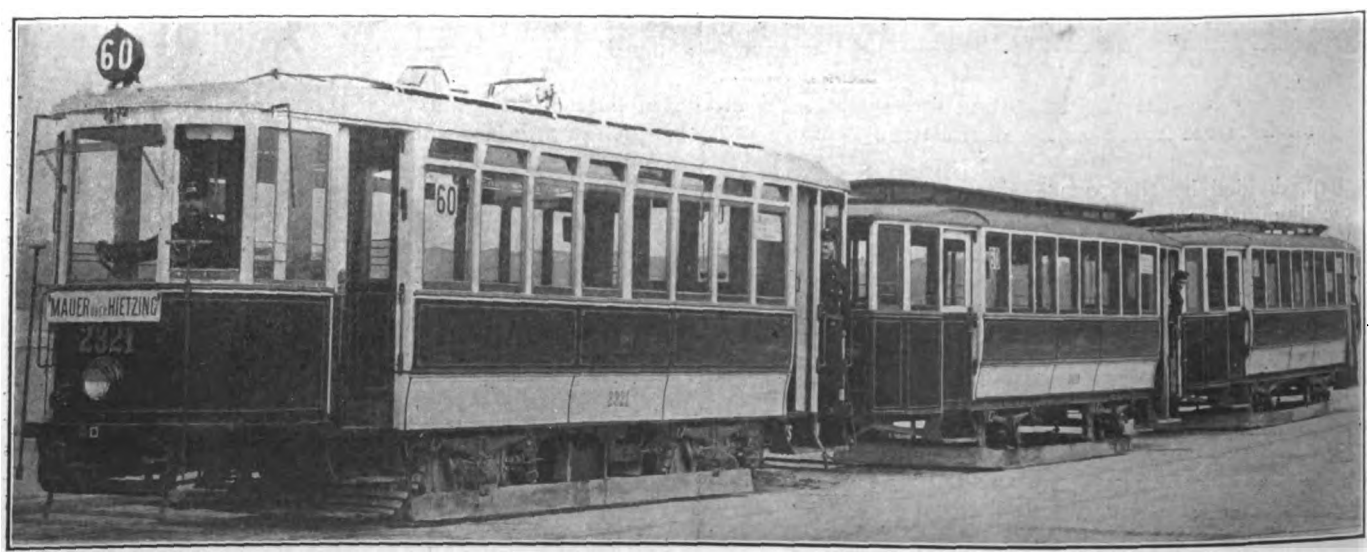
The principal data with reference to the single-deck cars are as follows: length over all, 35 ft.; length over the platforms, 32 ft.; length of car body, 19 ft. 6 in.; maximum width, 7 ft. 6 in.; length of platform, 6 ft.; distance between the individual axles, 11 ft. 10 in.; diameter of wheels, 32 in.; height of platform above the top of the rails, 31 in.; height of car floor above the rails, 37½ in.; seating capacity in cross seats, twenty-two, and standing room for ten persons each on front and rear platforms with permission to add two more on the back platform and twelve in the car body, thus giving a total capacity varying from forty-two to fifty-six passengers; weight of car, including electrical equipment, 27,720 lb., and without electrical equipment, 18,700 lb.

When operated on city sections the exit and entrance doors on one side of the rear platform are kept opened back to back behind the dividing post, whereas the sliding door on the opposite side is usually closed. The doors on the front platform are the same, but in this case the double doors are closed and the sliding door is open, this exit, however, being obstructed by a chain when it is not in use.

In Vienna cars are operated to permit entrance and exit on the left side when facing the direction in which the car runs. Passengers who depart by way of the rear platforms use the aisle nearer the bulkhead marked "Aus," while boarding passengers use the outer aisle marked "Ein."

The exit and entrance steps on the conductor's platform are 25 in. each, the width of the common doorpost being 3⅛ in. The exit step outside the sliding door is 28 in. wide. The body openings are provided with double doors which slide into individual pockets. The clear opening between these doors is 35½ in. The seating arrangement calls for a double cross seat 37 in. wide on one side and a single cross seat 19½ in. wide on the other, leaving a clear aisle width of 25½ in. In order to avoid congestion near the platforms, short seats but of transverse type are placed against the bulkhead in each corner.

The single-arch roof not only saves weight but also gives the ample package room desirable on a car for interurban service. Ventilation is provided by movable sash in the upper part of the side windows. The bulkheads and vestibules have drop sashes. An interesting feature of the vestibule glazing is that the central window has an upper sash adjustable for any angle, which can be used as an awning to prevent rain and snow from interfering with the view of the motorman. This scheme has proved so efficient that no squeegees are required for cleaning windows.



Vienna Cars—New Motor Car of Flat-Arch Roof and Vestibuled Platform Type Hauling Two Trailers

The cars are electrically heated, the control switch being so arranged that the temperature is maintained from 7 deg. to 10 deg. C. above that of the atmosphere. The motors

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are of the interpole type rated at 55 hp each at 750 volts on an hourly basis. The braking equipment consists of Ackley hand brakes, geared 14:34, and Chaumont slack adjusters. In regular operation a solenoid brake is used. Means are provided whereby the motorman can sand the track behind the car in case of running backward on a grade. Each motor car is capable of hauling two trailers weighing 5.8 tons each empty and carrying twenty-two seated and twenty-four standing passengers.

DOUBLE-DECK CAR

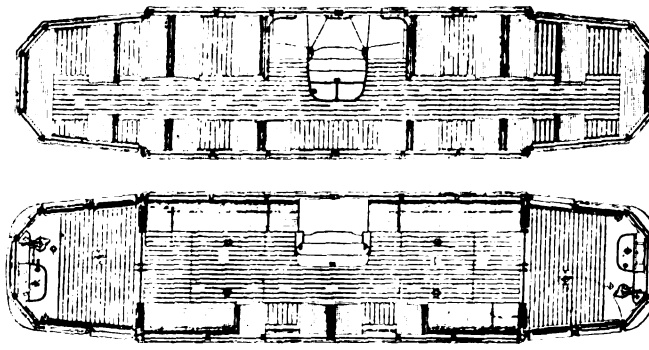
The Vienna Tramways has also built one double-deck car, which has the same width and length, door arrangement, motor equipment and wheel and axle layout as the single-deck cars. The seating arrangement, however, is quite different, owing to the fact that the stairway to the upper deck is placed in the center of the car instead of on the platform. Plans of both decks are presented. The roof is of the single-arch type with the same ventilating system as that of the single-deck car. The height of the car is 16 ft.

The accompanying views of the lower and upper decks show the position of the stairway and the character of the seating. The drawing of the end section indicates that the stairway is divided into three parts. This stairway is placed perpendicular to the longitudinal axis of the car in order to minimize the discomfort and possibility of accident due to sudden stopping and starting. It is constructed with an intermediate platform from which two aisles lead to the upper deck to enable incoming and outgoing passengers to choose separate routes. The lower deck seats sixteen passengers longitudinally and four transversely, while the upper deck contains thirty-two cross seats, to which room for twenty standing passengers on the two platforms should be added, thus giving a total of seventy-two passengers with a few extra standing places in emergencies. Smoking is permitted on the upper deck.

COMPARISON OF THE TWO TYPES

The weight of the double-deck car for seventy-two passengers, including electrical equipment, is about 14 tons, whereas a train consisting of the motor car and two of the company's lightest trailers weigh 18.4 tons for eighty-eight passengers. The lightness of the double-deck car is due to economy in the weight and size of non-essential parts, to the use of stationary windows (which are removed from the upper deck in summer) and to the employment of aluminum panels. The weight per seat of the double-deck car is 594 lb., compared with 920 lb. for a two-car train or 814 lb. for a three-car train. If the total seating and standing capacity is compared, the double-deck car weighs 427 lb. per passenger, the single-deck car with a trailer 462 lb, per passenger, and the three-car train 400 lb. per passenger. However, while the three-car train weighs less per passenger than the double-deck car, it occupies a length of 101 ft. compared with the 34-ft. 9-in. length of the double-deck car.

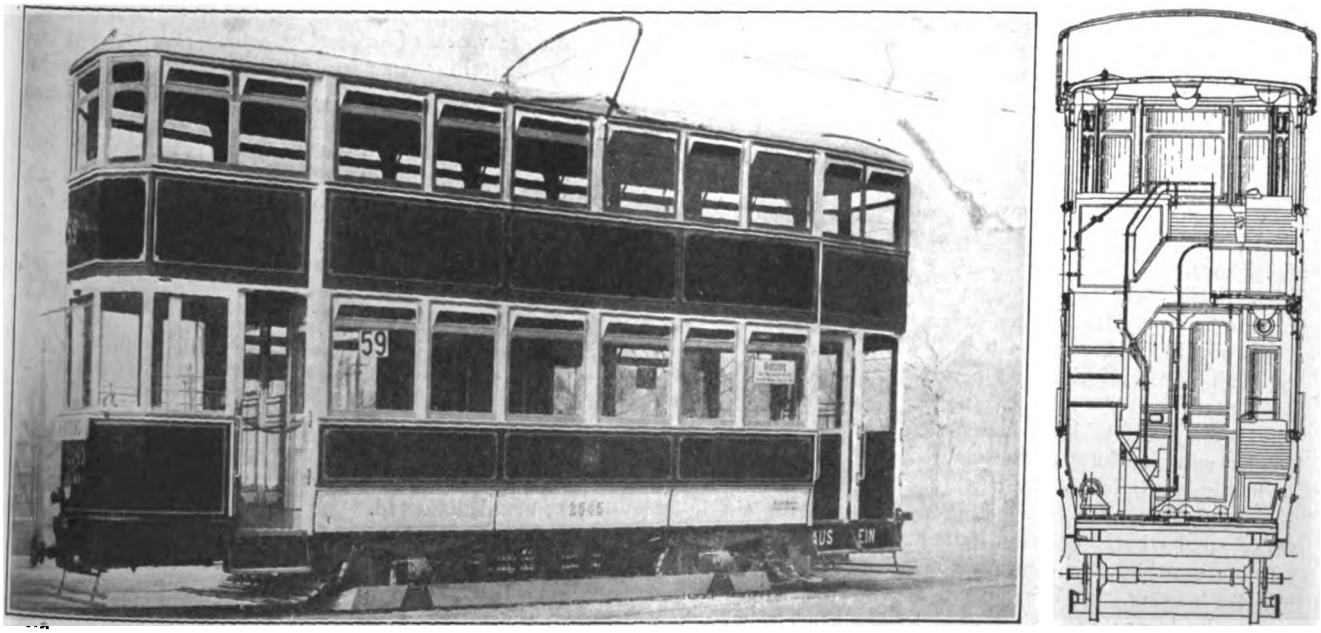
Mr. Spängler believes that this comparison demonstrates



Vienna Cars—Plans of Upper and Lower Deck of Double-Deck Car with Inside Stairway

that a double-deck motor car has many advantages from the standpoint of economy, especially as it can also haul a double-deck trailer. The saving is particularly important in the case where such cars can be handled by a single conductor, as in cities with single fares and without transfer privileges, on railways where the stops are not too frequent and, in general, on lines where the interchange of passengers is not excessive. The fact that the double-deck car requires less ground area for a given capacity relieves the streets and affords a saving in carhouse construction. For the double-deck car there are seven passengers per meter (39.37 in.) length, and for ordinary motor cars or trains only 4.22 to 4.32 passengers per meter.

In two communications to this journal, Mr. Spängler writes that the single-deck cars with separate entrance and exit which the Municipal Railways have had in use for several years have lowered the time of passenger interchange from 1.7 seconds to 1.3 seconds per passenger, a gain of 25 per cent over cars with no separate exit and



Vienna Cars—General View and Cross-Section of Double-Deck Car with Inside Stairway and Separate Entrance and Exit on Rear Platform

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entrance. These cars are not operated on the prepayment plan, however, because of the very complicated fare system which is used in Vienna.

The double-deck car has been in daily use since March 15 on a radial line which is crossed by several belt lines. This condition results in a heavy transfer traffic, which has been accentuated by a great deal of curiosity riding. The car has given the public great satisfaction, especially as the upper deck is so pleasant for sightseeing. Motormen find it easier to handle this car than they do a train as it rides better and can be accelerated and braked with greater ease. Two conductors have been employed so far because four different fares are in use and the transfer traffic amounts to 50 per cent. During non-rush hours, however, only one conductor is necessary. The conductors find the double-deck car superior to train operation in that no time is lost in waiting for signals from the trailer car. The time for loading and for unloading at terminals is nearly 1.2 seconds per passenger; elsewhere it is 1.3 seconds per passenger. In both cases this figure is about 10 per cent to 12 per cent more than for a two-car train. This difference is not large and, it is thought, is more than offset by the quicker acceleration and braking and by the elimination of the trailer signal. Furthermore, the time saved at terminals without loops is another important advantage of a double-deck car as compared with a train of motor car and trailer. No difference has been observed between the average speed of a double-deck car and that of a train made up of a motor car and trailer. It is planned to try the double-deck car later on one of the busiest streets.

Acknowledgment is due to *Elektrische Kraftbetriebe und Bahnen* for the halftone views and part of the data in this article.

WHEEL AND AXLE PRACTICE IN NASHVILLE

The Nashville Railway & Light Company is finding it profitable to purchase its heat-treated axles in the billet and turn them in its own shop. After four years' experience with this method of purchasing axles it has been found that a saving of $2.50 can be made on each 4½-in. axle renewed. The billets are purchased for approximately $5.50, and the cost of turning is $5 per axle. In addition to the saving, the plan also enables the mechanical department to employ continuously an expert machinist who is available for other shop work. Another advantage is that all axles may be purchased of one size and turned to fit any wheel bore.

For boring wheels the company has purchased Davis expansion boring bars in three sizes, namely, 3 in. to 4 in., 4 in. to 5 in. and 5 in. to 7 in. These bars are changed for each 1-in. variation in the cutting so that all chatter is eliminated and the bars are not subjected to over-strain. The boring-mill table is being revolved at 24 r.p.m. with good results, so long as the size of the bar is changed for each 1-in. variation in the cutting.

Other wheel practice included the use of single-life rolled-steel wheels 33 in. in diameter. These were selected to give considerable clearance between the motor frames and the paving, this being necessary in Nashville. Rolled-steel wheels are not being used to replace chilled wheels on single-truck cars, however, as it was found that with the larger wheelbase of the single-truck cars there was considerably more squealing with the rolled-steel wheels than with the cast wheels. The steel wheels are applied to the 4½-in. axle with a 6-in. wheel seat at 50 tons pressure, and no loose wheels have been detected during four years' experience. When the wheels are removed the pressure used is 120 tons. All wheels are purchased in carload lots, the empty car being loaded with old wheels which have been held in storage until new ones have arrived.

"WITH THE BLINDERS OFF"

BY A FORMER RAILWAY MANAGER

As a novel idea let me suggest that it would be an excellent thing for his employers, his subordinates, the general public, his customers and himself if the operating head of a public utility company, or the head of any department of it that comes into direct contact with the general public, could be banished to private life for six months or a year and made one of that public so far as his ideas are concerned.

I have had this rubbed into me very strongly this past year, and I venture it as a matter of personal experience and as one well worth consideration in these times of unrest in the dealings between the public and its privately owned and operated utilities. I am an old operator of public utilities—electric railways, central station lighting and power plants and gas works. I have been considered very successful in my work, especially in regard to my dealings and relations with the municipal authorities, the general public, and the employees. But since my retirement to private life and my becoming a member of that general public I have learned a whole lot of the other side. My ideas have become broadened and my vision more clear and comprehensive, and I believe that were I again to take up the management of public utilities I should be of much greater value to my employers than heretofore, and I am only an average man of middle age.

About the time that I left the business, a year or so ago, I felt that I could see matters pretty clearly from all angles, and I think that I had a clearer conception than most in my position, for the matter has always been a fad with me; but the trouble was that I did not realize the situation strongly enough to make me act on it in the proper way.

This was not because I did not realize certain necessities and conditions and viewpoints on the parts of the general public and the employees, nor was it because care and thought and attention were not constantly given to the subject. These points occupied my attention much more than the routine work of operating, which is only a matter of close and intelligent supervision of results obtained from a well-organized and properly departmented force of employees. And this viewpoint of the public, despite the general public belief to the contrary, is the major proposition of every intelligent executive. It is the skeleton at his every feast, the old man of the sea that rides his back sleeping or waking.

The trouble with me was—and it is the trouble with many otherwise good executives—that the full viewpoint of the "other man" was an impossible one to me so long as I held my position and acted in it. I was, metaphorically, like a horse in blinders. My view was limited to a narrow streak straight ahead of me, and, instead of my eyes being able to roam over the whole landscape and see all things in their natural color and form, they were limited to a little, straight section. All outside that streak was invisible or blurred and distorted.

And these blinders were a fixture so long as I held my position and fulfilled its duties. They are the results of the business environment in which every local executive finds himself, and their origin is the one constant viewpoint forced on him by that business environment.

From above there is the constant prodding to obtain more and more favorable financial results from the property that he manages. If those results have been poor from the standpoint of the owners, he is urged to make them good; if they are good, he is urged to make them better, and that "better" is used as a lever to make them a record. This is merely one of the phases of our present forcing system of development. It may produce good results in private businesses, but it is not an unmixed good in public utilities, either publicly or privately owned or operated.

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From around him there is the constant complaint and suggestion of the patrons from their extreme viewpoint, often erroneous, often unreasonable, often unjust.

From below come the continuously intermittent demands or objections of the employees, often selfish and inequitable, very often untimely and ill-advised.

Between the three, the manager is almost always compelled to choose that of the owners, for his bread and butter seems to depend on his pleasing them and giving the results they demand. Then, unconsciously, he is led to regard the other viewpoints as wrong—generally intentionally so. And the pity of it is that under that constant urging and pressure the main assets of the utility are apt to be lost sight of or to be but dimly seen or appreciated by the executive. Those main assets are a satisfied and favorable public and a loyal and contented force of employees, and the beauty of these assets is that while they are intangible as to dollars and cents value they are the assets that not only finally give the best pecuniary returns but that add more to the actual value of the plant than does its whole physical property. It seems strange that this is not more fully realized or that, being realized, it is not more fully acted upon. It must be remembered, however, that the local operator or manager is not the only one that wears blinders. The owners and bondholders not only seem to wear very large ones at times but to add smoked glasses to the outfit.

Now, it is of no use for anyone to try to tell me that these assets are impossible or even excessively difficult to obtain or retain, even in some very unlikely localities. I know better by actual experience in many divergent sections of this country. Notwithstanding my blinder myopia I have achieved them with fair success in every community where I have remained long enough to put my ideas into full practice.

You will hear that it is "impossible to please the public; the more you cater to them the more they will require of you." You will also hear that it is "unwise as well as impossible to satisfy the employees; as fast as you give them the inch that they demand they will insist on the ell."

That is simply bosh! I have tried it and found the contrary in every case. This classification into "public" and "employees" is a survival of feudal ideas and has done more harm than even the masses and classes slogan of the demagogue. You and I and all of us are the public to anything in which we are not directly interested as owners or employees. As an electric-light man I was one of the public as regarded telephones, telegraphs and steam railroads, and with reference to them I never felt that I or those of my friends or acquaintances similarly situated were either fools, knaves or ingrates. The public is you and I and millions of other plain Americans just like us, and there is a mighty small percentage of us that will not respond in kind to just, equitable and courteous treatment or that will not feel and act in the reverse way where our treatment is also of the reverse description. This applies to individuals, firms and private and public corporations and whether we are treated as individuals or as a class.

And most of us are employees also—employees of some one or something—and there are few of us that will not respond in kind to justice, equity, courtesy or a little liberality from our employers. We may kick a little and talk a whole lot if the shoe sometimes pinches us, but if we have been the ones to make the misfit there is seldom ill feeling back of the talk, and if there is, we can always trust the public to sense the difference between a "grouch" and a genuine grievance. A genuine grievance always has facts back of it. These facts may be dimly perceived or understood, but they are felt and that is all that is necessary to most of us, for we seldom take the time or effort to visualize very exactly or thoroughly. As a rule we leave that important part of our work to incompetent hands, such as our favorite (political) newspaper or our public representative.

And it is these dim matters, lurking in the back of our minds, that it is impossible for the local executive of a public utility to realize fully so long as he remains in continously active discharge of the duties of his position. He may really feel the same as one of the public toward other public utilities than his own, but unless he is a superman his business environment prevents him from recognizing that the matters which lead him to have certain feelings toward other public utilities are also adjuncts or attributes of his own business.

I know this to be true, for, despite flashes of intelligence and clear conception as to the real viewpoint and attitude of the public and the employees, some urgency of the business, some attitude of the owners or security holders, or some action of the public, the municipality or the employees, would cloud the situation to me and force the blinders back into position.

The moral to the public and to the employees is this: The apparent fault of your local utility or utilities may often be a misfortune of which they are unaware. It lies largely with you to dissipate that misfortune or that view of it, or, at least, to give the opportunity for that dissipation. Try the idea of looking at the other side of the shield. Come down to cases, and bring facts, not fancies, to back up your grievances. Do not break loose in newspaper, council-chamber, legislature or courts until you have tried direct, practical, sensible and courteous business appeal to the principals of your public utilities. That much is due to yourselves as well as to the utilities, for, individually, you are sane, just and courteous in your dealings with one another, and you must be the same to those who operate or manage your utilities; or you at once place yourselves in the wrong position. And you directly owe it to them to do this until, or unless, they have absolutely proved themselves impervious to truth, to dispassionate facts and to ordinary business courtesy—until this happens you have not fully done your share.

As a corollary to the above it might be insisted that it would be the proper and correct thing to give the public an opportunity fully to appreciate the other side by admitting it to the councils of the utility. But I am afraid that the time is not ripe for that, and such a course might be provocative of a little confusion in the management. The average American is born with an intuitive and complete knowledge of three things—how to manage a baseball team, how to edit a newspaper or magazine and how to operate a public utility, so that the probabilities are that in any city of 100,000 adults there would be 99,999 divergent, inexpert opinions on any one of these subjects (the other one being the actual manager), and this would be liable to produce confusion.

And the owners, operators and managers of public utilities have also something to learn. It is this: Shake off those blinders, open both eyes to the real facts, take every opportunity to go round to the other fellow's side of the shield and take—or give—time enough to study it thoroughly and minutely, time enough to obtain a clear and true view of it in its smallest detail. Only by thus doing can you obtain that clarity and completeness of vision of the whole situation that will enable you to deal with it equitably and justly and with advantage to yourself, your property and the public in general.

Take the blinders off yourselves, your agents and your subordinates, and keep them off no matter what you may find by doing so. You may have some things revealed to you that you do not like to see. But it is better so than unexpectedly to bruise yourself over them when you blindly stumble against them.

I have personally proved to myself and others that "in the country of the blind the one-eyed is king," and I am only sorry—for my employers, my profession and myself—that I did not shake off the blinders long ago. In that case I might have become a Tzar!

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Municipal Responsibility for Strike Damages

Digest of Briefs Submitted to United States District Court in Case of Wells Fargo & Company v. Jersey City in Which Award for Damages Was Made to the Express Company

The recent Buffalo and Jamestown strikes and the resulting claims put in against the cities have brought out more forcibly than ever the importance of the question of municipal responsibility for strike damages. In this connection the case of Wells Fargo & Company against Jersey City, decided last May, is of inestimable value by virtue of the legal light it throws on the issues involved and the exhaustive citation of cases it gives on the various points.

On May 10, 1913, Jersey City was found guilty by the jury in the United States District Court at Newark because of the failure of the city to give adequate protection to Wells Fargo & Company during the express drivers' strike in 1910. The facts brought out in the trial case were that the company was a corporation organized under the laws of Colorado and a citizen of that State, but authorized to do business in New Jersey by permit of that State. It was engaged in a general express business between points in New York and New Jersey and various points throughout the country, in the carrying on of which it maintained its principal depot office at Jersey City in the terminal of the Erie Railroad Company, and its stables for the accommodation of its horses and wagons on Pavonia Avenue, Jersey City. All of its business for the district of New York City was handled by means of these wagons and horses. Evidence was submitted showing that upon Oct. 26 and 27, 1910, its drivers and helpers, not on strike themselves, were prevented from doing their work by fear of violence from mobs and disorderly crowds on Pavonia Avenue, Jersey City, and that from that time until Nov. 14, 1910, business was interrupted and partially destroyed and other property injured and destroyed by mobs and riots in Jersey City. The Mayor of Jersey City was notified of this disorder and the police force was doubled and night and day shifts put on, but notwithstanding these facts, the provisions were inadequate to restore order and the disorderly conduct and rioting continued. From additional evidence the jury found that the company was prohibited from doing its normal business during this period, and that because of such mobs and riots the physical property was destroyed to the value of $300 and the intangible property, the business of the plaintiff, was damaged to the extent of $43,000, which amounts were reductions from the respective claims of the company of $512 and $87,500.

The principal questions before the court were of course whether any damages could be collected and, if so, their amount. The brief presented by the plaintiff is a well-constructed digest of the law on these points. It centers largely around the questions of municipal responsibility for actual physical damages and municipal responsibility for losses sustained by "business" in general, most of the dispute being waged around the second point. The company's attorneys in the case were Collins & Corbin, Charles W. Stockton and John H. Mooers, of Jersey City, N. J.

The statute under which the express company brought suit is very similar in wording to statutes which are in force in other states, and references to these statutes in a number of instances were made in the brief. The purpose of all of these statutes, as expressed in their preamble or as defined by the courts, is to compensate for injury to property in consequence of mobs or riots and to discourage mob violence. According to the brief they are "remedial" in character. Hence, as determined in several decisions, such as Marshall v. City of Buffalo, 50 App. Div. 149; 64 N. Y. S. 411; Spring Valley Coal Co. v. City, 65 Ill. 571, 590; Pittsburgh, C., C. & St. L. Ry. v. Chicago, 242 Ill. 178; 89 N. E. 1022; City of Chicago v. Penn. Company, 119 Fed. 497, the law demands a liberal construction sufficient to effectuate the purpose of the statutes. In this case the claim was made by the plaintiff that the property protected by the act was all kinds of property that might be injured or destroyed by mobs or rioters. The act fails to specify particular classes of property, but says generally that recovery may be had for damage to "any buildings or other real or personal property." This, the brief says, is broad language, and there seems to be no justification for any limitations or exceptions. If, in the construction of the statute, recovery is limited to compensation for injury to real estate or tangible property, and other property rights are excluded, it is tantamount to a declaration that the Legislature intended that mobs might wreak their spite upon property rights so long as they abstained from injuring physical and tangible property. In Palmer v. City of Concord, 48 N. H. 211, it was held that business is property and entitled to equal protection with other classes of property. The city, however, maintained that the business of Wells Fargo & Company and the right to carry it on in Jersey City was not property or a property right having a situs there and therefore it was not property within the purview of the act in question.

On this point the brief says, in part:

"The peculiar nature of the business and the property rights of express companies has received in several cases the consideration of the Supreme Court of the United States and its various aspects have been defined. The leading case on the subject is Adams Express Company v. Ohio State Auditor, 165 U. S. 194, 41 Law Ed. 683 (1896). This case is the first in which the Supreme Court upholds the application of the unit theory of taxation in respect to express companies, in ascertaining the value of the capital stock of an express company and apportioning such a part thereof to a particular state for taxation as is represented by the ratio between the mileage operated by the express company in that state and the total mileage operated everywhere. The use of express companies' tangible property in a particular state in connection with the entire property of the company scattered throughout the country resulted in the creation of an additional value and was an asset to the company as a whole. This additional intangible value was considered by the states to be property having a situs where the tangible property was used.

"In the Adams Express Company case the court said: 'No more reason is perceived for limiting the valuation of the property of express companies to horses, wagons and furniture than that of railroad, road, telegraph and sleeping-car companies to roadbed, rails and ties, poles and wires of cars. The unit is a unity of use and management, and the horses, wagons, safes, pouches and furniture, the contracts for transportation facilities, the capital necessary to carry on the business—whether represented in tangible or intangible property—in Ohio, possessed a value in combination and from use in connection with the property and capital elsewhere which could as rightfully be recognized in the assessment for taxation in the instance of these companies as the others.

"'We repeat that while the unity which exists may not be a physical unity, it is something more than a mere unity of ownership. It is a unity of use, not simply for the convenience or pecuniary profit of the owner, but existing in the very necessities of the case—resulting from the very nature of the business.'

"Continuing this thought the Supreme Court said:

"'The property taxed has its actual situs in the state.

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and is therefore subject to its jurisdiction. Pullman Palace Car Co. v. Penn., 141 U. S. 18, 22 (35:613, 3 Inters. Com. Rep. 595); Taylor v. Secor ("State R. Tax Cases") 92 U. S. 575 (23:663); Minot v. Phila. W. & B. R. Co. (Delaware R. Tax) 85 U. S., 18 Wall U. S., 21 Wall 492 (22:595); Columbus S. R. Co. v. Wright, 151 U. S. 470 (38:238).'

"Other cases in which the Supreme Court has affirmed the right of states to tax intangible property of this nature are Pittsburgh, C., C. & S. L. Ry. Co. v. Backus, 154 U. S. 429; Western Union Telegraph Company v. Taggart, 163 U. S. 1; Adams Express Company v. Kentucky, 166 U. S. 171."

On the basis of these decisions it was claimed that Wells Fargo & Company, conducting a general express business in several states and using for that purpose horses, wagons, equipment and other personal property which was kept in those states, had, in addition to that tangible property, certain intangible property and rights which had a situs where the tangible property was situated and the work was done, which were an asset and a thing of value in addition to the actual tangible property employed, which were subject to taxation, and, as a necessary corollary, entitled to protection. It being thus determined that Wells Fargo & Company had intangible property in Jersey City over and above their tanglible property, the next point involved proof of damage done. The damages to the tangible property were easily shown, but the municipality strongly opposed any recognition of its responsibility for any loss to the company's intangible property or so-called "business."

On this point the brief quotes from *in re* Jacobs, 98 N. Y. 105, where the Court of Appeals of New York held:

"The constitutional guaranty that no person shall be deprived of property without due process of law may be violated without the physical taking of property for public or private use. Property may be destroyed or its value may be annihilated. It is owned and kept for some useful purpose, and it has no value unless it can be used. Its capability for enjoyment and adaptability to some use are essential characteristics and attributes without which property cannot be conceived, and hence any law which destroys it or its value or takes away any of its essential attributes deprives the owner of his property."

Other cases quoted in which "property" was held to mean the owner's rights to the use of things were *ex parte* Koser, 60 Cal. 210; *ex parte* Law, 35 Ga. 294; Braceville Coal Co. v. People, 147 Ill. 71; Law v. Rees Printing Co., 41 Nebr. 146; Smith v. Furgish, 68 N. H. 123; Wyndhamer v. People, 13 N. Y. 378; Griffith v. Charlotte, etc., R. R. Co., 23 S. C. 25. The conclusion reached from these cases was that the legal effect of depriving one of the use of his property is to take or destroy the property itself, and this applies both to real and personal property.

The municipality objected to the introduction of testimony as to the amount of business done by the plaintiff for the period from Sept. 1 to Oct. 25 for the year 1910 and the same period for the year prior and the year subsequent to 1910, also to the introduction of testimony showing the plaintiff's business from Nov. 14 to Dec. 31, 1910, and the same period for the year prior and the year subsequent to 1910, and to the further showing of the business done by the plaintiff from Oct. 26 to Nov. 14, 1909, 1910 and 1911, being the year prior and the year subsequent to the period in which the plaintiff claimed an interruption of and damage to its business, as well as the period itself in which the interruption occurred, also to the other tabulations showing the business of the company for the years 1906 to 1911, inclusive. This testimony was admitted, however, as throwing light on the value of the property.

In conclusion, the brief, says:

"The intangible property of the company had its situs in Jersey City in that it was an inseparable part of the physical property which had its situs in Jersey City. The destruction of and injury to the use value of the plaintiff's property by reason of riotous mobs is as clearly within the contemplation of the Legislature as the physical destruction of the wagons which were burned in the streets by the mob, since the use value was an integral part of the value of the physical property which arose from its employment in the business. The entire destruction of the physical property, or merely the prevention of its use, would equally destroy the use value which inhered in its employment in the business. The right to use peaceably its property in the transaction of its business was injured and the actual use of the property destroyed, and in the destruction of the use, the value dependent upon the use was also destroyed. The measure of damages for the destruction of the use value of the property was the revenue which the plaintiff would have derived from the use of its property for the period of time for which the use was destroyed as shown by the testimony mentioned above. These were the injuries in consequence of the mob or riot and the damages sustained by reason thereof.

"To summarize, the law as laid down by the Supreme Court of the United States in the cases cited by the company is as follows:

"(1) The property of an express company engaged in transportation among the several states may be taxed by each of those states at a valuation greatly in excess of the combined market value of the separate pieces of physical property.

"(2) This increased valuation arises from the unity of use of all the property of the company and has its situs where the physical property is used.

"(3) The use value of such property is to be measured by the traffic in which it is employed and the gross earnings derived from such traffic.

"Furthermore, a destruction of the use of such property is a destruction of part of the property itself and the measure of damages is the loss of revenue which would have been received from the use of the property in the business in which it was employed.

"No fine-spun theories about situs should interfere to prevent large corporations whose property is taxable in many states from requiring of each state such measure of protection as the use value as well as the actual value of their property in these states requires."

DIESEL ELECTRIC CARS IN SWEDEN

In the foreign review of *The Journal* of the A. S. M. E. an account is given of the Diesel engine-driven motor cars which were recently installed on the Swedish railroads. The cars are designed to run at a maximum speed of 37 m.p.h. and take care of two trailers, weighing together 33 short tons. The power equipment consists of a six-cylinder, 75-hp Diesel engine, running at 700 r.p.m., and a direct-connected 50-kw, 440-volt, d. c. generator, supplying current to two 30-hp motors. The Diesel engine is of the four-stroke cycle type, with six working cylinders and one pump cylinder supplying compressed air for starting the engine and for fuel injection. The air for the brakes is supplied from a separate pump. The fuel tank is designed to hold fuel for a run of 745 miles with two trailers attached to the motor car.

A car was tested in May, 1912, in runs between the stations Enköping and Heby, a distance of 23 miles. Between these two stations there were five intermediate stations at which stops were always made. The following data as to consumption of crude oil are given: With motor car alone, weight of train 29 short tons, speed 24.8 to 27.9 m.p.h., the fuel consumption was 0.842 lb. per train mile. With motor car and trailer, weight of train 44 short tons, speed about 25 m.p.h., the fuel consumption was 1.07 lb. per train mile. With motor car, one passenger car and two freight cars, train weight about 60 tons, speed 21.7 m.p.h., the fuel consumption was 1.21 lb per train mile.

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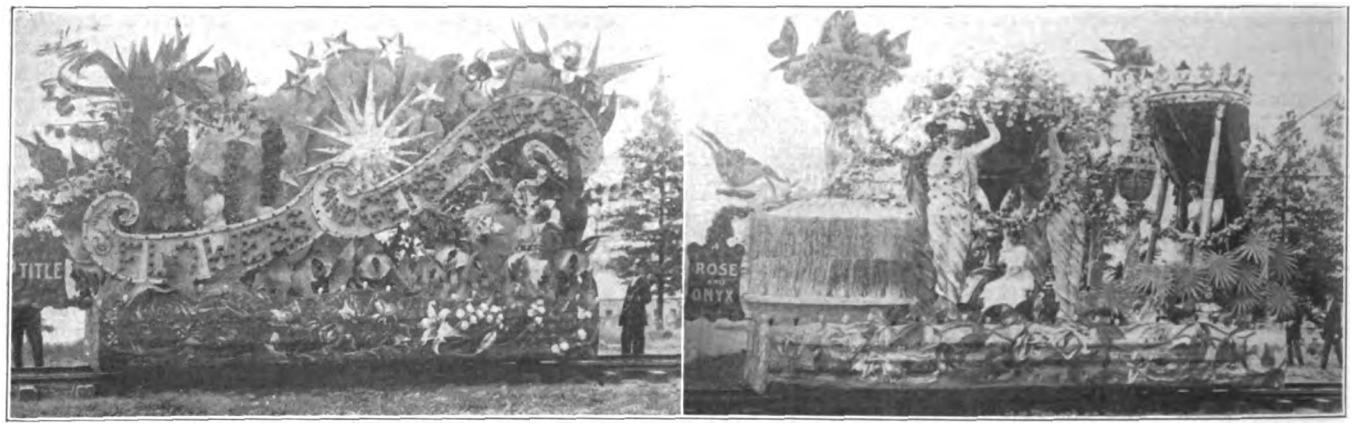
ROSE CARNIVAL IN PORTLAND, ORE.

During the week of June 9 the seventh annual Rose Carnival was held in Portland, Ore. One of the largest features of the festival was the electric parade, held on June 10 and June 14. Each year the decorated electric cars of the Portland Railway, Light & Power Company have been made more and more elaborate, and the last parade is claimed to have been the most elaborate and gorgeous ever presented. The parade was headed by the officials of the Rose Carnival in several decorated automobiles, followed by a large band, and between each of the floats were bands, marching.



Portland Rose Carnival—Trolley Floats Representing "Flowers and Gems of Oregon" and "Rose and Onyx"

The floats were built on single trucks, on which a perfectly flat body had been built. Part of the floor was lowered in the front end almost even with the track, and this lowered portion contained the controller and a place for the motorman. The cars were single-ended and equipped with two old motors each—W.P-30s and GE-800s. On these platforms the floats were built, composed of papier-maché, tinsel, plaster of paris and paper shapes. These designs were built onto the floats and artistically painted, and colored lights and bulbs of different shapes were used to carry out the designs. The lights varied from 700 to 1200 lamps on each float, and the floats cost from $1,000 to $2,000 each.

Quite a number of the floats had movable parts, which were belted up from the axle. On float No. 12, "Thistle and Turquoise," a rose-entwined swing was in the circle with a little girl seated in it. This swing was connected to the bird's mouth by a cord of roses, and as the swing moved back and forth the bird's head would move as if pulling the swing, and its beak would open and shut. On float No. 4, "Rose and Onyx," there were revolving lights of different colors on a corkscrew shape behind the tinsel in the waterfall, which, revolving, would make the tinsel look like water coming over the falls.

The first float was the "King's Float," representing the King of the Carnival. The second was the "Title Float," which bore the words: "Flowers and Gems of Oregon," and each float following represented a flower and a gem. Besides the ones reproduced, there were floats representing such combinations as "Chrysanthemum and Amethyst," "Cat's-eye and Geranium," "Agate and Poppy," "Lotus and Pearl," "The Tiger Lily," "Emerald and Wistaria," "Pansy and Diamond," and many other equally beautiful groups.

The motorman on all floats was concealed in the figure in the front of the car, which had small openings covered with white scrim, through which he could see but not be seen. The sides of the cars were draped close to the track with painted designs, and the only part of the car itself that could be seen was the end of the trolley pole, which extended out of the rear end of the float. Each car had two pages, dressed in red costumes, one to watch the trolley and the other to give orders to the motorman, as he could see only straight ahead.

In many cases mirror lamps were used to throw light to bring out the design, but as the brilliant coloring cannot be reproduced in the photographs they hardly do justice to this very beautiful and artistic pageant.

Portland Rose Carnival—Trolley Floats Representing "Thistle and Turquoise" and "Rose and Sapphire"

A scheme of electric underground railways for Milan is now in progress, while similar plans for Genoa and Naples are also about to be adopted. At Genoa it is proposed to run a 6.4-mile d.c. line from Sampierdarena to emerge at Quarto in the east. Of this route 5½ miles will be underground. There will be sixteen stations in the principal quarters of the city. T-rails, weighing 93 lb. per yard, will be used. The cost will be $6,250,000.

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COMMUNICATION

TRAFFIC CONDITIONS IN NEWARK

93 NASSAU STREET, NEW YORK.
July 28, 1913.

To the Editors:

In your issue of July 26 you comment adversely upon my report with reference to the proposed trolley terminal in Newark. In a measure your comment misrepresents the situation there. The proposed terminal has not been put forward primarily for interurban traffic. The amount of essentially interurban traffic handled on the streets of Newark is almost negligible as compared with the traffic within the 5-cent zone. True, a great deal of the 5-cent traffic comes from outside the corporate boundaries of the city of Newark, but that does not make it interurban traffic. The traffic coming from Kearney, Montclair, Bloomfield, the Oranges, etc., is strictly urban street railway traffic and is handled and should be handled in the same manner as traffic originating within the city limits of Newark. My report does not present arguments against a terminal for interurban traffic, but I state that in my opinion there is altogether too little of such traffic in Newark to warrant the construction of this big terminal with its subway and elevated approaches. It is true that the down-town streets of Newark other than Market and Broad Streets are not well adapted to through operation of cars. Neither are they well adapted to operation into a down-town terminal. The emphasis of my report was upon the duty of the city to modify its street plan so as to render possible the adequate handling of the traffic problem, present and future. Comparatively few street changes are required to afford the traffic relief for which the proposed terminal was designed, and in my judgment it is "up to" the city to make these changes and to work along the line of the through routing of local traffic and the postponement of the construction of an expensive terminal with subway and elevated connections until there is sufficient interurban traffic of the kind they have in Indianapolis, Denver and the other cities you mention to justify the expense.

DELOS F. WILCOX.

SINGLE-PHASE TRACTION FOR NORFOLK & WESTERN RAILWAY

A decision has now been reached in regard to the system of electric traction to be adopted for the electrification of the Elkhorn Grade-Bluefield section of the Norfolk & Western Railway's main line. A recommendation to adopt the single-phase system was made by Gibbs & Hill, the consulting engineers of the company, after an exhaustive analysis of the various systems now in use both in this country and abroad. A careful study was also made of the local conditions involved, and comparisons were made of the capital and operating costs.

The intention is to use 25 cycle, single-phase current at a potential of 11,000 volts at the trolley. Energy will be supplied from a power house to be erected by the railway company at Bluestone, W. Va., with an installed capacity of 27,000 kw. For transmission purposes the potential will be raised to 33,000 volts, and the transmission line will be carried mainly on the catenary bridges. Feeding points will be established at suitable locations along the line.

In view of the fact that freight trains only are to be handled, the locomotives, of which there will be twenty-four, are to be equipped with motors of the induction type, and the control and connections are to be arranged to give three running speeds of approximately 7, 14 and 28 m.p.h. respectively. Special attention is being given to the question of regeneration and electric braking on grades, which would decrease the wear and tear on train equipment and also under favorable conditions tend to reduce the demand on the power house.

PROPOSED CHANGES IN CHICAGO ORDINANCE

A letter sent by Bion J. Arnold to a sub-committee of the committee on local transportation of the City Council of Chicago in reference to the proposed merger ordinance was mentioned briefly in a recent issue of the ELECTRIC RAILWAY JOURNAL. In referring to the proposed personnel of the new board, Mr. Arnold said that it would be necessary to pay comparatively high compensation to secure the kind of talent required by the technical nature of the work and that there should be adequate engineering and accounting representation in the commission. He disclaimed the idea that the members of the present board, and especially he, were attempting to retain their present positions and declared in regard to his salary as chairman of the present board that for several years prior to his connection with the board, and when he was able to give his entire time to professional work, his income was more than four times his total compensation now received from the board. He added that his only reason for retaining the chairmanship for some time past has been that he felt he owed a moral obligation to the public and railway companies represented to remain long enough to establish firmly the principles of the ordinances.

The writer took up seriatim the clauses of the proposed ordinance and made certain constructive suggestions in regard to them. Perhaps the most interesting was in connection with the allowance for maintenance, repairs, renewals and depreciation. With the present rate of fare, he said, the minimum amount stipulated in the present ordinances for maintenance of the properties should be increased from 6 per cent to 8 per cent and the right should be retained by the board to increase the percentages for both maintenance and renewals. The letter then said, in part, that the maintenance and renewal funds should be separately provided for and maintained, as in the present ordinances, for the reason that it would be but natural for the company to endeavor to utilize, on the maintenance of the property, the funds that ordinarily should be kept intact for renewals, as the renewal fund is cumulative, while the maintenance fund is not. If, however, the amount of these funds, as measured in per cent of gross receipts, could be accurately determined in advance, or if not accurately determined made amply high, there would be no objection to these funds being combined into one fund, even though the company was interested in the net divisible receipts. The statement continued as follows:

"If the proposed ordinance finally takes the form of guaranteeing to the company a fixed return upon its agreed capitalization, and the company is not interested in the net profits, these maintenance and renewal funds could be combined into one fund, and in this case, if no authority is given to the board of control to increase it, the total percentage for the two funds should be fixed at approximately 18 per cent of the gross receipts (based upon the present rate of fare), but it would be better to fix a minimum amount of 16 per cent and give the board of control authority to increase it if necessary.

"So much of this renewal fund, in either case, as remains on hand at the end of any fiscal year of the company, as well as the amortization and contingency funds, should be invested in the first mortgage securities of the company, at par or less, or in other safe securities drawing an equally high rate of interest with the company's securities, for by this method the otherwise idle surplus remaining in these funds will be kept working, in quick salable assets."

Mr. Arnold also refers to the desirability of the establishment of a contingency reserve fund, which he says has the indorsement of many able financiers. If this theory be accepted, the letter says, the income of the company should be distributed as follows:

"1. Operating expenses, including insurance, taxes and maintenance.

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"2. Reserve for renewals to cover permanent shrinkage due to normal wear, depreciation, obsolescence, inadequacy, etc.

"3. Reasonable interest return on investment (or a basic return on 'agreed capital value').

"4. Amortization fund for the decapitalization of intangible values and tangible values, if the latter should be deemed advisable.

"5. Contingent reserve fund to provide for 'lean' years and other emergencies, due to catastrophes, etc., as above stated.

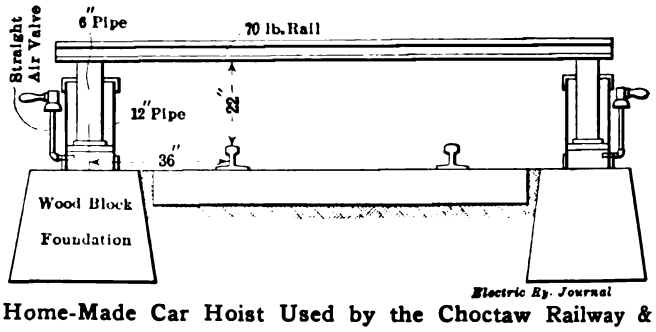
"6. Balance or residual net income to be shared by the company and the city with some provision for employees' bonus, pension and disability fund, unless it shall be decided to give the company a fixed guaranteed return and no more upon its capitalization, in which case the residual net income should be divided in such a manner between the city and labor as to insure the best possible service under a 5-cent fare, leaving it within the power of the city to devote its share of the profits to the improvement of the service. If the city saw fit so to use its entire profit, the highest standard of service would be obtained, consistent with the rate of fare paid, a protected investment and suitably compensated labor.

"Another method of fixing a standard of service is to ascertain, after carefully considering any specific case, the probable percentage of the gross receipts that should be devoted to service, leaving the balance to take care of fixed charges on the company's investment, profits, contingencies and amortization. In surface line street railways operating under average conditions, this amount would be from 65 per cent to 70 per cent of the gross receipts for service, including taxes, insurance and the necessary amounts for maintenance, renewal and accident funds, leaving 30 per cent to 35 per cent for company's use, amortization and contingency reserve purposes. For subways and elevated roads these percentages would vary from 40 to 65 per cent to service and 60 to 35 per cent for the other purposes above mentioned."

Referring to the section in regard to the right of the city to purchase the property, Mr. Arnold says that provision should be made for the reduction of the purchase price by the utilization of a percentage of gross receipts of the company or a portion or all of the company's share of its net profits and a portion or all of the city's share of its net profits by placing these sums in an amortization fund by which there could gradually be retired from the capitalization the intangible values contained in whatever capitalization might be agreed upon and fixed in the ordinance. This amortization, however, should extend over a sufficient length of time so that the annuity required, when measured in terms of the percentage of the gross receipts, should be low enough not seriously to interfere with the service rendered or jeopardize the investment of the company by reducing the agreed rate of return.

HOME-MADE CAR HOIST OF THE CHOCTAW RAILWAY & LIGHT COMPANY

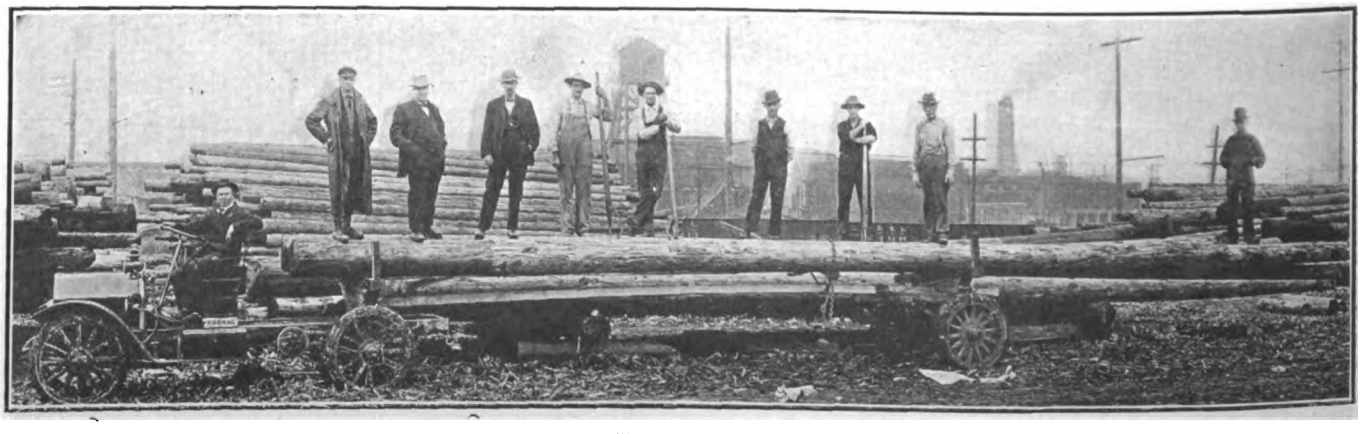
At a total cost of approximately $40, M. Plunkett, master mechanic of the Choctaw Railway & Light Company, McAlester, Okla., has equipped his shop with an air hoist of sufficient capacity to lift one end of a 30-ton car. Essentially this hoist comprises two units, each located about 36 in. outside the rail on opposite sides of the track. Each unit is made up of a section of 12-in. pipe with a 6-in. pipe inside, the base of which is provided with a special cast piston head, and a piece of 70-lb. rail is extended between them to support the car body regardless of its width. This combination mounted on a substantial foundation takes the place of an ordinary hydraulic jack. The raising and lowering of the piston of 6-in. pipe is accomplished through an ordinary straight-air valve with the inlet just below the lowest position of the piston head. Air for these home-made hoists may be supplied either by connecting them to the air reservoirs on another car in the shop for which pipe and hose lines are supplied, or they may be attached to the air reservoir on the car body to be raised, thus causing the car to raise itself.



Home-Made Car Hoist Used by the Choctaw Railway & Light Company at McAlester, Okla.

PORTLAND GASOLINE TRUCK ADAPTED FOR POLE HAULAGE

The adaptability of the gasoline motor truck to the most varied uses is illustrated in the accompanying view of a pole wagon in service with the Portland (Ore.) Railway, Light & Power Company. The truck is of 1-ton capacity and attached to it, with a long reach pole, is a two-wheeled trailer. Both the truck and trailer are equipped with United States solid tires. In a letter to the builder, the Federal Motor Truck Company, Detroit, Mich., C. P. Osborne, superintendent of power of the Portland company, states that the truck travels, on an average, from 40 to 50 miles a day, going everywhere and hauling from one to five poles. The tires, without exception, have also rendered good service.



Gasoline Automobile Equipped for Pole Transportation

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LONDON LETTER

(From Our Regular Correspondent)

Further particulars of the proposed underground railway for the conveyance of mails from Paddington to Whitechapel, for which a bill is being promoted by the government, were made public recently before a select committee of the House of Commons. The maximum speed will be 35 m.p.h., reduced to 12 m.p.h. when running through stations. The trains will work automatically. It is proposed to have them mount a slight dead incline at stations and stop, a switchman setting the points at each station. There would be no drivers on the trains, and there would always be a "dead" section between a train in a station and an approaching train. Current will be furnished by the government from its existing Blackfriars station, and a smaller generating station at Mount Pleasant will be utilized as a substation.

The Metropolitan Railway bill has been passed for third reading in the House of Commons by a select committee. The bill provides for the transfer of the Great Northern & City Railway from Finsbury Park to Moorgate Street and the construction of an extension from the existing terminus in Lothbury, where there will be a new station. The same committee has also passed the City & South London Railway bill to authorize the enlargement of the present tube so as to bring it up to date with regard to equipment and speed. It is stated that another bill will be presented to provide a loop line at Euston which will carry the City & South London Railway on to the North London tube railways so that trains can be operated through from Clapham Common to Watford.

The Hammersmith Borough Council, which has to arrange for the storage and delivery of large quantities of coal, reports in favor of a scheme to pipe the coal by air and water from the wharf to the generating station.

At a recent meeting of the Croydon Corporation a resolution was unanimously passed on the recommendation of the tramways committee with reference to the motor omnibus traffic in the borough. The committee recommended that the government be urged to pass such legislation as will place the motor omnibus companies on terms of equality with regard to public obligations with the municipal tramways in the metropolitan area, and that a communication on the subject be addressed to the Prime Minister, the president of the board of trade and the member for the borough.

The tramway committee of the Birmingham City Council has recommended the outlay of many thousands of pounds upon engineering work and rolling stock for the tramway system. The principal object of the committee, apart from the construction of new lines and the extension of existing routes, is to link the tramway terminals in the center of the city so as to enable passengers to travel from one side of the city to the other without change of car.

It is understood that the proposal of the National Electric Construction Company to deal with the Oxford tramway question by installing petrol-electric tramcars in the center of the city and the overhead trolley system on the rest of the routes has been recommended for acceptance by the tramways committee. Sir Alexander Kennedy has reported to the Council in favor of the petrol-electric system.

James Scott Duncan Moffet, general manager and engineer of the Rochdale Corporation Tramways, has been appointed tramways manager to the West Ham Corporation, to succeed H. E. Blain.

Balfour, Beatty & Company, Ltd., London, have completed the tramway from near the Nottingham city boundary to Ripley, passing through many towns hitherto supplied with inadequate transportation facilities. The route from Ripley may be continued through Alfreton and Mansfield, thus giving Mansfield direct communication with Nottingham. The new tramway is single throughout, with loops at frequent intervals. The tramway company had to rebuild or improve about half a dozen bridges, and this work, with the road widening and the removal of several projecting buildings, has entailed a heavy expenditure. It is intended to run early morning cars for the convenience of miners and other workmen. A large permanent carhouse has been built at Langley Mill, where a number of double-deck cars are ready for service. The main generating station is at Ilkeston, from which the current is distributed at 11,000 volts to the substations.

The Bristol Tramways & Carriage Company, which operates the tramway system in Bristol, has completed its motor works at Brislington, and in these works every detail of manufacture or repair is carried on. The capacity of the plant is 300 chassis a year. At the opening ceremony of these works it was stated that the policy of feeding the tramways traffic by means of the omnibus services linking up the routes at well-chosen points had proved very successful. The motor vehicles owned and worked at the present time number 550 cars.

To relieve the congestion of traffic in the center of the city, the Glasgow Corporation is at present considering the necessity of constructing a new bridge across the Clyde, over which a new line of tramways will be constructed. The Corporation is prepared to bear the cost of a new bridge immediately west of the Caledonia railway bridge. A second bridge just to the east of the Glascow Bridge has also been discussed. These bridges should mean a speedier service from north to south. At present considerations of further extensions into the outer suburbs are also being made. The new program sanctioned by the Corporation includes 15 miles of new lines.

The sub-committee on extensions which has had these matters in hand, has also recommended that the Corporation authorize Mr. Dalrymple, the general manager of the tramways system, to visit several of the most important cities in America, with a view to making himself acquainted with the most modern and up-to-date methods of operation, and this visit has now been authorized by the Corporation. He will be accompanied by the Master of Works, who will inspect different types of drawbridges.

In 1908 the London County Council decided that provision should be made for renewals at the rate of two-thirds of a penny a car mile, and that the question of the adequacy of this provision should be again considered in five years. The recent falling-off in the tramway receipts on account of the increase in the motor omnibus competition has brought to a negligible figure (£497) the surplus of 1912-13 to be added to the amount already in the renewals fund, and the surplus (estimated at £43,399) for the current year will be very small unless conditions are altered materially. The weekly mileage at present being run is about 1,100,000, and reckoning the annual mileage at 56,000,000, the amount per car mile works out at 0.635d., as compared with the estimate of 0.66d. of five years ago. The reduction is due chiefly to the item of permanent way, which has been decreased from 0.54d. to 0.498d. Experience has shown that the slot rails last very much longer than the other surface trackwork, the life of these rails being estimated to be about thirty years. It is considered that an average expenditure of about £139,000 a year, equal to 0.595d. a car mile run, will be sufficient to meet the normal requirements during the next five years. To meet this total expenditure of £695,000 there was £633,010 in the renewals fund at the beginning of the financial year and £273,786 in the general reserve fund. In view of the fact that under existing conditions it is practically impossible to estimate the amount that will be available for renewals, there appears to the highways committee to be no advantage in revising the basis at present, and the members of the committee are of the opinion that the actual surplus of each year should be carried to the fund for renewals, leaving the question of a possible revision of the basis for a further period of two years.

In the London letter which appeared in the ELECTRIC RAILWAY JOURNAL of July 5, page 37, referring to the London & Suburban Traction Company and the acquisition of a controlling interest in the South Metropolitan Tramways, the statement was made that "with the exception of the London County Council Tramways, all the tramways and motor bus services in the Metropolitan area are under one control." That statement was incorrect inasmuch as the West Ham, East Ham, Leyton, Walthamstow, Croydon, Erith, Bexley, Barking and Ilford Tramways systems are all in the Metropolitan area and none of them has been acquired by the first-named company. Practically all the tube railways, tramways and buses in the county of London, except the London County Council Tramways, are, however, now under the one control.

A. C. S.

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News of Electric Railways

Railroad Rates for October A. E. R. A. Convention

The following preliminary announcements regarding reduced rates for the 1913 convention of the American Electric Railway Association which is to be held in Atlantic City, Oct. 13 to 17, are made on the authority of the passenger associations interested.

Trunk Line Association.—The association includes New York, New Jersey, Pennsylvania, Delaware, Maryland, District of Columbia and the northern part of Virginia and West Virginia. Rates—One and one-half first-class limited fare, with minimum of $2 for the round trip, going and returning via the same route only. Tickets to be sold and good going Oct. 10 to 14 and returning to reach original starting point not later than Oct. 20.

Central Passenger Association.—The association includes southern Michigan, Indiana and Ohio, a small portion of western Pensylvania and that portion of Illinois extending from Chicago through Peoria and Quincy. Rates—Two cents per mile traveled in each direction to Eastern termini of Central Passenger Association, added to one and one-half first-class limited fare for the round trip from such termini to Atlantic City. Tickets to be good going and returning via the same route only and over which one-way tickets are regularly sold. Tickets of standard form "S" to be sold on Oct. 9 to 13, inclusive, except that from points in the States of New York, Pennsylvania, West Virginia and from Bellaire, Bridgeport, Martins Ferry, Steubenville, Wellsville and East Liverpool, Ohio, tickets will be sold on Oct. 10 to 14, inclusive. Return limit to reach original starting point not later than midnight of Oct. 21, 1913, except that on tickets sold from points in the States of New York, Pennsylvania and West Virginia and from Bellaire, Bridgeport, Martins Ferry, Steubenville, Wellsville and East Liverpool, Ohio, return limit to reach original starting point not later than midnight of Oct. 20, 1913.

Western Passenger Association.—This association includes Wisconsin, Minnesota, Iowa, Kansas, Nebraska, South Dakota; the eastern part of Colorado, including Denver, Colorado Springs and Pueblo; the eastern half of North Dakota, including Bismarck; the northern half of Missouri, including St. Louis and Kansas City, and the northern part of Illinois, including some joint territory with the Central Passenger Association in that State. Rates—Open rate of 2 cents per mile in each direction to Chicago, Peoria or St. Louis, added to the fares tendered therefrom, from a limited number of points in Western Passenger Association territory to be selected by the rate clerks. Fares made on one gateway to be equalized through other gateways, from territory from which it is customary to make such equalizations. From points in Illinois, also from Bellevue, Burlington, Clinton, Davenport, Dubuque and Keokuk, Ia., and from Hannibal and St. Louis, Mo., tickets to be sold Oct. 9 to 13, inclusive, with final return limit to reach original starting point not later than midnight of Oct. 21. From other points in Western Passenger Association territory tickets to be sold on Oct. 8 to 12, inclusive, with final return limit midnight Oct. 22.

New England Passenger Association.—The association includes all territory in the United States east of the New York Central and Hudson River Railroad and a line drawn from Albany north through the Hudson River and Lake Champlain, but not including Rouses Point, N. Y. Rates—With the exception of the Bangor & Aroostook Railroad and Eastern Steamship Corporation, the rates will be double local to boundary points of the territory, plus the rate offered by the Trunk Line Association. Tickets to be sold and good Oct. 10 to 14, and returning to reach original starting point not later than Oct. 20.

Transcontinental Passenger Association.—This association covers in general the through bookings from the territory west of that included in the Western Passenger Association and north of that included in the Southwestern Passenger Association. It also controls the through bookings to or from Pacific Coast points and what are termed the Eastern gateways, namely, Chicago, Peoria and St. Louis. No special reduced rates have been authorized, but delegates should avail themselves of the lowest tourist excursion rates.

Advance Notices of the A. E. R. A. Convention Programs

It is announced that the programs of the American Electric Railway Association and its allied bodies are well in hand. Aside from the committee reports of the Engineering Association and the Transportation & Traffic Association the convention will embrace subjects by the other organizations as follows: American Association: "Valuation," "Relations of Carriers to the Development of the Territory They Serve," "The Relief of City Congestion by the Construction of Subways and Viaducts," "Electric Railway Securities from the Investors' Viewpoint," "Present Tendency of Public Utility Laws and Regulations," and "Profit Sharing with Employees."

For the accountants F. B. Lasher will speak on "Accounting Department Conferences," A. R. Patterson on "Is the Accounting Department a Non-Productive Department?" B. W. Kalweit on "Transfers," and W. H. Forse, Jr., on a subject which he himself is to choose.

For the Claims Association John J. Reynolds and M. P. Spellane are preparing a joint paper on "Mechanical Devices for Preventing Accidents"; H. V. Drown and J. H. Handlon a joint paper on "The Prevention of Accidents"; George Carson a paper on "The Value of Safety Committees," and M .D. Bracken a paper on "Motor Vehicles."

President Harries' Call to Executives to Attend A. E. R. A. Convention

President George H. Harries has addressed the following letter to the presidents of member companies of the American Electric Railway Association urging them and others financially interested in electric railways to attend the next convention of the association:

"That the 1913 convention of this association, which is to be held at Atlantic City Oct. 13 to 17 next, will be a success is as nearly certain as any human thing can be, but it may be much less of a success than it could be. The deficiency, if there be any, will largely result from the absence of a great many presidents, vice-presidents, directors and heavy stockholders, who may be under the impression that such an assemblage as ours is composed for the most part of those who are engaged in pure operation. As a matter of fact, the bulk of the association's work has been and is being done by those holding responsible executive positions.

"The parent association has delegated detailed matters to the affiliated organizations and itself deals with the large questions that most deeply interest the executive chiefs and the more important investors, and it is in the sessions of the parent association that your presence and your views will have great value.

"At our October meeting there will be discussions on: 'Valuation,' 'Relations of Carriers to the Development of the Territory They Serve,' 'The Relief of City Congestion by the Construction of Subways and Viaducts, the Cost and Inadequate Return,' 'Electric Railway Securities from the Investor's Viewpoint,' 'Present Tendency of Public Utility Laws and Regulations,' 'Profit Sharing with Employees,' and a number of other most interesting topics, many of which are daily problems.

"Seventy-six per cent of the electric railway mileage of the country is affiliated with this association and we are steadily acquiring the outstanding remainder.

"May we not reasonably expect the presence of you and of the others suggested in this letter at our October assemblage?

"'United we stand, divided we fall,' may be both trite and ancient; but it is true."

Change in Organization of the New Haven Railroad

Howard Elliott has been elected president of the New York, New Haven & Hartford Railroad to succeed Charles S. Mellen, resigned. With the coming of Mr. Elliott it is proposed to change slightly the scheme of organization of the company. The president of the company is and has been not only the executive head in the general adminis-

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tration of the associated properties, but also the operating head of each. The special committee of directors delegated to select a successor to Mr. Mellen suggested that the titular head of the New Haven system should give his attention to the general administration and supervision of the associated properties, with an operating head for each separate property who would be responsible for efficient service. The committee thought that this could be probably done best by creating the position of chairman of the board for the New Haven and for each separate property, to be filled by one who would be chief executive of the entire system, while the president of each company should be the operating head, subordinate to the chairman of the board of directors.

To put into effect the suggested organization will entail a change in the by-laws, which, however, cannot be completed before the stated meeting of the board in October. The exigencies of the situation required more immediate action and the committee suggested that, pending the necessary changes in the by-laws, a president be elected who would as soon as possible be made chairman of the board, and that the position of president should be filled by one whose duties would be defined as outlined by the committee.

Developments in Detroit—Statement of Company

The meeting of the committee of the Common Council of Detroit, Mich., which was called for July 29, to consider the recent reply of the Detroit United Railway made through F. W. Brooks, general manager of the company, was postponed until the evening of Aug. 1, when it was expected that the company would present a statement supplementing its previous communication. The reply of Mr. Brooks was referred to briefly in the ELECTRIC RAILWAY JOURNAL of July 19, 1913, page 110. That communication considered quite thoroughly the questions of low fares, extensions, etc., and was concluded with two separate and distinct proposals from the company. After referring to the legal and moral responsibilities which rest upon the directors and officers of the company the communication of the company presented on July 14 said:

"It is not necessary at this time to point out the many somewhat minor objections to the ordinance, because if there is a disposition on both sides to get together on some fair and workable ordinance, doubtless these objections can be removed, but there are insuperable obstacles in the way of acceptance.

"First.—It provides for a rate of fare which cannot pay the cost of maintenance and operation, let alone paying any return on capital invested.

"Second.—It provides for the immediate construction of several extensions, which we concede are necessary, under terms and conditions which render it impossible to obtain the necessary capital."

On the subject of low fares the communication said in part:

"We have had the accounts for the year 1912, and for the first five months of the year 1913, which are kept in accordance with the methods prescribed by the Interstate Commerce Commission, carefully examined by competent auditors for the purpose of ascertaining what would have been the excess or deficit of earnings over cost of maintenance of operation had the company received 3 cents for each passenger fare instead of the rates which have prevailed. The result ascertained shows that for the year 1912 there would have been a net deficit from operation of cars within the city of Detroit, at 3 cents per passenger, after giving credit for all miscellaneous revenues whatever, and before charging any interest on investment or depreciation, of $49,816; and for the first five months of the present year, under like accounting, $20,429.

"That is not all. The proposed ordinance requires the company to do a large amount of paving which the city is now required to do, and which would increase the annual deficit above shown to an amount several times larger. Moreover, if the railway is to be kept up as it should be to prevent ultimate loss, there must be set aside each year out of its earnings for a depreciation reserve not less than $500,000 to cover losses from depreciation and obsolescence; but no amount whatever was allowed for this purpose in the computations showing the above deficit.

"The ordinance also calls for universal transfers. This would considerably reduce the number of fares sold, for many people could then ride for one fare instead of two.

"It is, therefore, too plain for discussion that under a 3-cent fare there would be no net earnings whatever to pay interest upon the company's indebtedness, or upon any part of it, and in considering this proposition it should not be forgotten that the company has, over the greater part of its system in the city, unquestioned right for several years to receive a higher rate of fare than is prescribed in the proposed ordinance. This right, and substantially all other rights, it must give up without anything in return."

Referring to the extensions, the communication said:

"The cost of the immediate extensions, which include necessary cars, power and other equipment called for by the proposed ordinance, so far as it can be estimated by our department heads, will amount to more than $1,700,000. When installed they will have to be operated under the same terms and conditions as the rest of the lines, and therefore must be operated at a loss. Moreover, we will be obligated to cease operation and to remove them at any time the Council may direct.

"It should be perfectly plain to any one that if this company should attempt or agree to attempt to operate its lines at a loss, and at the same time agree to build extensions removable at the will of the city, which during the continuance of their operation must likewise be operated at a loss, it could not obtain one dollar of additional capital to build such extensions.

"The ordinance, therefore, calls for that which is impossible, and whatever the consequences may be, both to the people of the city of Detroit and to the company, we must say that under no circumstances can it be accepted.

The company next called attention to the fact that the proposed March 4 ordinance apparently ignores Section 19 of the ordinances of the Common Council of the city of Detroit, approved Dec. 4, 1894, concerning the Detroit Railway, to which the Detroit United Railway is the successor in interest. That ordinance is commonly known as "the 3-cent fare ordinance." Under it the railway company was bound not only to operate the lines therein specified, but to construct and operate, under the same terms, all further extensions and additional lines which the Common Council should deem to be for the public convenience, or to give special privileges by which such lines, if constructed and operated by others, would become a part of the same general system of transportation. The company says that this ordinance was accepted by the railway company and constitutes a binding contract between the city of Detroit and the company and that the city of Detroit is not now at liberty to violate that contract. In this connection the company said in part:

"Section 19 is not confined to streets upon which no street cars are operated. It extends to all streets (excepting the streets occupied by the Fort Street lines, as stated in said section), upon which street cars are operated under a franchise which expires before Dec. 4, 1924.

"After the determination that the franchise to operate street cars on any of said streets has expired, no third person or corporation can operate street cars thereon until this company has been given the opportunity to operate and refused to operate the same, under the terms and conditions of said ordinance of Dec. 4, 1894. This company will not refuse, but, on the contrary, hereby states that if given said opportunity it will accept the same, and maintain and operate street car lines upon said streets in accordance with the terms of the ordinance of Dec. 4, 1894."

The company then made the following separate and distinct propositions:

"(1) In case the city of Detroit shall deem that the public convenience requires that all the street railways in the city (whether constructed under the ordinance of Dec. 4, 1894, or under other ordinances, and whether the franchise thereof has or has not expired) be operated under said ordinance of Dec. 4, 1894, and in connection with existing routes under said ordinance, this company will undertake to operate all such railways, under the terms, provisions and obligations of the ordinance of Dec. 4, 1894, to the end that the general low-fare system, with universal transfers,

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regulated by the Common Council as contemplated by the ordinance of Dec. 4, 1894, shall be made complete.

"(2) In case the city of Detroit desires to be released from the obligation to continue the policy established by the contract of Dec. 4, 1894, so that it may acquire and operate and determine, in accordance with law, to acquire and operate such a system for itself, the railway company is ready to sell and transfer to the city of Detroit all its railway property in the city of Detroit for a fair price, to be agreed upon, or failing agreement, to be determined in any fair and reasonable way. This offer will remain open until further notice, it being the wish of the railway company to continue it for a sufficient period to enable the city authorities, with due diligence, to take the necessary steps for valid and effective action thereon, provided, of course, that pending such action the status quo will be preserved, except that to meet immediately the urgent necessity for the relief of traffic congestion in certain portions of the city, the company is willing to proceed at once, under such terms and conditions as are named in the resolution adopted by the Common Council on April 4, 1911, providing for the extension of the street railway system on Hamilton Boulevard, Grandy Avenue and on other streets, to construct, maintain and operate, as a part of its Grand River line, the so-called Junction Avenue line between Grand River Avenue and West Jefferson Avenue, and to construct, maintain and operate in connection with its Mack and Myrtle lines the tracks necessary to connect such lines so as to form a through crosstown route, and also to construct, maintain and operate, under the terms and conditions of the ordinance of Dec. 4, 1894, an extension of its Kercheval Avenue line to St. Jean Avenue, then southerly to Jefferson Avenue.

"Or, if the Common Council so desires, the company will construct, maintain and operate the so-called Junction Avenue line as an extension of the line on Warren Avenue, under the terms and conditions of the ordinance of Dec. 4, 1894, instead of as a part of its Grand River system."

After the announcement by Mayor Marx of the postponement of the meeting of the Council to Aug. 1 Mr. Brooks was reported to have said that he knew of no conferences between the attorneys for the company and the Mayor and that no amended proposal had been made by the company.

James Couzens, secretary and treasurer of the Ford Motor Car Company and president of the Detroit Chamber of Commerce, has been selected by the Mayor as the third member of the street railway commission. The other two members are John F. Dodge and W. D. Mahon.

Philadelphia Transit Report

A. Merritt Taylor, transit commissioner of Philadelphia, Pa., issued on July 31 an exhaustive report setting forth the problem of better transit facilities for Philadelphia and of definite recommendations and plans for the solution of that problem. New subways and elevated railways are proposed to be built as follows: A two-track subway delivery loop is to start at Broad and Arch, go eastwardly along Arch to Eighth, thence to Walnut, to Fifteenth, to Filbert Street, and back to the point of origin. A four-track subway will begin at Broad and Arch and run northward to Pike, there forking into two elevated lines, one of which will go via McFerran Street to Luzerne, and finally along the Northeast Boulevard to Rising Sun Avenue. The other line will go north on Sixteenth Street to Belfield Avenue and ultimately to Olney Avenue via Ogontz Avenue. Then there will also be a two-track subway extending southward from Broad and Walnut to Bigler Street, where an extension will be laid in a depressed open right-of-way to League Island.

The part of the plan having to do with the elevated railways contemplates an elevated railway from the city's center to Frankford, and another to Darby, to be built by the Philadelphia Rapid Transit Company.

In addition to the enabling legislation for the financing of the new lines, a joint resolution proposing an amendment to the constitution has been adopted by the Legislature, will be offered a second time at the next session, and—if passed on affirmatively—will then go before the qualified electors of the State at the following general election. This amendment enables the city to borrow to the extent of 3 per cent in excess of 7 per cent on the assessed valuation of taxable property, for the purpose of improving transit facilities.

The total cost of construction and equipment for the Broad Street lines is estimated at $42,075,000, of which $34,682,000 is to be expended by the city and $7,393,000 by the lessee. For the Frankford line the lessee would bear the entire expense, reckoned at $8,912,000, and for the Darby line the lessee would spend $6,591,000. The estimated gross expenditure, therefore, is $57,578,000.

It is proposed to review the report at length in a later issue of the Electric Railway Journal.

Pennsylvania Public Service Company Law

On July 26, 1913, the last day on which he could act, Governor Tener of Pennsylvania affixed his signature to the public service company law as it came from the joint conference committee of the General Assembly thirty days before. The new law is a combination of the state administration measure as drafted by Attorney-General Bell, who will be general counsel for the new commission, and the Republican legislative committee's bill as drafted by Dean William Draper Lewis, of the Law School of the University of Pennsylvania. The law becomes operative on Jan. 1, 1914, but the commission has authority to organize and select its employees on or before Oct. 1, 1913. Inasmuch as the old State Railroad Commission is herewith legislated out of existence as of July 1, 1913, it is expected that Governor Tener will make the new public service commission appointments promptly, in order that the commission may have time to organize fully, hear any pending cases transferred to it by the State Railroad Commission and dispose of any of its unfinished business before the new work begins. The Governor has intimated that the new commissioners will be chosen on the basis of their business and financial qualifications rather than their political affiliations. It is expected that he will appoint Messrs. Ewing, Brecht and Pennypacker of the State Railroad Commission as members of the new body.

The new Public Service Commission is to consist of seven members who are to be appointed by the Governor by and with the consent of the Senate. Each commissioner at the time of his appointment shall be a resident of Pennsylvania and a qualified voter there for a period of at least one year next preceding his appointment, and he must also be not less than thirty years of age. No person may be appointed to the commission or hold any position under it who occupies any official relation to any public service company doing business in the State or who holds any other appointive or elective office in the State or any municipality. Each of the commissioners is to receive an annual salary of $10,000, except the chairman, to whom $500 additional is given. The commission has a secretary and a general counsel, who receive $5,000 and $7,500 respectively. The commission is also authorized to appoint an "investigator of accidents" at $5,000 a year, whose duty it shall be to take charge of the investigation of any accidents in connection with the operation of the property, facilities or service of any public service company and make a complete report thereon to the commission. Any commissioner or any of the counsel to the commission may be removed by the Governor with the consent of the Senate for inefficiency, neglect of duty or misconduct in office, after giving the defendant a copy of the charges against him and an opportunity of reply on not less than ten days' notice.

The commission, or four, a quorum thereof, must hold stated meetings at least twice a month during the year at the principal office in Harrisburg, other meetings being held at any time and any place within the State.

Article II of the law takes up in detail the question of the duties and liabilities of public service companies, and among the duties mentioned are these: to furnish and maintain service and facilities that are just, reasonably adequate and practically sufficient for the accommodation and safety of its patrons, employees and the public; to furnish such service at just and reasonable rates; to make all repairs, alterations and improvements reasonably necessary; to file with the commission and post and publish tariffs and schedules showing rates and distribution of facilities; to establish, file and publish reasonable and just joint rates;

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to make no change in any tariff or schedule filed or published except after thirty days' similar notice to the commission and the public stating the proposed changes, whether increases or decreases, and the date of change; to change no rate or classification theretofore determined by the commission within three years without the approval of the commission after thirty days' prior notice to the public; to file with the commission verified copies of all legal papers and information dealing with their public service; to keep a system of accounts prescribed by the commission, with proper attention to operating and capital entries and a depreciation account (municipally owned utilities being included herewith under this requirement); to account to the commission when required to do so for the disposition of all sales or pledges of stock, bonds and other evidences of indebtedness; to follow out the orders of the commission as to exchange of transfers and through routing and to give immediate notice of any accidents in connection with operation.

The commission, through the enforced requirement of its "certificate of public convenience," is to have power over the original incorporation and any change therein of a domestic corporation, over the exercise of the powers of a foreign corporation within the State and over selling, assigning, consolidating, merging and all other forms of intercorporate relations.

Furthermore, for any municipal corporation to acquire construct or begin to operate any plant, equipment or other facilities for the rendering or furnishing to the public of any service of the kind or character already being rendered or furnished by any public service company within the municipality, the certificate of public convenience is required. No contract or agreement between any public service company and any municipal corporation shall be valid unless approved by the commission, provided that upon notice to the local authorities concerned any public service company may apply to the commission before the consent of the local authorities has been obtained for a declaration by the commission of the terms and conditions upon which it will grant its approval of such contract or agreement, if at all.

When application shall be made to the commission by a public service company for the determination of the amount to be paid for any franchise privileges or other rights, or the aggregate value of merged or consolidated properties, or the value of any reorganized property, or for a certificate that stocks and bonds have been properly issued, or for the determination of any property or labor for which any bonds or other evidences of indebtedness are issued, the commission is authorized to hold hearings and make a finding in writing stating the value ascertained and to issue under its seal its "certificate of valuation."

The issuing by the commission of any "certificate of valuation" shall be deemed only to certify to the fact that securities were issued for money, labor or property actually received and shall not be taken as requiring the commission in any subsequent valuation to ascertain the value of the property of a public utility to fix a valuation which shall be sufficient to yield a return to the holders of the said securities; neither shall the certificate of valuation be deemed to require the commission in subsequently determining the rates to be charged for the service of the company to provide a rate sufficient to yield a return on the said securities.

Every public service company shall file with the commission on or prior to the date of issuance of any stocks, bonds, etc., payable at periods of more than twelve months after the date thereof (unless upon application as aforesaid a "certificate of valuation" has been obtained), a certificate to be known as a "certificate of notification," which shall show the total amount of securities thereof, the number and amount thereof outstanding prior to the date of the certificate, the amount retired, the amount undisposed of and whether held in treasury as a free asset or pledged, the number and amount to be issued and the purpose and contemplated disposal, the number and amount remaining unissued, the par value, the preference or privilege of the securities, the dates of maturity, rates of interest and any conversion rights and the redemption price. These certificates are to be signed and issued by the treasurer, auditor or controller of the company and are to be deemed public records.

The provisions of the act relative to certificates of valuation and notification shall not apply to the issuance of evidences of indebtedness payable in twelve months or less or the pledges of securities to secure such evidences of indebtedness, but if such evidences of indebtedness are refunded by securities running for more than twelve months the above certificate provisions apply.

It is declared unlawful for any public utility to capitalize its franchises and privileges in excess of the amount paid to the Commonwealth or to issue any securities for any consolidated or merged company exceeding the aggregate values of the properties so consolidated or merged and any additional sum actually paid in in cash and additional property actually contributed.

A public utility is prohibited from purchasing, acquiring or holding in absolute ownership as a pledge or as a collateral security, directly or indirectly, any controlling right, legal or equitable interest in the capital stock or securities of any other public service company in Pennsylvania without the consent and approval of the commission.

Upon complaint or upon its own motion the commission may examine the rates and service of public utilities and order more just, reasonable, safe and adequate service and rates. It shall also have power to fix maximum rates, set aside discriminatory and preferential rates and practices and order reparation for injuries. In any proposed increase in any rate the burden of proof to show that the increased rate is just and reasonable is on the public service company.

The commission is to have the power to prescribe whether railroad or railway tracks may cross other tracks or highways at grade or above or below grade and to regulate the manner in which such crossings shall be operated, maintained and protected by watchmen, block signals or other safety appliances. The cost of construction and condemnation shall be borne by the public service company or companies or municipal corporation concerned or by the Commonwealth, either severally or in such proper proportions as the commission after due notice and hearing may determine, unless these said proportions are mutually agreed upon and paid.

The commission shall have power upon application or its own motion to determine the fair value of a public utility property and shall exercise the power when deemed necessary or proper, taking into consideration original cost, improvements, earning capacity under existing rates, market value of securities, obsolescence, reproduction cost based on a fair average price of materials, property and labor, and the developmental and going value of the property.

The act clothes the Dauphin County Court with exclusive jurisdiction throughout the State to hear and determine all actions brought by any party to the proceedings within thirty days after the filing of an order. In general no appeal from an order of the commission shall operate as a supersedeas unless the Dauphin County Court shall upon notice to all parties of record and a hearing by an interlocutory order so decide. An appeal by a public utility against a change in rates, however, acts as a supersedeas in case a bond is filed with the Commonwealth to provide for the repayment to all aggrieved parties of any excess over the rates ordered by the commission.

Each day's continuance in the violation of any order of the commission is a distinct offense. Any officer of a public utility who affixes his name to any securities or any director who consents to their issuance in violation of an order by the commission is guilty of a misdemeanor punishable by costs and a fine not exceeding $5,000 or five years' imprisonment, or both. The same penalties hold for any officer, director, agent or employee who assents to an application or disposition of securities or the proceeds thereof in violation of the purpose set forth in the "certificate of notification" or makes any false statements to procure such certificate or in any report to the commission. A refusal or neglect to obey any final order of the commission or court or any assistance in such refusal or neglect is punishable by a fine of not more than $500 or by imprisonment for from one to twelve months, or both, and a second offense shall be punished by a fine of not more than $1,000 or by a three to eighteen months' imprisonment or both. Action for the recovery of any penalties or forfeitures and all prosecutions must be brought within three years from the date when the liability therefor arose.

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Rapid Transit Construction and Operating Contracts in New York

The Public Service Commission for the First District of New York has approved an agreement with the Interborough Rapid Transit Company for the reconstruction and temporary operation of the Steinway tunnel. This tunnel, which extends under the East River from Forty-second Street, Manhattan, to Long Island City, Queens, has been built for some years but has never been operated owing to the fact that it was not completed in the time specified by the franchise, and the owners never obtained the right to operate it. It was built by the New York & Long Island Railroad, the stock of which was owned by the Interborough Rapid Transit Company, and in the dual system contracts the latter company agreed to transfer the tunnel to the city of New York for a consideration of $3,000,000, although the cost of it was about $10,000,000, in consideration of its lease for operation in connection with the rest of the new subway system. These contracts provide for the extension of the tunnel in Manhattan to Times Square, where it will connect with the existing subway, and its extension on the Queens side to the Queensboro Bridge Plaza, where it will connect with the Astoria and Corona rapid transit lines. The contracts also provide for its temporary operation pending the completion of these extensions, and the agreement just approved authorizes the company to do such work as will fit it for temporary operation and to begin temporary operation as soon as possible. It is expected that the work will cost about $500,000. The commission has also approved an agreement transferring the title to the tunnel from August Belmont and others, as surviving trustees of the New York & Long Island Railroad, to the Interborough Rapid Transit Company, which later will transfer the same to the city of New York. It is expected that the work needed to fit the tunnel for temporary operation will be completed in about four months after the transfer of title.

On July 22 the commission opened bids for the construction of another section of the Broadway subway in Manhattan, which is to be operated by the New York Municipal Railway Corporation. This section extends under Broadway from Union Square to Twenty-sixth Street, and will include the northern half of the express station at Union Square and a local station at Twenty-third Street, Madison Square. On July 24 the commission awarded the contract to the E. E. Smith Contracting Company, the lowest bidder, for $2,056,702. The Broadway subway is now under contract from Trinity Place and Morris Street north to Twenty-sixth Street. Actual construction, however, extends only to a point between Houston and Bleecker Streets, the contracts for the two sections north of that point not having yet been approved by the Board of Estimate and Apportionment.

The Public Service Commission is advertising for bids, to be opened on Aug. 19 next, for the construction of Section No. 1 of the Astoria, Woodside and Corona rapid transit railroad in Queens. This road has two branches, one leading from the end of the Queensboro Bridge to Astoria and the other from the same point to Corona. Section No. 1 embraces the construction at the junction of the two lines at the bridge approach and also a connection with the proposed extension of the Steinway tunnel through Ely Avenue. Both lines will be elevated railroads and the greater part of each is already under construction.

Haste Urged with Toronto Valuations

The appraisers of the property of the Toronto (Ont.) Railway and the Toronto Electric Light Company will commence their work at once, and upon its completion the entire project of the purchase by the city, in all its details, will be laid before the Hydro-Electric Power Commission of Ontario for approval and sanction. Bion J. Arnold and J. W. Moyes, two of the appraisers, conferred with Mayor Hocken on July 22. Messrs. Arnold and Moyes will be joined shortly by R. A. Ross, Montreal, and John Mackay, who are to appraise the assets of the Toronto Electric Light Company. If the Hydro-Electric Power Commission agrees to the details of the deal between the city and the companies the agreement will be drawn by counsel for both sides and the matter will be submitted to the people. It is hoped to be able to take the vote by the end of September.

The consideration of subsidiary contracts is an important feature of the deal. It is practically agreed that the city will have to take the present load of power from the Electrical Development Company as a minimum. This and the fact that the Toronto Electric Light Company's contract with the Electrical Development Company and the Toronto Railway's agreement run for thirty years and eight years respectively are details to be considered by the Hydro-Electric Power Commission. The difficulties in connection with these details, however, would be removed by the acquisition of the property of the Electrical Development Company by the Hydro-Electric Power Commission of Ontario. Twenty million dollars is the price fixed for this property. Mayor Hocken has pointed out that if the Hydro-Electric Power Commission took over the Electrical Development Company all private corporations would be removed from the electric field in Ontario. In a letter to Mr. Arnold Mayor Hocken urges upon him the necessity of making the valuation as quickly as possible.

Adam Beck, chairman of the Hydro-Electric Power Commission of Ontario, said on his return to Toronto after a holiday trip of several weeks in Europe:

"I do not think the purchase of the property of the Electrical Development Company is a matter for discussion by me until it comes properly before the commission. When the time comes to say something it will be said. That time is not yet."

Fenders on the Toronto Suburban Railway.—The city solicitor of Toronto, Ont., has been instructed to communicate with the Ontario Railway Board in regard to the fenders used by the Toronto Suburban Railway.

Streator Strike Settled.—The strike of the employees of the Public Service Company of Northern Illinois, which has been in progress since May 15, has been settled, but the terms under which the men return to work have not been made public. The company operates 10.5 miles of electric railway in Streator.

Pennsylvania Reported to Be Negotiating Power Contract.—Negotiations are said to be pending between the Pennsylvania Railroad and the Philadelphia Electric Company for the latter to supply power to operate the line of the Pennsylvania Railroad to Paoli, which branch, as previously announced, is to be electrified.

Ordinance Passed Calling for Special San Francisco Election.—The Board of Supervisors of San Francisco, Cal., has passed the ordinance calling an election on Aug. 26, at which the question of issuing bonds to the amount of $3,500,000 for the purpose of constructing a system of municipal street railways will be voted on.

International Railway Buys Land for New Terminal.—The International Railway, Buffalo, N. Y., has purchased property adjacent to its carhouse in Lockport, N. Y., as a site for the proposed immense terminal for the Buffalo and Rochester cars when the pending reorganization and merger plan of the Buffalo & Lake Erie Traction Company is approved by the Public Service Commission.

Pacific Great Eastern Railway Proposes to Electrify Short Line.—The Pacific Great Eastern Railway, which is constructing a line from Fort George to North Vancouver, B. C., has agreed to electrify that portion of its route extending from Horseshoe Bay on Howe Sound through West Vancouver to North Vancouver, a distance of about 10 miles, provided the municipalities through which the company proposes to operate will grant the company a 60-ft. right-of-way free.

Toronto Deviation Case Before Privy Council.—The appeal against the decision of the Appellate Division of the High Court by the Toronto & York Radial Railway, Toronto, Ont., will be heard in Privy Council in London, Eng., in October. The decision of the court reversed the finding of the Railway Board, which permitted the company to divert its tracks at Farnham Avenue on Yonge Street and cross Woodlawn, Alcorn and Walker Avenues to the North Toronto terminal. The city argues that the crossings which are maintained at these points are dangerous.

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Mayor Jost Completes Tentative Franchise.—Mayor Jost of Kansas City, Mo., has completed the tentative draft of a franchise for the Metropolitan Street Railway and will submit copies to Judge Andrew F. Evans, city counselor, to be reviewed by him. The Mayor is averse to disclosing the details of the grant until it is formally presented to the receivers for the company. He has indicated that when he and the receivers agree on a franchise, copies of it will be printed and public meetings will be held to discuss the measure before it goes to the Council.

Dr. Tolman Delegate to International Housing Congress.—Dr. W. H. Tolman sailed on the *Ryndam* on July 29 as a delegate from the United States State Department to the International Housing Congress which will meet at The Hague on Sept. 8. He is also the secretary of the American Section of the Congress, of which Arthur Williams is vice-president. Dr. Tolman will go direct to London in the interests of the International Exposition of Safety and Sanitation to be held in New York next December under the auspices of the American Museum of Safety.

Extensions in Cleveland.—There will be some difficulty in extending the new East Side cross-town line of the Cleveland Railway into Gordon Park for some time, because the street in one place has been filled with material by the Lake Shore Railroad, which is building an arch under its tracks for the passage of the street railway. It is possible that when the cars are put into operation they will turn on a Y for some time until the track can be completed. It is stated that about 3 miles of the Denison-Harvard cross-town line and the poles and wire for most of the distance are completed. This will furnish the only through line between the East and West sides of the city.

Boston Elevated Arbitration Hearings Postponed.—On account of the illness of James J. Storrow, chairman and third member of the board of arbitration which will investigate wages and working conditions on the Boston Elevated Railway, the hearings upon these matters have been postponed until Aug. 18. It is probable that about a week will be occupied in the presentation of the employees' side of the case and that a similar period will be utilized by the company in rebuttal evidence and arguments. At a meeting in Boston on July 24 representatives of the company and of the employees' union agreed to make the findings of the arbitration board retroactive to May 1, 1913. The hearings will be public.

Increase in Wages in Phoenix.—The Phoenix (Ariz.) Railway has made known its new scale of wages and has offered the old places and seniority to such of its old men as return to their positions. When the recent strike was declared there were six employees of the company who remained with the company. Since that time three more former employees have returned to the company and two more have signified their intention of so doing. The wage scale adopted on Aug. 1 follows: First year, 22 cents an hour; second year, 25 cents an hour; third year, 25 cents an hour; fourth year, 26 cents an hour; fifth year, 27 cents an hour. The wages demanded by the men who went on strike were as follows: 22½ cents an hour for the first year, 24½ cents an hour for the second year and 26½ cents an hour for the third year and thereafter.

A. E. R. A. Data Sheet on Insurance.—The committee on insurance of the American Electric Railway Association, of which H. J. Davies, Cleveland, is chairman, sent out Data Sheet No. 106 on July 22. The blank is in duplicate, one copy to be returned filled in to the association. The data asked for follow: 1. Amount of insurance carried in 1912. 2. Amount of premiums paid in 1912. 3. If you had a fire in the year 1912, please state: (a) its cause; (b) in what property; (c) amount of loss; (d) amount of insurance recovered. 4. If any of your carhouses or other buildings are equipped with automatic sprinklers, please state: (a) the number of buildings so equipped; (b) the total cost (approximately) of your sprinkler equipment. 5. Please send the association two copies of your insurance forms.

Proposed Electric Railways in Spain.—Proposals are requested until Aug. 27, 1913, for building an electric tramway, estimated cost $45,775, in the suburbs of Vigo, Spain. If successful in bidding against La Compañia Anomina Tranvias Electricas de Vigo the concessionaire must pay $682 for the project with interest of 5 per cent from the date the project was filed. The concession and construction of an electric tramway from Reus to Tarragona, Province of Tarragona, Spain, has been awarded to Mariano de Cárcer, owner of the approved project. The rolling stock is to comprise at least four electric cars, ten trailers, five electric freight cars, twenty trailing freight cars and ten flat cars. The estimated cost of the line is $187,688. The contractor may be addressed in care of La Jefatura de Obras Públicas de la Provincia de Tarragona, Tarragona, Spain.

Trade Press Convention.—H. M. Swetland, president of the Federation of Trade Press Associations in the United States, announces that the program has been completed for the eighth annual convention at the Hotel Astor, New York, N. Y., Sept. 18 to 20. Acceptances are in hand from over sixty speakers of national reputation in the manufacturing, selling, advertising and publishing fields. There will be fifty ten-minute addresses at the editorial, circulation, advertising and publishing symposiums on vital questions affecting all those who have dealings with the business press of America. Other features of the convention will be an exhibit of successful class, technical and trade journal advertising campaigns, a big business meeting, at which will be told the inside stories of the big trade paper publishing successes, and an inspirational mass meeting with addresses by representative business and professional men on subjects of live interest to editors, publishers and advertisers. All the regular sessions of the convention will be open but tickets must be secured for the inspirational mass meeting. These may be obtained from any member of the federation or from W. H. Ukers, chairman of the committee on arrangements, 79 Wall Street, New York.

Stamford-New Haven Electrification Nearing Completion.—In a statement issued recently in regard to its work of electrification the New York, New Haven & Hartford Railroad said: "While it cannot be definitely stated when trains will be operated by electricity all the way from New York City to New Haven, the time is not far distant. The link that will complete the electrification to New Haven is the one between that city and Stamford. Part of this is completed, and only a small portion remains to receive the finishing touches. The section from Stamford to New Haven is about 40 miles in length. This entire section will obtain its power from the present power house at Cos Cob. This means that the Cos Cob power house will generate electricity to supply another section which is nearly twice as long as the one from Woodlawn to Stamford. It is estimated by the engineers of the company that the Cos Cob power house will be capable of taking care of all normal traffic on the line as far as New Haven, but on days when special traffic is handled, steam will have to be resorted to on some trains on the Stamford to New Haven link. When the electrification is continued to New London or Hartford another power house will be erected."

Council Committee Recommends Purchase of Seattle, Renton & Southern Railway.—Five of the nine members of the City Council committee of Seattle, Wash., voted on July 22 to recommend that an offer of $1,250,000 be made for the entire property of the Seattle, Renton & Southern Railway on the terms proposed by Scott Calhoun, one of the receivers of the company. This includes a double-track line extending from Third Avenue and Stewart Street on the north to the city of Renton on the south, a distance of 9 miles, about one-half lying within the city limits and the other half in King County. Mr. Calhoun's offer of the property to the city was made several weeks ago, when a price of $1,200,000 was fixed for the line within the city limits, or $1,400,000 for the entire system. It provides for the construction of extensions with funds realized from the sale of the remaining $150,000 of the $800,000 municipal street railway bonds authorized two years ago. Of this issue $300,000 of the bonds have been sold to the State and $350,000 would be required to make the cash payment for the Seattle, Renton & Southern property, leaving $150,000 for extensions. The offer authorized by the committee provides that the entire property be turned over to the city immediately upon the making of the first payment of $350,000 and the issuance of utility bonds for the remainder.

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Financial and Corporate

Stock and Money Markets

July 30, 1913.

Early trading was active in New York to-day. The market opened high but prices began gradually to decline. Following the announcement of the reduction of the Illinois Central dividend recessions of about 1½ points were recorded in the leaders. There was a fair increase in the aggregate volume of trading. Interborough-Metropolitan and Third Avenue each had declined ⅞ point at the close. Rates in the money market to-day were: Call, 2¼ @2½ per cent; sixty days, 3½@4 per cent; ninety days, 4@4½ per cent; four months, 4½@5¼ per cent; five months, 5½@6 per cent; six months, 5¾@6 per cent.

Outside of trading in arbitrage issues and two or three local issues, little activity was noticeable in the Philadelphia market. No bonds were sold after the first hour. Philadelphia Rapid Transit declined ¼ point.

The Boston Exchange opened strong but later weakened in sympathy with New York, New Haven being weak.

Trading in Chicago was mostly in industrials, although small sales were made of Chicago Railways, series 1 and 2.

Few sales were recorded in the Baltimore market. United Railways figuring in small stock and bond sales.

Quotations of traction and manufacturing securities as compared with last week follow:

	July 23	July 30
American Brake Shoe & Foundry (common)	87¼	89
American Brake Shoe & Foundry (preferred)	129	129
American Cities Company (common)	37	34
American Cities Company (preferred)	66¾	65
American Light & Traction Company (common)	340	345
American Light & Traction Company (preferred)	104	104
American Railways Company	38½	38
Aurora, Elgin & Chicago Railroad (common)	39½	*39½
Aurora, Elgin & Chicago Railroad (preferred)	82½	*82½
Boston Elevated Railway	89½	94½
Boston Suburban Electric Companies (common)	7½	7½
Boston Suburban Electric Companies (preferred)	55	55
Boston & Worcester Electric Companies (common)	*8	*8
Boston & Worcester Electric Companies (preferred)	42	42
Brooklyn Rapid Transit Company	87½	87¾
Capital Traction Company, Washington	117½	115
Chicago City Railway	*165	*165
Chicago Elevated Railways (common)	25½	*25½
Chicago Elevated Railways (preferred)	*75	*75
Chicago Railways, ptcptg., ctf. 1	*95	92
Chicago Railways, ptcptg., ctf. 2	25½	27⅛
Chicago Railways, ptcptg., ctf. 3	*7½	*7½
Chicago Railways, ptcptg., ctf. 4	*2½	*2½
Cincinnati Street Railway	a110	a110
Cleveland Railway	102¾	*102¾
Cleveland, Southwestern & Columbus Ry. (common)	6	*6
Cleveland, Southwestern & Columbus Ry. (preferred)	29	*29
Columbus Railway & Light Company	18	18
Columbus Railway (common)	69½	a69½
Columbus Railway (preferred)	88	88
Denver & Northwestern Railway	107	*107
Detroit United Railway	70	a70
General Electric Company	139¾	140
Georgia Railway & Electric Company (common)	114¾	*114¾
Georgia Railway & Electric Company (preferred)	82½	*82½
Interborough Metropolitan Company (common)	15½	15⅝
Interborough Metropolitan Company (preferred)	58⅜	58⅜
International Traction Company (common)	*30	*30
International Traction Company (preferred)	*95	*95
Kansas City Railway & Light Company (common)	18	15
Kansas City Railway & Light Company (preferred)	36	*36
Lake Shore Electric Railway (common)	9	*9
Lake Shore Electric Railway (1st preferred)	90	*90
Lake Shore Electric Railway (2d preferred)	25	*25
Manhattan Railway	126	126
Massachusetts Electric Companies (common)	14½	*14½
Massachusetts Electric Companies (preferred)	71	72
Milwaukee Electric Railway & Light Co. (preferred)	*90	*90
Norfolk Railway & Light Company	*25	25
North American Company	69½	60
Northern Ohio Light & Traction Company (common)	a75	a70
Northern Ohio Light & Traction Company (preferred)	a100	a100
Philadelphia Company, Pittsburgh (common)	39	43¼
Philadelphia Company, Pittsburgh (preferred)	39	43
Philadelphia Rapid Transit Company	22½	22½
Portland Railway, Light & Power Company	58	*58
Public Service Corporation	108	108
Third Avenue Railway, New York	35⅝	34¾
Toledo Railways & Light Company	a12	a12
Twin City Rapid Transit Co., Minneapolis (common)	104	*104
Union Traction Company of Indiana (common)	4½	*4½
Union Traction Company of Indiana (1st preferred)	80	*80
Union Traction Company of Indiana (2d preferred)	30	*30
United Rys. & Electric Company (Baltimore)	26¾	26⅝
United Rys. Inv. Company (common)	18½	22½
United Rys. Inv. Company (preferred)	35	42
Virginia Railway & Power Company (common)	51	51
Virginia Railway & Power Company (preferred)	89	89
Washington Ry. & Electric Company (common)	89¼	91
Washington Ry. & Electric Company (preferred)	87⅝	87¾
West End Street Railway, Boston (common)	71	71½
West End Street Railway, Boston (preferred)	86	86
Westinghouse Elec. & Mfg. Company	61½	63
Westinghouse Elec. & Mfg. Company (1st preferred)	108	109

*Last sale. a Asked.

ANNUAL REPORTS

American Power & Light Company

According to the annual report of the American Power & Light Company, New York, N. Y., which controls various electric light and power, gas, railway and water works properties in the West, the combined gross earnings of the controlled companies for the twelve months ended April 30, 1913, were $5,418,194, of which $211,179, or 4 per cent, was derived from the company's electric railway holdings. The combined net income of the controlled companies for the period was $560,052, and the balance accruing to the American Power & Light Company, after transfering $158,397 to a reserve for depreciation and setting aside $147,780 for common stock not held by the American Power & Light Company, was $253,875. The grand balance of combined surplus accruing to the American Power & Light Company as of April 30, 1913, was $1,080,523.

The Pacific Power & Light Company, one of the controlled companies, which operates 30.5 miles of street and interurban railways in Washington and Oregon, reports gross earnings for the period of $1,239,382, which, after a deduction of $641,777 for operating expenses, $299,951 for fixed charges and $238,750 for preferred dividend, gives a balance of $58,904, a decrease of $46,521 from the previous year, when only $165,000 was declared in dividends.

The gross earnings of the Southwestern Power & Light Company, operating 5 miles of electric railways in Texas, were $1,999,065, from which, after a deduction of $1,128,334 for operating expenses, $870,731 was left as net earnings, an increase of $112,600 over the preceding year.

The report says of two other controlled companies:

"The Kansas Gas & Electric Company supplies, under an advantageous contract with the Wichita Railway & Light Company, continuing until 1930, all the power used for the operation of the entire street railway business in Wichita, comprising 33.6 miles of track. It also has a contract with the Arkansas Valley Interurban Railway, expiring in 1930, to supply all the power necessary to operate all the interurban company's railway lines, already constructed for 38 miles and planned for 90 miles.

"The Texas Power & Light Company has a contract for fifty years with the Southern Traction Company to supply all the power for its interurban lines, which are now being built between Waco and Dallas and between Dallas and Corsicana, and for its traction system in Waco. The interurban system now planned will cover about 135 miles of interurban lines, in addition to the present Waco city system of approximately 16 miles of track and the Corsicana system of approximately 4 miles of track. Power is also supplied by the Texas Power & Light Company to the street railway in Cleburne, with 7 miles of track, the street railway in Paris, with 5½ miles of track, and the street railway in Bonham, with 2½ miles of track."

Middle West Utilities Company

The statement of income and expenditures of the Middle West Utilities Company, Chicago, Ill., for the fiscal year ended April 30, 1913, is as follows:

Interest received and accrued on bonds and debentures		$113,305
Dividends received and accrued on stocks of subsidiary companies	$224,375	
Dividends received and accrued on stocks of outside companies	40,590	264,965
Sundry interest on notes receivable, brokerage, etc.		86,968
Total interest and dividends		$465,239
Profits from cash sale of properties or securities		287,598
Profits from sale of properties to subsidiary companies where proceeds in securities or notes have not all been sold, arrived at on basis of values fixed by the board of directors		159,131
Total income		$911,969
Administration expense		93,957
Interest		60,655
Depreciation and losses on investments		19,743
Miscellaneous charges, including taxes, depreciation		38,591
Total expenditure		$212,948
Balance profit for period		$699,021

Out of this profit for the year dividends have been paid and accrued on the preferred stock in the amount of $353,417, leaving a surplus of $345,603.

Samuel Insull, president of the company, says in part:

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"At the time of its organization the company acquired certain public service properties in Indiana, Illinois, Kentucky, Missouri and the New England States. Since then it has from time to time materially increased its holdings in these States with the exception of Missouri,, and in addition has acquired properties in Michigan and Oklahoma.

"The various properties, with the exception of those in Michigan, have been consolidated into one or more subsidiary operating companies in each State. The junior securities of these companies are either in their entirety or in a large majority owned by this company. Its policy is, so far as possible, to keep the junior securities of its subsidiary companies in its own treasury.

"The subsidiary companies are in the aggregate serving 274 separate communities, having a combined population of between 800,000 and 900,000, with one or more classes of public utility service, namely, electric light and power, gas, heat, ice, transportation and water.

"The combined earnings of these subsidiary companies from the date at which they were respectively acquired to April 30, 1913, the end of this company's fiscal year, were as follows:

Gross earnings	$3,680,676	
Operating expenses	2,442,584	
Net earnings from operation		$1,238,092
Fixed charges to outside holders	$639,862	
Interest on debentures and dividends paid on stock held by outside holders, including their proportion of the surplus	161,794	
		801,657
Earnings accrued on securities of subsidiary companies held by this company		$436,435

"Of these earnings, $111,180 has come into the treasury of this company as interest on bonds and debentures, and $224,375 as dividends on stock, leaving a balance of $100,879, being the Middle West Utilities Company's proportion of the surplus carried in the aggregate surplus accounts of the subsidiary companies on their own books.

"Since the close of the fiscal year, the directors have authorized the issue of $3,500,000 of three-year 6 per cent collateral gold notes, secured by the deposit with a trustee of $4,667,000 par value of mortgage bonds of subsidiary companies; $2,000,000 of these notes will be sold immediately. The proceeds of this issue will be used to complete payments on properties heretofore contracted for, to provide funds for the development of subsidiary companies and to fund the floating debt of the company."

Minority Bondholders Object to Buffalo & Lake Erie Traction Company Reorganization and Consolidation

Minority bondholders of the Buffalo & Lake Erie Traction Company are protesting against the proposed plan of reorganization of that line and the consolidation with the Buffalo, Lockport & Rochester Electric Railway, which was described in detail in the ELECTRIC RAILWAY JOURNAL of July 26, 1913.

When the application of the majority bondholders came up for a hearing before Public Service Commissioner Decker in Buffalo, N. Y., on July 31, the representative of the minority bondholders applied for an adjournment for at least a month. He claimed that no notice of the details of reorganization had been received by the minority bondholders and it was not until this hearing that they became familiar with the terms of the proposed merger. The application for more time was rejected by the Public Service Commission, however, and continuance of the hearing set for Aug. 1.

The plan provides for paying the bondholders dollar for dollar, but it is pointed out by the bondholders that the preferred stock held by them will be wiped out and that they stand to lose close to a half a million dollars. When the bonds were originally placed on the market, they could not be purchased unless some preferred stock was secured, being sold in blocks of $10,000 worth of bonds and $2,000 worth of preferred stock. Under the proposed plan all preferred stock will be taken over by Bertron, Griscom & Jenks, New York bankers.

Among those who appeared at the hearing were C. K. Beekman, counsel for the petitioning bondholders; Gerald B. Fluhrer, for certain creditors of the Buffalo & Lake Erie Traction Company; A. B. Ottaway, Joseph J. Lunghino, John F. Burke, M. A. Federspiel, D. D. Eames and others for certain bondholders and stockholders.

Edward G. Connette, president of the International Railway, Buffalo, N. Y., was sworn and he testified as to the physical valuation of the Buffalo & Lake Erie Traction Company and the Buffalo, Lockport & Rochester Electric Railway. D. C. Jackson of Boston, a consulting engineer and a professor in the Massachusetts Institute of Technology, testified as to the value of the contract with the Canadian power company which will furnish 46,000 hp at the international boundary.

The greater part of the testimony during the morning and afternoon sessions was taken up with explaining how certain estimates as regards tracks, rigrt-of-way, maintenance cost and other similar details were arrived at. Nothing of unusual importance was brought out, but it is plain that the members of the commission will make an exhaustive investigation into the details before the application is granted.

All of the experts testified that the Buffalo & Lake Erie Traction line is in excellent condition and that certain parts of the line are paying well on the investment. Many bondholders were of the opinion that this line should not absorb a line which they claimed was in a less prosperous condition.

Sanderson & Porter Secure Common Stock Control of New Haven's Springfield and Worcester Electric Railways

It was reported in Boston on July 31 that the electric railways in Springfield and Worcester, in western New England, owned by the New England Investment & Security Company, on which the New York, New Haven & Hartford Railroad has guaranteed interest on the bonds and dividends of the preferred stock, had been sold to Sanderson & Porter, New York City, N. Y. In this connection the following statement was made at the office of the New York, New Haven & Hartford Railroad in New York:

"C. S. Mellen, president of the New York, New Haven & Hartford Railroad, understands it is true that a large amount of the stock of the New England Investment & Security Company, which controls the electric railways in Springfield and Worcester, has been acquired by Sanderson & Porter, who are constructors, operators and promoters of electric railways in various sections of the country. Just how much stock they have acquired Mr. Mellen is not advised, but he is told that it is enough to put control into their hands. Mr. Mellen is not advised regarding the policy of Sanderson & Porter and has no information of their intentions."

Sanderson & Porter subsequently confirmed the news to the effect that they have purchased a controlling interest in the common stock of the New England Investment & Security Company.

The New England Investment & Security Company, the controlling interest in the common stock of which has been purchased by Sanderson & Porter, was organized in June, 1906, to acquire the electric railways in Massachusetts controlled at that time by the New York, New Haven & Hartford Railroad. It controls the following companies through ownership of all or a majority of their stocks: Worcester Railways & Investment Company, Worcester Consolidated Street Railway, Milford, Attleboro & Woonsocket Street Railway, Springfield Street Railway and Springfield Railway Company. In April, 1909, the company acquired by assignment all rights of the Rhode Island Company's interest in the capital stock of the Attleboro Branch Railroad and the Interstate Consolidated Street Railway and of the Consolidated Railway's interest in the capital stock of the Worcester & Webster Street Railway and the Webster & Dudley Street Railway. The capital stock of the company consists of $10,000,000 of common stock, of which $100,000 is outstanding, and $10,000,000 of 4 per cent cumulative preferred stock, of which $4,000,000 is outstanding. The system in Springfield which the company controls consists of 166 miles of track, while the system in Worcester consists of more than 266 miles of track. The officers of the New England Investment & Security Company are J. T Harmer, president; Bentley W. Warren,

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vice-president; F. P. McIntyre, secretary, and L. Candee, treasurer.

It will be recalled that the Interstate Commerce Commission, in its recent report on the operations of the New York, New Haven & Hartford Railroad, recommended that the New Haven company divest itself of its electric railway interests, and it was subsequently reported in Boston that a syndicate to include members of the firms of Kidder, Peabody & Company, Stone & Webster and others was being organized to take over the electric railway properties of the company in Rhode Island. Charles A. Stone of Stone & Webster, however, was quoted to the effect that there was nothing to the report concerning the purchase of the Rhode Island properties. Others who were said to be interested in the purchasing syndicate were also quoted to the effect that they had no knowledge of the reported deal.

Report of Geary Street Municipal Railway for Six Months

The municipal authorities of San Francisco, Cal., have published the following statement of receipts and disbursements for operating expenses of the Geary Street Municipal Railway from Dec. 27, 1912, to June 30, 1913, inclusive. The interest due June 1 was $20,647, leaving a surplus over the expenditures and interest of $31,909.

	Receipts	Disbursements
December (4 days)	$3,300	$1,076
January	17,465	9,835
February	18,619	10,461
March	22,023	12,806
April	22,034	11,648
May	23,525	13,338
June 1 to 24 inclusive (Kearny to Thirty-third Avenue)	18,840	14,199
June 25 to 30 inclusive (Ferry to Ocean)	9,114	
Total	$134,923	$73,365

American Water Works & Guarantee Company, Pittsburgh, Pa.—J. B. Van Wagener, treasurer of the American Water Works & Guarantee Company, made a statement, in part as follows, on July 29: "Arrangements have been made for the payment of all interest maturing on Aug. 1 on securities of subsidiary companies of the American Water Works & Guarantee Company. The full and complete audit of the books of the American Water Works & Guarantee Company and its subsidiary companies ordered by the receivers has not yet been completed."

Arkansas Valley Interurban Railway, Wichita, Kan.—George J. Theis, Jr., Wichita, was elected president of the Arkansas Valley Interurban Railway at the annual meeting of stockholders on July 22 to succeed W. O. Van Arsdale. Stockholders of the company elected the following directors: George J. Theis, Jr., J. L. Johnson, O. A. Boyle, W. O. Van Arsdale, J. H. Elem, R. L. Holmes, C. G. Cohn, C. H. Smyth and L. M. Dakin. J. H. Elem was elected a director to fill the vacancy caused by the resignation of F. D. Treckle, who has sold his interests to Mr. Theis. The directors then organized as follows: George J. Theis Jr., president; O. A. Boyle, vice-president and general manager; A. Stone, secretary. The stockholders of the Interurban Construction Company, which is affiliated with the railway, elected the following directors: O. A. Boyle, George J. Theis, Jr., R. B. Campbell, J. H. Elem, R. L. Holmes, E. T. Battin and C. H. Smyth. E. T. Battin was elected in place of F. D. Treckle. The directors of the construction company elected officers as follows: O. A. Boyle, president; J. H. Elem, vice-president; R. B. Campbell, treasurer; E. T. Battin, secretary.

Billings (Mont.) Traction Company.—A special meeting of the stockholders of the Billings Traction Company will be held on Aug. 9, 1913, for the purpose of passing upon an increase of the capital stock to an amount not exceeding $500,000 and for the further purpose of amending the articles of incorporation so that preferred stock may be created and issuing preferred stock for at least a portion of the increase of stock, and for the purpose of creating a bonded indebtedness in an amount not to exceed $500,000, to pay the present indebtedness of the company and to secure money with which to make necessary extensions.

Central Park, North & East River Railroad, New York, N. Y.—Judge Lacombe, in the United States District Court, has directed Alexander Gilchrist, clerk of the United States District Court, to pay over to George W. Linch, receiver of the Central Park, North & East River Railroad, $75,492, being the balance of the proceeds of a sale of that property held on Nov. 14, 1912. The order is made so that the receiver may deposit the money with the Guaranty Trust Company, to be distributed under supervision of the Supreme Court of the State of New York, as provided in a judgment granted Dec. 12, 1912, in suit brought against the company by George P. Titus, Jr. Clerk Gilchrist is directed to hold $20,000 subject to the orders of the court. The Belt Line Railway Corporation is the successor to the Central Park, North & East River Railroad.

Denver & Northwestern Railway, Denver, Col.—The exact basis of the exchange of the $6,000,000 of first and collateral thirty-year 5 per cent bonds of the Denver & Northwestern Railway for bonds of the Denver City Tramway, referred to in the ELECTRIC RAILWAY JOURNAL of June 14, 1913, page 1088, is as follows: Each holder of a $1,000 Denver & Northwestern bond will receive a $1,000 first and refund sinking fund mortgage twenty-five-year 5 per cent gold bond of the Denver City Tramway, dated Nov. 1, 1908, due Nov. 1, 1933, and in addition thereto $50 in non-interest-bearing scrip exchangeable in amounts of $500 for the above-mentioned bonds of 1908.

Dry Dock, East Broadway & Battery Railway, New York, N. Y.—Judge Lacombe in the United States District Court on July 19, 1913, authorized F. W. Whitridge, receiver, to issue $179,000 of receiver's certificates to be known as series "B" and to bear 4 per cent interest. This sum was expended on the improvement of track and equipment and was chiefly furnished by the Third Avenue Railway.

East St. Louis & Suburban Railway, East St. Louis, Ill.—On May 22, 1913, the East St. Louis & Suburban Railway filed in Belleville a certificate of increase of capital stock from $3,850,000 to $4,100,000.

Gary & Interurban Railway, Gary, Ind.—Suit has been filed in the Porter (Ind.) Circuit Court by F. B. Raff, South Bend, Ind., owner of 5040 shares of stock of the Gary & Interurban Railway, to set aside the merger of the company with the Gary & Connecting Railways, the Valparaiso & Northern Railway, the Goshen, South Bend & Chicago Railroad and the Chicago-New York Electric Air Line Railroad. In case the petition for the dissolution of the merger is granted, the court is asked to appoint a receiver for the original Gary & Interurban Railway.

Highland Park & Lake Burien Railroad, Seattle, Wash.—The city of Seattle has decided to accept the offer of the Lake Burien & Highland Park Railroad and will take over the portion of the road within the city limits.

Interborough Rapid Transit Company, New York, N. Y.—Application has been made to the New York Stock Exchange for listing $37,027,000 of Interborough Rapid Transit Company first and refunding mortgage 5 per cent gold bonds. In all, some $160,000,000 of these bonds will be issued and listed from time to time. Of the total $37,027,000 to be listed at present about $5,000,000 have been exchanged for the old first mortgage bonds of the company on the basis of 105 for the old bonds and 98 for the new. Of the balance, half will be used for retiring note obligations and half for new construction. The total authorized issue of first and refunding 5 per cent bonds is $300,000,000, dated Jan. 1, 1913.

Lake Shore Electric Railway, Cleveland, Ohio.—The Lake Shore Electric Railway has been authorized by the Public Service Commission of Ohio to pledge as collateral for a loan, which shall be in the largest amount negotiable but not less than 60 per cent of the par value thereof, its 5 per cent general mortgage bonds of the total principal sum of $179,000, the issue of which bonds has heretofore been consented to and authorized by the commission.

Manila Electric Railroad & Lighting Corporation, Manila, P. I.—The eighth annual report of the Manila Electric Railroad & Lighting Corporation states that the gross earnings for the year ended Dec. 31, 1912, were $1,597,671, being an increase over the previous year of $144,986, or 9.98 per cent; operating expenses and taxes increased $821,648, or 12.87 per cent, while the net earnings from operation were $873,187, an increase of $62,337, or 7.68 per cent. Interest charges during the year were $277,500, and sinking fund requirements $28,250, leaving surplus earnings for the year of $567,437. The annual appropriation for the replacement and renewal fund of $80,000 was maintained, and

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deducting this from the year's surplus earnings, there remained an available surplus for the year of $487,437, being an increase of $61,612 over the previous year. From this amount there were paid four dividends of 1½ per cent each, and an additional dividend of 1 per cent, making 7 per cent for the year, aggregating $350,000, leaving $137,437 to be transferred to the surplus account, making the total accumulated surplus with reserves at Dec. 31, 1912, $1,362,140, an increase over 1911 of $282,061.

Metropolitan Street Railway, New York, N. Y.—Upon application of Douglas Robinson, as one of the receivers of the Metropolitan Street Railway, Judge Lacombe, of the United States District Court, has signed an order directing all persons having claims against the New York City Railway or the Metropolitan Street Railway prior to Sept. 24, 1907, when the roads went into receivership, to file their claims and assert title to such claims before Special Master William L. Turner. The order of the court directs that only those may prove claims who have been found to be entitled to payment out of the proceeds as apportioned on mandate of the court filed Jan. 13, 1913.

Oakland & Antioch Railway, Oakland, Cal.—A subscription list to the recently authorized $1,000,000 bond issue is being circulated among the stockholders of the Oakland, Antioch & Eastern Railway. The bonds are offered to stockholders at $85 and interest. In case the management succeeds in raising sufficient funds in this manner to complete the line to Sacramento, the proposed assessment will not be levied. Otherwise two assessments will be levied, one of $10 per share against the 35,000 shares of stock outstanding of the Oakland & Antioch Railroad, and the other of $5 against the 100,000 shares of stock of the Oakland, Antioch & Eastern Railway.

Quebec Railway, Light & Power Company, Quebec, Que.—Holders of two bond issues of Quebec Railway, Light & Power Company, consisting of $2,500,000 of Quebec-Saguenay division first mortgage thirty-year 5 per cent bonds and $2,100,000 new mortgage 5 per cent bonds, have been called to meet on Sept. 2 to consider the action to be taken in view of the registration on the property of the Quebec & Saguenay Railway of an alleged lien or privilege for the payment of contractors in connection with construction work done on the line of the Quebec & Saguenay Railway and to instruct the trustee of the bonds accordingly. The *Financial Post* of Toronto on July 19 quoted Rudolphe Forget, president of the Quebec Railway, Light, Heat & Power Company, as follows: "The railway has been doing finely and for the fiscal year ended June 30 the gross earnings were 18 to 20 per cent larger than last year." In regard to the many rumors of the sale of subsidiary lines, Mr. Forget is said to have remarked: "There is absolutely nothing in all these reorganization rumors. The company is in a good position, as will be seen from the statement when issued. The bond interest, about which there has been so much said, has been paid and the company is going right ahead. The matter of the French government tax should not give anyone any very great concern. Less than 20 per cent of the shares are held abroad and the control is over here."

Railways Company General, New York, N. Y.—The capital stock of the Railways Company General has been reduced from $500,000 to $400,000 (as authorized by the stockholders July 15, 1913) by retiring shares owned by the corporation and the purchase at not above par of shares for retirement. Various reductions have, since September, 1905, brought the capital stock down from $1,500,000 to the present amount.

San Francisco-Oakland Terminal Railways, Oakland, Cal.—The committee appointed to manage the affairs of the San Francisco-Oakland Terminal Railways is trying to negotiate a $4,000,000 loan with which to pay off the floating debt, take up the note of $2,500,000 held by Halsey & Company as security for a loan which is past due, and provide funds to complete improvements in the Key Route basin and elsewhere. July 15 was set as the date on which the committee should have been ready to comply with the demands of the bond houses in New York from which the money is to come for rehabilitating the concern. Not all of the requirements were met at that time, although the members of the committee expressed confidence that they soon would be met. The bond houses extended the time to Aug. 1. The committee had hoped that no legal action might be taken by the minority stockholders until the underwriting negotiations had been concluded, as it was feared that such action, if brought at this time, might so complicate matters as to interfere with the work of the financial committee. A petition was filed, however, in the United States District Court on July 24 by four of the creditors of F. M. ("Borax") Smith, asking that he be declared an involuntary bankrupt. As Mr. Smith is the head of the United Properties Company, the holding corporation for the San Francisco-Oakland Terminal Railways, this action may embarrass the financial committee in its negotiations.

Springfield (Ohio) Railway.—The Springfield Railway has been authorized by the Public Service Commission of Ohio to issue its first mortgage 5 per cent bonds of the total principal sum of $1,244,000 and its 6 per cent preferred capital stock of the par value of $356,000, the bonds to be sold for not less than 80 and the stock for not less than par. The proceeds of these issues are to be used to pay and retire the petitioner's present outstanding issue of 6 per cent first mortgage bonds of the principal sum of $500,000, to pay and discharge floating indebtedness represented by demand notes which on May 31, 1913, amounted to $837,390 and to pay in full for the ten cars which the company has contracted for at the estimated price of $51,687.

Dividends Declared

Connecticut Railway & Lighting Company, Bridgeport, Conn., quarterly, 1 per cent, preferred; quarterly, 1 per cent, common.

Detroit (Mich.) United Railway, quarterly, 1½ per cent.

Harrisburg (Pa.) Traction Company, 3 per cent.

Toledo, Bowling Green & Southern Traction Company, Findlay, Ohio, quarterly, 1½ per cent, preferred.

Union Street Railway, New Bedford, Mass., quarterly, 2 per cent.

ELECTRIC RAILWAY MONTHLY EARNINGS

BATON ROUGE (LA.) ELECTRIC COMPANY

Period			Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1 mo.	May	'13	$12,231	*$7,550	$4,681	$2,076	$2,606
1 "	"	'12	13,902	*7,769	6,133	1,730	4,203
12 "	"	'13	150,336	*92,257	58,079	22,162	35,916
12 "	"	'12	132,260	*79,969	52,292	20,753	31,539

BROCKTON & PLYMOUTH STREET RAILWAY, PLYMOUTH, MASS.

1 mo.	May	'13	$10,279	*$8,537	$1,742	$1,106	$636
1 "	"	'12	9,759	*7,688	2,071	1,055	1,017
12 "	"	'13	121,767	*94,184	27,584	12,806	14,778
12 "	"	'12	119,264	*89,837	29,427	12,641	16,786

CAPE BRETON ELECTRIC COMPANY, SYDNEY, N. S.

1 mo.	May	'13	$29,989	*$19,115	$10,874	$6,082	$4,792
1 "	"	'12	28,578	*16,192	12,386	5,703	6,683
12 "	"	'13	372,592	*199,621	172,970	69,932	103,038
12 "	"	'12	344,416	*190,191	154,225	67,872	86,353

DALLAS (TEX.) ELECTRIC COMPANY

1 mo.	May	'13	$184,737	*$108,829	$75,908	$24,615	$51,293
1 "	"	'12	150,065	*90,141	59,924	24,666	35,258
12 "	"	'13	1,982,032	*1,161,467	820,565	295,736	524,829
12 "	"	'12	1,688,788	*1,110,004	578,784	256,242	322,542

EL PASO (TEX.) ELECTRIC COMPANY

1 mo.	May	'13	$71,023	*$39,330	$31,693	$4,184	$27,509
1 "	"	'12	59,838	*34,377	25,461	6,597	18,864
12 "	"	'13	855,963	*460,169	395,794	53,831	341,963
12 "	"	'12	722,464	*408,814	313,650	82,337	231,313

GALVESTON HOUSTON ELECTRIC COMPANY, HOUSTON, TEX.

1 mo.	May	'13	$202,470	*$111,516	$90,954	$34,755	$56,199
1 "	"	'12	168,519	*97,821	70,698	33,815	36,883
12 "	"	'13	2,180,999	*1,256,545	924,453	409,692	514,762
12 "	"	'12	1,697,801	*1,048,707	649,093	303,273	345,820

HOUGHTON (MICH.) COUNTY TRACTION COMPANY

1 mo.	May	'13	$24,644	*$15,108	$9,536	$5,630	$3,907
1 "	"	'12	24,088	*14,381	9,708	6,612	3,096
12 "	"	'13	312,742	*178,067	134,676	67,058	66,618
12 "	"	'12	300,669	*179,269	121,399	63,990	57,409

JACKSONVILLE (FLA.) TRACTION COMPANY

1 mo.	May	'13	$59,833	*$37,665	$22,169	$11,185	$10,984
1 "	"	'12	52,515	*32,256	20,559	9,830	10,429
12 "	"	'13	586,487	*396,545	189,942	126,203	63,639
12 "	"	'12	572,965	*356,348	216,617	112,086	104,531

*Includes taxes.

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Traffic and Transportation

When Is Car Diversion Justified?

In the pending case of McCormick vs. United Railways & Electric Company, Baltimore, the Public Service Commission of Maryland is asked to decide the question whether a street railway is justified in diverting cars from their regular routes on account of pleasure travel even when such diversion is clearly advantageous to most of its patrons. To accommodate excursion traffic to River View Park, the cars of the Madison Avenue line are diverted during May to September from their regular route so that South Broadway between Bank and Thomas Streets is deprived of its regular car service. This diversion is made, weather conditions permitting, on week days, except Saturdays, from about 8 p.m. to 11 p.m., and on Sundays from 2 p.m. to 11.30 p.m. To provide service on South Broadway during these hours and also to accommodate passengers for the excursion steamer *Dreamland*, the cars of the Pennsylvania Avenue line are rerouted over eleven blocks, crossing steam railroad tracks four times on the diverted run. It is complained that these changes delay the regular patrons of the Pennsylvania Avenue line, that persons are often in doubt what car to take owing to uncertainties growing out of the statement "weather conditions permitting," that far more regular riders are inconvenienced on the Pennsylvania Avenue line than on the Madison Avenue line, and that, in any event, this diversion of cars is caused by an unjustifiable effort to accommodate excursion traffic during a part of the day during the excursion season.

The evidence presented at the hearing disclosed the fact that when the company first diverted its cars in June, 1910, it did so at the urgent request of a committee representing merchants, taxpayers and citizens of South Broadway and also at the request of the *Dreamland's* owners, who desired to have the cars routed directly to their pier at the foot of Broadway. Prior to June, 1910, the traffic on South Broadway during the excursion hours of the Madison Avenue line was cared for by a shuttle service. This service the South Broadway citizens considered "humiliating," and upon their petition it was abandoned in favor of the diversion of the Pennsylvania Avenue line. Although represented at the hearing, the company refrained from taking active part in the proceedings, leaving the contest to the representatives of the regular Pennsylvania Avenue riders and the South Broadway interests.

In reviewing the testimony, the commission admits that the excursion traffic is a legitimate one, and that it also affords the only means by which large numbers of persons of small means can reach the pleasure resorts to escape the heat and discomfort of crowded streets and dwellings. It contends, however, that this is a special service which should be given without interruption to regular service except such as is incidental to the operation of more cars to take care of the excursion traffic. In this instance it holds that it is not fair to inconvenience the patrons of the Pennsylvania Avenue line for the benefit of the South Broadway residents who were dissatisfied with tripper service. The commission therefore decided on July 15 that the diversion of the Pennsylvania Avenue line should be discontinued, but this change will not be made until the commission has also decided after another hearing what service should be provided for the South Broadway section. It has suggested tentatively that part of the Madison Avenue cars should serve this section, while the remaining regular cars and properly placarded trippers would go to River View Park.

Terms of Agreement Between Rhode Island Company and Its Employees

The agreement entered into between the officers of the Rhode Island Company, Providence, R. I., and the representatives of the employees, to which brief mention was made in the ELECTRIC RAILWAY JOURNAL of July 26, 1913, page 160, was signed on July 21, 1913, and will continue in effect until June 1, 1915, and from year to year thereafter unless changed after thirty days' notice by either party to the other. The agreement provides for recognition of the local union by the company, that the company treat with the duly selected committees of the union on all questions which may arise and that no discrimination shall be shown against employees who are members of the union. On their part the representatives of the union agree not to discriminate against employees of the company who are not members of their association and to a maximum of ten hours and a minimum of eight hours for a day's work, to be completed within a period of twelve hours, all trippers be included in regular runs as far as possible. The following scale of wages for motormen and conductors, effective from July 1, 1913, is provided: First six months, 23 cents an hour; second six months, 24½ cents an hour; second year, 26 cents an hour; third year, 27 cents an hour; thereafter, 28½ cents an hour. The wages paid previous to July 1, 1913, follow: First year, 22 cents an hour; second year, 23 cents an hour; third year, 23½ cents an hour; fourth year, 24¾ cents an hour; fifth year, 26¼ cents an hour; sixth year, 27½ cents an hour; thereafter, 27½ cents an hour.

The agreement also provides that all work on snow plows shall be paid for at the rate of 10 cents an hour extra. The wages of all men employed in the shops and mechanical departments of the various carhouses are increased 1½ cents an hour in addition to a similar raise which was granted on March 29, 1913. The wages of first-class linemen have been increased from $3.15 to $3.25 a day; second-class linemen from $2.70 to $2.85 a day; ground men from $2 to $2.10 a day. Permanent trackmen will receive $2 a day the first year and $2.25 a day after the first year for a working day of ten hours. Time and one-half will be paid these men for overtime, Sundays, holidays and night work, except when men are assigned to night work for a period of more than two days. Trolley boys are to receive $1 to $1.25 a day. Brakemen in the freight department will receive 20 cents an hour, an advance from 18 cents an hour. Freight handlers will receive 17 cents an hour the first year, 18 cents an hour the second year and 19 cents an hour the third year and thereafter, an increase from 16½ cents an hour. Firemen will receive $14 a week for eight hours per day, seven days a week. Firemen were previously paid $12.60 a week for a day of ten hours, seven days a week, but each fireman was allowed one day off in every seven. Firemen helpers will receive $12.60 a week for the first year and $13 a week after the first year for eight hours a day, seven days a week. Power house laborers will receive $12.60 a week the first year and $13 a week after the first year. It is estimated that the increase granted to the employees will amount to approximately $200,000 a year.

Provisional Agreement in Regard to Traffic Changes in Montreal

As the result of a conference between a special committee of the Montreal Council, the Comptrollers and E. A. Roberts, president of the Montreal (Que.) Tramways, a provisional agreement has been reached in regard to measures to be taken to improve the service and reduce congestion during the rush hours. The basis of the agreement is the report submitted by G. Janin, the city's chief engineer. This report has been ratified by the Council. The most important recommendation is for fifteen new routings and modifications of routings. Among the minor recommendations are the elimination of stops, increasing the switchmen, the improvement of signs on the cars, the cessation of smoking on the rear end of the cars, and the control of traffic at central points. Mr. Roberts has suggested that later a more general plan should be worked out to meet conditions due to the increase in the population.

The company has obtained judgment by the Court of Review, dismissing a conciliation board appointed by the Minister of Labor to consider a dispute between the company and certain ex-employees. Several conductors and motormen whose services were dispensed with secured the co-operation of a union with the result that a conciliation board was appointed. Legal proceedings followed, and Justice Greenshields, in the Court of Review, holds that none of the employees who were dismissed was a member of the union which secured the appointment of the board of conciliation.

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Increase in Wages in Minneapolis

The Twin City Rapid Transit Company, Minneapolis, Minn., put in effect on July 1 an increase in the wages of trainmen amounting to about 10 per cent over the scale of wages adopted on July 1, 1912. The wage scale provides for an increase in the wage rate for each period of service as before, but sets the wage maximum at six years instead of eight. The following is the new scale of wages as issued by Horace Lowry, vice-president: First six months in service, 23 cents an hour; second six months, 24 cents an hour; second year, 26 cents an hour; third year, 27 cents an hour; fourth year, 28 cents an hour; fifth year, 29 cents an hour; sixth year and thereafter, 30 cents an hour. All extra men will be guaranteed an extra wage of $2 per day. The old wage scale made July 1, 1912, was as follows: First six months in service, 22 cents an hour; second six months, 23 cents; second year, 24 cents; third year, 25 cents; fourth and fifth years, 26 cents; sixth and seventh years, 27 cents; eighth year and thereafter, 28 cents.

The company made the following additional statement at the time the raise in wages was announced:

"Under the new wage schedule new conductors and motormen will be guaranteed a minimum wage of $2 per day, and this will mean that with regular runs they will have a chance to make $70 per month from the outset, with regular increase each year. With the prospect of securing work in the Twin Cities that will be always permanent, no matter what the season may be, the new wage scale is bound to attract a large number of young men from the country and the smaller towns of the State. There is no work that offers better opportunities for advancement than the electric railway business, and it is notable that the best men street railways are securing for employment in their train service are country boys and young men who have been brought up in the rural districts. These young men develop rapidly and are the ones usually marked for advancement."

The Menace of the Automobile

A collision recently between a car on the interurban line of the Peninsula Railway, San José, Cal., and an automobile resulted in the almost immediate death of the occupants of the machine. The evidence went to show that the accident was entirely unavoidable on the part of the company, and the coroner's jury exonerated the motorman from all blame. Following the accident W. G. Boynton contributed an article in part as follows to the San José *Mercury* in which he brought out forcibly the serious menace which the automobile is to safe operation of electric interurban railways:

"In the various meetings held by the safety committee of the Peninsula Railway during the last twelve months, the carelessness of the drivers of automobiles has been brought forward so repeatedly by the operating crews of the cars that a unanimous resolution was passed to the following effect: That in cases where the automobile is leading on the road, and thus is ahead of the car, the auto driver must be considered as an irresponsible person as to his actions, for by experience it has been found impossible to tell what he would do, or what course he would follow. Bulletins to this effect have therefore been issued to all men operating the cars.

"A more serious, although indirect, condemnation of auto drivers cannot be imagined. This makes plain the astounding fact that all motormen of electric railway cars deliberately take on themselves the entire responsibility of avoiding a collision in such cases. It seems that owing to unguarded confidence, or hardy ignorance, the bulk of auto drivers when leading have no idea of following the rules of the road. Hence the law that they must be held to be irresponsible!

"Men buy machines without knowing the principles of driving or guiding, and are guileless of all efficiency beyond putting on the pace and trusting to that to carry them over. Nothing further remains to be said when you compare the efficiency of the carefully selected railway men with the charce capacity of the average amateur auto driver."

The Booster.—With the August number, which is just coming from the press, *The Booster*, the bright little publication issued by the Louisville & Northern Railway & Lighting Company and the Louisville & Southern Indiana Traction Company, New Albany, Ind., has completed two years and a half of service, and thirty numbers are now in the file. The paper has been a companion to the Boosters' Club of the traction and associated lines in New Albany, chronicling the work of the club and encouraging those who take part in the club work. It has also been the means of giving publicity to the commercial interests of New Albany and southern Indiana, in line with the policy of the companies to assist in development work wherever such a course is possible.

Transfer Proposal Submitted in Trenton.—The Trenton & Mercer County Traction Corporation and the New Jersey & Pennsylvania Traction Company have filed with the City Commission of Trenton, N. J., an agreement between them fixing two points at which they are willing to grant transfers on the basis of a 5-cent fare. In the communication accompanying the agreement and signed by both Rankin Johnson and Sydney L. Wright, presidents of the respective companies, it is suggested that if the city desires a "more general system of transfers," the companies are willing to enter into negotiations for such, "with the understanding that the fare shall be fixed at such an amount between 5 and 8 cents as will afford a proper and reasonable payment to each company for the transportation furnished by each, and not at the sum of 5 cents, which is below cost, and, therefore, to the detriment of the interests of the much greater proportion of passengers who will begin and complete their journeys on one line."

Fare Decision by Massachusetts Commission.—The decree of the Public Service Commission of Massachusetts concerning the fares over the Worcester Consolidated Street Railway between Blackston and Uxbridge has been published. The company has been charging 10 cents for its service in Blackstone, a 5-cent fare between the state line at Woonsocket and the village of Millville, a distance of 3.145 miles, and another 5-cent fare between said village and the boundary lines between the towns of Blackstone and Uxbridge, a distance slightly in excess of half a mile. The petitioners desired the elimination of the fare between the last-named points. The commission issued its decree under date of July 22, 1913. The company is ordered to eliminate the fare in question. The commission also directs the company to provide a special form of ticket, which may be purchased by the workingmen and which will be accepted by the employees of the company between the hours of 5.30 and 7.30 a.m. and between 5 p.m. and 7 p.m. The order became effective on July 31.

Hours of Labor Discussed at Springfield, Mass.—There have been differences of opinion in the interpretation of the Massachusetts "nine-hours-in-eleven" act of 1913, which recently became operative. J. T. Harmer, president of the Springfield Street Railway, has issued a statement pointing out that by a three-year agreement between the union and the company dating from 1912 a maximum of nine and a half hours' work performed in twelve consecutive hours constitutes a day's work for all regular motormen and conductors, and emphasizing the fact that the new law expressly provides that existing agreements as to hours of labor shall not be affected by it. Mr. Harmer states that the company is willing to submit to arbitration on the question and calls the attention of the public to the hardships imposed by the "nine-hours-in-eleven" act in relation to handling the fluctuating service of a modern street railway. As a result of a conference on July 28 at Springfield, Mass., between officials of the Worcester Consolidated Street Railway, the Springfield Street Railway and representatives of the employees' organization, it was agreed to submit to arbitration the question at issue between the companies and the men in accordance with the 1912 agreement. The principal point to be discussed will be the application of the "nine-hours-in-eleven" act, which was passed by the last Legislature, to the existing working schedules. A number of minor questions bearing upon wages will also be considered. The arbitration board will be selected by the choice of one member each by the companies and their employees, the third member being chosen by these two.

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Personal Mention

Mr. N. E. Davis has succeeded Mr. D. J. Rinville as resident engineer of the Hudson Valley Railway, Glens Falls, N. Y.

Mr. Louis Larson has been appointed roadmaster of the Chicago, Aurora & DeKalb Railroad to succeed Mr. Floyd Clark.

Mr. R. Swartz has been appointed superintendent of the Hot Springs (Ark.) Street Railway to succeed Mr. J. H. Butterfield.

Mr. Daniel Bentz has succeeded Mr. George E. Seiple as park manager of the Northampton Traction Company, Easton, Pa.

Mr. J. R. Mueller has succeeded Mr. C. B. Duffy as purchasing agent of the Wellston & Jackson Belt Railway, Wellston, Ohio.

Mr. A. L. Brownell has been appointed superintendent of the Marquette County Gas & Electric Company, Ishpeming, Mich.

Mr. M. H. Epps has been appointed auditor of the Galesburg & Kewanee Electric Railway, Kewanee, Ill., to succeed Mr. Holland.

Mr. Frank Cramer has succeeded Mr. J. McCloskey as roadmaster of the Youngstown & Southern Railway, Youngstown, Ohio.

Mr. E. T. McMurray has been elected secretary of the Petaluma & Santa Rosa Railway, Petaluma, Cal., to succeed Mr. Thomas Archer.

Mr. J. E. Webb has been appointed superintendent of the Parsons Railway & Light Company, Parsons, Kan., to succeed Mr. Theodore Dienst.

Mr. W. H. Dempster has been appointed manager of trolley trips of the Pacific Electric Railway, Los Angeles, Cal., to succeed Mr. C. M. Pierce.

Mr. E. D. Blynn, Jr., has been elected vice-president of the Lincoln Railway & Light Company, Lincoln, Ill., to succeed Mr. E. D. Blynn, Sr.

Mr. C. R. Laub has been appointed superintendent of the Public Service Company of Northern Illinois, Streator, Ill., to succeed Mr. R. B. Basham.

Mr. Murat Blizard has been appointed general manager of the St. Joseph Valley Traction Company, Elkhart, Ind., to succeed Mr. Charles H. Cox.

Mr. A. J. Bemis has been appointed general manager of the Vicksburg Light & Traction Company, Vicksburg, Miss., to succeed Mr. W. B. Moorman. Mr. Bemis was formerly chief engineer of the company.

Mr. F. W. Frueauff, New York, has been elected vice-president of the Meridian Light & Railway Company, Meridian, Miss., of which Mr. H. L. Doherty is president. Mr. Frueauff succeeds Mr. Russell Palmer.

Mr. J. T. Nichol has been appointed commercial agent of the Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia., in which capacity he succeeds Mr. Marshall Craig, who had the title of traveling freight and passenger agent.

Mr. Edward Slant, superintendent of the Forest Avenue carhouse of the International Railway, Buffalo, N. Y., has had his jurisdiction extended to the Hertle Avenue carhouse of the company, vice Mr. George Baker, transferred.

Mr. George J. Theis, Jr., Wichita, has been elected president of the Arkansas Valley Interurban Railway, Wichita, Kan., to succeed Mr. W. O. Van Arsdale, who has been president since the railway was built in 1910. Mr. Van Arsdale continues as a director of the company.

Mr. Edward M. Graham has been appointed assistant to the president of the Bangor Railway & Electric Company, Bangor, Maine. Mr. Graham was formeriy assistant to the general manager of the Cumberland County Power & Light Company and the Lewiston, Augusta & Waterville Street Railway.

Mr. H. S. Rykert has been appointed superintendent of employment and instruction of the International Railway, Buffalo, N. Y. Mr. Rykert was previously engaged in similar work for the Houston (Tex.) Electric Company. He has also been connected with the transportation departments of the Brooklyn Rapid Transit Company, the Aurora, Elgin & Chicago Railroad, Wheaton, Ill., and the Rockford & Interurban Railway, Rockford, Ill.

Mr. J. E. Adams has been appointed traffic manager of the Stockton Terminal & Eastern Railroad, Stockton, Cal. Mr. Adams served as a clerk in the accounting department of the Southern Pacific Company for two years and in the operating department and station service of the San Francisco & San José Valley Railway for two years. He also served in the station service and as a dispatcher for six years with the Sierra Railway of California.

Mr. James Dalrymple, general manager of the Glasgow Corporation Tramways, has been authorized to visit the most important cities in America to study recent American electric railway practice. Mr. Dalrymple last visited America in 1905, primarily to explain to Mayor Dunne of Chicago the work that had been carried out in Glasgow. On that occasion he visited Chicago, Minneapolis, St. Paul, Cleveland, Buffalo, Washington, Philadelphia, Montreal, Boston and New York. His impressions on that trip were referred to at length in the Electric Railway Journal of Aug. 5, 1905, page 222.

Mr. G. A. Webb, superintendent of the railway department of the Tampa (Fla.) Electric Company, has completed twenty-one years of service with that company and its predecessors. A delegation of the employees waited upon Mr. Webb recently and presented him with a diamond ring. Mr. Webb entered the service of the Consumers' Traction Company as a motorman and later became master mechanic of the company. When the property was taken over by Stone & Webster, Mr. Webb was made master of transportation and subsequently received the title of superintendent of the railway department.

Mr. R. B. Hull has been appointed acting manager of the Conestoga Traction Company, Lancaster, Pa., to succeed the late C. Edgar Titzel. Mr. Hull entered the service of the Edison Electric Company, Lancaster, as an electrician on Jan. 7, 1900. On March 1, 1903, he was appointed foreman of the meter department of the company and on Oct. 1, 1910, he was appointed superintendent of the overhead department of the Edison Electric Company and the Conestoga Traction Company. On July 1, 1912, he was appointed general superintendent of the Conestoga Traction Company, Edison Electric Company, Lancaster Gas Light & Fuel Company and Columbia Gas Company, Lancaster.

Mr. Frank E. Cole, superintendent of the lines of the Louisville & Northern Railway & Lighting Company and the Louisville & Southern Indiana Traction Company, with headquarters at New Albany, Ind., has resigned. His resignation is to become effective in ninety days. Mr. Cole has been in his present position for nine years, going to New Albany from Chicago, where he was for ten years with Mr. Samuel Insull in the management of the latter's electrical interests. For the time being at least direct reports from the trainmasters, master mechanics and other officials in New Albany are to be made to Indianapolis, the offices of the Middle West Utilities Company, which controls the properties in New Albany and vicinity, being in that city.

Mr. George J. Baker has recently been appointed general superintendent of transportation of the Buffalo & Lake Erie Traction Company with offices at Fredonia, N. Y. Mr. Baker entered the service of the Buffalo & Lake Erie Traction Company in 1902 as a conductor on its city lines in Buffalo. In 1906 he was promoted to be inspector of the city and interurban lines in and out of Buffalo. In 1910 he was appointed superintendent of the interurban division with offices at Fredonia. The office of general superintendent of transportation to which Mr. Baker has recently been appointed is a new one with the company and was created when Mr. J. S. Pevear, vice-president and general manager of the company, was appointed to the International Railway, Buffalo, and Mr. A. R. Myers was appointed general manager of the Buffalo & Lake Erie Traction Company.

Mr. Howard Elliott, who has been president of the Northern Pacific Railway, was elected president of the New York, New Haven & Hartford Railroad on July 25 to succeed Mr. Charles S. Mellen, resigned. As soon as the

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necessary changes in the by-laws of the company can be made Mr. Elliott will be elected chairman of the board of directors of the company and separate presidents will be elected for the New York, New Haven & Hartford Railroad and each of its subsidiaries. Mr. Elliott was born in New York City. He was educated in New England and left the Cambridge High School to enter the Lawrence Scientific School in 1878, when he was eighteen years old. In 1881 he was graduated with the degree of civil engineer. During the summer of 1880 he was a level rodman in the employ of the Chicago, Burlington & Quincy Railroad, and in 1881 he regularly entered its employ as a clerk. He remained in the service of the road or its subsidiaries until 1903, as clerk, cashier, assistant auditor, auditor, general freight and passenger agent, general manager and finally vice-president. He was subsequently elected president of the Northern Pacific Railway.

Mr. G. J. Collins has been appointed claim agent of the Birmingham Railway, Light & Power Company, Birmingham, Ala., to succeed Mr. C. A. Avant, who has been transferred to the law department. Mr. Collins' connection with street railway work dates back to 1892, when he entered the employ of the Paterson (N. J.) Street Railway as a stable boy. When the road was equipped with electricity Mr. Collins served for a number of years as a conductor. About thirteen years ago he was placed in the claim department of the company as investigator by the late John P. Feeney, who at that time was superintendent of claims of the company. A year later Mr. Collins was appointed claim agent of the Passaic County division and remained in this position for more than four years. When Mr. H. V. Drown, now general claim agent of the Public Service Railway, Newark, N. J., took charge Mr. Collins was transferred to the Essex division and carried the title of adjuster up to the time of his appointment as claim agent of the Birmingham Railway, Light & Power Company. He has thus been almost constantly employed by the Public Service Railway and its predecessors in New Jersey.

Mr. Samuel Barnes has been appointed general superintendent of the Jersey Central Traction Company, Keyport, to succeed Mr. A. H. Mann, resigned. Mr. Barnes was educated at one of the high schools in London, England, and at the high school at Berlin Heights, Ohio. He finished his technical training in Liverpool, England, in 1886. He entered the public utility field with the electric light and city water plant at Grayling, Mich., and continued with that plant until 1889, when he was appointed electrical engineer and superintendent of the West Bay City (Mich.) Electric Railway. From 1891 to 1894 Mr. Barnes was with the Consolidated Street Railway, Grand Rapids, Mich., as electrical engineer. He resigned from the Consolidated Street Railway to accept the position of consulting engineer with J. B. Stone & Company, London, England, and in 1897 became connected with the Lindell Railway, St. Louis, Mo., as electrical engineer. After the World's Fair at St. Louis Mr. Barnes accepted the position of general manager of the Cape Girardeau-Jackson Interurban Railway, Cape Girardeau, Mo. He resigned from the Cape Girardeau-Jackson Interurban Railway to become general superintendent of the Jersey Central Traction Company and the Middlesex & Monmouth Electric Light, Heat & Power Company, Keyport, which system includes the railway properties in Perth Amboy, between Perth Amboy and Keyport, in Lockport, Matawan, South Amboy, Atlantic Highlands, Red Bank and the Highlands and the electric light and power system in Keyport and vicinity.

OBITUARY

Allan W. Paige, Bridgeport, Conn., for some time general counsel of the Connecticut Railway & Lighting Company prior to the purchase of the property of the company by the Connecticut Company, died recently at Chicago in his fifty-ninth year.

Duncan Miller, superintendent of the Hamilton (Ont.) Street Railway, which is controlled by the Dominion Power & Transmission Company, Ltd., was killed in an automobile accident on July 23 on the Guelph Road, 2 miles beyond Hamilton. Mr. Miller was appointed superintendent of the Hamilton Street Railway about ten years ago. He is survived by a widow and two children.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Fairfax (Cal.) Incline Railway.**—Incorporated to construct an inclined railway from a point in Fairfax Manor up the hillside for 1500 ft. The line will be on an approximate grade of 30 per cent. The directors are George D. Gray and E. J. Holt, Alameda; P. N. Gray, Marin County; George C. Lake and L. M. Welch, San Francisco.

***Van Horn Valley Railway, Van Horn, Tex.**—Incorporated in Texas with a capital stock of $100,000 to build a 95-mile steam or electric railway from Lobo to a point in New Mexico. Incorporators: R. H. Owen, F. J. Cumming, A. J. Owen and J. E. Hayes.

FRANCHISES

San Anselmo, Cal.—S. J. Norton, representing the San Rafael & San Anselmo Valley Railway, has received a franchise to construct a line in San Anselmo. The proposed line will connect Fairfax, Rafael and San Anselmo. [E. R. J., Dec. 21, '12.]

Waukegan, Ill.—The Chicago & Milwaukee Electric Railway, Milwaukee, has received a thirty-year franchise in Waukegan. A special election will be held on Aug. 12, when the voters will accept or reject the ordinance.

Topeka, Kan.—The Topeka Railway has received a franchise for the extension of the West Eighth Street line from the western boundary of Topeka to Gage Park.

Louisville, Ky.—The city of Louisville is considering a plan to create an ordinance providing for the operation of a line on Brook Street. The Louisville Railway, which is expected to purchase the franchise, has stated its willingness to build to Hill Street, but does not desire to extend as far as Shipp Street.

***Melita, Man.**—R. E. Denny, Brandon, has received a franchise to build a street railway and install water works at Melita.

Newark, N. J.—The Public Service Railway has received the first of the twenty-seven franchises which it applied for in connection with its proposed terminal plan.

Syracuse, N. Y.—The Board of Estimate has approved of the sale of the franchise to the New York State Railways for the extension of its South Crouse Avenue line to the entrance of the university stadium.

***Black Mountain, N. C.**—It is stated that the Black Mountain Telephone Company will apply to the Aldermen for a street railway franchise in Black Mountain. This proposed line will extend from Black Mountain station to Montreat and Ridgecrest.

Toronto, Ont.—At a special meeting of the Council on July 23 the Forest Hill Electric Railway franchise was accorded its first and second readings, and at the regular session, which will be held later, the by-law will be given its third and final reading. [E. R. J., July 5, '13.]

Portland, Ore.—The Portland Railway, Light & Power Company has asked the Council for a franchise for a cross-town line on the East Side in Portland. If the franchise is granted a double-track line will be built during the year.

Dallas, Tex.—The Southern Traction Company has applied for a franchise over Zang and Hutchins Boulevards for its Corsicana-Waco line.

El Paso, Tex.—The El Paso Electric Railway is seeking a franchise to build an extension out North Oregon Street to the Mesa.

Seattle, Wash.—The Puget Sound Light & Traction Company has withdrawn its application for a franchise in Avalon Way.

Madison, Wis.—The Chicago & Wisconsin Valley Street Railway has received a franchise to build a line through the city.

Milwaukee, Wis.—The Milwaukee-Western Electric Railway has received a franchise to enter the city over the Lisbon Avenue, Walnut and Third Street lines of The Mil-

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waukee Electric Railway & Light Company to the Public Service Building.

TRACK AND ROADWAY

Montgomery (Ala.) Traction Company.—It is stated that this company plans at an early date to extend its line from the Cloverdale line to the Capital City Country Club.

Glendale & Eagle Rock Railway, Glendale, Cal.—This company will rebuild its line from Verduga Park to Glendale and will place orders for 8000 6-ft. x 8-in. x 8-in. redwood ties and forty kegs of 9/16-in. x 5½-in. spikes. The company has just completed 5 miles of new track from Verduga Park through Montrose to La Crescenta and will place it in operation at once.

Pacific Electric Railway, Los Angeles, Cal.—The H. E. Dillon Construction Company has received from this company the contract for the construction of a bridge over Cucamonga Wash.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—This company is building a branch to Pittsburg from its right-of-way, which will be 3 miles long and which will be completed this month.

Vincennes, West Baden & Louisville Traction Company, Vincennes, Ind.—A. M. Yelton announces that this line and the Vincennes & Southeastern Traction Company and the Vincennes, Washington & Eastern Traction Company will be operated as one system and will be known as the West Baden System. About 7 miles have been graded. It is expected to resume work on Sept. 1. The total length of the system will be 175 miles and it will connect Vincennes, Washington, Loogootee, Petersburg, Otwell, Ireland, Jasper, Huntingburg, Ferdinand, Troy, Tell City or Cannelton. Later it will be extended to West Baden and French Lick. Capital stock, $3,500,000; bonds, $3,500.000. Officers: T. H. Adams, president; A. M. Yelton, Box 33, Vincennes, secretary; John O. Davis, treasurer.

Interurban Railway, Des Moines, Ia.—A new right-of-way for the proposed extension of this company's line from Colfax to Newton is being surveyed. If a satisfactory route can be found between the two towns it is probable that the extension will be constructed. C. F. Hewitt, general manager of the company, has announced that the plan of using the old Newton & Northwestern line between Colfax and Newton has been abandoned.

Sioux City (Ia.) Service Company.—This company is relaying about 3½ miles of track in paved streets in Sioux City.

Independence, Neodesha & Topeka Traction Company, Independence, Kan.—This company has applied to the Public Utilities Commission for permission to issue stock to the amount of $298,600 for the purpose of purchasing the right-of-way for the proposed line. The preliminary survey has not yet been made. [E. R. J., July 19, '13.]

Manhattan City & Interurban Railway, Manhattan, Kan.—During the next few weeks this company will award contracts to build 10 miles of new track in Manhattan.

***Taylorsville, Ky.**—Citizens of Taylorsville are securing the right-of-way for a line between that city and Jeffersontown, Ky. A branch of the Louisville & Interurban Railroad runs to Jeffersontown, and connection with Louisville would be afforded Taylorsville in the event of the construction of the proposed line. Those who are securing the right-of-way believe that they will be able to induce some company now in the field to build the line.

Trans-St. Mary's Traction Company, Saulte Ste. Marie, Mich.—This company will build 500 ft. of new track and 2100 ft. of brick paving.

***Luce Electric Company, Minneapolis, Minn.**—This company is making a survey for the north and south electric railway to extend from Jackson to Sleepy Eye, connecting with the line under construction from Minneapolis to Watertown, S. D.

Jefferson City (Mo.) Bridge & Transit Company.—It is stated that this company plans to extend its track 1 mile to the west end of the city. The extension to the east end will also be begun soon. Eventually the company intends to build an extension to the Moreau River.

Geneva & Waterloo Railway, Waterloo, N. Y.—It is reported that this company has taken steps to extend its line to Auburn.

***Chickasha, Okla.**—A. W. Thornley, Chickasha, is said to be interested in the promotion of a proposed 50-mile line and would like to obtain as much information as possible regarding construction material, equipment, etc. It is presumed that the company will want to use some gasoline motor cars. A charter will be obtained as soon as a preliminary survey is made, which will be within the next thirty days. Correspondence should be addressed to the Interurban Company, 419 First National Bank Building, Chickasha, Okla.

Norman Interurban Railway, Oklahoma City, Okla.—During the next five weeks this company will award contracts to build 9½ miles of track between Moore and Norman. Orders have been placed for the rails and copper wire except for the bond wires. This line will connect Oklahoma City, Moore, Norman, El Reno, Edmond and Britton. George W. Knox, president. [E. R. J., May 3, '13.]

Imperial Traction Company, Ottawa, Ont.—The Parliament has extended the time within which the already authorized lines may be built and has given the company power to build additional lines from Smithville to Bridgeburg and from Hamilton to Toronto. [E. R. J., July 26, '13.]

Schuylkill Railway, Girardville, Pa.—This company plans to begin work soon on its line from Shenandoah to Frackville.

Montreal (Que.) Tramways.—This company has begun work on the new routes approved by the Council for some of its lines in Montreal.

Rhode Island Company, Providence, R. I.—The contract between the towns of Glocester and Smithfield and the Rhode Island Company for an extension of its line from the present termination at Centerdale through these towns to Chepachet has been signed by all the interested parties and it is expected that work upon the new line will be begun at once.

Maryville-Knoxville Interurban Railway, Knoxville, Tenn.—This company, which proposes to build a 14-mile line from Maryville to Knoxville, Tenn., via Rockford, Little River and Vestal, will begin preliminary surveys at once. There will be a bridge 150 ft. long and others from 40 ft. to 50 ft. long. Officers: Morton Butler, Chicago, Ill., president; John F. Shea, Knoxville, vice-president; Knox Burger, treasurer; John M. Clark, Barryville, secretary. [E. R. J., July 26, '13.]

Nashville (Tenn.) Traction Company.—This company is seeking to amend its charter so as to add some lines and extensions to the already proposed route. The application for the amendment to the charter is signed by Walter O. Parmer, G. M. Hendrie, R. A. Alger, W. H. Muir and Henry Ledyard, directors. [E. R. J., April 19, '13.]

Cumberland Valley Interurban Railway, Nashville, Tenn.—This company will begin construction of its 80-mile track within the next six months. It will connect Nashville, Statesville, "The Hermitage," Smithville, Liberty and Sparta. Capital stock authorized, $10,000. Officers: J. H. Cartwright, 410 Union Bank Building, Nashville, president; A. F. Richards, Sparta, vice-president; W. H. Mires, secretary and treasurer, and O. L. Omohundro, Nashville, chief engineer. [E. R. J., July 19, '13.]

Southern Traction Company, Dallas, Tex.—This company has completed its new steel bridge across the Brazos River, built for its Dallas-Waco interurban lines in Waco.

Guadalupe Traction Company, Seguin, Tex.—Surveys have been completed and grading has been begun by this company on its line between San Antonio and Austin, via Seguin and Lockhart. A. B. Axtell, chief engineer. [E. R. J., June 28, '13.]

Corpus Christi Street & Interurban Railway, Corpus Christi, Tex.—This company has purchased enough track material for paving, consisting of Lorain 6-in. 72-lb. steel rails, 7-ft. 90 per cent heart pine ties and General Electric 10-in. compression bonds.

Newell (Va.) Bridge & Street Railway Company.—It is said that this company will extend its lines to Wellsville.

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*Norton, Va.—A trackless trolley system is to be built to cover an important section in the coal fields of western Virginia, according to a report from that section. J. G. Rossman and others, of New York, are in charge of the project. One proposed line will extend from Norton, Va., to Big Stone Gap, Va., and another from Norton to Coeborn, Va., distances of 12 and 14 miles respectively.

*Richmond, Va.—Steps are being taken to perfect the organization of a company for the purpose of constructing an electric railway in Chesterfield County.. The proposed line will begin at the intersection of Broad Rock Road and Hull Street, extended, and will parallel the road for a distance of 3 miles. The terminus will be at Falling Creek, where, it is said, an amusement resort will be established. It is proposed to capitalize the company at $250,000, and the incorporation papers are now being drawn. John C. Robertson, Forest Hill, is at the head of the new company. Those who are actively behind the new company are Clarence Vaden, T. N. Cheatham, W. A. Horner, D. E. Goode, James Cox and W. J. Carter.

Oregon-Washington Railroad & Navigation Company, Seattle, Wash.—This company plans to build a railway from Argo to a connection with the electric line of the Puget Sound Traction, Light & Power Company at a point near Twelfth Avenue South and Bailey Street in Seattle. If the proposed line is not electrified, gasoline motor cars will be used.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis.—The Milwaukee Electric Railway & Light Company has practically completed a three months' improvement policy, which has cost nearly $1,000,000. Including regrading, paving, etc., the company has completed 123 city blocks of double-track rehabilitation. There are about 9 miles of track work still under construction. When completed, the company will have 39 miles of track.

SHOPS AND BUILDINGS

Glendale & Eagle Rock Railway, Glendale, Cal.—This company expects to build a new carhouse in Montrose within the next four months.

Connecticut Company, Norwich, Conn.—This company is preparing plans for a new freight station, 25 ft. x 40 ft., to be built in Danielson.

Paducah (Ky.) Traction Company.—This company is considering the erection of a brick repair shop in Paducah.

Houghton (Mich.) County Traction Company.—It is reported that this company will ask for bids for improvements to be made to its carhouse in West Hancock. The work will include new concrete floors and inspection pits to replace the wooden flooring and pits. The company will also lay 80-lb. rails from the main line into the carhouse.

Chambersburg, Greencastle & Waynesboro Street Railway, Waynesboro, Pa.—This company will erect a new carhouse in Rouzerville.

Seattle, Wash.—Daniel Huntington, city architect, is preparing plans for the construction of a two-story reinforced concrete carhouse and office building for the Municipal Street Railway. The building will cost approximately $50,000, and will be located at Third Avenue West and Union Street.

POWER HOUSES AND SUBSTATIONS

Sioux City (Ia.) Service Company.—This company is building an addition to its power house in Sioux City. It has purchased two new boilers and stokers, a 3000-ft. air compressor and an eighteen-panel switchboard.

Manhattan City & Interurban Railway, Manhattan, Kan.—This company plans to build soon a new power house in Manhattan.

Houghton (Mich.) County Traction Company.—This company expects to remodel its substation at Laurium. An addition will also be built to the station.

Corpus Christi Street & Interurban Railway, Corpus Christi, Tex.—This company has purchased from the General Electric Company a 200-kw generator direct-connected to a tandem-compound Harrisburg engine, complete with switchboard. The company expects to enter the lighting field by Aug. 15, 1913.

Manufactures and Supplies

ROLLING STOCK

Billings (Mont.) Traction Company is said to be in the market for several cars.

Glendale & Eagle Rock Railway, Glendale, Cal., is in the market for three double-truck passenger cars.

Chicago, Ottawa & Peoria Railway, Peoria, Ill., is contemplating the purchase of three interurban cars.

Third Avenue Railroad, New York, N. Y., has ordered four storage battery snow sweepers from The J. G. Brill Company.

Utah Light & Railway Company, Salt Lake City, Utah, will change fifty-four more of its cars to the pay-as-you-enter type.

Corpus Christi Street & Interurban Railway, Corpus Christi, Tex., is in the market for one 28-ft. single-truck passenger car.

Sandwich, Windsor & Amherstburg Railway, Windsor, Ont., is in the market for two single-truck city cars and two double-truck interurban cars.

Connecticut Company, New Haven, Conn., has ordered from the Wason Manufacturing Company four 30-ft. 8-in. passenger cars mounted on Brill 27-MCB-1 trucks.

Illinois Traction System, Peoria, Ill., is contemplating the purchase of four city cars for the Decatur Railway & Light Company, Decatur, Ill., and four city cars for the Peoria (Ill.) Railway.

Cincinnati (Ohio) Traction Company, noted in the ELECTRIC RAILWAY JOURNAL of June 28, 1913, as expecting to purchase 100 cars, has ordered fifty of these cars from the Cincinnati Car Company.

Cleveland (Ohio) Railway, noted in the ELECTRIC RAILWAY JOURNAL of July 12, 1913, as having ordered fifty prepayment cars from the G. C. Kuhlman Car Company, has specified the following details for these cars:

Weight (car body only), 20,980 lb.	Curtain material...Pantasote
Bolster centers, length.....23 ft. 5½ in.	Fare boxes.....Cleveland
Length of body..35 ft. 5½ in.	Hand brakes.....Dayton
Length over vestibule.....40 ft. 4½ in.	Heaters .....Smith
Width over sills... 8 ft. 2 in.	Headlights .....Dayton
Width over all... 8 ft. 4 in.	Journal boxes....Symington
Height, rail to sills, 33 3/16 in.	Motors.....4 West.
Sill to trolley base, 9 ft. 7⅜ in.	Paint.....S. W. & Chicago
Body .....composite	Sanders ....Nichols-Lintern
Interior trim.....cherry	Sash fixtures.....Dayton
Headlining .....Galco	Seats .....Brill
Roof.....plain arch	Seating material.....rattan
Underframe .....steel	Springs .....Brill
Couplers .....O-B	Step treads.....Mason
Car trimmings .....Kuhlman	Trucks....Brill No. 27-FE-1
Curtain fixtures, Cur. Sup. Co.	Varnish.....Chicago and Glidden outside; Wright's inside
	Ventilators .....Scullin
	Wheels .....National

TRADE NOTES

Blake Signal & Manufacturing Company, Boston, Mass., has moved its office from 246 Summer Street to 251 Causeway Street.

General Electric Company, Schenectady, N. Y., has appointed S. H. Boyer its district manager at St. Louis, Mo. Mr. Boyer was formerly district manager of the Chicago office of the company.

H. H. Althouse, New York, N. Y., who recently resigned as chief engineer of the Erie Railroad, has opened an office for consulting practice at 172 Fulton Street. Mr. Althouse will specialize in railway work.

St. Louis Magda Lamp Works, St. Louis, Mo., have appointed R. H. Henderson manager of the company, succeeding H. S. Black. Mr. Henderson was for a number of years works manager of the Westinghouse Lamp Company.

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Graves Engineering Company, New York, N. Y., has been incorporated by C. A. Graves, of Brooklyn; C. N. Jones and F. B. Erwin, of New York. The company is capitalized at $100,000 and proposes to do a mechanical and civil engineering and contracting business.

Rockwell Electric Company, Chicago, Ill., has been formed by Edwin R. Rockwell, formerly president of the Guarantee Electric Company, with offices in the First National Bank Building. The company will handle electrical machinery and offers its services for electrical engineering in all its branches.

Curtain Supply Company, Chicago, Ill., has received the curtain order for the 100 new cars of the Boston Elevated Railway now being built by the Jewett Car Company, and also the curtain order for the ten new cars of the Pittsburgh Railway being built by the McGuire-Cummings Manufacturing Company.

Standard Varnish Works, Chicago, Ill., have opened a branch office at 113 Front Street, San Francisco, Cal., where they will carry a large and complete stock of all their architectural specialties, including Elastica No. 2, Elastica floor varnish, Satinette white enamel and Kleartone stains. F. T. McHenry, who has represented the company on the Pacific Coast for many years, will be in full charge of this office.

Titan Copper Products Company, Inc., Buffalo, N. Y., maker of brass, bronze and aluminum castings, has been organized by Charles V. Slocum, who for the past six years has been engaged in introducing titanium to the steel and iron trade. The officers of the company are as follows: Charles V. Slocum, president; A. N. Slocum, vice-president; W. W. Slocum, treasurer, and Frank P. Lund, general superintendent.

Manhattan Electrical Supply Company, New York, N. Y., has purchased the business and plant of the Rock Island Battery Company, of Cincinnati, Ohio, and will take possession on Aug. 1, 1913. This move will not mean the discontinuance of the Rock Island dry battery, for this battery will be manufactured in addition to the Red Seal, Hi-Up, Blue Seal and Mesco batteries, which the company now manufactures.

American Engineering Company, Philadelphia, Pa., has recently received large orders for "Taylor" stokers, from many sources, including the New York, New Haven & Hartford Railroad, United Illuminating Company, National Quality Lamp Division of the General Electric Company, Interborough Rapid Transit Company, Elmira Water, Light & Railroad Company, Edison Electric Illuminating Company and the Detroit Edison Company.

National Tube Company, Pittsburgh, Pa., has announced that commencing Aug. 1, 1913, it will enter the electrical conduit field. The company has contracted with the National Metal Molding Company and the Safety-Armorite Conduit Company, both of Pittsburgh, Pa., to manufacture and sell this product as its agents under their various brands. The company has also decided to sell this product on the Pittsburgh basing discount plan in the same manner as all wrought pipe for other purposes has been sold for the past thirteen years.

Western Electric Company, New York, N. Y., has opened a new sales office at New Orleans, La., under the management of E. H. McFall. A warehouse, carrying a complete line of electrical supplies and telephone apparatus, is also being operated at New Orleans under the direction of J. S. Shaw, formerly associated with the company's Atlanta branch. P. E. Davidson and W. J. Whaley, also formerly at Atlanta, are assigned to the new offices. This territory covers all of Louisiana and Mississippi, Texas and Alabama and the Gulf Coast from Key West to Beaumont. A branch house has also been opened at New Haven under the management of T. L. Holmes and another at Providence, R. I., under the management of H. D. Wilcox.

Manning, Maxwell & Moore, Inc., New York, N. Y., together with their subsidiary companies, will move their general offices on or about Oct. 1 from 85-89 Liberty Street to the new Lewisohn Building, 113-119 West Fortieth Street. This change is being made to meet the demand for a more convenient and central location, as well as larger space to handle material increases in their various lines, which cover electric traveling cranes, machine tools, engineering specialties, railway, machinists', engineers', factory and contractors' supplies. A large portion of this product is manufactured by their constituent companies, the Shaw Electric Crane Company, the Ashcroft Manufacturing Company, the Consolidated Safety Valve Company, the Hayden & Derby Manufacturing Company and the Hancock Inspirator Company. They will occupy the twentieth and twenty-first floors of the above-named building, giving them 28,000 sq. ft. of space. This space will be exclusively for offices and is almost double that at present occupied for offices on Liberty Street.

ADVERTISING LITERATURE

H. M. Byllesby & Company, Chicago, Ill., have issued Department Bulletin No. 6 on "The Efficiency Movement."

National Tube Company, Pittsburgh, Pa., has issued a small pamphlet entitled "Interesting Experiences with Kewanee Unions."

Sprague Electric Works, New York, N. Y., have issued Bulletin No. 240, superseding Nos. 235 and 310, which illustrates and describes motor-driven exhaust fan outfits for both direct and alternating current.

National Conduit & Cable Company, New York, N. Y., manufacturer of bare copper wire, weather-proof wires and cables for telephone, telegraph, electric light and power work, has issued a pamphlet taking up the copper situation in a general way.

American Steel & Wire Company, Chicago, Ill., has issued a small paster, to be inserted on page 24 of its new catalog entitled "Triangle Mesh Wire, Reinforced Concrete Pavements and Roadways," in order to correct a typographical error that appeared on this page.

Chicago Pneumatic Tool Company, Chicago, Ill., has issued Bulletins Nos. 34R and 43, which illustrate and describe respectively its "Chicago pneumatic" class L-SS and L-SB compressors (inclosed self-oiling types) and the "Rockford" railway motor cars.

Northey-Simmen Signal Company, Ltd., Indianapolis, Ind., has issued a catalog on the Simmen system of railway signaling and dispatching. The catalog contains a number of illustrations in regard to the installation of this system, with a full description of the same, and points out its many advantages.

Pyrene Manufacturing Company, New York, N. Y., has issued the *Pyrene Bulletin* for July, 1913, which contains several articles showing what great service these extinguishers have been in averting what might have been very serious fires. The bulletin also contains a list of some of the recent purchasers of Pyrene extinguishers.

U. S. Metal & Manufacturing Company, New York, N. Y., has issued a small folder on the "Lincoln" arc welder, for which it is general selling agent. The folder describes what the welder will do and also contains information on types and capacities for electric and steam railway work and work in steel foundries, boiler shops, mills, etc.

Hemingray Glass Company, Covington, Ky., has issued Catalog No. 28, which illustrates and describes its different types of glass insulators. On each page, under the view of the different types, is a line drawing giving the exact dimensions of the insulator above it and also containing other information in regard to the average weight of each insulator and the approximate weight per 1000 packed for shipment.

General Railway Signal Company, Rochester, N. Y., has recently issued Bulletin No. 114-B, completely illustrating and describing its train dispatchers' telephone selector system, which takes up in detail every phase of the subject, including the switchboard with motor generator and storage battery, dispatchers' key cabinet, selector and bell. The company has also issued Bulletin No. 129 describing its mechanical dwarf signal R. S. A. design, and also containing several views of the signal with numerous line drawings showing the signal with respect to R. S. A. clearance diagram, arrangement for wire connection, cross pipe connection, longitudinal pipe connection, etc.

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Electric Railway Journal

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Of this issue of the ELECTRIC RAILWAY JOURNAL, 8000 *copies are printed.*

REFORM IN CAR WASHING

The results of the analytical investigation of the subject of car washing by the Detroit United Railway, published elsewhere in this issue, carry a lesson in economy that is of great value to the companies. Before the conclusions were announced the subject was considered from every possible standpoint, and the improved methods developed as a result of the tests received a thorough trial. If car-washing is in the hands of careless workmen without proper supervision, the loss to the company may be very heavy. In order to accomplish the mere end for which they are working, the washing of the car, the men may use water heated to too high a temperature or solutions that are not made properly. Both of these risks can be overcome by the methods recommended by the Detroit United Railway, and no company can afford not to overcome them. In the chemical analyses and in all of the conclusions drawn therefrom extreme care and conservatism were used, particularly after the extent of the economy arising from even a slight lengthening in the life of paint and varnish became apparent. The gratifying prospects of economy shown in the article by Mr. Smith, therefore, represent moderate estimates of the advantages anticipated.

GIVING WIDE PUBLICITY TO ROUTE CHANGES

It is clear that a good many managers fail to realize the opportunity for well-directed publicity which occurs whenever important route changes are put into effect. In view of the interest of the public in all features of the service with which its comfort and convenience are associated, something more than a bald announcement of an impending change in car routing is highly desirable. Here is excellent publicity material. Such changes are properly the result of careful studies of traffic distribution, development of neighborhoods, shifts in population, temporary municipal construction arrangements, important repairs to track, or other special events or conditions which are all in the day's work to the railway man but which are matters of genuine news interest to the people at large. If a company can bring out these news features in announcing alterations of a more or less permanent character in its schedules and routes, much good can be accomplished. The local press is pretty likely to accord liberal space in its reading columns to such matter, and it is certain to be perused by the great mass of readers because the majority are directly and personally affected by the change in routing. Moreover, the carefully prepared, brief explanation of the reasons for such changes disarms an extraordinary amount of potential criticism. Many people are constitutionally opposed to changes of any sort and do not realize, for example, that by the shortening of a route between two terminals of dissimilar population it may be possible for a company to give even better service between an intermediate point and the larger center. A simple explanation in connection with the announced change may obviate a great deal of illogical grumbling by people who are really benefited by the change and contribute to the stock of popular good will which is always so great an asset for an operating company.

CONFLICT OF PUBLIC SERVICE COMMISSIONS

A suit recently brought by the Southern Pacific against the California and Arizona Railroad Commissions has finally crystallized the question of the conflict of the two state commissions over matters pertaining to a line common to both states. Attorneys for railroads and interurban electric lines have long been perplexed as to the relative or final jurisdiction of state public service commissions in cases where a road is attempting to improve its system as a unit and finds itself confronted by several and often conflicting orders in the states containing the unit. The immediate cause of the present suit was the refusal of the Arizona Railroad Commission to authorize a two-year note issue of $30,000,000 already consented to by the California Railroad Commission. When two public commissions thus have a head-on collision in a matter of mutual interest, the result simply puts one more crack in the theory of public service regulation of security issues under our present system of state government. The Supreme Court has cleared up the question of the relative jurisdiction of state commissions and the Interstate Commerce Commission over the valuation of carriers as a basis for interstate and intrastate rates, but now it will probably be called on to decide a conflict of state commission jurisdiction in a purely financial matter over which the Interstate Commerce Commission has no control. If the present commission control is to continue, some way must be devised whereby proper weight may be given to the decision of an equally empowered but foreign commission having jurisdic-

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tion over the same case. Otherwise we shall have a louder demand for an increase in power of the Interstate Commerce Commission to cover such financial questions. A clear-cut decision, free from all technical and legal subtleties, defining the extent of the powers of state commissions to prescribe the terms upon which a corporation engaged in interstate business may secure money required for its corporate purposes would aid materially in settling this conflict of jurisdiction, and such a decision is needed.

PENNSYLVANIA PUBLIC UTILITY LAW

The "public service company law" recently passed by the State of Pennsylvania, which was abstracted in detail in the news notes last week, is on the whole better than most of those which have been passed in other states during the past two years. As originally introduced the bill was exceedingly crude, but by the process of amendment it was considerably improved before its final passage. Whether in practice it will be as effective and satisfactory to all parties as its sponsors predict is a matter, of course, for the future to decide. We say "of course" because this country is really on the threshold only of good public utility legislation and regulation. Our lawmakers as yet are only groping their way in the dark so far as this matter is concerned, and this is probably the reason for the exceedingly imperfect and ill-considered acts of this kind which have been put upon the statute books of some of our states recently. It should not be forgotten also that the success of public service regulation in any state depends quite as much upon the character of the men chosen to administer its provisions as upon the act itself. Indeed, so important is the personality of a public service commission that a good body can do well under a bad law, whereas a bad commission is able to accomplish a great deal of harm even under a good law. Not only, then, is the general plan of public service regulation still in an experimental state in this country, but we are still uncertain whether under our form of government and the method generally followed for the appointment of such commissioners it is possible to secure and retain such a high standard of men as the importance of their duties requires. It may be that their term of office will have to be extended to equal that of our judges in the highest courts—say for fifteen years or for life. The ten-year term under the Pennsylvania law seems to indicate a tendency in this direction.

To discuss concretely now some other provisions of the Pennsylvania law—one of the sections of greatest moment in any law of this kind is that which deals with the issuance of securities. In the Pennsylvania act two methods are outlined. Under the one the public service corporation may apply to the commission for permission to issue its securities, stating the various terms, conditions and purposes of the issue, and if the commission finds the facts set forth in the application to be correct, it grants its "certificate of valuation." In case, however, the issuance of the securities is immediately necessary, the public utility is permitted to proceed without the official sanction of the commission, provided it subsequently files with the commission a "certificate of notification," giving the purposes and a detailed description of the issue, and accounts for the application of the money arising from the sale. Thus, under either plan the public is protected from fraudulent stocks and bonds, and at the same time the system is so elastic that no corporation should be seriously hampered in the making of necessary improvements.

Of scarcely less importance is the final solution reached by the Legislature in the always perplexing matter of the abolition of grade crossings. The Pennsylvania Legislature recognized the futility of attempting to establish in advance a hard and fast method of a division of the expense of improvements of this kind. Local conditions vary so greatly that any set rule is apt to be inequitable in nine cases out of ten to one or two of the interested parties—the railway, the State and the municipality. Hence, the commission has received power under the act to apportion the cost in each particular case as the benefits to be derived from the improvements by each may appear upon an examination of the circumstances. This, it is true, places a great deal of power in the hands of the commission, but if its decisions are made judicially and impartially no more satisfactory plan could be devised, and the whole principle of public service regulation depends upon the selection of men for commission work who will decide questions of this kind fairly and equitably.

The section of the law concerning the keeping of accounts is important in view of the present agitation for municipal ownership. The idea has been prevalent in some circles that fabulous profits exist in public utility ownership and operation, and this belief has undoubtedly inspired to a great extent the movement in this country for municipal ownership, especially of electric light plants. Authoritative data, however, as to the realization of such profits and the comparative economies of privately and municipally owned plants are lacking. The Pennsylvania law states, however, that both privately and municipally owned utilities must keep uniform accounts and render reports to the commission, a provision which should materially aid in making more nearly possible a conclusive comparison of the two methods. The law also places a desirable restriction on any municipality wishing to furnish its citizens with service already offered by a private utility, in that before so doing it must obtain from the commission a "certificate of public convenience." Thus the commissioners, not the local authorities, are the final judges of the needs of the public, and they have power to protect a private company doing good business from unregulated competition by municipally operated plants. This provision, while benefiting more directly light and power properties, nevertheless protects all investments in public utilities better than before.

As a counter-provision to the above concession to privately owned utilities, however, a section once eliminated was reinserted, providing that no contract between a public utility and a municipality is valid unless approved by the commission. This obviates the difficulty under former conditions whereby corporations could make contracts with municipalities that would debar the commission from control of the corporations owing to the inviolability of the contract relation.

The final, and perhaps most important, part of the act which we shall discuss here is that which is the most important part of any act of this kind, namely, that relating to

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rates and the methods to be employed by the commission in enforcing its rulings. Under the Pennsylvania law the commission has power over rates, and severe penalties are provided for refusal to follow its orders. But the rigor of these penalties is somewhat lessened by the procedure outlined for appeals. Upon an appeal from any order of the commission the Dauphin County Court is authorized after a special hearing to grant an interlocutory order of supersedeas upon such terms and conditions as it, in its discretion, may prescribe. A more specific provision is made in the case of an appeal from an order establishing or changing rates, prices, etc., for such an appeal itself acts as a supersedeas, in case a bond is filed with the Commonwealth to provide for damaged parties in the event of a decision adverse to the utility. On the refusal to obey any order of the commission, therefore, the penalties will not apply if any appeal is brought immediately and sufficient reasons are given for the issuance of an interlocutory order, and in the case of a refusal to establish new rates the appeal automatically suspends the penalties. These arrangements make possible a punishment for a deliberate and groundless refusal of obedience yet do not bar the utilities from recourse to the courts for the redress of actual injustice.

The Pennsylvania Legislature seems to have been little influenced by the prevailing haste to make public utility legislation, and the result is a fairly comprehensive and detailed law. Undoubtedly there are errors in it of omission and commission which time will bring to light. But in view of the tendencies of the day and after the act is balanced pro and con, it seems a better example than usual of public utility legislation because while making provision for the settlement of grievances against public utilities it still affords to them some protection against persecution on the part of the authorities.

AVOIDING OR MAKING TROUBLE?

"Street Railway Avoids Trouble with the City by Making Concessions." This is the column heading used by several daily newspapers reporting the settlement of a dispute entered into last week by a railway company and the authorities of the city in which its lines are located. Without reference to this particular agreement, which for the sake of argument may be assumed to be entirely wise and proper, there is ample reason to question whether public service corporations avoid trouble by "concessions." When the corporations are in the wrong, when the demands of a municipality or a public service commission are just, of course the corporation must make concessions. But to avoid immediate trouble too many surrenders are made which should not be made. A long succession of such surrenders leads to a situation—a state of mind—in which it appears to be the rule that railways have no rights which administrative bodies or the public need respect. The treatment of the steam railways in connection with compensation for carrying the mails is an example of what happens as a result of constant concessions, or, in other words, constant surrender to impositions. Notwithstanding the fact that the railroads were performing a constantly increasing service, their pay was reduced from 34 per cent of the total revenues in 1901 to 21 per cent of the revenues of 1912. Then the parcels post law was passed, with only casual consideration of the additional work it would impose on the carriers, and a 5 per cent increase in pay was grudgingly voted for a 30 per cent increase in postal business. Very soon the 11-lb. limit is to be increased to 20 lb. without any provision for increased compensation to the railroads which have had weighings under the 11-lb. rule.

We cite this case because it happens to be a current illustration of the results of making "concessions"—that is to say, of submitting to exactions without a fight—but other examples in which electric railway companies have been the sufferers could easily be mentioned. What happens to individuals who do not stand up for their rights? They may be kicked and cuffed with impunity—and that is what generally happens to them. A similar fate may be expected by corporations that do not insist—even at the expense of some trouble and unpopularity—that their rights shall be respected.

PHILADELPHIA TRANSIT PLANS

Philadelphia is the latest recruit to the list of large American cities whose inhabitants are extremely anxious to be whisked between home and work at express train speed. In accordance with this demand, the Philadelphia city administration, through its transit commissioner, A. Merritt Taylor, has worked out a plan for a combined subway and rapid transit system which is to be constructed at a cost of nearly $60,000,000. An abstract of Mr. Taylor's report appears elsewhere in this issue. A notable feature of his report is the moderation shown with regard to subways, not more than 8.6 miles of underground route being proposed at present. Indeed, stress is placed upon the fact that modern elevated structures can be made unobjectionable.

The wisdom of this moderation will be apparent when a comparison is made of the density of population of Philadelphia and other cities, as quoted in the abstract. A city of 2,000,000 inhabitants scattered at the rate of 5.2 per dwelling cannot hope for the costly subway construction which is permissible in old New York with its 26.5 persons per house. In fact, the example of London is sufficient to prove the financial risk of heavy subway building in a city which is free to grow in every direction. The great advantage preserved by Philadelphia, from the standpoint of health, of being a city of one-family houses is a disadvantage when the development of a costly means of transit is concerned. Hence if Philadelphia should want an extensive underground rapid transit system it must be prepared to subsidize it by a guarantee to private capital of an adequate return upon the investment. It would be little balm to the partner company to know that while it was losing money, the city was more than recouping its own operating losses in higher realty values. It is not impossible, however, that the building of a rapid transit system will actually result in creating wide strips of apartment houses along the new routes. Mr. Taylor observes that the two-family house rather than the one-family dwelling followed rapid transit to West Philadelphia, and the same phenomenon to a more exaggerated degree is promised by real estate operators in Brooklyn.

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The Kansas City, Clay County & St. Joseph Railway

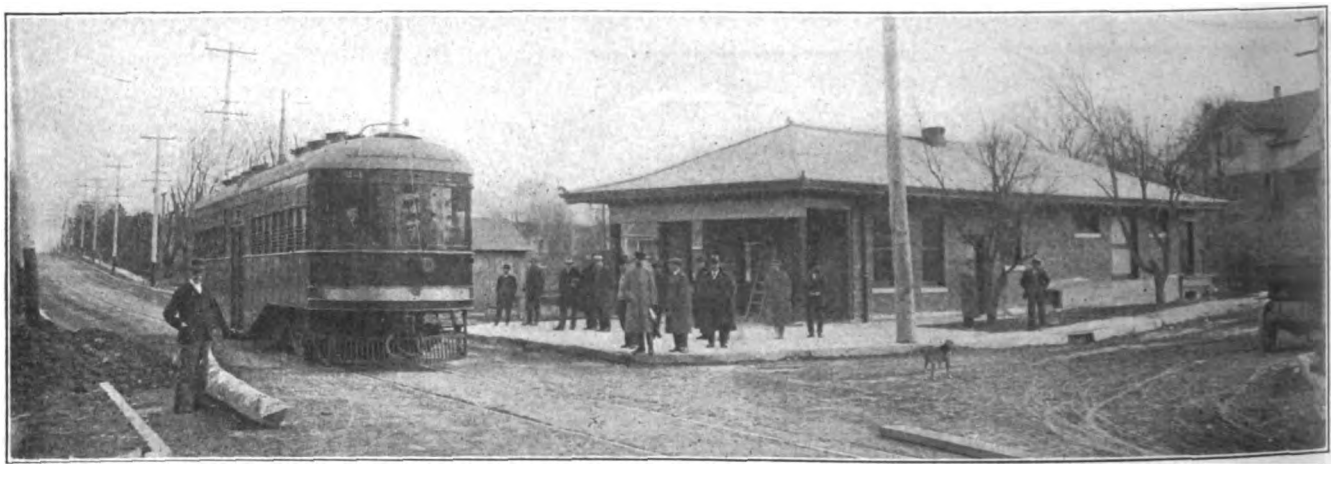
An Important and Extensive Interurban Railway Recently Completed in Missouri—1200 Volts Is Used, with 1200-Volt Rotaries in the Substations—The Construction Standards of the Company Are Described in Detail

The Kansas City, Clay County & St. Joseph Railway, recently placed in operation between Kansas City, St. Joseph and Excelsior Springs, Mo., marks the completion of a work that for years has been the dream of interurban promoters, namely, a high-speed, short-route electric line connecting the cities of Kansas City, Mo., and St. Joseph, Mo. This location has long been recognized as one of the most desirable in the Central West for an electric line, and during the past ten years no less than ten such interurban lines have been projected—all of which were doomed to failure, principally on account of the construction difficulties and the high cost necessary in building between these two points an electric line that could compete successfully with the steam roads.

There are at present six steam roads competing for the freight and passenger business between these points. The shortest of these has a length of 62 miles, and the quickest running time is two hours and ten minutes. To this time must be added that to allow passengers to reach the depots from the center of the business district, making the time actually consumed from terminal to terminal about two hours and thirty minutes. Inasmuch as there are no municipalities of large size between Kansas City and St. Joseph, an interurban, to secure revenue enough to justify the investment, had to construct practically a straight line between these two cities, to shorten the running time, and at the same time lower the fare as compared with the steam roads. To secure this practically straight line, it was necessary to build through some very hilly territory, making the construction costs so heavy that financing the project was difficult.

Another difficulty which beset the early promoters was the fact that the Missouri River had to be crossed at some point, and as there was no bridge available over which an electric road could secure trackage rights, it was necessary for the railway company to build its own bridge. The cost of such a project was in itself enough to discourage any real attempt at building the road, and it was this matter of a bridge that was the real cause of the failure of the majority of the roads that had been projected.

Prior to the beginning of construction on the Kansas City, Clay County & St. Joseph Railway, the Armour-Swift-Burlington syndicate purchased, directly across the Missouri River, in North Kansas City, 3200 acres of land and platted this ground for a town site. To develop this territory it was necessary that this addition should have quick and easy connection with Kansas City proper, and accordingly the syndicate built a $2,000,000 bridge across the river at this point. This bridge is the largest of its kind in existence and may be classed among the really great bridges of the country. It has a length of 5000 ft., is built of two decks, and 18,076 tons of stetl was used in its construction. The lower deck is for steam road service, while the upper deck is arranged for street and interurban cars, vehicles and pedestrians. That part of the bridge over the river channel is so designed that the lower deck may be raised for the passage of boats without interfering with traffic on the upper deck.



K. C., C. C. & St. J.—Waiting Station at Liberty on Springs Division

In addition to the bridge, the syndicate also built a double-track, 600-volt electric line connecting with the Metropolitan Street Railway at Third and Locust Streets in Kansas City, extending across the bridge and through the syndicate holdings north of the river. At about the middle of the track the road is divided into two branches, one extending to the north and the other to the east.

The promoters of the Kansas City, Clay County & St. Joseph Railway were not slow in seeing the advantage thus created for building the much-promoted electric line between Kansas City and St. Joseph and between Kansas City and Excelsior Springs, and accordingly they secured from the syndicate a contract giving to the proposed road trackage rights on the bridge and over the syndicate's electric line through the holdings north of the city. Construction of the road was started in September, 1911, and the first car was placed in operation on Jan. 21, 1913, on the Excelsior Springs division and on May 5 on the St. Joseph division.

The Excelsior Springs division, after leaving the tracks of the Union Depot Bridge & Terminal Company, ascends abruptly from the river bottoms to the higher lands and strikes practically a straight line to the Excelsior Springs terminal, passing through the city of Liberty, famous in civil war times as the home of Mosby and Quantrell, the raiders. This city has a population of about 5000 and is the county seat of Clay County and the home of William

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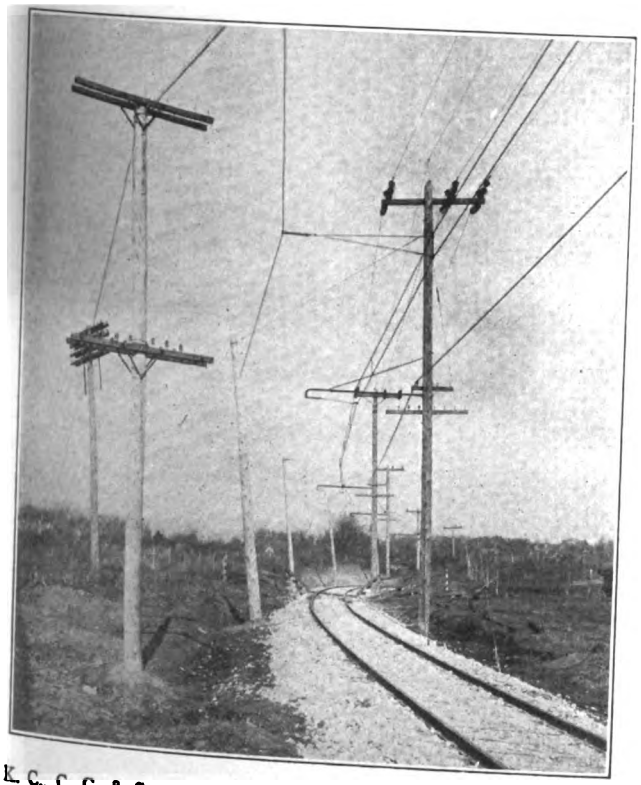
Jewel College. The city is 15 miles from Kansas City, the running time for this distance being forty-five minutes, eighteen of which are consumed by a car in reaching the junction at North Kansas City from the Kansas City terminal.

Excelsior Springs, the only other city of the Excelsior Springs division and the terminal of the line, has a population of about 7000, in addition to the large hosts of health seekers attracted to the city by the curative values of its mineral springs.

The St. Joseph division of the road is approximately two times the length of the Excelsior Springs division, the type of construction being the same. In addition to the terminal cities of Kansas City and St. Joseph, two small cities, namely, Dearborn and Camden Point, are located on this division. The former of these cities has a population of about 900 and the latter a population of about 300, in addition to the students of the Missouri Christian College, which is located at this place. In addition to the population of the cities above mentioned, the two Kansas Cities have a combined population of about 330,000, and St. Joseph a population of about 78,000, making the number of people served by the line, including the rural population, about 500,000.

It is the intention of the road to do a general railroad business, both freight and passenger. That the estimates of the promoters in regard to the passenger revenue were conservative has been fully demonstrated up to the present time, the number of passengers carried having exceeded all expectations. To date, no freight has been handled, but this service will be inaugurated soon. Inasmuch as the interurban taps considerable territory that is served by no other railroad, the prospects are bright for a large revenue from this service.



K. C., C. C. & St. J.—Track and Overhead Line on Curve at Entrance to Middletown

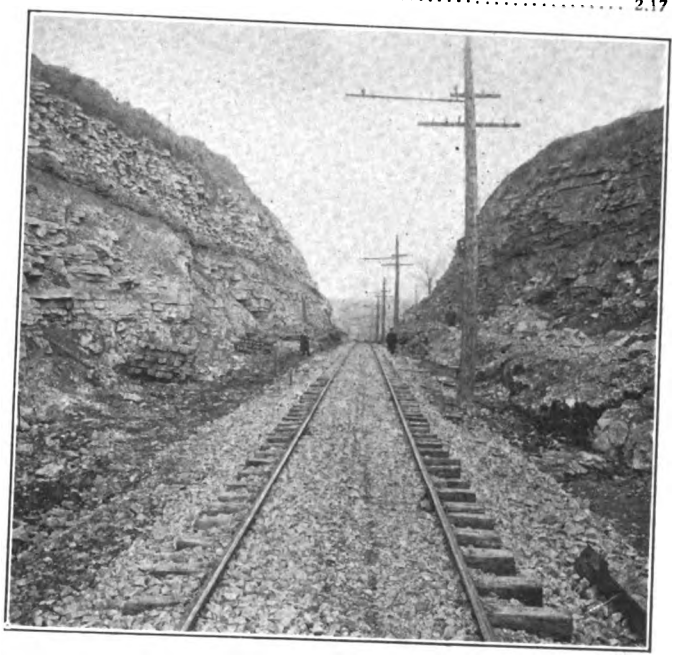
FRANCHISE

The road is built in two divisions, one from Kansas City to Excelsior Springs and the other from Kansas City to St. Joseph, these divisions having a length of 28.35 miles and 52.42 respectively. For the Excelsior Springs division this distance is divided up as follows:

	Miles
Metropolitan Street Railway tracks in Kansas City	1.09
Union Depot Bridge & Terminal Railway tracks	4.23
Kansas City, Clay County & St. Joseph Railway tracks	23.03

The mileage of the St. Joseph division of the road is as follows:

	Miles
Metropolitan Street Railway tracks in Kansas City	1.09
Union Depot Bridge & Terminal Railway tracks	2.94
Kansas City, Clay County & St. Joseph Railway tracks	46.22
St. Joseph city tracks	2.17



K. C., C. C. & St. J.—Rock Cut on Springs Division

The Kansas City terminal of the railway company is located at Thirteenth and Walnut Streets, in the heart of the retail, theater and hotel district of the city. It is a two-story brick building consisting of waiting room and baggage room, with the general offices on the second floor. The city tracks on one side of this terminal are not used by the city cars, a plan which allows for lay-overs by the interurban cars without interfering with city traffic. Inasmuch as this terminal is located only a little more than a mile from the private right-of-way of the Union Depot Bridge & Terminal Railway, only about twelve minutes are consumed from the time the cars leave the Thirteenth and Walnut Street terminal until they are outside of the city limits. This, together with the short mileage as compared with competing steam roads, gives the interurban a decided advantage in the matter of running time to the cities on its route.

In St. Joseph the cars also operate to the middle of the business district on the city tracks of the St. Joseph Railway, Light, Heat & Power Company, the interurban terminal being located at Eighth and Edmond Streets, directly across from the Federal Building.

The road traverses Clay, Platte and Buchanan Counties and, in addition to the cities mentioned above, Dearborn, St. Joseph and Liberty. All county franchises are for the period of the life of the charter of the railroad, which is 200 years. The franchises in the city of Dearborn are for the same period, while that in St. Joseph over the one-half mile of track owned by the railway company is for twenty-five years and in Liberty for fifty years. The company has no franchise in Excelsior Springs as it enters that city over a private right-of-way on which no streets or alleys are crossed.

TRACK AND ROADWAY

From a point where the road connects with the tracks of the Union Depot Bridge & Terminal Railway, it is built on a private right-of-way for the entire distance except in the cities. This right-of-way varies in width from 60 to 200

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ft., the standard width being 66 ft. The country traversed is hilly, making necessary some heavy grading. The heaviest grade is 3 per cent, and the sharpest curve outside of the cities is 5 deg. The largest cut is 62 ft. deep and 1450 ft. long. The material taken from this cut consisted mostly of stone, which was crushed and used to ballast the Excelsior Springs division. The greatest fill is 58 ft. deep and adjoins the cut just mentioned at the entrance to Excelsior Springs. Five-hundred and eighty-three thousand seven hundred and eight cubic yards of earth and 178,949 cu. yd. of rock were removed on the Excelsior Springs division and 1,028,257 cu. yd. of earth and 140,250 cu. yd. of rock on the St. Joseph division.

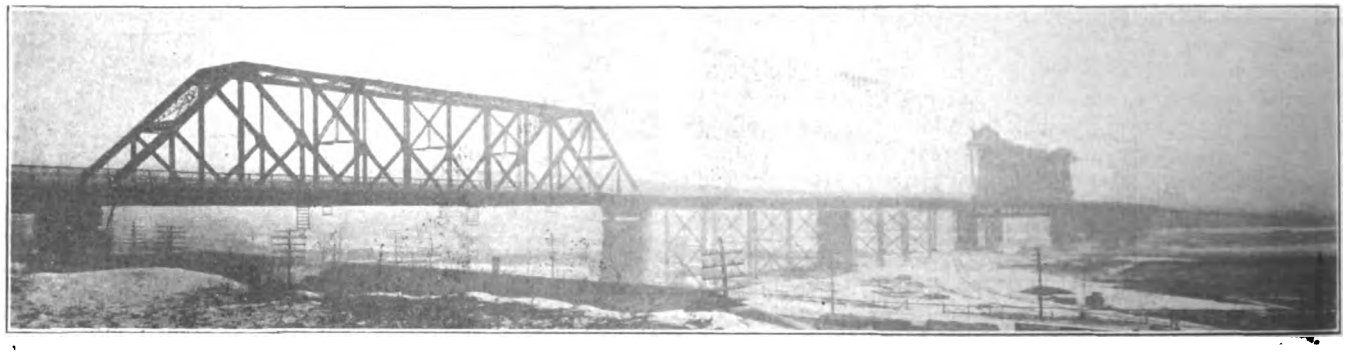
The roadbed on embankments is 16 ft. in width and in excavations 22 ft. with side slopes one and one-half to one in rock. Typical sections of the roadbed are shown in the cuts on page 220.

The rails are of 70-lb. A. S. C. E. section, laid on white oak ties placed on 24-in. centers and ballasted in crushed rock. Approximately 2000 yd. of ballast was used to the mile. These rails are joined with Duquesne rail joints on the St. Joseph division and continuous rail joints on the Excelsior Springs division. All the joints are of the four-hole type and are bonded with American Steel & Wire No. 0000 compressed terminal bonds. The rails are laid with broken joints. Turn-outs are spaced every 3 miles and are 300 ft. long. High rigid switch stands, No. 7 frogs and 15-ft. switch points are used at switches. One-half of these sidings on each division face one direction and the other half face the opposite direction. Under this arrangement all trains receive rights to the switch point only and must head in and then back out at the sidings at the meeting point unless otherwise directed by the dispatcher. This is done to avoid the possibility of a trainman leaving the switch open.

The right-of-way for the entire distance is fenced with the American & Steel Wire ten-bar railway fence. Approach fences adjoining the highway are constructed like the line fence, and the ayes and cattle guards are built of 1-in. x 6-in. x 3-in. fencing constructed in truncated shape and secured to three stub posts.

BRIDGES

The bridges consist of six steel structures and 108 reinforced concrete arches, all designed to carry safely a concentrated load of 100 tons on two trucks spaced 22 ft. apart, in trains and at high speed on each track.



K. C., C. C. & St. J.—Armour-Swift-Burlington Bridge Over Missouri River

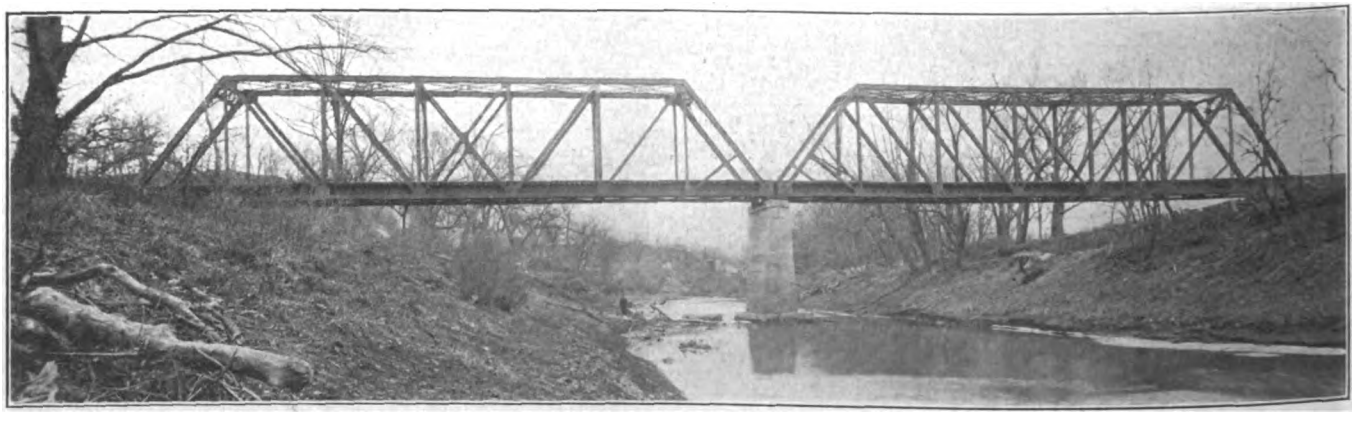
The largest of the steel structures is through the town of Dearborn on the St. Joseph division. This was necessary because at this point the road descends abruptly from a high bluff. This structure is of girder construction and is composed of twenty-five spans, each 60 ft. in length. The maximum height is 37 ft. and the gradient 2.97 per cent. With the exception of the Platte River bridge, which consists of two spans, each a 164-ft. Pratt truss, all of the bridges were built to carry the electric line over steam roads. There are seven of these steam-road crossings, varying in length from 692 ft. to 139 ft. The largest and most interesting of them is that over the Quincy, Omaha & Kansas City Railroad at Avondale on the Excelsior Springs division. This structure has a length of 692 ft. and a clear height of 34 ft., and is of girder construction, built on a 3-deg. curve and 1.1-per cent grade. Other railway crossings are over the Chicago, Burlington & Quincy at Liberty, where the steam road is crossed on a girder structure 338 ft. long and 23 ft. high, the Chicago, Milwaukee & St. Paul crossing at Liberty, a plate girder viaduct 139 ft. long and 25 ft. high, and the Chicago Great Western bridge at Willow Brook, 230 ft. long and 27 ft. high.

The size of the concrete arches used for carrying the load over water courses varies in length from a few feet, one span, to the largest, consisting of three spans, each 60 ft. in length. All of these arches are of the Luten design.

The following cost formula was used in computing the cost of all arches:

$$I(S+2)(3F+W+10) = \text{price, where}$$

S = Span in feet,
F = Profile fill,
W = Subgrade width in feet, and



K. C., C. C. & St. J.—Platte River Bridge

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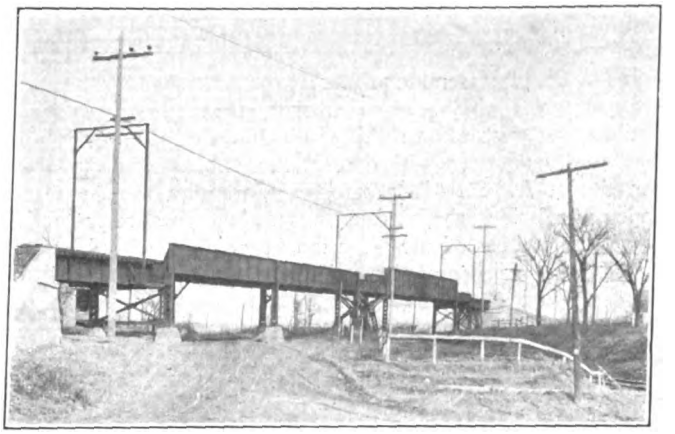
I = Unity for the following prices:

Cement, per barrel	$1.25
Sand, per yard	1.00
Stone, per yard	1.00
Lumber, per 100 feet	2.00
Steel, per hundredweight	1.75
Labor, per day	2.00
Excavation, per yard	.50
Superintendence, per hour	.50
	$10.00

K. C., C. C. & St. J.—Typical Concrete Arch Over Watercourse



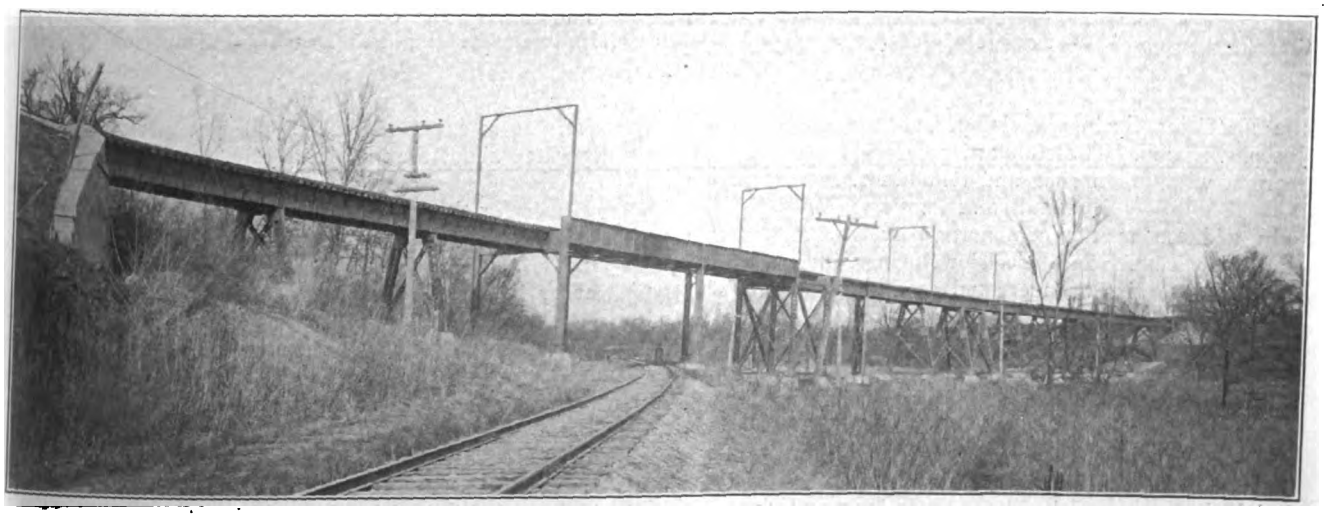
K. C., C. C. & St. J.—Crossing Over Chicago, Burlington & Quincy Railway at Liberty

The values of I on the Kansas City, Clay County & St. Joseph Railway were as follows:

St. Joseph Division		Springs Division	
Sta. 171 to 299	= 1.30	Sta. 325 to 533	= 1.35
Sta. 299 to 587	= 1.40	Sta. 533 to 618	= 1.40
Sta. 587 to 674	= 1.35	Sta. 618 to 840 + 50	= 1.35
Sta. 674 to 903	= 1.45	Sta. 840 + 40 to end	= 1.40
Sta. 903 to 1135	= 1.50		
Sta. 1135 to 1179	= 1.45		
1179	= 1.50		
Sta. 1207 to 1520	= 1.45		
Sta. 1520 to 2394	= 1.40		
Sta. 2394 to 2638	= 1.45		
Sta. 2638 to end	= 1.40		

As an example: At Station 261 + 60 on the St. Joseph division is an arch with a span of 12 ft. The profile fill is 9 ft., the subgrade width is 16 ft., and the value of I for this station is 1.30. Substituting these values in the formula gives the price as $964.60.

With one exception, inside the city of St. Joseph, no steam roads and but a few highways are crossed at grade.



K. C., C. C. & St. J.—Interurban Crossing Over Quincy, Omaha & Kansas City Railroad

For the most part, concrete arches are used when passing over highways, and steel structures are employed to carry highways over the interurban road.

PASSENGER STATIONS

In addition to the waiting stations in Kansas City and St. Joseph, which were remodeled from business buildings by the company to fit conditions, there were also built combination passenger and freight stations at Liberty and Excelsior Springs.

The former of these two stations has a length of 60 ft. and an over-all width of 24 ft. 8 in., and is partitioned off into waiting room, office, baggage room, freight room and toilet room. The building is one story in height with walls of hard-burned shale brick on concrete foundation, all walls being laid with cement mortar, colored black. The floors, with the exception of a ½-in. top dressing, are of concrete 4 in. in thickness, laid on a foundation of cinders 6 in. thick. Window frames and doors are wood. The roof is of asbestos shingles. A platform is provided for the loading and unloading of freight.

The Excelsior Springs station has a ground area of 24 ft. by 60 ft., and is divided into three compartments, namely, a waiting room, ticket office and freight room. Specifications for this station are the same as for the Liberty station with the exception that in this case the walls are carried above the roof and capped with tile coping, and the roof is composed of wood sheathing water-proofed, with a five-ply tar and gravel roofing.

SHELTER STATIONS

At every point where a stop has been established by the railway company a shelter station has been erected. As standard, the company has adopted three classes of shelter stations, known as Classes 1, 2 and 3 respectively. The type of station built at any point is determined by the amount of business done at the place in question. Class 1 station is 8 ft. square in plan, with a height of 8 ft. from the floor to the peak of the roof, and is built with side walls of sidings with one door and two windows. The platform in the

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front of the station is 12 ft. long and 6 ft. wide. Four stations of this class were built on the Excelsior Springs division and eight on the St. Joseph division. Class 2 and Class 3 stations are open shelters. Class 2 has a length of 30 ft. and is provided with two seats separated from each other by a wooden partition, the whole being protected by a roof projecting far enough to insure protection in case of bad weather. To date only one of these stations has been built. Class 3 station is the one most frequently used and meets admirably the needs of a country shelter shed where but few people assemble at one time. As shown by the view on page 218, this station consists primarly of two partitions, set at right angles to each other, equipped with seats and protected with a roof, the whole being supported on the 10-ft. x 10-ft. platform. Although the shelter is open at all sides, the passenger can always secure protection by it, regardless of the direction in which the wind or rain is coming. Eleven of these shelter sheds have been built on the Excelsior Springs division and sixteen on the St. Joseph division. The standard painting for all stations is maroon with green roof and trimmings.

K. C., C. C. & St. J.—Right-of-Way Over and Overhead Highway Crossing and Dearborn Viaduct on St. Joseph Division

FREIGHT STATIONS

In addition to the combination freight and passenger stations at Liberty and Excelsior Springs, individual freight stations have also been erected at St. Joseph and Kansas City. The Kansas City freight station is at Third and Cherry Streets at the south end of the Armour-Swift-Burlington Bridge and has a length of 100 ft. and a width of 18 ft. This station is outside of the territory covered by the franchise of the Metropolitan Street Railway so that freight cars will not be operated over the city tracks. To facilitate the rapid handling of freight at this station, the freight house proper has been made long and narrow with roller steel doors in the two side walls, directly opposite each other. With this arrangement freight can be unloaded from the cars and moved crosswise of the building to the team loading and unloading platform, on the other side of the building. Conversely, outgoing freight can be loaded into cars in the same manner.

The freight station at St. Joseph has been remodeled from a brick dwelling and is at Eighth and Angelique Streets, but a short distance outside of the retail business district. This building is divided into three divisions by brick walls and consists of an office, a perishable freight room and a general freight room. The walls are of brick, extending above the roof and capped with tile coping. The roof is of concrete, reinforced with self-centering expanded metal, No. 24 gage. It is waterproofed with a five-ply tar and gravel roofing. The floors are of concrete 1½ in. in thickness. The same general plan for loading and unloading freight has been followed in the freight room as in the Kansas City freight house, large doors being placed in each side of the wall. For the present the freight equipment consists of five 52-ft. steel express motor cars, equipped with four 100-hp General Electric No. 225, 1200-volt motors, and five wood trailer cars, 40 ft. in length.

It is the intention for the present to do a package express business, no arrangements having been made for the interchange of freight with steam roads, and no contracts have been made with old-line express companies for handling express. It is expected that the freight service will be inaugurated about the middle of July.

POWER

Power for the operation of the two divisions of the road is purchased from the Metropolitan Street Railway Company, of Kansas City, and is generated at the Third and Cherry Streets power plant at 25 cycles, three phases and 6600 volts. To take care of this additional load the Metropolitan Street Railway Company installed at this plant, in addition to the former equipment, one 2500-kw G.E. turbo-generating set. Under its power contract, the Kansas City, Clay County & St. Joseph Railway agrees to purchase power from the Metropolitan Street Railway Company for a period of twenty-five years.

The power is transmitted over the pole line of the Union Depot Bridge & Terminal Railway Company from the power house to the railway company's transformer station located in North Kansas City at the junction of the two divisions of the road. At this point the 660-volt current is stepped up to 33,000 volts and delivered to the railway company's transmission lines.

TRANSFORMER STATIONS

In the design of the Kansas City transformer station, as well as in all other power and passenger buildings built by

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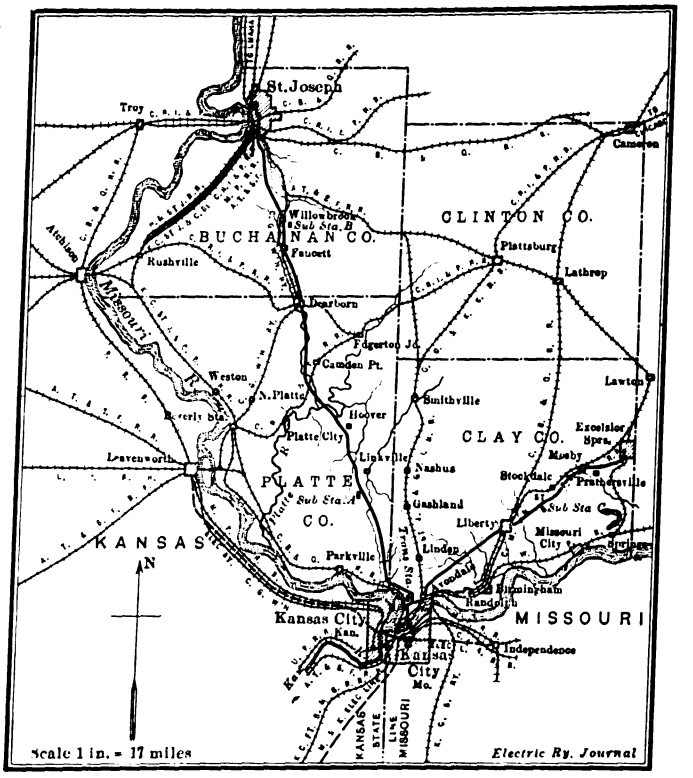
the company, special attention has been given to securing a thoroughly fireproof construction so as to get as low an insurance rate as possible. That the aim of the designers was realized is evidenced by the fact that the company has been able to secure a rate of 25 cents for all insurance.

The transformer station is 36 ft. sq. over all and is two stories in height. The first story is divided into a dispatchers' office, trainmen's room, toilet and bathroom for the trainmen and transformer compartments, while the second story is given up to the switch room. The walls of the building are of No. 1 kiln-run hard common brick, supported on concrete foundation, the bricks being laid with American bond with six stretchers between the header courses. The walls are capped with tile coping. All window openings are framed with steel sashes, the lower sash being pivoted at the top and opening in. Glass in all windows is "A" grade, double strength plain glass. Steel doors are used for all door openings. The floor on the first story of the transformer station is of concrete, 4 in. in thickness, laid on a foundation of 6 in. of broken stone well rammed into place, with the exception of the floor in the transformer compartments, which is 6 in. in thickness, carried on a foundation of 9 in. of broken stone. This heavier floor at this point is necessary to support the transformers. The thicknesses of concrete above mentioned include a surface coat composed of one part Portland cement and two parts of sand, applied before the foundation layer of concrete had time to take its initial set.

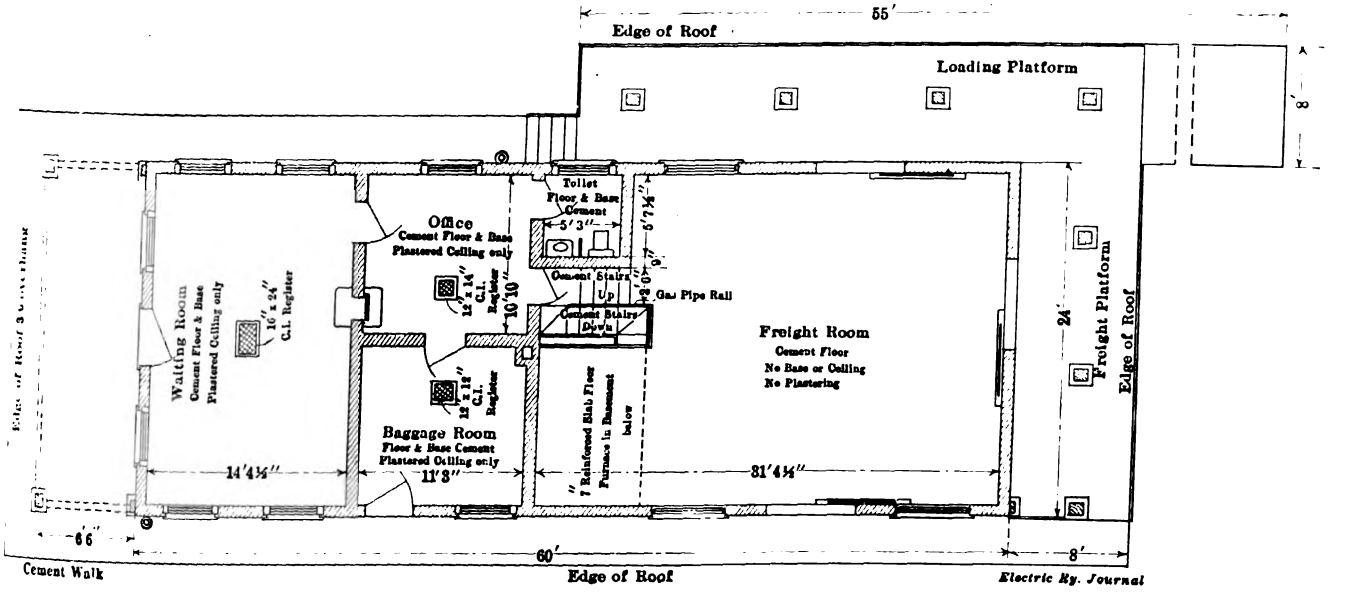
The second-story floors are of the ferrolithic type of flat construction, the reinforcement being unpainted No. 24 gage, with ½ in. depth of corrugation. The roof is also of the ferrolithic type, the reinforcement being No. 24 gage with corrugations ½ in. deep. The upper surface of the corrugation is covered with ⅞-in. coat of one part Portland cement to three parts of sand, floated to a true surface. The under side of the roof reinforcement is plastered with a ⅜-in. coat of cement plaster composed of one part Portland cement to two parts of sand, to which mixture was added two-fifths of a part of hydrated lime and hair. This mixture of hydrated lime and hair is composed of 4 lb. of hair to five sacks of lime and was allowed to stand forty-eight hours before being placed. The roof is waterproofed with a five-ply tar and gravel roofing.

One interesting feature in the design of this transformer station is the transformer compartments. Each of these measures 9 ft. x 10 ft. with a height equal to the height of the first floor, and they are divided from each other and the rest of the building by fireproof walls without openings. Entrance to each compartment is through an 8-ft. x 11-ft. steel door opening from the outside of the building. Ventilation for each compartment is secured by a hinged ventilator and by metal framed windows with gratings at the top of each compartment.



K. C., C. C. & St. J.—Map of Route of New Railway by Solid Black Line

The main equipment of this transformer station consists of three 750-kva, oil-insulated, self-cooled, single-phase, twenty-five-cycle, 6600 to 33,000-volt Westinghouse transformers, together with switchboards and switching apparatus. In addition to the main transformers one 5-kva "SK," single-phase, twenty-five-cycle, 6600-220-110-volt Westinghouse transformer is installed. From this latter transformer is secured the 110-volt power for lighting the transformer station and the shops and the 220-volt current for the operation of the shop machinery.



K. C., C. C. & St. J.—Passenger and Freight Depot at Liberty, Mo.

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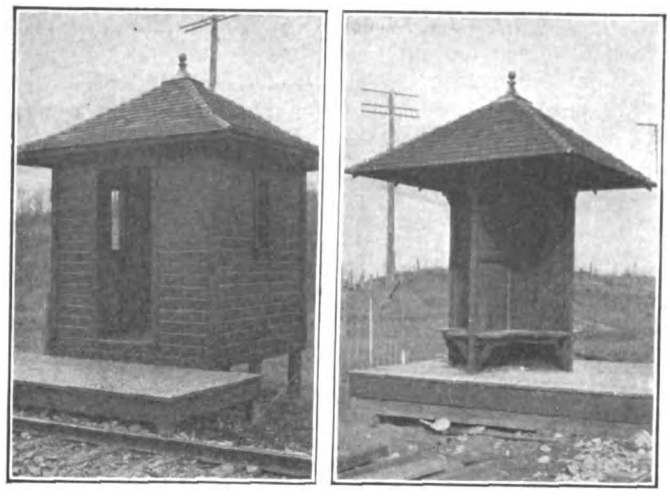
The switchboard is composed of one panel in two sections. This is mounted on an angle-iron frame and located on the ground floor in the dispatcher's office.

SUBSTATIONS

The high-tension, 33,000-volt, twenty-five-cycle current is converted to 1200-volt direct current at three substations, one on the Excelsior Springs division and two on the St. Joseph division. The general specifications of substation



K. C., C. C. & St. J.—Typical Small Waiting Stations

buildings conform very closely to the specifications of the transformer station, and in design they are identical with one another. These buildings have a ground plan 43 ft. 6 in. x 41 ft. and are divided into two divisions by a brick fire wall, whose openings are protected by steel doors. In the larger of these compartments are installed the transformers, electrolytic lightning arresters and auxiliary apparatus, while the rotaries and switchboards are installed in the smaller compartment. The buildings are one story in height with brick walls of the same specifications as the transformer station and supported on concrete foundation. The floors are of concrete, and the roof is of the same type as the transformer station. The window frames are of steel as are also the doors opening into the building. As will be noted from the accompanying halftone of the transformer and substation, no effort has been made toward architectural adornment, the object sought in the design being rather utility, combined with lasting and fireproof qualities.

In each of these stations is installed, as the main equipment, two 500-kw, 1200-volt commutating-pole Westinghouse rotary converters having a speed of 750 r.p.m. These rotaries are insulated for and can be operated at 1500 volts. This speed of the rotary was chosen in place of 500 r.p.m. because somewhat better efficiencies are obtained at all loads and a more stable commutation at heavy overloads. With a six-pole rotary converter operating at 500 r.p.m. it is not possible to place the brushes as advantageously as with the four-pole rotary at higher speed. The space between poles on the 750-r.p.m., four-pole rotaries is greater and allows for a more advantageous armature winding for this high voltage than can be obtained on a 500-r.p.m. rotary. This is due to the fact that a greater number of commutator bars can be employed, with a correspondingly average reduced potential difference between bars, permitting a more advantageous use of the interpoles. The four-pole construction also enables the rotary to carry larger overloads than would be possible with the 500-r.p.m. construction, owing to the more advantageous proportioning of the machine, so that it was possible to obtain from the manufacturers a guarantee on overloads up to 200 per cent of the rated capacity of the machine, or three times full load current of 416 amp, for swinging periods of twenty seconds without undue heating or injurious sparking. These rotaries are self-starting from the alternating-current end.

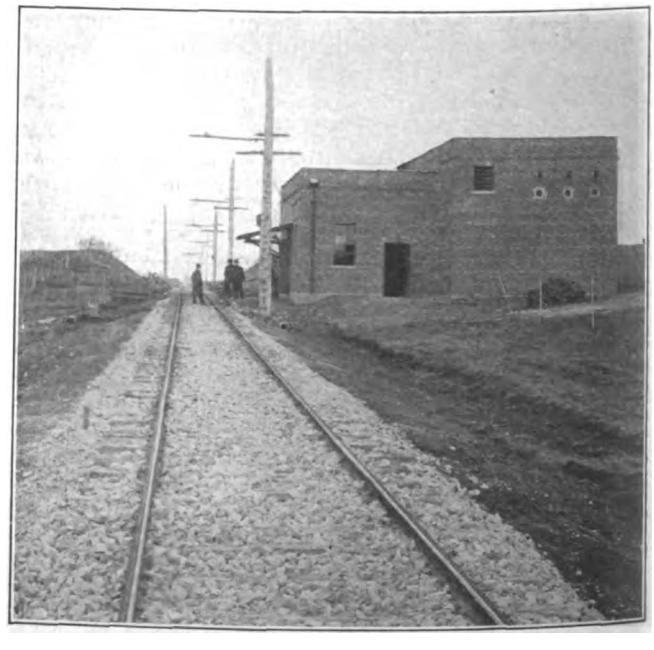
The switchboard in each station is composed of black marble mounted on angle-iron frames and consists of six panels, two converter panels, two feeder panels and two negative bus panels.

One interesting feature in the design of the high-tension buses is the fact that they are run in iron pipe mounted on insulated pipe-frame brackets. The transformers used in the substations have a capacity of 185 kva. These are oil-insulated and self-cooling, single phase, twenty-five cycles, 33,000-730 volts. Two banks of these transformers are placed in each station. The additional equipment of the transformer compartment includes type "A" electrolytic lightning arresters, complete with horn-gap disconnecting and charging device for use on the 33,000-volt circuit with ungrounded neutral; type D choke coils, 35,000 volts; type M disconnecting switches, 33,000 volts; type GA oil circuit-breakers, three-pole, single-throw, hand-operated with distant mechanical control and 44,000-volt overload automatic inverse time limit relays. All of the transformer and substation equipment was furnished by the Westinghouse Electric & Manufacturing Company.

OVERHEAD CONSTRUCTION

One pole line is used to carry the trolley wire and three-phase transmission line, one telephone circuit and the feeder cable, space being allowed on the crossarms for signal wires. The design is such that the road may ultimately be operated at 1500 volts d.c. with 1200 volts d.c. for initial operation. The design is initially for single track, permanently located on the right-of-way as one of the tracks of a double-track road.

In general five-point catenary bracket construction is used, span construction being employed only on long overhead viaducts and bridges and for short distances in the cities. Bracket construction is also used on the fifteen sidings on the St. Joseph division and the eight sidings on the Excelsior Springs division, a line of poles being set on the outside of the siding and opposite the main line of



K. C., C. C. & St. J.—Substation "C," Springs Division

poles. With this design, in case the line is double-tracked, the siding poles may be used as main line poles without change.

The pole spacing is 150 ft. on tangent line and less on curves, the distance depending upon the degree of curvature. The accompanying table gives approximately the spacing used on curves, also span and pull-off hanger spacing.

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All sags are calculated to a temperature of 60 deg. Fahr.

The sags above given are from the center of the messenger to the center of the trolley, equal to 22 in. at the bracket arm.

All poles are Michigan white cedar, those carrying transmission lines being 40 ft. in length and without transmission lines 35 ft. in length. All poles have a diameter of

TABLE SHOWING POLE SPACING, ETC., ON DIFFERENT DEGREES OF CURVES

Brackets	Degree of Curve	Pole Spacing	Hanger Straight Line	Hanger Pull-off	Sag
9 ft.	tangent to 1 deg.	150 ft.	5	..	16 in.
12 ft.	1 deg. to 2¾ deg.	150 ft.	4	1	16 in.
12 ft.	2¾ deg. to 3¼ deg.	135 ft.	4	1	13 in.
12 ft.	3¼ deg. to 4 deg.	120 ft.	4	1	10 in.
12 ft.	4 deg. to 5½ deg.	105 ft.	4	1	8 in.
12 ft.	5½ deg. to 7½ deg.	90 ft.	2	1	6 in.
12 ft.	7½ deg. to 10 deg.	75 ft.	2	1	4 in.
12 ft.	10 deg. to 17 deg.	60 ft.	..	2	2½ in.
12 ft.	17 deg. to 80-ft. radius	45 ft.	..	3	..

8 in. at the top to comply with the Northwestern Cedar Men's Association standard specifications for electric poles. As a rule the poles were framed before being set, and the pins and insulators placed on the crossarms. In special instances, when the wires pass over foreign transmission and telephone lines, poles having a length as great as 60 ft. are used. The following table gives the pole settings for different lengths of poles:

35-ft. poles in the ground 6 ft. deep.
40-ft. poles in the ground 6 ft. deep.
45-ft. poles in the ground 6 ft. 6 in. deep.
50-ft. poles in the ground 7 ft. deep.
55-ft. poles in the ground 7 ft. 6 in. deep.
60-ft. poles in the ground 8 ft. deep.

On curves all poles are keyed with stone or timber and in soft ground are set in concrete at points of special strain. Poles on bracket construction are set with the face of the pole a distance of 7 ft. 6 in. from the center line of the track, and on straight line they are set with a rake of 8 ft. from the track. On span construction through towns and at other places where such procedure was necessary the main line of poles is set with a rake of 2 ft. and the 35-ft. poles opposite with a rake of 4 ft. Where guying was necessary ⅜-in., seven-strand, galvanized steel wire having a tensile strength of 5000 lb. was used, the pole being protected by galvanized iron bands where the guy wire passes around the pole. Wood strain insulators are cut in all guy wires at a distance of 8 ft. from the pole, and the guys are anchored to a ⅝-in. x 6-ft. anchor rod, passed through a 6-in. x 8-in. x 8-ft. tie, buried 5 ft. deep. All guying was done before any strain was brought on the poles by the erection of any high-tension, trolley or feeder wires.

The crossarms are of Washington fir with dimensions as follows:

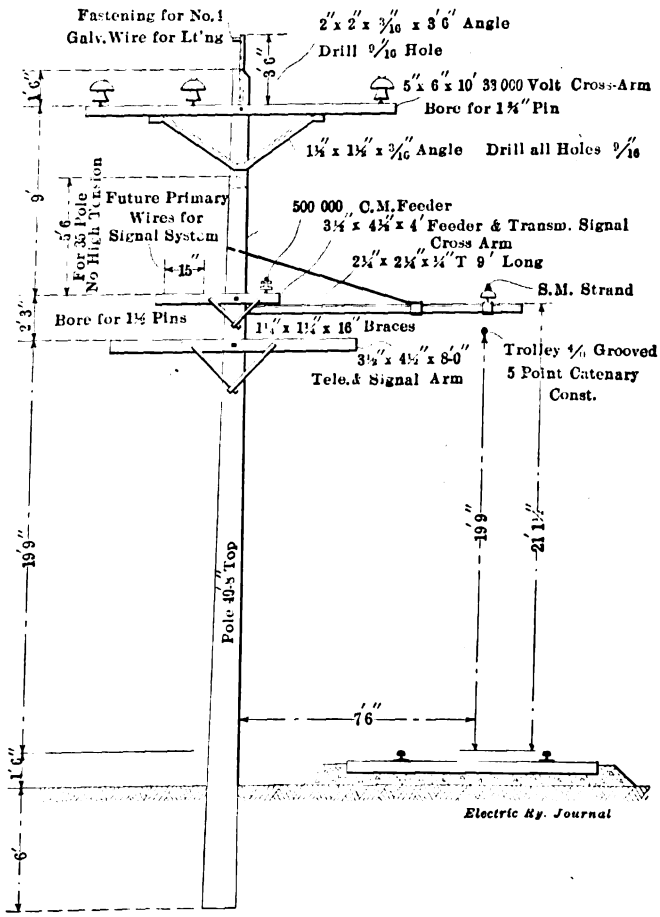
For the 33,000-volt high-tension line, 5 in. x 6 in. x 10 ft., four pin; feeder arm, 3½ in. x 4½ in. x 4 ft., three pin; telephone crossarm, 3½ in. x 4½ in. x 8 ft., eight pin. A space has been allowed on this and the feeder crossarms for the installation of signal wires.

The high-tension crossarm is placed at the top of the poles and is braced with 1½-in. x 1½-in. x 3/16-in. angle brace, having a spread of 5 ft. The feeder arm is placed second from the top immediately above the bracket arm and the telephone arm just below the bracket arm. On curves of 2 deg. and greater, iron pins having a ¾-in. x 7-in. shank and a 4¾-in. curved base to fit 5-in. x 6-in. arms and extending 7½ in. above the high-tension crossarms are used. For high-tension lines along tangent track, locust pins having a 1¾-in. x 6-in. shank and 13 in. over all to fit Ohio Brass Company's 33,000-volt insulators are installed. For the d.c. 1200-volt feeders the company uses 1½-in. x 4½-in. shank, locust pins, 9 in. over all, to fit Ohio Brass Company's insulators No. 10,041, and for the telephone line 1½-in. x 4½-in. shank locust pins, 9 in. over all, to fit Ohio Brass Company's insulators No. 10,565. For telephone transposition 1½-in. x 4½-in. shank, locust pins, 10 in. over all, to fit Ohio Brass Company's insulators No. 10,747 are used.

All insulators on the St. Joseph division are brown porcelain, having a wet flash-over test of 68,000 volts and a dry flash-over test of 90,000 volts. The high-tension line on the Excelsior Springs division is carried on porcelain insulators having a wet flash-over test of 70,000 volts and a dry flash-over test of 133,000 volts. All 1200-volt feeder insulators are designed for a working voltage of 6600.

The 9-ft. bracket arms are 2½-in. x 2¼-in. x ¼-in. T-sections, with ⅝-in. tension rods. All brackets are black japanned. For tangent steadies on inside curves the bracket arms are 12 ft. long, 2¼-in. x 2¼-in. x 5/16-in. T-sections with ⅝-in. tension rods. These also are black japanned. The messenger insulators are designed for test voltage of 20,000.

On span wire construction ⅜-in., seven-strand Siemens-Martin galvanized steel cable, having a tensile strength of



K. C., C. C. & St. J.—Pole Line Construction

5000 lb., is used. This is attached to the poles with ⅝-in. x 14-in. galvanized eye-bolts. These eye-bolts are placed at such a height as to allow for a dip in the span wire of 1 ft. in 10 ft., with the eye-bolt run out the full length. Wood strains are cut into the span wire 8 ft. from the trolley on either side and into the pull-offs and bridle guides. The catenary cable is supported at the center of the span by Westinghouse cross-stand messenger hangers.

The catenary construction is of the single messenger type, the sag at the center being approximately 16 in. The messenger is 7/16-in. Siemens-Martin steel strand, having a tensile strength of 9000 lb. and an elastic limit of 5300 lb. Five-point suspension, with Westinghouse flexible catenary hangers and curve pull-offs, is used.

The trolley is No. 0000 B. & S. gage, hard-drawn standard grooved copper wire having a textile strength of 46,500 lb. per square inch. The height of the trolley wire is 19 ft. above the head of the rails.

The feeder wire is 500,000-circ. mil, bare stranded copper cable, composed of thirty-seven strands, each having a

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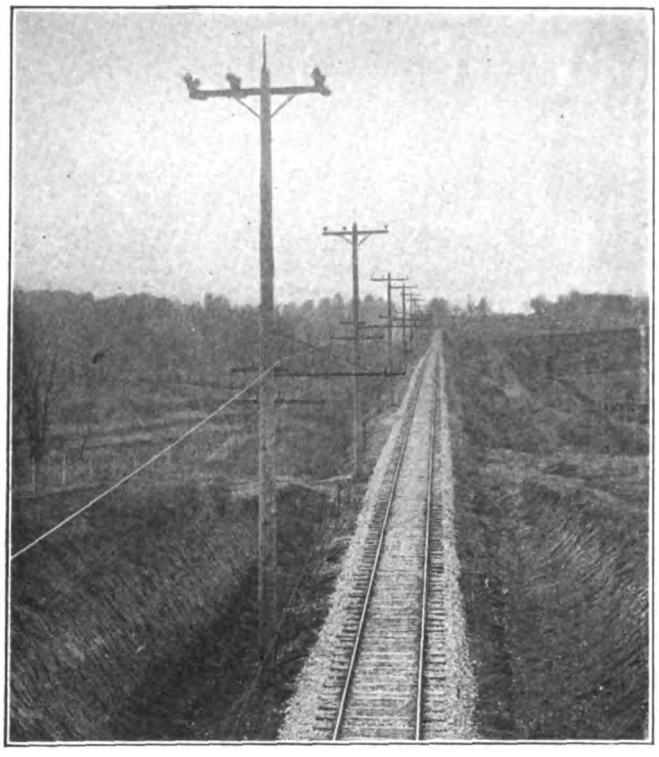
diameter of 116.2 B. & S. gage, concentric type. This cable is strung the entire length of both the Excelsior Springs and St. Joseph divisions. It is tied to the insulators with No. 6 B. & S. soft-drawn copper wire and is rope-spliced and soldered. This feeder was erected before the bracket arms were placed and, as shown in the accompanying cut, this feeder is placed on the track side of the pole.

The trolley and messenger is sectioned at four pointts,



K. C., C. C. & St. J.—View of a Tangent Over an Overhead Highway Crossing

one being on each division to insulate the 1200-volt railway current from the 600-volt current of the Union Depot Bridge & Terminal Railway, one at the substation on the Excelsior Springs division and one at substation "B" on the St. Joseph division. Westinghouse 1200-volt section insulators are used. The feeder is tapped into the trolley approximately three times per mile. These taps are No. 0 B. & S. copper wire, soldered to the feeder and run through two feed tap porcelain insulators and fastened to the feed tap trolley feeder. Rymco trolley switches are used at all turnouts.

Garton-Daniels 1200-volt arresters are used for the protection from lightning of the feeder and trolley wires. These arresters are located about five to the mile and are so spaced as to bring an arrester on each pole where a feed tap is located. These arresters are placed about 17 ft. above the top of the rail and are connected to the feeder wire by means of a No. 6 B. & S. copper wire which is soldered to the No. 0 B & S. copper wire and is stapled to the pole with galvanized fence staples. The ends are soldered to the brass caps of a ¾-in. x 7-ft. galvanized iron pipe having a driving point placed at one end and the brass cap at the other end. This pipe is driven directly underneath the lightning arresters to a depth of 6 ft., leaving 1 ft. above the ground.

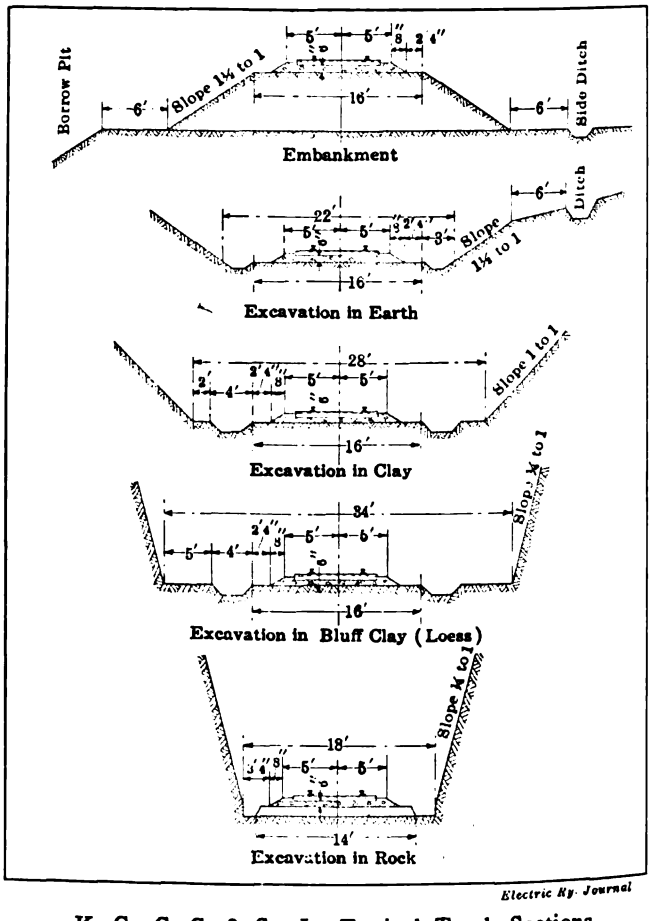
The high-tension, 33,000-volt, three-phase, twenty-five-cycle transmission line is carried from the Metropolitan power house to the junction transformer station by three 300,000-circ. mil bare stranded feeder cable. From the transformer to substation "A" on the St. Joseph division, a distance of about 12 miles, three No. 2 B. & S. medium hard-drawn bare copper wires are used. These are supported on insulators and pins as stated above and tied in with No. 6 soft-drawn B. & S. copper tie wire. From substation "A" to substation "B," a distance of about 26 miles, and also from the transformer station to substation "C" on the Excelsior Springs division, three No. 4 B. & S. medium hard-drawn bare copper wires are strung.

For the protection of the high-tension lines a No. 6 B. W. G. galvanized steel wire is strung over the top of all high-tension poles. It is placed at a height of 22 in. above the top of the pole and 3 ft. 6 in. above the top of the high-tension crossarms. This wire is fastened to a porcelain knob, which in turn is bolted to a 2-in. x 2-in. x 3/16-in. x 3-ft. 6-in. angle-iron. This ground wire is grounded approximately five times to the mile by means of No. 8 B. W. G. galvanized steel wire, which extends down the track side of the pole and is fastened at intervals of 5 ft. with galvanized iron fence staples. This wire is attached to the ground wire by wrapping and soldering and is grounded at the base of the pole to a ¾-in. x 7-ft. galvanized pipe, having a driving point and brass cap and driven into the ground at the base of the hole.

The telephone circuit consists of two No. 10 B. & S. copper wires. This line is transposed every 1000 ft., the transposition being made on one transposition insulator. Telephone jack boxes are placed every mile and at all sidings for the entire length of each division.

METHOD OF ERECTION OF CATENARY LINE

The following is the method used in the erection of the catenary line: After the poles were placed and guyed, the brackets were placed at a height of 21 ft. 1½ in. from the



K. C., C. C. & St. J.—Typical Track Sections

top of the rail to the top of the bracket, and the insulators were placed on the pins. The trolley and messenger wires were both pulled in at once and hung over the brackets, except at curves where the trolley was supported below the bracket arms by means of a loop of No. 8 galvanized iron wire hung over the bracket arm at intervals of from 30 ft. to 40 ft. The trolley wire was then pulled tight and temporarily anchored while it was resting on the bracket arm.

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In order to get the desired tension of about 1000 lb. for the No. 0000 trolley, the pull was made with a pair of three-shear blocks and a purchase with a pair of two-sheave blocks. By using this method it was found that three men would get the desired tension. The messenger was next adjusted to give the proper sag, after which it was lifted on the insulators and tied to prevent moving in the direction of the track. The trolley wire was then dropped and temporarily supported by loops of No. 8 iron wire from the T-iron bracket and from the center of the messenger spans. The hangers were then installed, and the trolley and messenger wires were anchored every half mile on tangent track and at the end of tangent track at the end of each curve. Sufficient slack was left in the curves to allow the trolley messenger wire to be pulled over to the proper alignment of the track. To prevent the creeping of the messenger and unequal strains at the brackets, the tension of the messenger was made the same in short spans as in the 150-ft. spans, and this required different length of hangers according to the span. The messenger is not secured rigidly to the insulators but is allowed to move, thus keeping the tension uniform.

SHOPS

The shops and carhouse are in one building situated at North Kansas City, the junction point of the two divisions of the road. In ground plan, this building is 192 ft. 8 in. long by 115 ft. 2 in. wide, and it is divided into two bays by a 12-in. brick fire-wall. There are three openings in this wall protected by tin-clad automatic fire-doors. The larger of these bays, measuring 54 ft. 1 in. wide, is devoted to car storage. Four tracks run the entire length of the building, and the storage capacity is twelve passenger cars. The south half of this storage bay has a concrete floor, the remainder being of Joplin grit. All track openings are protected by rolling steel fire-doors.

One interesting feature in the design of this storage bay is that the tracks are raised above the floor about 18 in., being supported on small concrete pedestals. This arrangement greatly facilitates the work of inspectors when examining trucks and other apparatus located under the car. The same arrangement of tracks is also carried out outside of the building for a considerable distance.

The smaller bay, measuring 48 ft. 6 in., is given over to the shops proper, the paint shop and the storeroom. The west end of the shop for a distance of 69 ft. 10 in. is depressed about 5 ft. below the main floor and permits work to be performed under two cars at one time. In this depressed portion of the shop there are a blacksmith's outfit and a shop-heating boiler and sand drier. A concrete walk extends around the two sides of the depressed portion.

The paint shop is 72 ft. long and 16 ft. 6 in. wide, divided from the machine shops by a plastered ferrolithic partition, a rolling steel fire-door protecting the opening into this paint shop. The storeroom is at the rear of the building and measures 32 ft. x 23 ft. 4 in. There are two tracks into the shop bay, and one of them extends into the machine shop. The capacity of these tracks is five cars. Midway on these shop tracks are placed two 10-ft. turntables connected by a cross track. These turntables are to facilitate the handling of trucks.

To the east of the car shop is an addition 95 ft. long and 10 ft. wide. This is divided into a hard-coal bin, sand bin, soft-coal bin, washroom for the shop employees, and the master mechanic's office. To the east of the building and about 15 ft. from it is a detached oil house of the same type of construction as the shop proper, measuring 15 ft. square.

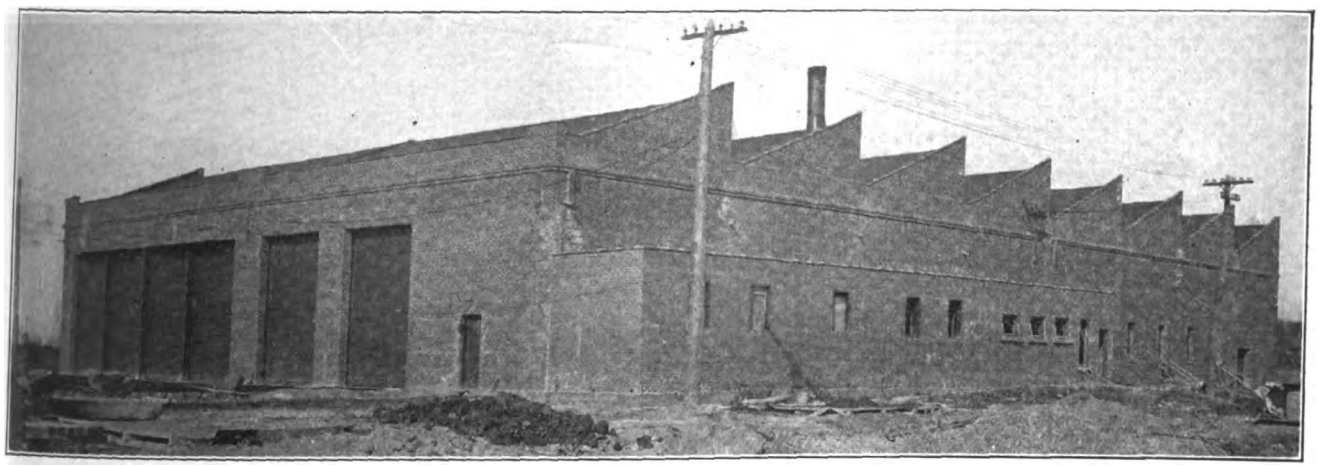
The shops are heated throughout by steam heat on the vacuum system. The lighting is by incandescent lamps attached to the 110-volt, twenty-five-cycle lighting mains.

The building walls are of brick, supported on concrete foundation, and are capped with salt-glazed tile coping. The floors are of concrete. The roof is of reinforced concrete of the saw-tooth type, with the skylights facing the north. This is of the ferrolithic type of construction and supported on structural steel roof trusses. All doors and window openings are furnished with metal doors and metal window sashes.

OPERATION

The road is operated under strictly standard rules, standard form 31 train order being used. The Excelsior Springs division was placed in operation on Jan. 21, 1913, and the St. Joseph division on May 5. Up to the present time the number of passengers carried has exceeded all expectations and the indications are that this business will increase as the road becomes better known. The success so far enjoyed by the road may be attributed to several causes, among which are the shorter time as compared with steam roads, lower fare, the convenience to passengers afforded by the cars entering into the business district in the cities and the determination of the operating department, headed by J. R. Harrigan, general manager, to give service unequaled by any steam road in the county. At present a forty-five minute headway is in force on the Excelsior Springs division and a seventy-minute headway on the St. Joseph division. Trains are composed of one car, except on Saturdays, Sundays and holidays, when two-car trains are operated in multiple. The type of passenger cars used was described in the ELECTRIC RAILWAY JOURNAL for Jan. 18, 1913.

The road was built by the Wyandotte Construction Company, Robert P. Woods, chief engineer, all designs, plans and specifications being worked out and all work done under his supervision. For the most part the work was sub-contracted except in a few instances when the work was done by the construction company itself.



K. C., C. C. & St. J.—View of Repair Shops Taken Before Completion

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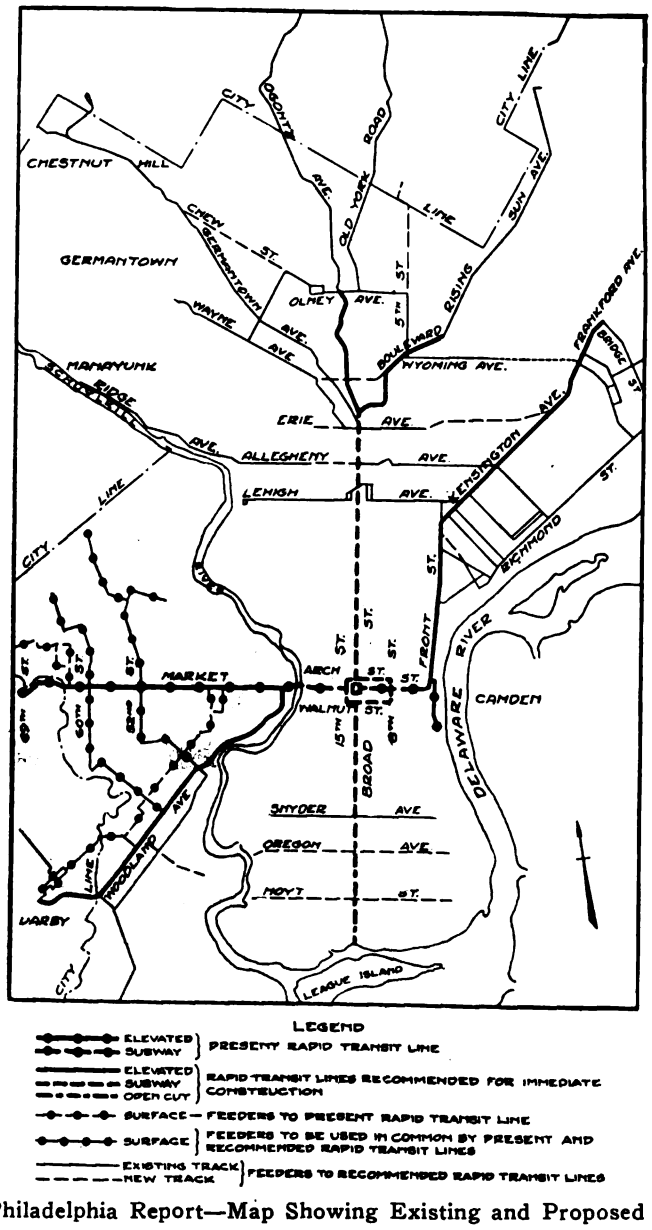
Rapid Transit Report on Philadelphia

A. Merritt Taylor, Director of Department of City Transit, Recommends Construction of Subway and Elevated Lines at a Total Cost of Nearly $60,000,000—The First Development Would Comprise 25.4 Miles of Subway and 33.9 Miles of Elevated Single Track

The Philadelphia Department of Public Works has issued, under date of July 31, Vol. I of the report of A. Merritt Taylor, director of department of city transit, on an enlarged subway and elevated system for Philadelphia. Vol. II will contain maps and plans, mostly in colors. The technical portions of the report were conducted under the direct supervision of Ford, Bacon & Davis, consulting engineers, New York.



Philadelphia Report—Map Showing Existing and Proposed Rapid Transit Routes

Director Taylor recommends that the city start at once on the construction of a four-track subway in Broad Street from City Hall northward to Pike Street and a two-track subway southward from City Hall to League Island, with a central delivery subway loop in Fifteenth, Walnut, Eighth, Arch and Filbert Streets. The city also shall proceed at once with the construction of an elevated branch railway from the Broad Street subway at Pike Street to Olney Avenue and one to Rising Sun Avenue.

Coincident with these undertakings Director Taylor recommends that the Philadelphia Rapid Transit Company shall begin construction of an elevated railway from Front and Arch Streets to Frankford and an elevated railway from Thirtieth and Market Streets to Darby. The various routes suggested are shown in the accompanying map. In general, free use has been made of elevated structures outside of the central business district.

Mr. Taylor estimates the total cost of these improved rapid transit facilities at $57,587,000, of which $34,682,000 is to be paid by the city and $22,896,000 by the Rapid Transit Company in equipment as lessee of the Broad Street subway and for construction and equipment of the Frankford and Darby elevated railways.

In submitting his report with these recommendations to Mayor Blankenburg, the director says:

"The report contains definite recommendations and plans whereby such recommendations can be carried out by the city without burden to the taxpayers and with ultimate profit to the city treasury.

"All legislation necessary to enable the city to carry out the recommendations has been outlined, drafted and passed by the Legislature and signed by the Governor since my appointment as transit commissioner.

"The recommendations in the report cover the construction, equipment and operation of specific routes by the Philadelphia Rapid Transit Company, the construction of the Broad Street subway and branches by the city and the operation and equipment thereof by the Philadelphia Rapid Transit Company; also a logical and sound financial plan whereby the undertaking can be financed by the city and the Philadelphia Rapid Transit Company jointly in a manner which will gain these facilities for the city without causing an increase in the tax rate and in such a manner as to vest ownership of all the valuable facilities recommended for immediate construction and the equipment thereof in the city ultimately as a great income-producing asset, the cost thereof to be paid by the earnings from operation."

RECOMMENDED RAPID TRANSIT SYSTEM

Section I of the first volume deals with the recommended rapid transit system and explains how the routes were laid out on the basis of traffic studies. In the case of Broad Street it was felt that two express tracks should be provided at the outset, as it was calculated that the capacity of two local tracks would be exceeded within from five to ten years after the completion of the line. The mileage of the first development of the recommended rapid transit system, if operated by the Philadelphia Rapid Transit, would be as follows:

TABLE I—MILEAGE OF FIRST DEVELOPMENT OF RECOMMENDED RAPID TRANSIT SYSTEM

Line	Miles of Line			Miles of Track		
	Subway	Elevated	Total	Subway	Elevated	Total
North Broad Street line (north of Race Street)	4.2	4.0	8.2	16.3	8.1	24.4
Delivery loop (Race to Spruce Street)	2.1	...	2.1	4.5	...	4.5
South Broad Street line (south of Spruce Street) (a)	2.3	1.1	3.4	4.6	2.2	6.8
Frankford line	...	6.4	6.4	...	12.7	12.7
Darby line	...	5.4	5.4	...	10.9	10.9
Total (a)	8.6	16.9	25.5	25.4	39.9	59.3

(a) Includes as elevated 1.1 miles of two-track line in open cut south of Bigler Street.

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If satisfactory arrangements cannot be made with the Philadelphia Rapid Transit Company, an independent system, with surface feeders, is recommended. This system would include 22.4 miles of subway and 34.5 miles of elevated single track.

TABLE II—REVENUE PASSENGERS PER CAR MILE, YEAR TO JUNE 30, 1913

	Surface	Rapid Transit	Ratio Rapid Transit to Surface
New York (Manhattan and Bronx)	6.5	4.9	75%
Brooklyn (including Queens)	5.6	5.2	93
Total, Greater New York (excluding Richmond)	6.1	4.9	80
Chicago (a)	5.2	3.7	71
Philadelphia	5.3	5.7	108
Boston (b)	5.7	5.8	102
Average	5.6	4.8	86%

(a) Chicago surface for year to Jan. 31, 1910; Rapid Transit for year, June 30, 1910.
(b) Boston Elevated Railway Company's system only; includes Cambridge, Somerville, Chelsea, Everett, Medford, Malden, Watertown, Brookline, Arlington and Belmont.

GENERAL DESIGN AND ESTIMATES

Section II covers general design. The cars should be about 50 ft. long, weigh about 40 tons and have at least three doors in each side, to be operated by compressed air. The trains should consist exclusively of motor cars equipped with, say, two 125-hp motors per car and operated for a normal station stop of twenty seconds and a maximum stop of forty seconds.

Although all electric lines, both surface and non-surface, of the Philadelphia Rapid Transit Company have a wide gage, it is recommended that the proposed system be of standard gage. In the cost estimate for subway construction it has been assumed that the open-cut method will be used almost exclusively and that elevated structures will be of solid-floor design. In all cases the stations have been estimated as 500 ft. in length to accommodate ten-car trains. Section III is devoted to cost estimates according to different headrooms, number of tracks, etc.

TABLE III—REVENUE RIDES PER YEAR PER CAPITA, YEAR TO JUNE 30, 1913

	Surface	Rapid Transit	Total
New York, including Bronx	159	229	388
Brooklyn (including Queens)	186	79	265
Total Greater New York (except Richmond)	171	167	338
Chicago (a)	204	74	278
Philadelphia	252	22	274
Boston (b)	234	50	284
Average	199	109	308

(a) Chicago surface for year to Jan. 31, 1910; Rapid Transit for year, June 30, 1910.
(b) Boston Elevated Railway Company's system only; includes Cambridge, Somerville, Chelsea, Everett, Medford, Malden, Watertown, Brookline, Arlington and Belmont.

TIME SAVING

Section IV is devoted to a statement of the travel time saved by the proposed routes, the city being divided into time zones. It is estimated that the present subway-elevated line to West Philadelphia saves time for about 165,000 people, but the new lines would raise this to 983,000 persons, or 60 per cent of the (1912) population within the city limits. A large part of the remaining 40 per cent is within the central part of the city and would be served better by surface lines.

SURVEY OF PRESENT TRAFFIC, ESTIMATED TRAFFIC, INCOME ACCOUNT, ETC.

Section V is a survey of present traffic. In making this survey two observers were placed on approximately every fifth car of each line during practically the entire day, and a record of the trip of each passenger boarding the car was obtained, under the following headings:

Record (a) time of day; (b) route of car; (c) direction; (d) street at which passenger boards car; (e) street corner to which passenger is destined; (f) route on which destination is located if reached by transfer or exchange ticket; (g) fare presented—whether cash, exchange ticket, transfer or free; (h) transfer or exchange ticket issued, if any. The data were transferred to cards by means of an electric tabulating machine, and the cards were then segregated in 113 traffic sections. Each section was noted for (a) population in 1912, (b) land areas in acres available for residences, (c) density of population per acre, (d) rides originating on day of survey, (e) equivalent revenue, year to June 30, 1913, (f) rides per annum and (g) revenue per capita, year to June 30, 1913.

Section VI relates to the estimated traffic of the proposed rapid transit system. Section VII is an estimate of income account, with allowance for taxes and 3 per cent of operating expenses for reserve fund. It is accompanied by curves showing the rides per capita in New York, Brooklyn, Chicago and Boston.

FUTURE RAPID TRANSIT SYSTEM

Section VIII deals with the future rapid transit system and the possibility of inter-operation with electrified steam suburban lines. In addition to the lines recommended for immediate construction, it is tentatively suggested to follow them with 132.4 miles of elevated and 24.2 miles of subway single track.

TABLE IV—INCREASE IN RIDING HABIT

	1890	1895	1900	1905	1910	1912
New York, including Bronx	...	...	276	312	376	388
Brooklyn, including Queens	...	...	208	230	251	265
Greater New York (excluding Richmond)	...	...	249	279	325	338
Chicago (a)	159	180	200	235	278	...
Philadelphia	158	192	220	258	258c	274
Boston (b)	172	200	229	255	274	284

(a) Chicago surface for year to Jan. 31, 1910; Rapid Transit for year, June 30, 1910.
(b) Boston Elevated Railway Company's system only; includes Cambridge, Somerville, Chelsea, Everett, Medford, Malden, Watertown, Brookline, Arlington and Belmont.
(c) Adjusted for strike

EFFECT ON ASSESSED VALUES, POPULATION, ETC.

Section IX discusses the effect of subway and elevated construction on real estate values in the business and residential districts based on experience with both the West Philadelphia line and the New York subway system.

Section X covers population and housing statistics, showing past increases of population in New York, Chicago, Philadelphia and Boston and estimated increases for Philadelphia. In 1910 the population density per acre of land area was as follows: New York (Manhattan and Bronx), 69; Brooklyn, 32.9; Chicago, 19; Philadelphia, 14.3, and Boston, 19. Another table shows that in 1910 Philadelphia had 295,220 dwellings, or one house per 1.1 families within the corporate city limits, as compared with 104,143 for New York (Manhattan and Bronx), or one house for 4.3 families. The population per dwelling compares with other cities as follows: New York, 26.5; Brooklyn, 11.1; Chicago, 8.9; Philadelphia, 5.2; Boston, 7.9. The report concludes that if Philadelphia is to maintain its pre-eminent advantage of having a dwelling for each family it is necessary to develop the outlying areas.

TABLE V—POPULATION PER MILE OF TRACK

	Surface			Rapid Transit		Total	
	Population	Miles of Track	Population per Mile of Track	Miles of Track	Population per Mile of Track	Miles of Track	Population per Mile of Track
New York (Manhattan and Bronx)	2,904,906	190.6	15,241	457.2	6,353	653.0	4,449
Brooklyn (including Queens)	2,038,154	121.9	16,720	698.8	2,917	815.5	2,499
Total Greater New York (a) (excluding Richmond)	4,943,060	312.5	15,818	1,156.0	4,276	1,468.5	3,365
Chicago (b)	2,185,283	143.7	15,207	666.2	3,280	809.9	2,698
Philadelphia (a)	1,623,200	14.7	110,422	564.7	2,874	579.4	2,802
Boston (a)	1,094,831	26.5	41,314	420.0	2,607	446.5	2,452
Total	9,846,374	497.4	19,796	2,806.9	3,508	3,304.3	2,980

(a) For year 1912 (estimated). (b) 1910 U. S. Census.

RAPID TRANSIT IN AMERICAN CITIES

Section XI opens with a history of rapid transit in New

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York, Brooklyn, Chicago, Boston and Philadelphia. Comparison of track mileage shows that Philadelphia with 14.7 miles of rapid transit lines has about one-half the rapid transit mileage of Boston, one-tenth that of Chicago and one-twentieth that of Greater New York. The ratio of rapid transit track to total track of the local surface, elevated and subway systems is 2.5 per cent in Philadelphia compared with 20 per cent for New York's present mileage and 35 per cent for New York's authorized mileage. In Philadelphia about 8 per cent of the passengers travel on the rapid transit lines, in Chicago 25 per cent, in Brooklyn 33 per cent, and in New York more than 50 per cent. The revenue passengers per car mile and the rides per capita for the year ended June 30, 1912, were as given in Tables II and III, while Table IV shows the increase in riding habit since 1890 for the same cities. The population per mile of track is shown in Table V and the approximate investment per mile in Table VI.

RATES OF FARE

Section XII relates to rate of fare. In Greater New York the 5-cent fare extends to the northern limit of Manhattan Borough and eastwardly through the built-up districts of Brooklyn and Queens. Beyond this the 10-cent and 15-cent limit from the City Hall extends beyond the 16-mile circle of the metropolitan area, while in New Jersey, owing to the disconnected location of the various communities, 20 and 25 cents is charged to that distance. The maximum ride to the edge of this metropolitan district varies from 0.6 cent per mile to 1¼ cents per mile. In Chicago the 5-cent fare limit from the City Hall extends to approximately 10 miles from the business center. The 15-cent limit approximately coincides with the 16-mile circle, giving a maximum ride for about 1 cent per mile.

In Philadelphia practically all of the street railways are operated within the city limits at the 5-cent rate. The second 5-cent zone, making a 10-cent fare limit from the City Hall, extends from 8 to 11 miles from the center to the west and from 12 to 14 miles on the north; the 15-cent fare limit on the north coincides with the 16-mile circle, while in New Jersey the 20-cent fare limit extends to the 16-mile circle.

In Boston the 5-cent fare limit extends about 5 to 9 miles from the center of the city, while the 15-cent limit largely coincides with the 16-mile circle.

In all four cities the central business and residential districts are within the zone of 5-cent fares. Transfers are practically universal, although in Philadelphia 3 cents is charged at some points for transfers which are locally termed "exchange" tickets.

In New York the subway and elevated lines charge an almost universal rate of 5 cents for any distance, a second 5-cent rate being charged only to some points in Brooklyn. On the Hudson tunnel system, operated to Newark in conjunction with the Pennsylvania Railroad, the fare is 17 cents for about 9 miles, or approximately 2 cents per mile, although the sixty-trip monthly commutation rate averages 1.06 cents per mile. The Hudson Tunnel system has recently increased its local fare to points north of Christopher Street from 5 cents to 7 cents.

In Chicago the 5-cent rate is charged on the elevated lines to the city limits on the north and an extra 5-cent fare beyond the city limits. To the west an interurban electric line connects with the elevated line, charging three additional 5-cent fares to the limit of the 16-mile circle.

In Philadelphia and Boston the subway and elevated lines charge a 5-cent fare in conjunction with free transfers to outlying surface lines.

CONCLUSIONS DRAWN IN REPORT

The proposed rapid transit lines for Philadelphia are all within the 7-mile radius from the City Hall and well within the 5-cent fare limits of the surface lines. Only one, the Darby line, extends beyond the present city limits. The 5-cent rate of fare, therefore, must necessarily be adopted on these lines.

From the standpoint of the public, in order to promote free intercourse between all parts of the city, it would appear to be desirable that transfers should be given at many points of intersection of surface lines with rapid transit lines and at points of intersection of the rapid transit lines themselves. There are limitations, however, which should be observed.

Care must be taken to avoid congestion of the expensive high-speed lines by short riders to and from the business district, which is already well served by surface lines, and to this end transfers with surface lines should not be given generally closer than about 3 miles from the central business district, or at points showing a time saving of less than five to ten minutes, and only at intersections where stations exist. Within this central zone the present surface lines provide facilities for taking care of this traffic almost as expeditiously as the rapid transit lines and short-ride travel should not be encouraged on the latter.

TABLE VI—APPROXIMATE INVESTMENT IN PRESENT RAPID TRANSIT SYSTEM PER MILE, DEC. 31, 1912

	Elevated		Subway		Total	
	Of Line	Of Track	Of Line	Of Track	Of Line	Of Track
New York (Manhattan and Bronx)	$2,739,700	$1,003,300	$5,510,900	$2,126,800	$3,806,200	$1,421,800
Brooklyn (including Queens)	1,034,500	437,000	5,294,100	1,730,800	1,176,500	492,200
Total Greater New York	1,836,700	723,600	5,498,300	2,099,700	2,708,700	1,059,200
Chicago	1,788,300	682,000	.....	.....	1,788,300	682,000
Philadelphia	.....	.....	.....	.....	2,328,800	1,156,500
Boston	.....	.....	.....	.....	3,283,500	1,660,400
Average investment per mile					$2,751,500	$985,100

NOTE—The above costs per mile include equipment and all appurtenances and are not comparable with cost of structure alone, referred to elsewhere. The low costs in Brooklyn and Chicago are due to the preponderance of elevated track.

EXTENSION OF BERLIN RAPID TRANSIT LINE

An article on the latest extension of the Berlin Elevated & Subway Company, which was written by G. Kemman, retired government councilor, Berlin, for the June and July proceedings of Der Verein Deutscher Eisenbahnverwaltungen (German Railroad Managements' Association), has just been reprinted in pamphlet form. The article describes the Spittelmarkt-Alexanderplatz extension and gives a comprehensive idea of the latest construction and line equipment standards of the Berlin company, especially in signal work. The details concerning the construction and reconstruction of the Spree River tunnel are also of unusual interest.

CHANGES ON DESSAU-BITTERFELD LINE

The Dessau-Bitterfeld trial section of the single-phase electrification of the Prussian State Railroads has been equipped with an improved form of line construction to permit the use of 15,000 volts instead of 10,000 volts and also to permit the span lengths to be increased from 246 ft. to 328 ft. The lengthening of the spans not only gives a decrease in the number of porcelain insulators required but also reduces the obstruction of line signal indications. It is planned at present to electrify a total of 93 miles for trains operated at a maximum speed of 68.2 m.p.h.

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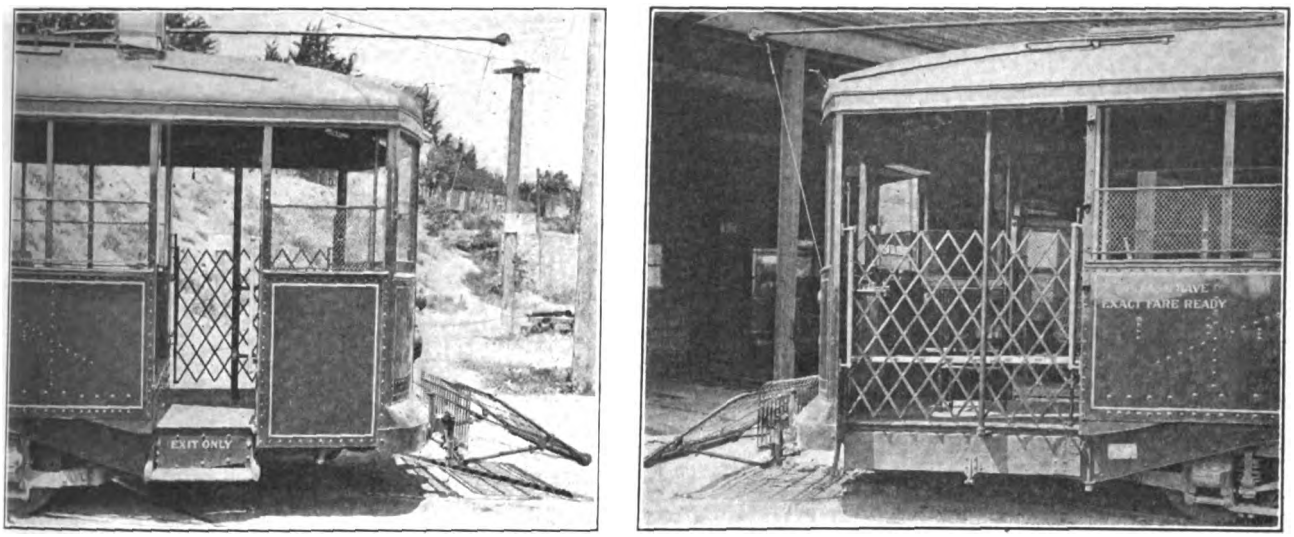
California Type Cars for San Francisco

The Sixty-five New Cars of the United Railroads of San Francisco Are Notable for the Adoption of Side-Girder Semi-Steel Construction, Arch Roof, Combination of Open and Closed Sections, Large Platforms, Prepayment Features, Etc.

The United Railroads of San Francisco have placed in service sixty-five new cars, the design of which involves several novel features worthy of mention.

The general outlines and dimensions are the same as with most of the rolling stock used by this company for the past five years, except that the company has adopted what



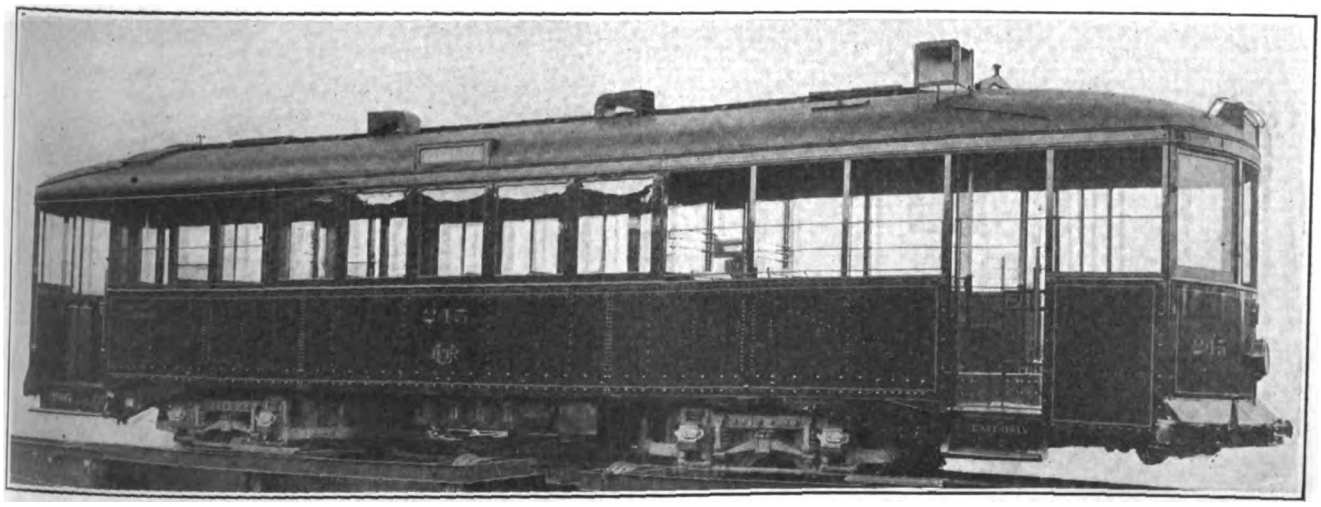
San Francisco Car—Front and Rear Platforms, Showing Entrance and Exits

is known as the "California" type, which in general involves open sections at each end with a closed section in the center. The principal dimensions are as follows: Length over bumpers, 47 ft.; length over corner posts, 32 ft. 4 in.; outside length of closed section, 15 ft. 4¾ in.; width over drip rails, 9 ft. 2 in.; height of roof above rail, 11 ft. 3 5/16 in.; truck centers, 20 ft. 10¼ in.; truck wheel-base, 4 ft. 6 in.

The material used in construction comprises side sills of long-leaf yellow pine, end sills of white oak and steel plates, crossings and diagonal bracing of white oak, side and corner posts of white ash, platform knees of steel plates and angles, arch roof of ⅜-in. poplar, sash of white ash, body bolsters of pressed steel and ball-bearing center plates. The interior of the cars is finished in white ash, the head-lining of agasote and the metal finish of polished brass. The cars are also furnished with Hedley anti-climbers.

SIDE-PLATE CONSTRUCTION

The entire side plate is designed to act as a plate girder, using the side sills as the bottom chord and the 3/32-in. side plate as the web plate, with intermediate stiffener angles at each side post. The upper chord is composed of angle iron, cut out at each side post, in addition to which there is an over truss rod of flat bar steel to take a portion of platform load. This method of side-plate construction does not in any way depend on the side post for strength, thereby allowing the use of a very light side post, which gives the car a light appearance above the window sills.



San Francisco Car—Latest Design for the United Railroads of San Francisco, Showing Division into Central Closed Section, Semi-Open Sections, Arch Roof, etc.

PLATFORM AND STEPS

The floor area of each platform, 46.25 sq. ft., is larger than that of any other car in use at the present time in San Francisco and is of great advantage in loading and

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unloading. On observation the company has found that twenty-five people can stand on the rear platform, which is a great help during rush-hour loading at congested points.

Stop-watch tests have also shown the average loading time per passenger to be 1.1 seconds and for unloading by front exit only, 0.95 second per passenger.

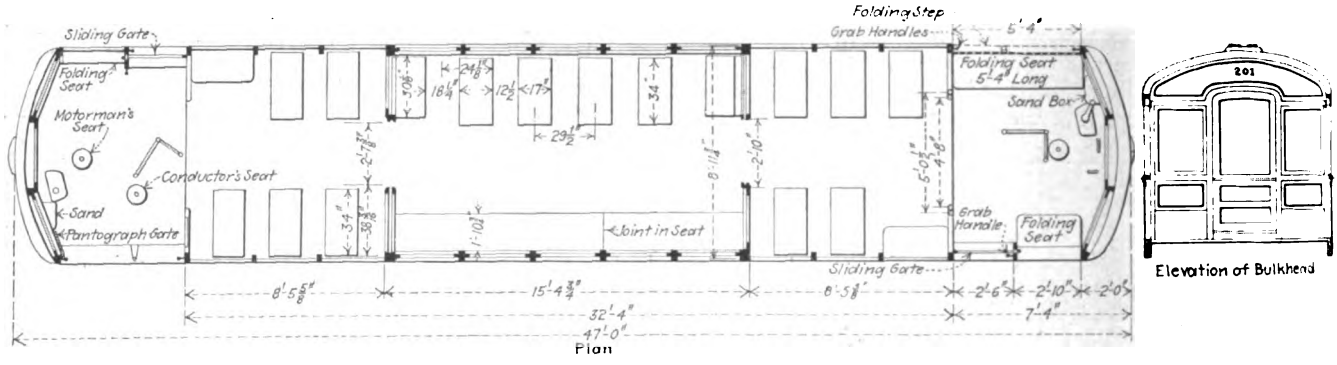
Great consideration was given to step and platform design, which is the heart of the prepayment type of car.

VENTILATION

Ventilation for the closed section is obtained through four roof funnels, two acting as intakes and two as outlets. In addition a perforated panel ventilator is carried at each end of the closed section over the window opposite the door.

SEATING ARRANGEMENT

Two different seating arrangements are used, varying only in the closed section, where cross seats are used on one side in place of longitudinal seats on both sides. In the cars that have longitudinal seats on both sides of the closed section, there is an unobstructed space under the entire length of seats, thus permitting the free use of a vacuum cleaner.



San Francisco Car—Plan and End Elevation at Bulkhead

The distance to the first step from the street is 15⅛ in., from the first step to the platform 12⅛ in. and from the platform to the car proper, with the use of a 2-in. platform ramp, 10 in. This arrangement places the floor of the car only 39¼ in. above the head of the rail, with a light car and new wheels, despite the vertical curves over which these cars operate and the use of 33-in. wheels.

The conductor's railing, which can be locked up to the ceiling, is designed to give the maximum-width entrance. It also acts as a motorman's guard rail and serves to operate the folding step on the blind side of the car, thus making it impossible for the car crew to neglect to raise or lower the step at the proper time.

FOLDING PLATFORM SEATS

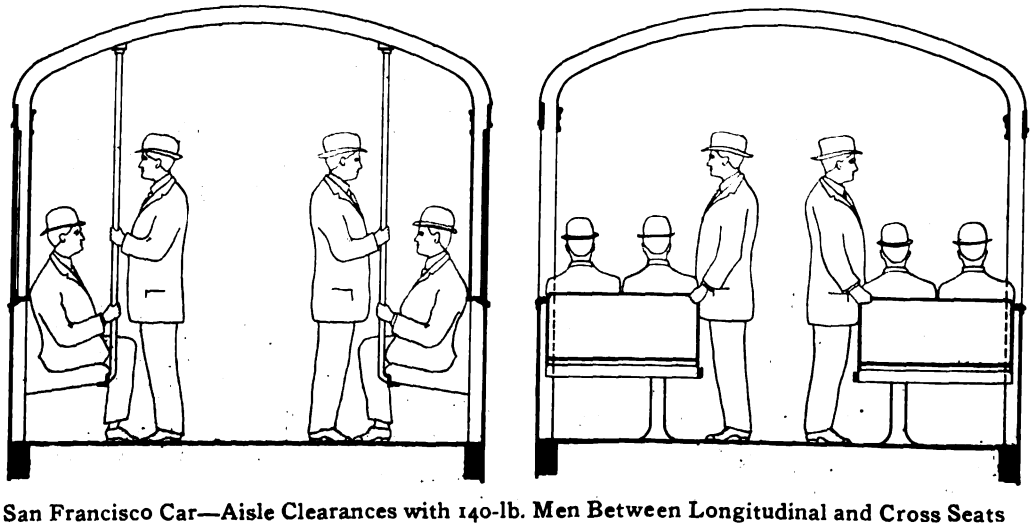
The car has four folding platform seats which are used only on the front end of the car. These seats afford an extra seating capacity for six people but interfere in no way with passengers who leave the car by way of the front exit. Wired, polished plate glass, ⅜ in. thick, is set in each side sash of the platform windows to protect users of these very popular seats in case of a slight collision.

EXIT GATES

All operating mechanism of the sliding exit gates is concealed behind the panel back for folding the platform seats, which is removable. The mechanism has been so arranged that the momentum of the car does most of the work in opening and closing.

The seats in the open sections are of special design, as they are pivoted only and not throw-over. They are of slat construction, with natural finish to match the interior finish of the car. These special seats permit a clear aisle space of 31⅛ in. between the cross seats. The accompanying line drawings of sections of a closed and open section with standing load were taken from actual photographs of a 140-lb. man.

After careful study and actual tests the company decided to use vertical hand rods in the closed section in place of hand straps. Passengers of various heights, of course, can use these rods with equal comfort. The stanchions and screens at the end sills serve two purposes: first to define clearly the dividing line between the platform and the car proper so that conductor can ask passengers to step into the car; second, the screens act as a guard to prevent passengers who are occupying seats of the open section from putting their feet against passengers who are occupying the folding platform seats. As all stanchions are enameled white, they are easily kept clean.



San Francisco Car—Aisle Clearances with 140-lb. Men Between Longitudinal and Cross Seats

The seating capacity of the cars with longitudinal seats on both sides of the closed section is fifty, including folding platform seats, and fifty-two for those cars having cross seats on one side of the closed section.

EQUIPMENT, WEIGHTS, LIGHTING, ETC.

The operating equipment per car consists of two Brill 27 GE-1 trucks, four GE-216 form E motors and two K-28-J controllers. The scale weight of a car ready for service is 48,440 lb., or 931 lb. per seated passenger. The cars receive ample illumination by means of twenty-four 16-cp carbon lamps.

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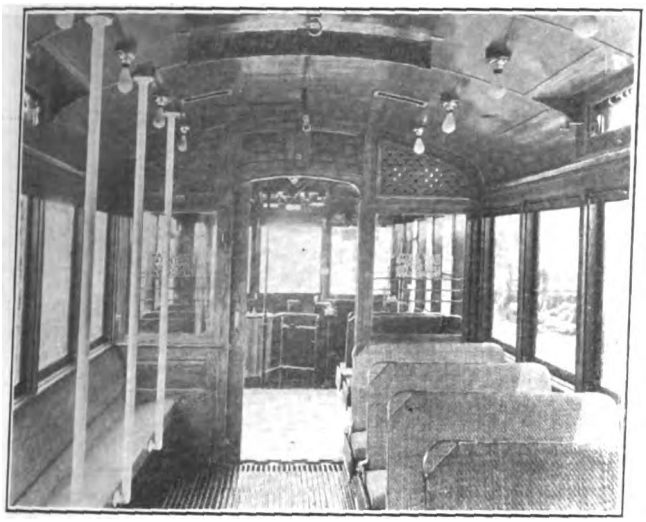
CONCLUSION

The management prepared the plans for these cars with the most painstaking care, utilizing every inch of space so well for the comfort of passengers that the new type is now the most popular car operating in San Francisco. The complete car was designed by W. B. Farlow, chief draftsman of the engineering department, under the supervision of Charles N. Black, vice-president and general manager United Railroads of San Francisco. The cars were built at the American Car Company works of The J. G. Brill Company.



San Francisco Car—Looking from Closed Section Toward Semi-Open Compartment and Platform

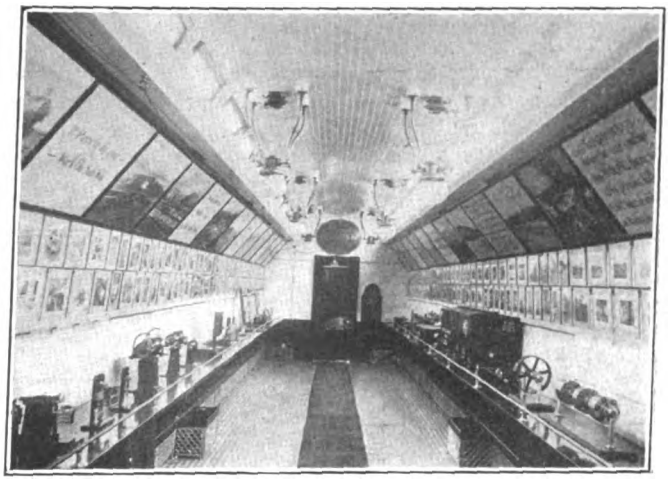
SAFETY EXHIBIT CAR ON NEW YORK CENTRAL

The New York Central Railroad Company has just completed a "safety exhibit" car, which will be put into service in connection with the work of the safety department of the company. The car is intended primarily for use as an instruction car to inculcate the doctrine of "safety first" in the minds of the 25,000 or more employees of the railroad. It was equipped under the supervision of M. A. Dow, general safety agent for the entire system, who will have charge of the various trips the car will make over all the company's lines.

A car of this kind, of course, is of greater importance to steam railroads than to electric railways, owing to the greater extent of the former, but as the electric lines are taking a great interest in safety appliances and education, a brief description of the car may be of value here. With its concrete models for teaching workmen and its easy accessibility to the public, the car affords a means for the reduction of accidents that some of the larger interurban electric lines might find it advantageous to adopt.

The interior of the car is finished in white enamel. Along each side is a shelf about 3 ft. from the floor, finished in mahogany and containing models of the principal machine tools used in the many shops of the system. The New York Central requires all such machinery to be properly guarded so as to prevent workmen becoming caught in the various parts and injured, and these models show the proper manner of applying the guards. Along the side walls of the car above the models are several rows of pictures, some showing the principal shops of the company and others demonstrating machine guards and various safety appliances. On one side of the car the picture space is devoted entirely to unsafe practices, and there are fully 100 photographs which explain graphically the common practices of railroad employees that cause accidents resulting in injuries, both to themselves and to others. Alongside of each picture showing the improper or unsafe way of doing various kinds of shop and road work is another picture showing the safe or proper way. Employees will be conducted through this car by an attendant and instructed in the matter of safeguarding not only themselves but also the public from injury.

One section of the picture gallery is devoted to the trespass question, and pictures show how people needlessly risk their lives trespassing on railroad property. Above these trespass pictures is a statement of the number of persons killed and injured on railroads in the United States during the past year. Attached to the exhibit car there will be a coach which will be used as a lecture car. This car is equipped with a stereopticon, and illustrated lectures on safety will be given to employees at various points. The safety car will be exhibited at first in the large terminals and centers of operation in the East, then in the shops, and lastly in the smaller localities.



Interior of Safety Exhibit Car of New York Central, Showing Exhibits

The New York Central lines have a department devoted entirely to safety work, and a systematic effort to bring about a reduction of all classes of accidents has been made for some time past. That the work has proved successful is indicated by statistical statements appearing in the car.

ELECTRIC RAILWAY PROPOSED FOR BAGDAD

Two English engineers have just arrived at Bagdad to survey three different lines for an electric railway from Moazzem, 5 miles north of Bagdad, to Garara, 5 or 6 miles south of Bagdad. It was reported in May, 1912, that a concession to build this line had been granted to Mahmoud Shabander, Bagdad, and that Mr. Shabander had left for Europe to contract for engineers and materials. It is now reported here that Mr. Shabander has sold his concession in whole or in part to an English firm and that actual construction will begin in the near future. The engineers are surveying two lines through the city of Bagdad and a third line just along the east border of the city. A fourth line will be surveyed along the west bank of the Tigris through west Bagdad. After the surveys have been completed the plans must be submitted to the imperial government at Constantinople for approval of the one or the other line or lines.

A number of the cars in Pittsburgh display the letters "M. U. F." on one of the advertising cards at the front end of the car. The unsophisticated stranger is apt to ask the meaning of these letters, and he is told that they stand for "Move Up Front." Because they excite curiosity, they probably make more impression than if the words were spelled out.

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Car Washing Versus Paint Preservation

An Account of a Chemical Investigation of the Subject of Car-Washing, Revealing the Detrimental Effects of Poor Soap on Paint and Varnish—Improvement in Methods Possible as a Result of the Investigation—Will Lengthen the Life of Paint and Varnish

BY MORGAN B. SMITH, CHIEF CHEMIST AND COMBUSTION ENGINEER DETROIT UNITED RAILWAY

In the latter part of November, 1912, E. J. Burdick, superintendent of power of the Detroit United Lines, made a trip to one of the suburban car-washing stations of his company for the purpose of noting the methods used in washing the large interurban cars running on that division. He was particularly interested in finding out the reasons for the failure of the paint and varnish on one of the cars after only three months' service after it was refinished.

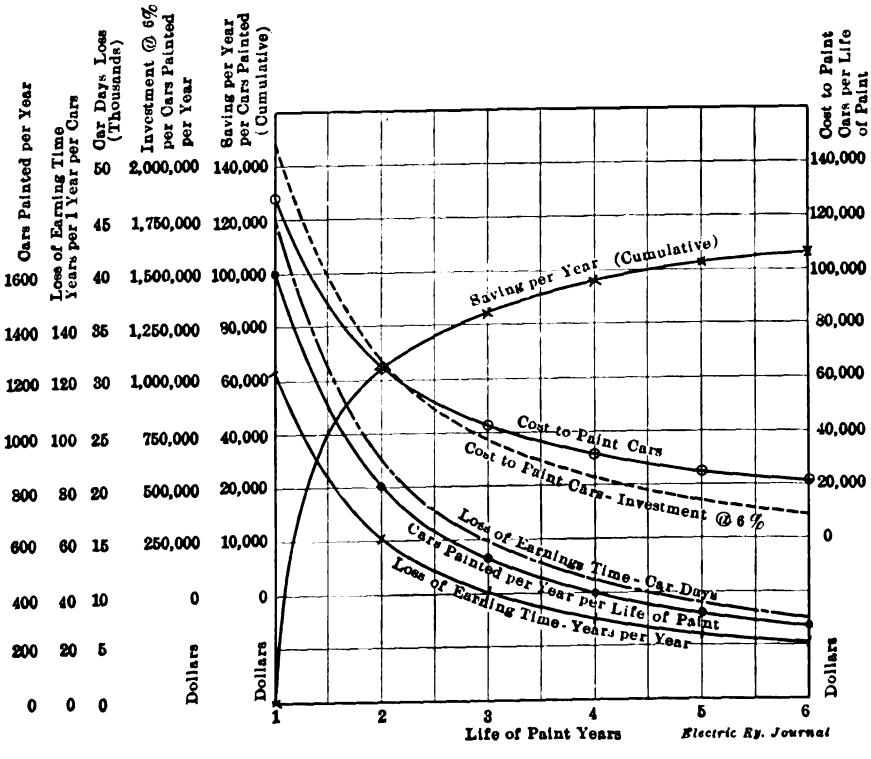

Diagram Showing Statistics of Painting Cars in Detroit

The results of this observation of methods at one car-washing station led to a very complete investigation of the methods employed at the other stations, about twenty in number. This general investigation proved beyond any doubt that the washing of cars plays a large part in the life of the paint and varnish with which the cars are finished.

In order to indicate in a general way the importance of long life of car finish some computations were made on the basis of 1600 cars in service (a low figure) at a cost of $80 each for refinishing (also a low figure). These calculations are shown in Table I.

Not only is there the direct cost of preparing the car for refinishing and the subsequent refinishing; there is also the much greater factor, namely, the loss of earning time while the cars are out of service in the paint shop.

TABLE I—POSSIBILITIES OF ECONOMIES

Life of Paint, Years	No. Cars Painted per Year	Cost to Paint Cars	Saving in Cost of Painting (Cumulative)	Cost to Paint Cars Represents an Investment of (at 6 per Cent)
1	1600	$128,000	.....	$2,133,333
2	800	64,000	$64,000	1,066,666
3	534	42,720	85,280	712,000
4	400	32,000	96,000	533,333
5	320	25,600	102,400	426,666
6	267	21,360	106,640	356,000

Assuming that it requires four weeks properly to refinish each car, we arrive at the figures given in Table II, which show the actual loss of earning time in car days per year and in years per year.

As the result of this investigation the company determined to turn the matter over to the laboratory for thorough research there under the direction of the writer of this article.

The results of the laboratory research may be summarized thus:

CRITICISM OF OLD METHODS

1. Water at too high a temperature is used.
2. Too much soap is used.
3. The period of contact of soap with the highly finished surfaces is too long, i.e., rinsing does not follow soon enough after the application of the soap.
4. The use of soda ash cannot be too highly condemned.
5. There is insufficient wetting of the car surfaces to soften hard mud and dust and to loosen sand, etc.
6. Soap is used which undoubtedly attacks the varnish and paint.

INVESTIGATION OF METHODS CRITICISED

1. Reference to builders of motor cars and other highly finished vehicles, followed by exhaustive laboratory tests, showed that the maximum safe temperature for wash water is 80 deg. Fahr.
2. The use of too much soap may be avoided (and now is) by supplying the car-washing stations with a stock soap solution of a strength equivalent to 1.5 oz. per gallon of water. With stronger soaps this weight of soap may be reduced, but it should never be used on car surfaces at a greater strength than given above.
3. Rinsing must follow the soaping immediately to avoid attack by the soap on the car surfaces.
4. Soda ash or other equivalent alkali must be kept out of reach of the car washers. It is an excellent paint remover.
5. Cars must be wet down over the entire surfaces at least twice and, better, three times, to assure the softening of the accumulated mud and sandy particles.
6. Referring to paragraph one, above, we recommend that at each car-washing station there be installed a suitable recording thermometer in each of the supply tanks so that a record of the temperature of the wash water may be had for every hour of the day. We further recommend that the charts used be marked with red ink at the desired

TABLE II—ACTUAL LOSS OF EARNING TIME

Life of Paint, Years	Cars Painted per Year	Loss of Earning Time per Year— Years per Year	Car Days per Year
1	1600	123.1	44,800
2	800	61.5	22,400
3	534	41.0	14,952
4	400	30.0	11,200
5	320	24.6	8,960
6	267	20.5	7,476

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temperature (80 deg. Fahr.) so that the men in charge may see at a glance whether the temperature is correct or not.

6. The character of the soap used has a great deal to do with the life of the varnish and paint upon which it is used.

ANALYSES OF SOAPS

In order to get some knowledge of the general run of the so-called potash oil soaps on the market, eleven soaps were purchased in the open market in the city of Detroit and analyzed. The results are shown in Table III.

These soaps were also used in so-called panel tests, which will be described below.

No soap was found which did not in time attack the varnish and paint on the test panels. As the result largely of the panel tests, recommendations were made as follows in the matter of first, second, third, fourth and fifth choice among the soaps tested for the given utility, namely, car washing. First choice, soap No. 3; second choice, soap No. 9; third choice, soap No. 4; fourth choice, soap No. 2; fifth choice, soap No. 10. It is to be noted that those soaps which had the least detrimental effect upon paint and varnish in the panel tests are those which contain medium amounts of actual soap, running from 28.18 per cent to 31.00 per cent fats (anhydrides).

Soap No. 5, above, contains a large percentage of free alkali and showed by far the worst attack on paint and varnish.

TABLE III—ANALYSES OF SOAPS, PERCENTAGES

Soap No.	1	2	3	4	5	6	7	8	9	10	11
Water	58.45	59.85	64.05	58.86	49.41	52.62	54.62	47.36	54.90	64.5	53.75
Free acid	0.17	0.51	0.40	0.43	0.17	0.23	0.51	0.28	0.56	0.43	1.07
Total alkali	5.88	5.54	4.45	5.31	5.53	6.65	6.31	6.69	5.44	5.23	6.28
Free alkali	0.06	0.08	0.07	0.05	1.84	0.08	0.06	0.11	0.94	0.10	0.085
Insoluble in water	...	0.03	0.03	0.05	0.02	0.01	0.02	0.01	0.01	0.01	trace
Fats (soap)	29.2	29.00	29.50	31.00	39.00	33.00	32.60	39.50	30.04	28.18	37.88
Undetermined (fillers), glycerine, etc.	6.24	4.99	1.51	4.31	4.04	7.81	5.89	6.05	8.13	1.53	0.935

Notice the free alkali in Nos. 5 and 9 and the free acid in No. 11.

PANEL TESTS

In the so-called panel tests sections of panels from trolley cars were subjected to the action of solutions of the soaps being tested. The panels were one-half immersed. The temperature was that of the laboratory, ranging from 20 deg. to 24 deg. C. The strength of the soap solutions in each case was equivalent to 10 grams per liter (1.33 oz. per gallon).

The panels were immersed in the soap solutions, left for a stated time, removed, rinsed with running water and brushed off with a soft long-haired brush. The condition of the paint and varnish was then noted.

The panel tests resulted as shown in Table IV, beginning with that soap which showed the least effect upon the paint and varnish:

TABLE IV—RESULTS OF PANEL TESTS

Time: 24 Hours	48 Hours	96 Hours	120 Hours	13 Days	14 Days
Soap No: 2	2	4	3	3	3
3	3	3	4	9	9
7-11	7-11	10	9	4	4
4-10	4	6	10	1	2
9	10	2	6	2	10
5	9	9	1	10	1
1	6	1	2	6	7
6	5	7-11	7-11	8	6
8	8	5	8	7-11	8

The panel tests are undoubtedly of great value in the final acceptance or rejection of soaps for car-washing purposes.

There was a very great divergence in the character of the soaps tested in the panel tests, there being a decided line of demarkation between the first five soaps and the remaining soaps.

All analyses were carried out in the manner recommended by the United States Department of Agriculture, Bureau of Chemistry, Bulletin No. 109, revised.

NEW BASIS FOR CAR WASHING

Upon completion of this very important research the matter of car washing was at once placed upon a new basis. A competent man, trained in practical handling of paints and varnishes, was placed in charge of this operation and is now held responsible for the work on the cars.

The new system has now been in operation about three and one-half months and already the bettered conditions are evident. Not only is there less attack on the paint and varnish, the cars look better and brighter. They lack a certain dulled appearance which they formerly quickly assumed in the course of washing. The varnish retains its luster very markedly compared with its appearance under the old methods of car washing.

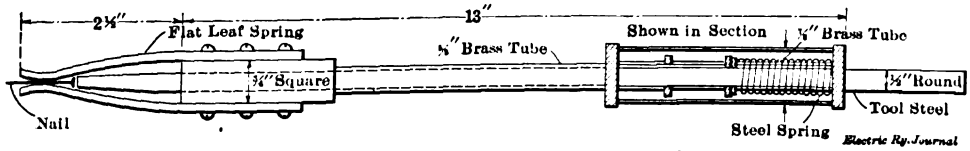
The company hopes to lengthen the life of the paint and varnish at least one year; it may be that an increase of two or three years is entirely within reach. Reference to the calculations given above shows what an important factor this is in the economies of car maintenance.

As in all work of this nature, experience will show what is most desirable and where improvements may be made in the recommendations advanced for the new car-washing methods.

The company believes it has located one of the "leaks" which have gone unnoticed heretofore in car handling, and it is giving this information to the railroad world in the hope that it may be of interest and value to those engaged in the operation and maintenance of cars in general.

TOOL FOR DRIVING NAILS IN INACCESSIBLE POSITIONS

Considerable trouble has been experienced in recabling the cars of the Topeka (Kan.) Railway Company when the point of application is at a point inaccessible for nailing. In order to eliminate this difficulty S. S. French, master mechanic, has designed and manufactured a special tool for this purpose. In principle this device consists of a pair of leaf springs to hold the nail at the end of a tool-steel plunger. A hammer blow at the opposite end of this plunger drives the nail and is returned to the normal position by a steel spring. The device is simple, inexpensive and will pay for itself on a single car in time saved. The design details of this tool are shown in the sketch presented herewith.



Hammer and Nail Holder for Fastening Cleats on the Bottom of Cars

John M. Roach, president of the Chicago (Ill.) Railways, is having a private railroad built to connect his Florida grapefruit plantation with the Allen River. The railroad will be 10 miles long and will open up a rich portion of Florida on the northern edge of the Everglades that has been to a great extent undeveloped owing to lack of adequate transportation.

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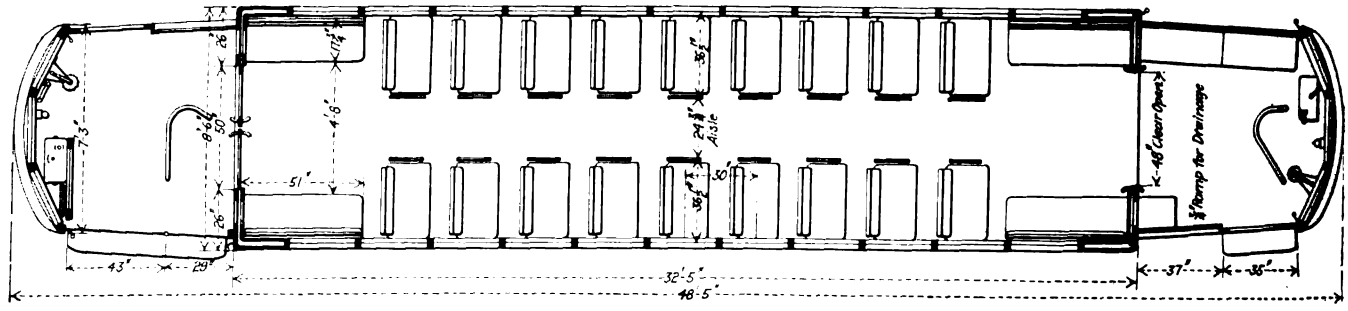
New Cars of the Chicago Railways

Like the Company's Preceding Type, These Cars Are of Arch Roof Design, but They Are Notable for the Use of Maximum Traction Trucks with Field Control Motors, Structural Changes to Secure Lower Weight and Greater Seating Capacity

Mention has been made in the ELECTRIC RAILWAY JOURNAL of the 200 cars which are to be added to the equipment of the Chicago Railways Company. One hundred of these cars will be built in the shops of the company, fifty have been ordered from the American Car Company and fifty have been ordered from the Southern Car Company. The cars will be of the same type and will involve a number of changes from the present standard car of the company, particularly in the use of maximum traction trucks, motors with field control, deep side girders, use of some wood in the floor framing, cast-steel bolsters, greater seating capacity and lower weight per seated passenger. Earlier designs of the company are described in the ELECTRIC RAILWAY JOURNAL for Nov. 7, 1908, Aug. 28, 1909, and Oct. 7, 1911. The new cars will follow the double-end design now in use on the lines of the company.



Chicago Railways Car—Combination of Transverse and Longitudinal Seating

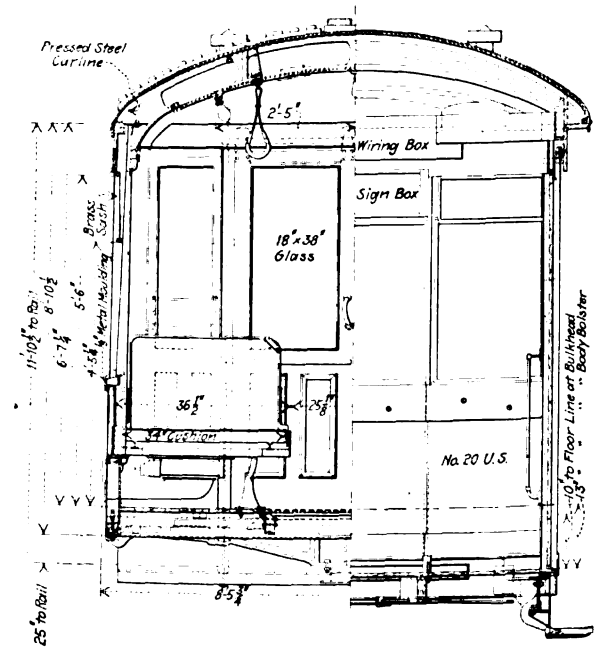
No other design was considered seriously at the present time in view of the desire of the company to have the cars for winter operation and of the disinclination to make a radical change in type without a careful study to determine the applicability of other types to the particular traffic conditions existing in Chicago. The company, however, will undoubtedly make engineering studies in the future, when it has more time to do so, in order to determine whether another type would be better suited to existing conditions than the one which has been standard in the past. The present double-end standard type of car has been found to be well adapated to the high schedule speed requirement of the Chicago properties.

The trucks of the new cars will be manufactured by The J. G. Brill Company and will be of the 39-E type.

Before a decision as to the electrical equipment was made a number of tests were completed for the purpose of determining what type of equipment would best meet the traffic needs existing in Chicago. It was decided finally to equip the cars with two motors, and the motors to be used will be the Westinghouse Electric & Manufacturing Company's type No. 534 Y-1. The new motor will have interpoles and field control and will be fully ventilated; the gearing will be three-pitch, with a gear ratio of 15:69.

During the preliminary tests to determine the acceptable type of electrical equipment it was found that the schedule in the congested district was about 5.75 m.p.h., while in the non-congested district it was about 11.1 m.p.h. In the congested district the rate of braking and of acceleration was 1.5 m.p.h. per second. In the non-congested district the rate of acceleration was found to be 2 m.p.h. per second; in braking the rate was 2.1 m.p.h. per second. The line on which these tests were made was the West Madison Street line. The congested district was determined as the district between Halsted Street and the central business district loop, comprising a total of 2.165 miles of track. The number of miles of track in the non-congested district, comprising that part of the line extending between Halsted Street and the western outlying terminal, was 8.005 miles. The total number of miles of track in the line, therefore, was 10.17 miles. The entire trip was within the limits of the city of Chicago.

It was found that the stops per mile in the congested district, including slow-downs, averaged about 15.75. In the non-congested district, including slow-downs, they averaged about 8.25. Two slow-downs were estimated to be equivalent to one stop. The average duration of the stops in the congested district was 10.5 seconds. In the non-congested district the average was 5.7 seconds. While the line on which these tests were made is not the heaviest traffic line of the company, it is one of the heaviest and in ordinary operation involves many and frequent passenger stops as well as serious vehicular interference.



Chciago Railways Car—Half End Section and Elevation

During the tests particular attention was paid to the requirements of the company in connection with tunnel operation. It was found that the car with the new type of motor equipment could be operated out of the tunnel successfully on an 11.5 per cent grade with one motor, provided a running start could be made.

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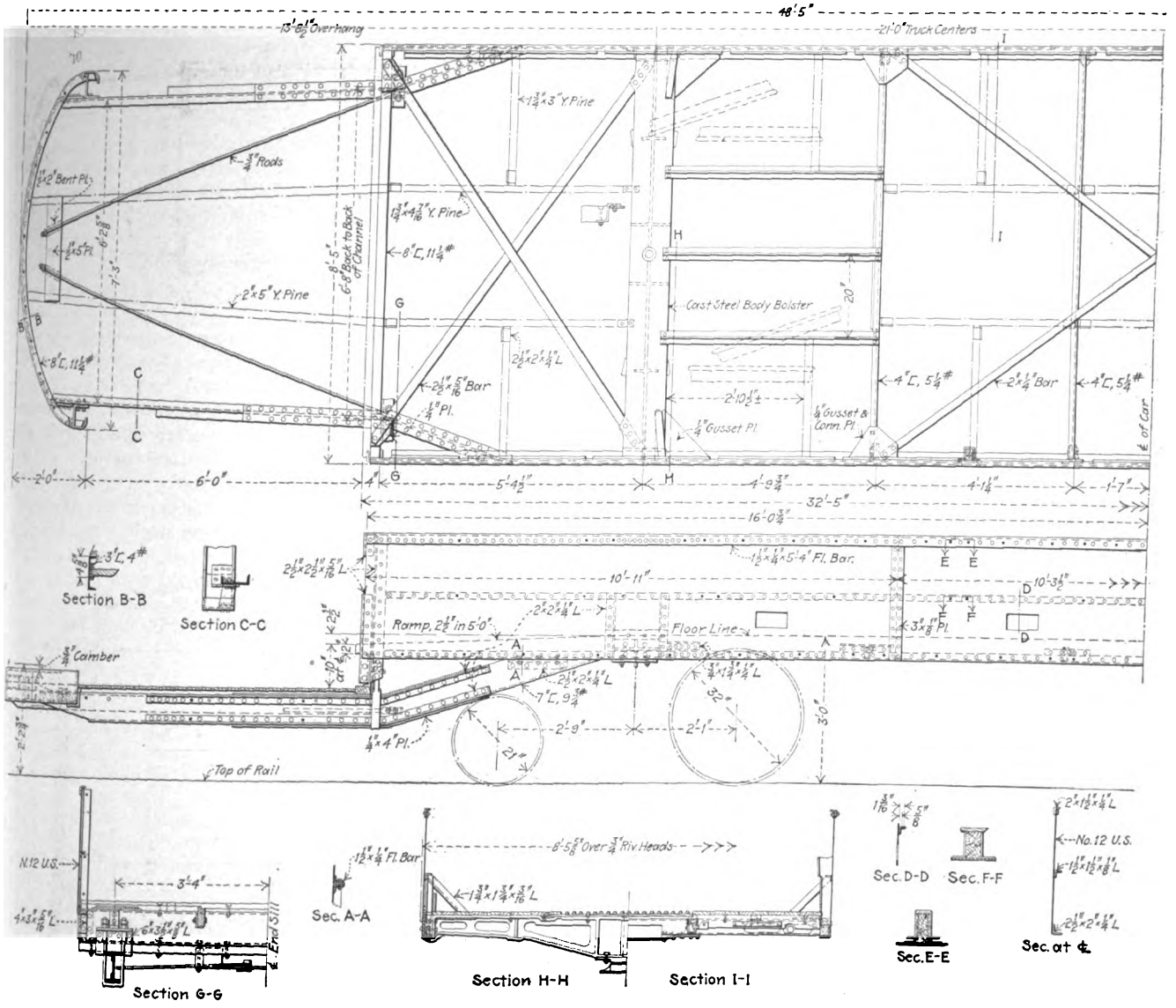
The air brakes for the new cars will be furnished by the National Brake & Electric Company. An emergency feature will be included in the provision for a conductor's valve on the platform. This is designed particularly for use in case of necessity during operation through a tunnel. The grades in the tunnels under the Chicago River through which the company operates vary from approximately 8 to 11.5 per cent.

In the design of the car body every effort was made to keep the equipment as light as possible consistently with strength. The estimated weight of the car is not to exceed 37,000 lb., and it is hoped that it will be considerably lighter than this. A great deal of attention was paid to the design of the details of all members of the car. There will be a steel underframe, the principal feature of which will consist of a deep side girder of No. 12 gage sheet steel 30 in. wide. This also forms the outside sheathing of the car. The underframe is designed with standard structural sections throughout and will be furnished by the Chicago plant of the American Bridge Company and shipped to the car builders and to the shops of the Chicago Railways Company. The weight of the underframe is approximately 4000 lb., not including cast-steel bolsters. In the design of the floor members of the underframe wood has been substituted for some of the longitudinal and transverse members in place of the usual steel, as wood was found to be lighter for these parts. The steel body bolsters are being obtained from the Gould Coupler Company and are guaranteed to meet a service center-pin load of 22,000 lb. The underframe is so designed that the maximum fiber stress which comes at the point directly over the bolsters does not exceed 12,500 lb. per square inch. This underframe is of such a design that it can be manufactured readily by structural-steel manufacturers as well as by car builders. The car body has a length of 32 ft. 5 in. over corner posts and 48 ft. 5 in. over bumpers. The truck centers are 21 ft. The width of the car at the widest part is 8 ft. 6 in.

The cars are arranged with doors in the end bulkheads, giving a wide opening in the center and permitting two passages for the entrance and exit of passengers. This arrangement differs somewhat from the one existing in the present Chicago Railways cars. It permits a larger seating capacity in the interior of the car, due to the fact that the longitudinal seats are run to the end bulkheads. This permits the use of four additional transverse seats. The number of seats in the present type of car is forty; the number in the interior of the new car will be forty-eight, or an increase of 20 per cent. In addition seats accommodating five passengers will be arranged on the forward platform, giving a total seating capacity of fifty-three passengers per car. The car will be of the arched-roof type and will be provided with the Cooke vacuum ventilating system. The intakes for the air are placed in the side of the girders instead of in the floor, thus avoiding the dust which has been experienced with floor intakes. The side girders will be provided with louvers through which air will be taken to the heaters by means of ducts.



Chicago Railways Car—Half-Plan, Half-Side Elevation and Miscellaneous Structural Details

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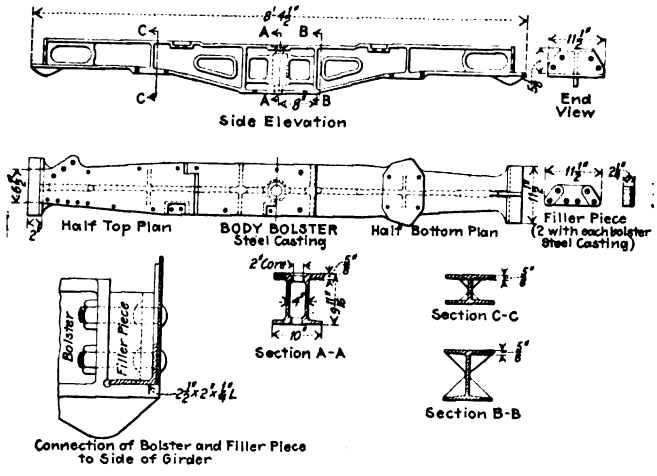
The steps are particularly low. The first is 12½ in. above the rail; the second step leading to the platform is 11½ in., and from the platform to the interior of the car the step is 10 in. Beginning at the threshold plate there will be a ramp of 2½ in. in 5 ft. This gives a total height from the rail to the top of the floor in the center of the car of 36 in. This is accomplished by the use of 32-in. diameter driving wheels.



Chicago Railways Car—Details of Steel Body Bolster

The new car has been designed by the equipment department of the Chicago Railways Company under the jurisdiction of H. H. Adams.

MR. WESTINGHOUSE DISCUSSES BRAKES AND COLLISIONS

During the current week George Westinghouse contributed to the *New York Times* an interesting letter on "Brakes and Collisions." Using the recent New Haven accident and the subsequent exoneration of Engineer Dougherty as a text, Mr. Westinghouse preaches to the public a well-needed homily on the relation between high speeds and collisions. Not only does the public demand the highest possible speeds, but it severely criticises the company which fails to keep all of its trains to schedule. The pressure thus exerted upon the railway officials, and in turn upon the man at the throttle, leads to conditions where the speed made over certain sections far exceeds the safe limit when it is felt that lost time must be regained at any cost. It follows that some accidents are due not to defects in equipment but to the natural failure of that equipment to meet conditions for which it was not originally designed.

As an illustration Mr. Westinghouse states that a train which is equipped with a certain air brake will make an emergency stop within 1100 ft. when the initial speed is 60 m.p.h., but when the initial speed of the same train is 80 m.p.h. it will still be traveling at the rate of 60 m.p.h. at the end of 1100 ft. With regard to the public demand for steel cars on the score of safety he says: "If a train could be so solidly constructed that there would be no telescoping, then the impact of collision at high speed would be of such force that the occupants of the colliding trains would be injured . . . whereas if a portion of the train yields or is crushed, the effect is to lessen the blow upon the remaining cars of the two trains involved."

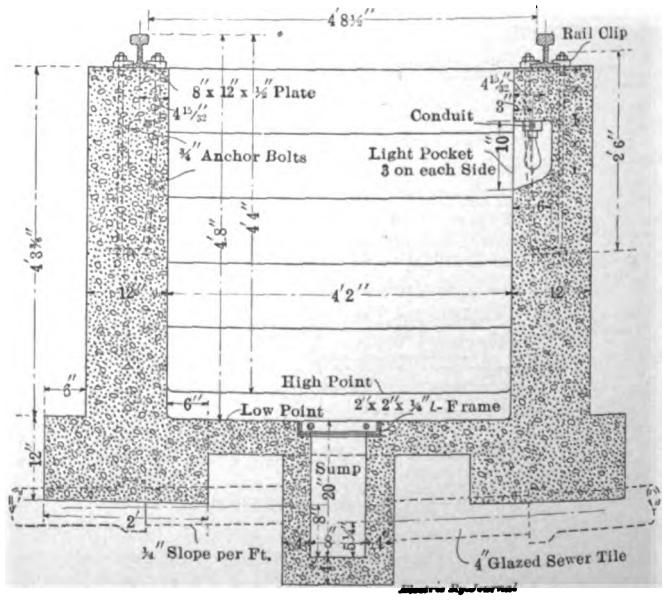
Mr. Westinghouse concludes that the first and greatest step to be made toward the attainment of safety is to limit the maxium allowable speed of trains. To this end locomotives should be fitted with a speed indicator and graphic recorder for observation by the engineer and for checking by his superiors. Such a device could be combined with an automatic apparatus which would apply the brakes when the permissible maximum speed was exceeded. Finally, Mr. Westinghouse urges an investigation of the entire safety problem by the Interstate Commerce Commission, but justly insists that the public ought to be willing to reimburse the railroads for the introduction of improved devices and methods.

A LIGHT AND DRY PIT

A growing appreciation of the fact that the best work is done in comfortable and cheerful surroundings is shown by the attention now being given to the layout of shops and carhouses. Formerly the repair pit was a gloomy and unwholesome place in which to work and there was little incentive to do good work in it. In the carhouses recently built the repair pit is designed for comfort and convenience. This is illustrated in the pits recently completed for the Portland Avenue carhouse of the New York State Railways in Rochester. A cross-section of one of these pits is shown in the accompanying figure.

In the design of these pits special attention was given to lighting and drainage. Each pit is 103 ft. long, 4 ft. 2 in. wide and 4 ft. 8 in. deep from the top of the rail to the lowest part of the floor. A pitch of 4 in. in the length of the pit is allowed to drain water to a sump located 12 ft. from one end. The walls are of concrete 12 in. thick and rest on a footing 12 in. x 24 in. The floor is 5 in. thick. At one end is a flight of 9-in. x 9-in. concrete steps. The sumps of adjacent pits are connected with 4-in. glazed sewer tile laid with ¼-in. slope to the foot.

To support and hold the rails, 8-in. x 12-in. steel plates ½ in. thick are embedded in the concrete and the rails are clamped on these by means of ¾-in. anchor bolts 2½ ft. long and standard rail clips, two bolts to a plate. The sump is covered with a grating resting in a rectangular frame made of 2-in. x 2-in. x ¼-in. angle iron, 12 in. x 12 in. outside. The grating consists of nine bars, 11¼ in. x 1½ in. x ¼ in., set on edge, mounted on 2½-in. x 11-in. machine bolts and spaced uniformly apart with 1-in.



Cross-Section of Pit in Portland Avenue Carhouse, Rochester, N. Y.

separators of ½-in. pipe. There are three incandescent lamps on each side of the pit mounted in pockets 6 in. x 10 in. x 6 in. in size and placed 8 in. below the top of the wall. The sockets for the lamps are located in steel outlet boxes and the wiring is carried in iron conduit molded into the walls.

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News of Electric Railways

Developments in the Detroit Situation

On Aug. 5 the Detroit United Railway proposed a settlement of the differences between itself and the city of Detroit by offering to operate at a fare of seven tickets for 25 cents, with universal transfers. This offer was in answer to Mayor Marx's recommendation to the Council that the fare be reduced to 3 cents on all lines on which franchises have expired and that some of the company's property be seized in security for taxes claimed to be due for several years back. The company has agreed, as a part of its proposition, to pay these taxes. The terms to which the company offered to agree follow:

"First—On or before Aug. 15 we will put in effect rates of fare as follows:

"(1) Seven tickets for 25 cents, good on all lines in the city of Detroit and within the one-fare zone, so-called, during twenty-four hours of the day.

"(2) Upon the payment of a seven-for-a-quarter ticket or a 5-cent fare, a transfer shall be issued to any connecting or intersecting line according to the existing custom.

"(3) The existing provisions for workmen's tickets, eight tickets for 25 cents, to remain unchanged.

"(4) The rates of fare now in effect on the Detroit Railway lines to remain unchanged, except that payment of a seven-for-a-quarter ticket shall be received for a fare, including a transfer on any other line.

"(5) A single cash fare shall be 5 cents.

"Second—Detroit United Railway shall do all paving on all lines except where existing franchises otherwise provide.

"Third—Detroit United Railway will construct the proposed crosstown line on or near Junction Avenue, in connection with existing tracks; also connect the Mack Avenue and Myrtle Street line as heretofore proposed, and will extend the Kercheval Avenue line easterly to St. Jean Avenue, thence southerly to Jefferson avenue, and also make the necessary extensions to the new Michigan Central terminal station—all to be done on streets and locations to be approved by the Common Council. This work shall be started in 1913 and completed as soon as practicable, and all such lines and extensions shall be constructed and operated under the same terms, in substance, as those on which the Hamilton Boulevard extension, so-called, was constructed and is being operated.

"Fourth—The Detroit United Railway will pay to the treasurer of the city of Detroit, on or before Aug. 15, 1913, $75,000 for the privileges exercised by it on the Fort Street lines since July 24, 1910.

"Fifth—While we have understood that payment of the $300 per day under the resolution of the Common Council exempted the railway from the payment of the city taxes involved herein, nevertheless, for the purpose of reaching an adjustment of differences, the Detroit United Railway will pay to the treasurer of the city of Detroit the back city taxes assessed against it in the years 1910, 1911, 1912, as per the city treasurer's books, including interest and penalties as fixed by law, up to Aug. 15, 1913—such payment to be made in ninety days, or sooner, from Aug. 15, 1913, with interest at 6 per cent per annum from Aug. 15, 1913, to the date of payment. This does not in any wise affect the liability of the Detroit United Railway for the taxes assessed against it for the year 1913.

"Sixth—In consideration of the foregoing, the Detroit United Railway expects and understands that it shall be relieved of the payment of $300 per day fixed by the resolution of the Common Council adopted on Oct. 26, 1909, approved Nov. 2, 1909.

"Seventh—It is further understood that no existing rights of either the city of Detroit or the Detroit United Railway shall be impaired or affected in any wise by this temporary arrangement, except as herein explicitly stated, and that it is a day-to-day arrangement only."

This communication was read before the Common Council at its meeting on the evening of Aug. 5 and was referred to the committee on franchises. A meeting of the Council was called for Aug. 7 to consider the proposition. Street Railway Commissioner James Couzens opened the negotiations with the company which resulted in this offer. Mayor Marx said in part in his message to the Council regarding the offer:

"I am pleased to be able to announce to your honorable body the receipt late this afternoon of a communication from J. C. Hutchins, president of the Detroit United Railway, in which the company agrees to make valuable concessions to the city without the granting of a term franchise of any kind whatsoever. These concessions, I estimate, will be worth more than $1,000,000 a year to car riders of Detroit.

"In addition, Mr. Couzens informed me, and also President Hutchins of the railway company, that he and Messrs. Dodge and Ford, of the Ford Motor Car Company, stood ready to place at the disposal of the car riders of Detroit 1000 Ford cars should the company discontinue all or any part of its service Thursday morning. It was this splendid act on the part of Mr. Couzens and his colleagues in the Ford company that did more than anything else to force the company to our terms.

"I believe that, pending municipal ownership, these terms will be welcomed by the people of Detroit and I recommend that the 3-cent resolution which I advised your honorable body to pass be deferred. Also that the $300 a day rental resolution, passed in 1909, be rescinded."

Mayor Oscar B. Marx sent to the franchise committee of the City Council of Detroit on Aug. 1 a letter repudiating all proposals of the Detroit United Railway and advocating the passage of a resolution establishing 3-cent fares and universal transfers on all the lines on which franchises have expired. Three of the seven members of the committee were absent at the time and action on the resolution was therefore postponed.

In his letter Mayor Marx said:

"The Detroit United Railway has put into writing its final proposition, involving the only concession which it is willing to make as now stated, in lieu of the concessions previously offered, which reads as follows:

"In addition to the propositions contained in the recent communication to the Common Council of the city of Detroit, the company makes these additional propositions:

"'As soon as it is legally authorized to do so by the city of Detroit, it will operate all the street railways within the city (whether constructed under the ordinance of Dec. 4, 1894, commonly called the Detroit Railway ordinance, or under other ordinances, and whether the franchise thereof has or has not expired) under the terms, provisions and obligations of said ordinances of Dec. 4, 1894, and it will agree at any time during the life of said ordinance, which expires Dec. 4, 1924, to sell and transfer to the city of Detroit all its railway property in said city, on fair and reasonable terms to be agreed upon, or failing agreement, to be determined in any fair and reasonable way, and will further agree that in the event of said sale, the valuation for all franchise rights shall be taken as if this agreement had not been made.'"

This offer the Mayor characterized as ridiculous and impossible. He said further in his letter:

"I therefore have the honor to place before your honorable committee and to recommend for passage the resolution declaring 3 cents to be the legal fare upon all lines where the franchises have expired. I would be very glad to be able to recommend that this include all the lines in this city, but we have power to legislate only on the lines where franchises have expired. As far as the purchase of lines is concerned, that properly comes within the jurisdiction of the board of street railway commissioners."

The resolution presented to the committee by Mayor Marx declares that the fares upon all of the streets where franchises have expired are excessive and unreasonable.

On Aug. 4 Mayor Marx announced that he would urge Council to take action toward seizing cars for alleged back taxes amounting to $439,734 and unpaid rental on the Fort Street line. The committee on franchises had already acted favorably upon the Mayor's resolution declaring a 3-cent fare and the Police Commissioner had prepared to enforce the order. At a meeting of the committee Attorney Joslyn

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read a statement from the company in which it was asserted that the property could not be operated on the plan outlined. Apparently the company had decided to cease operations on the lines and parts of lines where franchises are held to have expired. The company's statement follows in part:

"The company cannot and will not attempt to operate upon the terms of said resolution, but it desires to continue the operation of its cars as heretofore, or under the terms and conditions hereinafter indicated. But as protection in such operation cannot be expected from the police department or other city authorities, it will not attempt to continue operations against physical violence or interruption; and as there is no other alternative, it will, if said resolution becomes effective, discontinue operations upon the streets and parts of streets named in said resolutions whenever such violence or interruption occurs. In other words, we will only stop service when compelled to do so by violence.

"While this company believes that the proposed proceedings on the part of the city government are illegal and in violation of the contractual rights of this company, it none the less realizes that it is its duty to do what it can to prevent injury and loss to itself and to the industries of the people of the city.

"Mayor Marx, in commenting on our proposition, communicated by him to your honorable body on Friday, said that it included 'no extensions.' The company desires to correct this misconception. The Mayor should have understood that the company's former offer to build extensions continues in full force, and that if all its railways are put under the Detroit railway franchise, as stated in Friday's proposition, all extensions will be built and operated under that ordinance."

To make this so clear that it could not again be misunderstood the company restated its proposition.

On July 31 James Couzens, J. F. Dodge and W. D. Mahon took the oath of office as members of the street railway commission and organized with J. F. Dodge as president. Edward T. Fitzgerald was selected as temporary secretary. It was decided to ask the City Council to appropriate $2,500 to pay the salary of a permanent secretary. The acting secretary was instructed to communicate with the officers of the Detroit United Railway and ascertain whether they are willing to negotiate with the city for the sale of all the lines pending the decision of the Supreme Court on the validity of the Verdier home rule law.

Award of Buffalo Arbitrators

Edward D. Jackson, who represented the employees of the International Railway, Buffalo, N. Y., on the board of arbitration chosen to settle the question of wages, hours and length of the agreement to be entered into between the employees and the company, withdrew from the board on the afternoon of Aug. 1 and Mayor Louis P. Fuhrmann, the third member of the board, said that arbitration had failed. Bert L. Jones, vice-president and general manager of the Great Gorge Route, who represented the company on the board, was opposed to granting the men any increase. Mayor Fuhrmann's proposition was 23 cents an hour minimum to 29 cents an hour maximum with a five-year sliding scale.

Through the efforts of Mayor Fuhrmann another conference of the board was held on the night of Aug. 1 and at midnight an agreement was reached. Under the terms of the agreement the motormen and conductors on the city lines and the Lockport branch will receive 1 cent an hour increase with a five-year sliding scale with 23 cents as the minimum and 29 cents as the maximum. This agreement relative to wages will run for three years, when the men will receive another increase to run for the remaining two years of the agreement. During the last two years the men will receive an increase of 2 cents an hour over the present scale, which is 22 cents minimum and 28 cents maximum. The agreement was not signed by Mr. Jackson, representing the men. He presented a minority report. The text of the award made to the men by Mayor Fuhrmann and Mr. Jones is as follows:

"The wages for all motormen and conductors in passenger service, both city and interurban lines, shall be as follows: From May 1, 1913, to May 1, 1916: First year, 23 cents per hour; second year, 24 cents per hour; third year, 25 cents per hour; fourth year, 26 cents per hour; fifth year, 27 cents per hour; over five years, 28 cents per hour; over nine consecutive years' service shall be 29 cents an hour.

"From May 1, 1916, to May 1, 1918, the wages shall be as follows: First year, 23 cents per hour; second year, 24 cents per hour; third year, 25 cents per hour; fourth year, 27 cents per hour; fifth year, 28 cents per hour; over five years, 29 cents per hour; over nine years' consecutive service, 30 cents an hour.

"Regular men shall perform extra work when necessary to take care of traffic exigencies and to provide adequate service to the public when extra men for any reason are not available.

"All regular men assigned for extra work over and above their regular day's work shall be paid at the regular rates for all overtime worked beyond their regular day's work.

"No increase of wages shall be granted train dispatchers, telegraph operators, agents, baggagemen and ticket clerks. They are receiving fair compensation for the services rendered, and we believe are as well paid as men occupying similar positions on lines similarly operated.

"Men having no Sunday runs and who are required to show up for work shall be paid from the time they are ordered to report until they are relieved, at their regular rates, with a minimum allowance of five hours' time.

"All men taken from their own runs to do other work, where the hours for service are less than their regular work, shall receive pay for the number of hours their regular work calls for, and they shall be paid at the regular rates per hour for all overtime.

"No increase in wages shall be granted to men having charge of boilers or fire engines at carhouses and shops or to men working in the building department. We therefore determine that the matter of increase of wages for men having charge of boilers or fire engines at carhouses and shops or to men working in the building department shall be a matter of adjustment by the company in individual cases.

"Shopmen shall be allowed time and one-half for over time and for work on Sundays and holidays.

"Men who are promoted to positions in shops and barns shall receive such compensation as their qualifications, efficiency and length of service may warrant, all of which shall be determined by the company.

"The demand for a horizontal advance in wages of 25 per cent is denied, because it is unreasonable and the method illogical and unjust, as there are doubtless many men employed in the shops who are receiving as much as they should be paid for their services rendered, while there may be some who are not receiving as much as they should receive. We, therefore, determine that the matter of increase of wages of shopmen shall be a matter of adjustment by the company in individual cases.

"No increase of wages shall be granted to switch tenders, curve greasers and electric-shovel men. We therefore determine that the matter of an increase of wages of the above men be a matter of adjustment by the company in individual cases.

"Extra men shall receive a minimum wage of $1.25 for each day on which they respond to all such calls as may be designated by station foremen.

"This agreement and the provisions hereunto shall continue in force and be binding on both parties mentioned in this agreement until May 1, 1918, and shall continue thereafter from year to year. Either party desiring a change in any section or sections shall notify the other in writing thirty days before the expiration of this agreement, and thereafter if any change in any section or sections shall be desired by either party, notice shall be given thirty days prior to the first day of May of the following year."

The questions at issue between the company and its employees, other than those of wages and the length of the term of the contract, were all settled in conference. On Aug. 5 the members of the executive committee representing the men were granted a hearing by Edward G. Connette, presidnt of the company. Following this meeting Mr. Connette issued a statement in which he said that both parties had agreed to abide by the decision.

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United Railways, St. Louis, Operating with Keokuk Power

On July 29 the United Railways Company, St. Louis, Mo., transferred about one-half of its entire load from its own steam stations to the hydroelectric plant of the Mississippi River Power Company at Keokuk, Ia. The Union Electric Company, also of St. Louis, has a contract with the United Railways whereby it supplies a maximum of 25,000 kw, which is being supplied to it in turn by the Mississippi River Power Company. The final transfer of the railway load from the two steam generating stations, namely, the Central and North Broadway, totals at this time between 20,000 kw and 21,000 kw during the morning and evening peaks.

For the present, at least, both the Central and North Broadway power stations will be held in reserve with seventeen boilers banked in the former and fifteen in the latter and the Central power station will supply 5000 kw during the evening peak and the Broadway station will supply 4000 kw. As soon as the reliability of the hydroelectric service is established, the company will bank only a sufficient number of boilers in the two steam stations to supply 8000 kw during the morning and evening peaks, 5000 kw at one station and 3000 kw at the other. The contract for power with the Union Electric Company, St. Louis, is about to expire, and this 25,000-kw additional load will be transferred to the Mississippi River Power Company in the near future, which will make the total maximum contracted load carried to the United Railways 47,400 kw.

Two new GE 2000-kw, 300-r.p.m. interpole rotary converters with brush-raising devices for starting have been installed temporarily in the Central power house. It is anticipated that this substation equipment will ultimately be transferred to an existing station when increased capacity is desired. At this substation new transformer equipment was purchased, but at the other stations it was necessary to tear down the old transformers and rewind them from a step-down from 6600 volts to 430 volts to a transformation from 13,200 to 430 volts a.c.

It is anticipated that the transfer in the power load from the United Railway's generating stations to the Mississippi River Power Company will result in a saving of approximately three-fourths of the coal bill and 33 per cent of the labor.

Appointments to Pennsylvania's Public Service Commission

The members of Pennsylvania's Public Service Commission, which is to supersede the State Railroad Commission, have been appointed by Governor Tener. The commission is made up of the following: Nathaniel Ewing, Fayette County, chairman, ten-year term; S. L. Tone, Allegheny County, nine-year term; Samuel W. Pennypacker, former Governor, eight-year term; Emory R. Johnson, Philadelphia, professor of transportation and commerce expert, University of Pennsylvania, seven-year term; Milton J. Brecht, Lancaster County, six-year term; Charles Frederick Wright, Susquehanna, five-year term; Frank M. Wallace, Erie, four-year term. There are three members of the new commission that served upon the State Railroad Commission, Messrs. Ewing, Pennypacker and Brecht.

Prof. Emory Richard Johnson has been professor of transportation and commerce in the University of Pennsylvania since 1896. He is an authority on valuation of railroad property and was a member of the Isthmian Canal Commission. He was born in Waupun, Wis., on March 22, 1864. In 1888 Professor Johnson received the degree of bachelor of laws in the University of Wisconsin, and in 1893 the University of Pennsylvania conferred upon him the degree of Ph.D. He was instructor of economics in Haverford College from 1893 to 1896. In the latter year he was chosen professor of transportation and commerce in the University of Pennsylvania. He was a member of the United States Industrial Commission in 1899, and from that year to 1904 he served as a member of the Isthmian Canal Commission. In the year following Professor Johnson was the expert on valuation of railroad property for the United States Census Bureau. In 1909 he was engaged as a traffic expert for the National Waterways Commission. He was appointed by President Taft in 1911 to report on Panama Canal traffic, tolls and measurement of vessels. Since 1901 Professor Johnson has been the editor of Annals of the American Academy of Political and Social Science. He is a member of the board of collaborators preparing an economic history of the United States for the Carnegie Institute. He is the president of the Geographic Society of Philadelphia and a member of the American Economic Association, the National Geographic Society, the Association of American Geographers and the Historical Society.

S. L. Tone is second vice-president of the Pittsburgh Railways. He is a graduate of Rensselaer Polytechnic Institute of Troy, N. Y., and has served twenty years with the Pittsburgh Railways.

Charles Frederick Wright is a native of Susquehanna County and was educated in the Montrose Academy. He served as cashier in the First National Bank of Susquehanna, and is now vice-president of that institution. He is also interested in manufacturing and water power enterprises. He was elected to Congress in 1898, 1900 and 1902. He was appointed Treasurer of Pennsylvania by Governor Stuart April 11, 1910.

Mr. Wallace is president of the Second National Bank of Erie, has charge of the Strong estate and other large interests and is treasurer of the Pittsburgh Coal Company.

At the organization of the commission John P. Dohonoy was promoted from marshal of the old commission to investigator of accidents, a new position paying $5,000 a year. George A. Wood, Philadelphia, has been transferred from the State Department to marshal of the commission at $2,000 a year. William M. Trinkle, of the Attorney General's Department, was made chief counsel at $6,500 a year, resigning his position as assistant deputy attorney general. Archibald B. Miller, secretary of the old commission, was elected temporary secretary of the new commission. The commission has laid preliminary plans for active work and Investigator Dohonoy will look into the recent Pennsylvania Railroad wreck at Tyrone.

The provisions of the Pennsylvania Public Service Company law were summarized in the ELECTRIC RAILWAY JOURNAL of Aug. 2, 1913, page 194.

San Francisco Chamber of Commerce Protests Against Municipal Railway Extension

The proposal of the city of San Francisco, Cal., to issue $3,500,000 in bonds for the extension of the municipal railway in that city has met with unqualified disapproval by the Chamber of Commerce. On July 21 that body issued a statement giving its reasons, which may briefly be summarized as follows: The exposition can be adequately served in other ways not involving a large drain on municipal resources. The extension of the existing system of street car lines into the outlying districts would be indefinitely blocked by the proposed municipal ownership plan. The city cannot afford to borrow the money, for "cities as well as individuals must pay the penalty of extravagance."

The body says that it has considered the subject from three points of view as follows: (1) as it will affect a solution of the street railroad facilities for the visitors to the exposition in 1915; (2) as it will affect a solution of the street railroad transportation problems of the whole city as they relate to the city's proper growth and development, and (3) as it affects the borrowing capacity of the city in relation to its imperative necessities.

So far as the transportation to the exposition is concerned the Chamber of Commerce says in its report that this transportation "can readily be obtained without cost to the city by securing extensions to existing lines at four or five points, comprising approximately only fifteen blocks of new track and by an automobile bus service operated along Van Ness Avenue from important sections of the city." The report says, however, that the question of transportation to the exposition, although important, is merely a temporary condition, that the general transportation problem is of much more importance and that this problem can be solved only by encouraging the extension of the existing railways. Reasonable conditions should be written in any new franchise for privately owned roads as the result of the charter amendment, and private capital should be induced to construct and operate extensions into the new sections. Finally the report says that the bonded indebtedness of the

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city is such that it would be most unwise to attempt to place all of the available funds of the city in municipal railways when money is required for a new water supply and other necessary city improvements.

Vote on Electrification Proposal.—The vote on the proposal to electrify the London & Port Stanley Railway, London, Ont., will be taken on Aug. 11.

Underground Railway Proposed in Montreal.—A project for the construction of an underground railway in Montreal, Que., has been submitted to the City Council by F. S. Williamson, who is a member of the Canadian Society of Civil Engineers. The plans show that the construction of 12.5 miles of double-track lines is proposed at an estimated cost of $20,000,000.

The Proposed Maine Referendum.—Governor W. T. Haines of Maine has issued a proclamation stating that the general election to decide on the recall of the public utilities act of Maine will not be held until September, 1914, which means that the present railway commission of Maine will continue until that time. In the proclamation Governor Haines emphasized what he considers the good points of the law and urged the people of the State to consider the question carefully before voting on the act.

Transportation Committee for New England.—The following gentlemen have been asked by M. C. Brush, second vice-president of the Boston Elevated Railway, to serve on the committee on transportation of the American Electric Railway Association for New England: Massachusetts, E. S. Wilde, New Bedford; Robert E. Hamilton, Boston. Maine, Harry B. Ivers, Portland. New Hampshire, J. Brodie Smith, Manchester. Rhode Island, A. E. Potter, Providence. Connecticut, W. S. Murray, New Haven. Vermont, F. C. Wilkinson, St. Albans.

Subway Construction Contract Let.—The Public Service Commission for the First District of New York has executed a contract with the E. E. Smith Contracting Company, the lowest bidder, for the construction of that section of the Broadway-Manhattan subway lying between Union Square and Twenty-sixth Street. The total amount of the Smith company's bid was $2,056,702. The plans call for a four-track underground railroad with one-half of the express station at Union Square and a local station at Twenty-third Street and Madison Square.

Canadian Pacific Electrification Story Denied.—G. M. Bosworth, vice-president of the Canadian Pacific Railway, has issued a statement denying that the company contemplates running an electric railway from Hamilton to Niagara Falls, Ont. It had been previously stated that the company would shortly commence the construction of such an electric railway. The Canadian Pacific Railway now operates between Hamilton and Buffalo over the Toronto, Hamilton & Buffalo Railway and the Michigan Central Railway and between Toronto and Hamilton over the Grand Trunk Railway.

Elevated and Subway Bill in St. Louis.—A bill has been introduced in the House of Delegates to grant the St. Louis Rapid Transit Company a franchise for the construction of a combined subway and elevated rapid transit system, stretching westward through the heart of St. Louis from Second and Mullanphy Streets to Clayton Avenue and the city limits. The plan is being promoted by James D. Houseman, who has estimated the total cost at $17,000,000. Mr. Houseman is reported to be connected with the St. Louis & Western Traction Company and the St. Louis County Belt Road, both projected, with offices in the Roe Building, St. Louis.

Negotiations in Regard to Phones in New Subways in New York.—Negotiations are under way looking toward the operation of public telephones in all of the subway stations in the new dual rapid transit system in New York, but inasmuch as the rapid transit act prohibits the use of such places for other purposes than those immediately connected with transportation it is necessary that the Legislature so amend the provisions of the rapid transit act as to permit telephone operation. Commissioners McCall and Maltbie, of the Public Service Commission for the First District, conferred recently with Governor Sulzer in regard to the proposal.

Double-Unit Turbo-Alternators for New York Subway.—The Interborough Rapid Transit Company, New York, N. Y., has awarded to the Westinghouse Machine Company the contract for three 30,000-kw steam turbo-generator units for installation in the Seventy-fourth Street Station to assist in supplying energy for operating the enlarged New York subway. Each unit will consist of a high-pressure and a low-pressure element, each element comprising an independent steam turbine driving a synchronous alternator. The high-pressure and low-pressure turbine of each unit will be governed simultaneously in order that the load on the unit may be divided properly between the two elements.

Letter from A. E. R. A. Manufacturers' Association.—On July 31, 1913, H. G. McConnaughy, secretary-treasurer of the American Electric Railway Manufacturers' Association, wrote a letter to the members of the association in regard to the spirit of co-operation that should characterize the work of the association. He asks why the membership of the association cannot be increased to 1000. In conclusion Mr. McConnaughy says: "Here is an opportunity for you—sales managers and publicity managers—to show your ability. Will you start a little mail order campaign for the good of all? You have about twelve weeks to get one or more members, which means a thousand by Saturday Oct. 11. Can you see the Pier with a layout of that size? We want Saturday and Sunday to prink up and receive the early arrivals. No opening of boxes or hammering on Monday."

Appeal in Newark Gas Case.—The Public Service Gas Company, Newark, N. J., carried to the Court of Errors and Appeals at Trenton on July 31 an appeal from the decision of the Supreme Court of New Jersey sustaining the order of the Public Utility Commission requiring the company to furnish 90-cent gas in fifteen municipalities constituting the Passaic zone. The company contends that the order is unjust and unreasonable and unconstitutional, because its effect is to take property without just compensation. Other grounds advanced for reversal are that the valuation of $4,750,000 placed upon the property by the board was below the fair value of the property; that in estimating the reproduction cost the board disregarded reliable and uncontradicted proof of value and accepted unreliable and inaccurate evidence; that the board excluded important elements of value, including special franchises, and that the findings were inadequate because the board included only fifteen of the 150 municipalities in which the company operates in the State.

First Train Under New Subway Contracts in New York.—The first operation of trains under the dual system subway contracts signed by the Public Service Commission for the First District on March 19 last took place on Aug. 4, 1913, when the New York Municipal Railway Corporation (Brooklyn Rapid Transit) began running trains through the Centre Street Loop subway from the Williamsburg Bridge to City Hall, Manhattan. The Centre Street Loop is about 1½ miles long and runs from the basement of the new Municipal Building northward under Centre Street to the Delancey Street extension and under the Delancey Street extension to the Williamsburg Bridge, with a spur from Canal Street leading over the Manhattan Bridge. For the present, no use will be made of the Manhattan Bridge connection, which will go into operation when the Fourth Avenue subway in Brooklyn is ready for use. At present, also, there is no connection with the Brooklyn Bridge, but that connection is being built and when it is completed loop operation over the Williamsburg and Brooklyn Bridges will be possible. The temporary operation by the Brooklyn company will utilize only the two western tracks under Centre Street and the two northerly tracks under Delancey Street extension. Over these tracks the elevated trains going over the Williamsburg Bridge bring passengers as far south as Chambers Street station under the new Municipal Building without change of cars and without the payment of any additional fare. As soon as certain reconstruction work on the Broadway and Myrtle Avenue elevated lines is completed, additional elevated trains will be transferred from the Brooklyn Bridge to the Williamsburg Bridge and through the loop subway. This will allow the company to send more trains over the Brooklyn Bridge, which at present is badly crowded.

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Financial and Corporate

Stock and Money Markets

Aug. 6, 1913.

Quotations at the close of trading to-day on the New York Stock Exchange showed little change from those of the preceding day. The local traction shares were active and strong for a short period, Brooklyn Rapid Transit advancing ½ to 89¼. A slight gain was also made in Interborough-Metropolitan common. Rates in the money market to-day were: Call, 2¼ @ 2½ per cent; sixty days, 3¼ @ 3¼ per cent; ninety days, 4½ @ 5 per cent; four months, 5¼ @ 5½ per cent; five months, 5½ @ 6 per cent; six months, 5½ @ 5¾ per cent.

In the Philadelphia market the net changes, on light trading, were small. The bulk of the trading was in United States Steel.

Securities were stronger in Chicago to-day. Chicago Railways, Series 2s, were a feature. The demand for bonds was good.

Trading on the Boston market continued dormant. The bond market was extremely weak.

In the Baltimore market to-day the trading in stocks was fairly active. United Railways issues were the features.

Quotations of traction and manufacturing securities as compared with last week follow:

	July 30	Aug. 6
American Brake Shoe & Foundry (common)	89	90¼
American Brake Shoe & Foundry (preferred)	129	129
American Cities Company (common)	34	37½
American Cities Company (preferred)	65	65½
American Light & Traction Company (common)	345	345
American Light & Traction Company (preferred)	104	104
American Railways Company	38	38
Aurora, Elgin & Chicago Railroad (common)	*39½	39½
Aurora, Elgin & Chicago Railroad (preferred)	*82½	82
Boston Elevated Railway	94½	91
Boston Suburban Electric Companies (common)	7½	7½
Boston Suburban Electric Companies (preferred)	55	55
Boston & Worcester Electric Companies (common)	*8	*8
Boston & Worcester Electric Companies (preferred)	42	*42
Brooklyn Rapid Transit Company	87¾	88½
Capital Traction Company, Washington	115	115
Chicago City Railway	*165	*165
Chicago Elevated Railways (common)	*25½	*25½
Chicago Elevated Railways (preferred)	*75	*75
Chicago Railways, ptcptg., ctf. 1	92	*92
Chicago Railways, ptcptg., ctf. 2	27⅛	27⅛
Chicago Railways, ptcptg., ctf. 3	*7½	*7½
Chicago Railways, ptcptg., ctf. 4	*2½	*2½
Cincinnati Street Railway	a110	a110
Cleveland Railway	*102¾	a102¾
Cleveland, Southwestern & Columbus Ry. (common)	*6	*6
Cleveland, Southwestern & Columbus Ry. (preferred)	*29	*29
Columbus Railway & Light Company	18	18
Columbus Railway (common)	a69½	a69
Columbus Railway (preferred)	88	a90
Denver & Northwestern Railway	*107	*107
Detroit United Railway	a70	a70
General Electric Company	140	140
Georgia Railway & Electric Company (common)	*114¾	a114¾
Georgia Railway & Electric Company (preferred)	*82½	*82½
Interborough Metropolitan Company (common)	15⅝	15¾
Interborough Metropolitan Company (preferred)	58⅛	58¼
International Traction Company (common)	*30	*30
International Traction Company (preferred)	*95	*95
Kansas City Railway & Light Company (common)	15	*15
Kansas City Railway & Light Company (preferred)	*36	*36
Lake Shore Electric Railway (common)	*9	*9
Lake Shore Electric Railway (1st preferred)	*90	*90
Lake Shore Electric Railway (2d preferred)	*25	*25
Manhattan Railway	126	126
Massachusetts Electric Companies (common)	*14½	*14½
Massachusetts Electric Companies (preferred)	72	74½
Milwaukee Electric Railway & Light Co. (preferred)	*90	*90
Norfolk Railway & Light Company	25	25
North American Company	69	70½
Northern Ohio Light & Traction Company (common)	a70	a70
Northern Ohio Light & Traction Company (preferred)	a100	a100
Philadelphia Company, Pittsburgh (common)	43¼	42
Philadelphia Company, Pittsburgh (preferred)	43	40
Philadelphia Rapid Transit Company	22½	23⅜
Portland Railway, Light & Power Company	*58	*58
Public Service Corporation	108	108
Third Avenue Railway, New York	34¾	35¼
Toledo Railways & Light Company	a12	*12
Twin City Rapid Transit Co., Minneapolis (common)	*104	104¼
Union Traction Company of Indiana (common)	*4½	*4½
Union Traction Company of Indiana (1st preferred)	*80	*80
Union Traction Company of Indiana (2d preferred)	*30	*30
United Rys. & Electric Company (Baltimore)	26⅝	26⅞
United Rys. Inv. Company (common)	22½	*23
United Rys. Inv. Company (preferred)	42	*42
Virginia Railway & Power Company (common)	51	53
Virginia Railway & Power Company (preferred)	89	*89
Washington Ry. & Electric Company (common)	91	91
Washington Ry. & Electric Company (preferred)	87¾	88¼
West End Street Railway, Boston (common)	71½	72
West End Street Railway, Boston (preferred)	86	88
Westinghouse Elec. & Mfg. Company	63	63½
Westinghouse Elec. & Mfg. Company (1st preferred)	109	111

*Last sale. a Asked.

ANNUAL REPORT

Brooklyn Rapid Transit Company

Gross earnings of the Brooklyn Rapid Transit Company in the year ended June 30, 1913, increased 3.99 per cent over the preceding twelve months. Operating expenses, however, increased only 1.76 per cent, so that the surplus from operation showed a gain of 21.17 per cent. The annual report to stockholders presents the following results:

Revenue from operation, year ended June 30:	1913	1912
Transportation	$23,865,260	$22,949,021
Miscellaneous	287,028	277,529
Total	$24,152,288	$23,226,550
Operating expenses:		
Maintenance of way and structure	$1,678,124	$1,636,712
Maintenance of equipment	2,202,208	2,155,134
Operation of power plant	1,421,123	1,404,160
Operation of cars—trainmen's wages	4,062,796	3,863,700
Operation of cars—other expenses	1,572,661	1,586,974
Damages	605,092	681,441
Legal expenses in connection with damages	217,211	231,975
General law expenses	61,934	65,196
Other general expenses	746,871	733,294
Freight and mail expenses	264,324	252,762
American Railway Traffic Co.—expenses	1,112	711
Total	$12,833,456	$12,612,059
Net revenue from operation	$11,318,832	$10,614,491
Income from other sources	339,947	317,991
Total income	$11,658,779	$10,932,482
Deductions:		
Taxes	$1,750,083	$1,775,041
Interest and rentals (net)	5,411,768	5,446,219
Total	$7,161,851	$7,221,260
Surplus	$4,496,928	$3,711,222
Profit from real estate disposed of and other miscellaneous items	†7,483	20,037
Total surplus for year	$4,504,411	$3,731,259
Surplus at beginning of year	5,863,813	5,427,394
Total	$10,368,224	$9,158,653
Of this amount there has been appropriated:		
Accounts written off	$28,514	$2,973
Adjustment of taxes prior years	*116,256	28,544
Adjustment of expenses prior years	67	14,460
Supersession and depreciation	60,523	9,013
Special reserve	50,000	1,000,000
Dividend on B. R. T. Co. stock outstanding	2,440,770	2,239,851
Total appropriations	$2,463,618	$3,294,841
Balance sheet surplus	$7,904,606	$5,863,812

*Credit. †In 1913 miscellaneous items only.

The report of T. S. Williams, the president, explains at length the contract with the city for rapid transit development and says on this subject:

"It will be seen that all the surplus earnings of the new rapid transit system, except that portion which is paid over to the city, will accrue to the New York Consolidated Railroad Company, of whose stock the Brooklyn Rapid Transit Company and one of its constituent companies own over 96 per cent.

"Stockholders are to be congratulated that so large a part of the funds called for by the city contracts, and all that will probably be required during the first three years, are in hand and were secured upon more favorable terms than would be possible under existing financial conditions. The construction work is now under way and will be prosecuted as rapidly as conditions permit.

"In the meanwhile a portion of the Broadway-Fourth Avenue line, namely, two tracks in the Centre Street loop, was placed in operation on Aug. 4, 1913, and, under the provisions of the city contract as to temporary operation, the pooling of earnings then became effective.

"The status of the surface railroad lines in the company's system remains unaffected by the new contracts with the city."

On other topics the report says:

"Dividends declared during the year aggregated $2,440,770. The rate was 1¼ per cent quarterly, except for the last quarter, when it was increased to 1½ per cent.

"Certain adjustments of the profit and loss account, including the setting aside of a special reserve of $50,000 and the charging off of $60,523 to supersession and depreciation, left the surplus of the combined system as of June 30, 1913, $7,904,606, as against $5,863,812 at the close of the fiscal year 1912.

"The construction charges aggregated $5,400,819, of which

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the larger amount was in connection with the rapid transit contracts with the city of New York.

"Two short extensions of surface lines were constructed during the year. Additional trackage thus constructed was 1.19 miles measured as single track; 13.43 miles (including 0.14 miles on the Brooklyn Bridge) of single track were relaid with a standard type of heavy grooved rail; 122,565 sq. yd. of improved pavement (14.57 miles of street) were laid between tracks and rails, and in addition the city was reimbursed for approximately 32,150 sq. yd. of pavement laid adjacent to the outer rails of tracks. A much larger volume of work has been arranged for the ensuing fiscal year. Six electrically operated switches, three side tracks, and five crossovers were constructed during the year, and seventy-five pieces of special work were renewed.

"On the elevated lines 47,045 ft. of rail (representing approximately 4.45 miles of single track) and 3540 ft. of steel guard rail were renewed; 19,300 cross ties, 28,582 ft. of timber guard rail, 69,424 ft. of footwalk and 2473 track bonds were renewed. Three and one-half miles of elevated structure were repainted.

"The 20,000-kw turbo-generator unit contracted for last year has been delivered and is now being erected, the installation of the auxiliary apparatus being practically completed. A temporary substation, made necessary by the operation of the Centre Street loop, has been erected at Centre and Walker Streets, Manhattan, and equipped with two 1000-kw rotary converters and auxiliary apparatus.

"In the transmission system, 66.77 miles of trolley wire were renewed and 2.06 miles erected in connection with extensions, side tracks, etc.; 1523 trolley poles were painted, 191 poles reinforced, 690 poles reset, 250 poles replaced and 112 new poles erected; 1.56 miles of feeder were installed in underground conduits and 3.75 miles of overhead feeders removed.

"One hundred surface cars of the center entrance type were ordered and eleven had been put in use at the close of the fiscal year; 105 cars of miscellaneous type—freight, mail, work cars, etc.—were equipped with wheel guards; two snow plows were added; fifty-seven pairs of modern design maximum traction trucks replaced an equal number of equipments of less efficient type; 1507 surface passenger cars and eighty-two freight cars were overhauled, repaired and varnished; 900 elevated passenger cars were overhauled, repainted and varnished, and five additional lights installed in each of thirty-two motor cars. The brake equipment of 317 elevated motor cars was improved by the installation of interlocking devices. Additional machinery was installed in the various shops.

"The East New York employees' club house was altered to provide increased facilities and equipped with refrigerating plant and cold-storage room, and additional restaurant and kitchen utensils and restaurant and club room facilities have been installed and improved at other locations.

"The sprinkler equipment in the Fifty-eighth Street depot, contracted for last year, was completed.

"Numerous minor improvements have been made, particularly in repair shops and depots, for the better protection of the companies' properties against damage by fire.

"Three hundred new fireproof metal lockers have been installed at various depots and shops.

"New equipment for the construction and repair of tracks has been purchased, consisting of three rail grinders, two electric cranes, one electric rail-welding machine, one electric bonding apparatus, two electric track drills, two gasoline concrete mixers and one rail-cutting machine.

"The effectiveness of the work of the medical inspection bureau, established in December, 1912, was reflected in a very material decrease in the number of working days lost by employees on account of sickness compared with the corresponding period of the year previous. The bureau is supported by the company and the service is rendered without charge to employees, and through an arrangement with various druggists the employees are enabled to procure medicines at small cost.

"Just prior to the close of the fiscal year and effective July 4, 1913, a general increase was announced in wages of employees, benefiting about 6000 men in the transportation department. The increases varied according to the length of service and record of efficiency, and ranged from 4 to 15 per cent.

"An opportunity was presented during the fiscal year to acquire upward of two-thirds of the capital stock of the Coney Island & Brooklyn Railroad, and application to take this stock was made to the Public Service Commission, First District, by the Coney Island & Gravesend Railway, one of the constituent companies. No action has been taken by the commission upon the application.

"On March 1, 1913, the Brooklyn Rapid Transit Company, in co-operation with the American Museum of Safety, undertook a children's safety campaign of six months in the public schools of Brooklyn. This work, authorized by the Board of Education of the city, has been continued with great success through the last four months of the regular sessions of the schools ending in June, and is now going on in the summer schools and playgrounds throughout the territory in which the company operates.

"In many of the schools the teachers have given most encouraging co-operation by such undertakings as the organization of safety patrols to guard the children in crossing streets going to and from school, and in the arrangement of safety days, on which, in several instances, an entire day has been given up to safety demonstrations, with lectures, recitations by the children and safety plays, in which some children would impersonate passengers, some conductors and motormen and others pedestrians and the drivers of vehicles in the streets. In one school, where a publication is issued monthly, one number of this publication was devoted especially to the safety work, and cuts were printed of the Brooklyn Rapid Transit safety wagon, the model cars and the other paraphernalia of the safety crusade.

"The safety work has adapted itself very successfully to the instruction in the summer schools and summer playgrounds maintained in various parts of the borough of Brooklyn, particularly in the congested districts. The summer school and playground instruction being necessarily of a more informal character than that of the regular school session, the lecturers in the safety campaign have been able to come very intimately into contact with the children and in many instances with their parents.

"Specially for this summer school work, a set of drawings was prepared graphically illustrating accident conditions due to carelessness of passengers or pedestrians, which drawings have been employed with evident appreciation by the children and the teachers. All told, in the campaign of the last six months, approximately 300,000 safety buttons have been distributed and 600,000 leaflets. The lecturers have visited practically all of the public schools in Brooklyn, 170 in number, and many parochial schools. The summer instruction is covering thirteen summer schools and over thirty playgrounds.

"It is anticipated that the school crusade this year will be a beginning for even more extended safety instruction in the schools with possible outside co-operation from organizations or committees. Evidences of appreciation by the children and their parents have come in from many sources, and the work has the cordial indorsement of the school authorities of the city."

Statistical results are given in the report as follows:

	1913	1912
Passenger earnings—increase over preceding year, per cent	3.94	5.66
Passengers carried	626,304,156	598,555,794
Revenue mileage	82,217,451	81,604,127
Increase over preceding year, per cent	0.75	2.49
Earnings per revenue mile, cents	28.5	27.6
CENTS PER PASSENGER		
Passenger earnings	3.74	3.77
Miscellaneous earnings	0.17	0.16
Total earnings	3.91	3.93
Operating charges	2.05	2.11
Taxes	0.28	0.29
Interest and rentals	0.86	0.91
Total	3.19	3.31
Surplus	0.72	0.62
CHARGES PER CENT OF OPERATING EARNINGS		
Repairs and renewals	16.13	16.30
General operating	33.53	33.89
Damages	2.51	2.05
Legal expense	1.16	1.28
Total operating	53.33	54.51
Taxes	7.27	7.67
Interest and rentals (net)	20.71	21.78
Surplus	18.69	16.04
	100.00	100.00

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Report of Subsidiary Companies of Republic Railway & Light Company

The Republic Railway & Light Company, which controls about 136 miles of interurban and street railways in Ohio and Pennsylvania, reports for the first half of 1913 an increase in gross of 13.77 per cent on the earnings of subsidiary companies, an increase in net of 12.14 per cent and in balance surplus (after interest) of 23.78 per cent.

The consolidated statement of earnings of the subsidiaries for the twelve months ended June 30, 1913, as compared with those of the preceding year, items between subsidiary companies and between subsidiary companies and the Republic Railway & Light Company being eliminated, follows:

	1913	1912
Gross earnings	$2,842,175	$2,518,450
Operating expenses and taxes	1,723,933	1,511,712
Net earnings	$1,118,242	$1,006,738
Interest	535,029	531,378
Surplus	$583,213	$475,360

The earnings of subsidiary companies, exclusive of the Pennsylvania Power Company, increased approximately 50.7 per cent in gross and 76.3 per cent in net in the four years ended Dec. 31, 1912.

The percentage of increase for the first six months, 1913, over the corresponding period, 1912, were as follows:

	1912	Jan.-June, 1913
Gross earnings	10.90	13.77
Net earnings	11.17	12.14
Surplus	25.38	23.78

Questions and Answers Under Uniform System of Accounts

Another series of tentative answers to questions raised in connection with the uniform system of accounts established by the Interstate Commerce Commission is published below. Agreement on these answers, as on those published in the issues of May 17, 1913, June 7, 1913, and July 5, 1913, has been reached by members of the committee on a standard classification of accounts of the American Electric Railway Accountants' Association and representatives of the commission. As these answers have not yet received the formal approval of the commission, however, it should be understood that the decisions do not represent its final conclusions and that they are subject to such revision as may be thought proper before final promulgation in the accounting bulletins of the commission.

Q. What account should be charged with amounts paid for the services of trustees under mortgages?

A. Account No. 79, "Miscellaneous General Expenses," in the classification of Operating Expenses of Electric Railways.

Q. What accounts should be charged with the rent of a floor in a building which provides space for the receivers of conductors' collections, instruction and club rooms, etc.? What account should be charged with the cost of maintaining the furniture and equipment of the club room?

A. The rent of the portion of the building used for receiving and instruction rooms should be charged to Operating Expense Account No. 48, "Superintendence of Transportation." The rent of the portion used for recreation purposes and the cost of maintaining its furniture and equipment should be charged to Account No. 72, "Other Transportation Expenses." If the rent is an insignificant amount it may all be included in Account No. 48, "Superintendence of Transportation."

Q. What account should be charged with the cost of chisels, bits, drills, etc., used on power-driven machines, such as lathes, drills and shapers in the shops?

A. Operating Expense Account No. 38, "Shop Machinery and Tools."

Q. What account should be charged with the first cost of welding rail joints?

A. If the work is done on existing tracks, the cost should be charged to Operating Expense Account No. 5, "Rail Fastenings and Joints," unless the welded joint is more expensive and is a distinct improvement over the joint replaced, in which case the excess cost of the new joint over the original cost of the old one should be charged to Account No. 7, "Rails, Rail Fastenings and Joints," in the classification of Expenditures for Road and Equipment of Electric Railways, the remainder of the cost being charged to operating expenses as indicated above. If the welding of joints is done as part of the original construction of the road, the entire cost should be charged to Account No. 7, "Rails, Rail Fastenings and Joints," in the classification of Expenditures for Road and Equipment of Electric Railways.

Q. What accounts should be charged with the cost of packing used in power plants, carbon rings for turbines and power station tools?

A. The cost of packing and of carbon rings for turbines should be charged to Operating Expense Account No. 30, "Power Plant Equipment." The cost of repair parts of machine tools in power plants should also be charged to Account No. 30, and the cost of hand tools to Account No. 54, "Miscellaneous Power Plant Supplies and Expenses."

Q. An electric railway company which owns a private right-of-way in a city is required to pave intersecting streets to the full width of the right-of-way. To what account should the first cost of such paving be charged?

A. To Road and Equipment Account No. 10, "Paving." (See Case 191 in Accounting Bulletin No. 7.)

Q. Should the rent of rooms in general offices assigned to the use of officers and clerks whose salaries are charged to Account No. 48, "Superintendence of Transportation," be charged to that account or to Account No. 75, "General Office Supplies and Expenses"?

A. Account No. 75, "General Office Supplies and Expenses."

Q. What accounts should be charged with the rent of rooms and the cost of telephone service for the claims department, which is accommodated in a portion of the space rented for general offices?

A. The rent should be charged to Operating Expense Account No. 75, "General Office Supplies and Expenses," and the cost of telephone service to Account No. 79, "Miscellaneous General Expenses." (See Case 96 in Accounting Bulletin No. 7.)

Q. In making an extension of a power house it was necessary to tear down the end wall. The salvage, with other material, was used in building a new wall. What disposition should be made of charges and credits in such a case?

A. The cost of the wall removed should be credited to the road and equipment account to which it is charged. The same cost, less the value of salvage, together with the cost of removal, should be charged to Operating Expenses. The cost of the new wall should be charged to Road and Equipment Account No. 30, "Power Plant Buildings."

Q. What accounts should be charged with the cost of construction and maintenance of cars equipped as track-riveting machines and portable substations?

A. The first cost of electric motive equipment should be charged to Road and Equipment Account No. 37, "Electric Equipment of Cars"; the first cost of car bodies and trucks to Account No. 38, "Other Rail Equipment"; the first cost of riveting machinery, including its electric motors, to Account No. 38, "Other Rail Equipment," and the first cost of substation equipment used to Account No. 31, "Substation Equipment." The cost of maintenance of such cars should be correspondingly divided among Operating Expense Accounts Nos. 31, "Electric Equipment of Cars"; 35, "Service Cars," and 31, "Substation Equipment."

Change in Control of the New England Investment & Security Company

Sanderson & Porter, of New York, who have acquired a controlling interest in the common stock of the New England Investment & Security Company, are making an engineering study of the subsidiary electric railways. Until this is completed and the data obtained in this way are considered no announcement will be made by Sanderson & Porter in regard to their plans concerning the properties.

In referring in its issue of Aug. 4, 1913, to the status of voting power as between the preferred stock and the common stock of the New England Investment & Security Company the Boston *News Bureau* said:

"Some confusion has arisen as to the voting power of the

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preferred and common shares of the New England Investment & Security Company, control of whose common stock has been transferred from New Haven interests to Sanderson & Porter, New York.

"The trust was created in 1906 with seven trustees, three of whom, Charles S. Mellen, Nathaniel Thayer and William Skinner, were deemed to be appointed by the preferred shareholders, and four, Robert W. Taft, Edwin Milner, D. Newton Barney and Charles F. Brooker, were deemed to be appointed by the common shareholders. [The original trustees were succeeded by others. The last reported trustees were Henry L. Higginson, A. Willard Damon, J. T. Harmer, Aug. G. Bulock, Bentley W. Warren and Charles E. Ware. Eds.]

"It is provided in the declaration of trust that a majority of the preferred stock may at any duly authorized meeting remove any trustee 'deemed to be appointed' as representing the preferred shareholders and appoint a new trustee in his place. Similarly a majority of the common shareholders may act in regard to the four trustees 'deemed to be appointed' in their interest.

"It is furthermore provided that if default on the preferred 4 per cent dividend should continue thirty days the management of the trust shall be vested in the three trustees appointed by the preferred stock and the power of the four members representing the common shall be suspended, as well as the voting power on the common stock at any meetings so long as the default shall continue.

"To the common stock, however, alone belongs the right to terminate the trust. The association was formed to run for twenty years and eleven months, with the proviso that a vote of two-thirds of the common stock outstanding may at any time terminate it. There is at the present time only $100,000 of common stock outstanding.

"In event of liquidation the preferred stock is entitled to $105 per share, the annual dividend rate while outstanding being 4 per cent, both of which were guaranteed by the Consolidated Railway Company, which a year later was merged with the New York, New Haven & Hartford Railroad, the latter assuming the guarantee.

"The guarantor company has the option of calling the preferred stock at any dividend date (January and July) at 105. Terms of the call provide that once a week for eight weeks notice of the call must be published in some Boston, Springfield and Worcester newspapers, the last publication to be at least seven days prior to the dividend date."

The Boston *News Bureau* said in its issue of Aug. 2, 1913:

"H. L. Higginson, a trustee of the New England Investment & Security Company, says in connection with the sale of that property to Sanderson & Porter, New York:

"'The press seems to regard this as a belated New Haven sale, when, as a matter of fact, the New Haven railroad sold its Massachusetts trolleys to this voluntary association some years ago.

"'At the time the New England Investment & Security Company was formed I was invited to subscribe for 100 common shares at $100 cash, and did so. No string was attached to the subscription and I had the right to sell or keep the stock at my pleasure, and have done so. I recently sold my stock for $200 a share because it seemed to me best.

"'The point to be made is that the New Haven railroad parted with the Massachusetts trolleys years ago to the New England Investment & Security Company. The recent sale of the common shares to New York interests was a voluntary step taken by the owners of these common shares because they preferred the money to their shares. I do not see where the New Haven figures in this transaction.'"

Interborough Rapid Transit Company Lists Additional Bonds

Announcement has been made by the New York Stock Exchange that $12,541,000 of first and refunding 5 per cent bonds of the Interborough Rapid Transit Company, New York, have been admitted to the list, and $148,416,000 additional of said bonds may be added prior to July 1, 1914, on official notice that they have been sold and passed beyond control of the company. Following is the proposed distribution of the $160,957,000 bonds:

For payment of notes paid May 1, 1913	$16,043,000
For refunding of outstanding mortgage bonds at 105 and interest (to be called probably Nov. 1, 1913)	33,861,800
For company's share of new subway construction	54,043,000
For equipment of new subways	21,000,000
For elevated third-tracking	10,800,000
For elevated extensions	13,154,000
For improvements on power plant of existing elevated lines	4,000,000
For expense of sale of bonds and to make up discount or deficiency, the amount realized on sale to net not less than 93½	8,055,200
Total	$160,957,000

The remaining bonds, to the amount of $139,043,000, of the authorized issue of $300,000,000 may be issued with the approval of the Public Service Commission for any additional needs for further construction of the subway or elevated lines that may arise, as well as to provide funds for additions to the proposed system when traffic demands warrant.

Barcelona Traction, Light & Power Company, Ltd., New York, N. Y.—The stockholders of the Barcelona Traction, Light & Power Company, Ltd., have authorized the creation of $12,500,000 of 7 per cent non-cumulative preferred stock. Of this amount $10,000,000 has already been sold to a French syndicate at par. The proceeds will be used for further developing the plans of the company in and around Barcelona, Spain. The remaining $2,500,000 of the new preferred stock will be held in the company's treasury against further needs. Dr. F. S. Pearson is president of the company, which was organized two years ago to construct and operate a tramway property in and around Barcelona and also to develop and distribute electric light and power. The company also has $30,000,000 of common stock, all of which has been issued. The company controls all of the tramway lines and electric light and power properties in Barcelona, Spain.

Buffalo & Lake Erie Traction Company, Buffalo, N. Y.—At the request of minority bondholders of the Buffalo & Lake Erie Traction Company, Chairman Decker, of the Public Service Commission, on Aug. 1 granted an adjournment until Aug. 22 on the application of the bondholders' committee for the reorganization of the company, the acquisition of the capital stock of the Buffalo, Lockport & Rochester Railway and a new electric power corporation. Minority bondholders will organize formally so as to present their side of the case before the commission.

Cleveland & Eastern Traction Company, Cleveland, Ohio.—A rehearing before the Public Service Commission has been asked by the Cleveland & Eastern Traction Company on an adverse ruling made some time ago relative to the issue of $54,000 of first mortgage bonds. No further hearing has been asked on the ruling in regard to issues of $32,000 of preferred stock and $27,000 of common stock.

Commonwealth Power, Railway & Light Company, Saginaw, Mich.—The Commonwealth Power, Railway & Light Company has declared a second dividend of 1 per cent on its $15,500,000 of common stock, along with the regular quarterly payment of 1½ per cent on the $16,000,000 of 6 per cent cumulative preferred stock, both payable on Aug. 1 to holders of record July 19.

Connecticut Valley Street Railway, Greenfield, Mass.—A quarterly dividend of three-quarters of 1 per cent has been declared on the $500,000 of common stock of the Connecticut Valley Street Railway, payable on Aug. 1 to holders of record of July 19, which compares with 1 per cent on May 1, one-half of 1 per cent on Feb. 1, 1913, and Aug. 1, 1912, and 1 per cent on Feb. 1, 1912, the first payment.

County Traction Company, Chicago, Ill.—The portion of the County Traction Company which operated in Evanston prior to the recent strike, the settlement of which was described in the Electric Railway Journal of July 26, 1913, page 150, has been sold to a group of capitalists represented by Clement C. Smith, Robert E. Bernat and Frank McCollough. The new company has not yet filed incorporation papers, but the nominal capital is said to be $500,000. The purchasers will immediately take steps to obtain a franchise from Evanston and in the meantime a temporary permit under which they can operate the property. Rehabilitation will begin as soon as funds can be obtained.

Dixon, Rock Falls & Southwestern Electric Railway, Tampico, Ill.—A bill was filed by the Illinois State Trust

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Company, East St. Louis, as mortgage trustee, at the June term of the Circuit Court of Henry County to foreclose the mortgage of the Dixon, Rock Falls & Southwestern Electric Railway, under which, it is stated, $165,000 of bonds were issued. It is proposed to reorganize the company by permitting the holders of the bonds of the present company to exchange their bonds for a like number of shares of stock in the new company, but bondholders have the option of filing their bonds and receiving in cash their share of the proceeds of sale. It is stated that about $15,000 in cash was subscribed to buy the Tampico terminal, lay tracks, etc. Additional subscriptions will have to be made to purchase right-of-way and equipment.

Fort Smith Light & Traction Company, Fort Smith, Ark.—The directors of the Fort Smith Light & Traction Company have failed to declare the July dividend on the $1,410,000 of 7 per cent cumulative preferred stock.

Gary & Interurban Railway, Gary, Ind.—Frank N. Gavit, president of the Gary & Interurban Railway, is quoted in part as follows in regard to the suit for receivership brought by F. C. Raff: "The action is an effort to test the validity of the consolidation of the various roads which now constitute the corporation known as the Gary & Interurban Railway. This consolidation was made on Jan. 28, 1913, under the authority of the Indiana statutes. Mr. Raff holds a minority of stock in the Gary & Interurban Railway, which, like the other original companies, went out of existence at the time of the consolidation. He contends that the consolidation is not valid, and he seeks to have it so adjudged. We have confidence of the termination of the suit in favor of the consolidation. If, however, Mr. Raff should succeed, the only effect would be to dissolve the consolidation and put the companies in the position they occupied theretofore." The application for the appointment of a receiver was referred to in the ELECTRIC RAILWAY JOURNAL of Aug. 2, 1913, page 200.

Georgia Railway & Electric Company, Atlanta, Ga.—The Georgia Railway & Electric Company has applied to the State Railroad Commission to be allowed to issue $430,000 of first mortgage refunding and improvement bonds. A hearing is set for Aug. 12. The petition states that these bonds are for refunding purposes and to provide funds for extensions and improvements.

Lincoln Railway & Light Company, Lincoln, Ill.—It is stated that the Lincoln Railway & Light Company at Lincoln, Ill., will discontinue the operation of its railway lines on Sept. 21, in consequence of financial embarrassment brought on by street paving expense and the substitution of new rails for the present rails in the district to be paved.

Louisville (Ky.) Railway.—According to the statement of the Louisville Railway for June, which was recently made public, the gross operating revenues of the company were $5,676 greater than those of June, 1912. There was an increase of $10,031 in operating expenses, however, bringing the net operating revenue to $4,355 less than that for June, 1912. For the six months ending June 30, 1913, gross operating revenue increased $58,217, and net revenue $33,463. Net income of all properties operated by the company, after the payment of all expenses and charges, was $58,622 for June, a decrease of $15,261 as compared with June of last year, and $354,331 for the six months, a decrease of $16,970. Officers of the company estimate that nearly $7,000 of the June increase in operating expense is due to the recent advance in wages. Another factor in the increased expense was the Oak Street cross-town line, started a few months ago, which is not yet paying its way. The interruption of traffic over several suburban lines by the spring floods is also responsible for a part of the decrease shown for the six-months period ending June 30. The company is setting aside for taxes on the interurban lines $1,000 a month more than a year ago, and the same additional amount on the city lines. Interest charges are $4,160 a month greater than a year ago, by reason of the February issue of $1,000,000 of 5 per cent bonds.

Morris Railroad, Morristown, N. J.—The mortgage of the Morris Railroad to the Safe Deposit & Trust Company of Pittsburgh, as trustee, is made to secure an issue of $137,500 thirty-five-year 5 per cent $1,000 bonds dated July 25, 1913, but redeemable at par after one year, interest semi-annually. The mortgage provides for a sinking fund to retire the bonds at maturity.

Newell (W. Va.) Street Railway.—The Newell Street Railway and the Newell Bridge Company have been consolidated as the Newell Bridge & Street Railway Company.

Northern Ohio Traction & Light Company, Akron, Ohio.—On July 28 the Ohio Public Service Commission heard the petition of the Northern Ohio Traction & Light Company for permission to issue $3,000,000 in securities to be used as collateral to secure a loan.

Ohio Electric Railway, Cincinnati, Ohio.—As a result of recent changes in the financial organization of the Ohio Electric Railway the company now has the following stock and bond issues: Common stock authorized, $8,000,000 in $100 shares, $8,000,000 issued; preferred stock, 5 per cent non-cumulative, with equal voting rights, par $100, callable on any dividend date at 105 on thirty days' notice, $6,000,000 authorized, outstanding $3,000,000; second and general mortgage 5 per cent gold bonds, dated June 2, 1913, par $10, $500 and $1,000, authorized amount $5,000,000, outstanding July 24, 1913, $601,700. The bonds are to be delivered for improvements when and as approved by the Public Service Commission of Ohio or other governmental authority. The entire bond issue is subject to call on any interest date for payment in cash or for substitution of first and refunding mortgage bonds dated Jan. 1, 1910, exchanged at par after eight weeks' notice.

Pacific Gas & Electric Company, San Francisco, Cal.—The Pacific Gas & Electric Company reports the recent sale of $4,500,000 of one-year 6 per cent notes.

Porto Rico Railways, Ltd., San Juan, P. R.—Shareholders of the Porto Rico Railways are offered the right to subscribe at par at the Royalty Securities Corporation on or before Aug. 23 for $500,000 of 7 per cent cumulative preference shares, one new share for each seven shares (common and preferred combined) now held. The proceeds will be used to meet capital expenditures in 1913, chiefly for the completion of lighting lines. Subscriptions are payable 25 per cent now and 25 per cent Sept. 1, Oct. 1 and Nov. 1.

San Francisco, Napa & Calistoga Railway, Napa, Cal.—Practically all of the claims against the San Francisco, Napa & Calistoga Railway on account of the recent accident are said to have been settled out of court. The directors have levied an assessment of $5 a share on stockholders.

St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo.—E. W. Clark & Company, Philadelphia, Pa., have sent the following notice to holders of the Fidelity Trust Company certificates of deposit of common stock of the St. Joseph Railway, Light, Heat & Power Company: "The contract with Henry L. Doherty & Company for the purchase of the common stock of the St. Joseph Railway, Light, Heat & Power Company was made for the benefit of the Cities Service Company and has been transferred to that company. We have agreed with the Cities Service Company to extend the payment due Aug. 1, 1913, to March 1, 1914, and the payment due Feb. 1, 1914, to Aug. 1, 1914, so that the balance of purchase under such contract is due $15 a share March 1, 1914, and $35 a share Aug. 1, 1914. Interest on all instalments at the rate of 5 per cent has been paid to date, and the new agreement provides for interest after Aug. 1, 1913, at the rate of 6 per cent per annum, payable March 1, 1914, and Aug. 1, 1914. Pursuant to this agreement, $500,000 of Cities Service Company 7 per cent convertible notes have been deposited with the Fidelity Trust Company as additional collateral for the instalment due March 1, 1914, the notes to be returned to the Cities Service Company upon payment of this instalment. We regard this agreement as being to the advantage of depositing stockholders, and more than 65 per cent of the deposited stock has approved the agreement. Interest due on Aug. 1, 1913, will be paid on presentation of certificates of deposit at our office for indorsement of such payment and assent to the modified agreement."

Toronto (Ont.) Railway.—Twenty-seven 4½ per cent currency bonds of $1,000 each and 270 sterling bonds of £100 of the Toronto Railway issued under the first mortgage dated Sept. 1, 1892, have been drawn for redemption on Sept. 1.

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Dividends Declared

Connecticut Railway & Lighting Company, Bridgeport, Conn., quarterly, 1 per cent, preferred; quarterly, 1 per cent, common.

Detroit (Mich.) United Railways, quarterly, 1½ per cent.

Harrisburg (Pa.) Traction Company, 3 per cent.

Toledo, Bowling Green & Southern Traction Company, Findlay, Ohio, quarterly, 1¼ per cent, preferred.

Union Street Railway, New Bedford, Mass., quarterly, 2 per cent.

ELECTRIC RAILWAY MONTHLY EARNINGS

CLEVELAND, SOUTHWESTERN & COLUMBUS RAILWAY, CLEVELAND, OHIO

Period			Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1 mo.	June	'13	$111,601	$63,763	$47,838	$31,744	$16,094
1 "	"	'12	105,172	59,536	45,636	30,995	14,641
6 "	"	'13	575,158	357,345	217,823	187,547	30,276
6 "	"	'12	540,874	330,558	210,316	182,598	27,718

COLUMBUS (GA.) ELECTRIC COMPANY

1 mo.	May	'13	$55,982	*$25,869	$30,173	$20,350	$9,823
1 "	"	'12	49,319	*23,154	26,165	19,028	7,137
12 "	"	'13	644,135	*290,522	354,613	233,734	120,879
12 "	"	'12	583,583	*260,851	322,733	216,236	106,497

INTERBOROUGH RAPID TRANSIT COMPANY, NEW YORK, N. Y.

1 mo.	June	'13	$2,649,559	$1,087,803	$1,561,756	$1,101,301	$460,455
1 "	"	'12	3,454,394	1,067,239	2,387,155	1,094,501	1,292,654
12 "	"	'13	32,985,361	13,260,743	19,724,618	13,187,549	6,537,069
12 "	"	'12	32,351,592	13,047,802	19,503,790	12,980,024	6,523,766

JOPLIN & PITTSBURG RAILWAY, PITTSBURG, KANS.

1 mo.	June	'13	$47,895	*$29,069	$18,826	$12,542	$6,284
1 "	"	'12	45,077	*26,513	18,564	12,933	5,641
12 "	"	'13	560,285	*328,650	231,635	150,500	81,135
12 "	"	'12	503,587	*297,134	206,453	154,993	51,450

LEHIGH VALLEY TRANSIT COMPANY, ALLENTOWN, PA.

1 mo.	June	'13	$148,222	$65,215	$83,007	$46,518	$36,489
1 "	"	'12	129,983	56,448	73,535	42,209	31,326
12 "	"	'13	1,661,961	709,860	952,101	534,590	417,511
12 "	"	'12	1,438,231	629,957	808,274	483,128	325,146

MONONGAHELA VALLEY TRACTION COMPANY, FAIRMONT, W. VA.

1 mo.	June	'13	$78,738	$27,415	$51,323	$24,127	$27,196
1 "	"	'12	72,400	30,038	42,362	21,854	20,508
6 "	"	'13	442,067	151,655	290,412	144,660	145,752
6 "	"	'12	387,024	159,142	227,882	113,107	114,775

NEW ORLEANS RAILWAY & LIGHT COMPANY, NEW ORLEANS, LA.

1 mo.	June	'13	$562,320	*$363,917	$198,403	$145,225	$53,178
1 "	"	'12	522,855	*326,789	196,066	136,472	59,594
6 "	"	'13	3,467,585	*2,139,812	1,327,773	856,958	470,815
6 "	"	'12	3,342,493	*1,988,356	1,354,137	821,151	532,986

NORTHERN TEXAS ELECTRIC COMPANY, FORT WORTH, TEX.

1 mo.	May	'13	$183,317	*$98,074	$85,244	$24,166	$61,078
1 "	"	'12	148,060	*77,318	70,742	20,846	49,897
12 "	"	'13	1,975,120	*1,048,806	926,313	284,405	61,078
12 "	"	'12	1,634,302	*890,489	743,814	251,677	492,137

PADUCAH TRACTION & LIGHT COMPANY, PADUCAH, KY.

1 mo.	May	'13	$35,645	*$17,907	$7,739	$7,425	$314
1 "	"	'12	21,418	*15,955	5,462	7,132	†1,669
12 "	"	'13	285,260	*188,836	96,423	87,569	8,854
12 "	"	'12	275,783	*180,601	95,182	83,937	11,245

PENSACOLA (FLA.) ELECTRIC COMPANY

1 mo.	May	'13	$22,770	*$15,635	$7,135	$6,477	$658
1 "	"	'12	34,141	*14,828	9,313	6,377	2,936
12 "	"	'13	285,728	*179,251	106,477	76,526	29,951
12 "	"	'12	286,825	*181,303	105,522	68,235	37,288

PUGET SOUND TRACTION, LIGHT & POWER COMPANY, SEATTLE, WASH.

1 mo.	May	'13	$715,073	*$411,192	$303,881	$171,713	$132,168
1 "	"	'12	681,003	*390,603	290,399	164,663	125,736
12 "	"	'13	8,354,255	*4,885,798	3,468,458	2,018,238	1,450,220
12 "	"	'12	.....	.....	.....	.....	.....

SAVANNAH (GA.) ELECTRIC COMPANY

1 mo.	May	'13	$70,026	*$45,209	$24,817	$22,726	$2,090
1 "	"	'12	63,524	*47,481	16,044	16,009	35
12 "	"	'13	782,654	*562,086	222,569	218,007	2,562
12 "	"	'12	724,337	*535,995	188,342	187,299	1,043

TAMPA (FLA.) ELECTRIC COMPANY

1 mo.	May	'13	$69,556	*$38,158	$31,398	$4,528	$26,870
1 "	"	'12	63,365	*33,277	30,088	4,363	25,725
12 "	"	'13	771,535	*464,078	367,457	54,977	312,481
12 "	"	'12	721,577	*389,244	332,333	56,637	275,696

TWIN CITY RAPID TRANSIT COMPANY, MINNEAPOLIS, MINN.

1 mo.	June	'13	$754,495	$363,242	$391,253	$145,443	$245,810
1 "	"	'12	692,417	335,853	356,564	143,079	213,485
12 "	"	'13	4,230,531	2,166,225	2,064,306	878,629	1,185,677
12 "	"	'12	3,926,120	2,048,606	1,877,514	855,475	1,022,039

*Includes taxes. †Deficit.

Traffic and Transportation

Increase in Wages on Pacific Electric Railway

A general increase of 8 to 10 per cent in the wages of trainmen employed by the Pacific Electric Railway was announced on July 26, 1913, by Paul Shoup, president of the company, the increase being effective on July 1. President Shoup, in his letter to J. McMillan, general manager of the company, said:

"In reference to previous discussion as to increase in wages of trainmen, particularly to the recommendation of the superintendents submitted on May 10, 1913, with your approval, to analyses made subsequently thereto as to the increase in operating expenses if such recommendation were adopted, and to my final approval given on July 3 to the changes in schedule, date of effectiveness being left open pending certain questions as to the reassignment of runs that would follow through the application of our seniority rule, the effective date governing increase in pay will be July 1. Changes in runs under seniority rule referred to can be made before such date as you determine as giving proper opportunity to all interests, taking into consideration the necessities for re-examinations.

"The officials of the company have inaugurated a sweeping change which involved the reclassification of the trainmen. There will be two classes—those employed in the interurban service and those in the city service. According to the orders trainmen, whether now employed in city service or interurban service, may exercise their seniority rights to change runs from one service to another and reassignment of runs will be made accordingly. Hereafter as vacancies occur or new runs are established trainmen will have the rights thereto according to seniority, whether in city or interurban service. New employees will, as far as possible, be assigned to city service and not to the interurban lines at the beginning of their service. The following schedule of wages will govern for the train service employees, for passenger conductors and motormen, interurban service only: First year, 27 cents an hour; second year, 28 cents an hour; third year, 29 cents an hour; fourth year, 30 cents an hour; fifth year, 31 cents an hour; sixth year and thereafter, 32 cents an hour.

"The schedule for the freight and work trainmen and yardmen is as follows: Motormen, 33 cents an hour; conductors, 33 cents an hour; brakemen and switchmen, 29 cents an hour; trolleymen, 25 cents an hour; yard foremen, 33 cents an hour; yardmasters, $125 a month.

"Employees of all other departments, such as employees in power houses, substations, electric line work, car inspection and repairing and maintaining, towermen, terminal stationmen, gatemen, as well as men employed in and around offices, including the general offices, who wish to take advantage of the increase in wages and enter the train and yard service, will be given preference over applicants not now in the company's service, conditional upon their qualifying for such service."

Increase in Wages in Milwaukee.—The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., on Aug. 1, 1913, increased the wages of the motormen and conductors in its employ 1 cent an hour. A similar increase went into effect in July, 1912.

Increase in Wages in Kansas City.—Federal Judge Hook at Kansas City has ordered the receivers of the Metropolitan Street Railway, Kansas City, Mo., to increase the wages of the motormen and conductors in the employ of the company 5 per cent. The increase is to date from Aug. 1.

Violation of Two-Cent Fare Law Alleged.—R. T. Breckenridge, of the Duquesne Manufacturing Company, Columbiana, Ohio, has filed complaint to the effect that the Youngstown & Southern Railway is violating the 2-cent fare law and is discriminating in the rate of fare charged between various points.

Strike Unlikely at Holyoke, Mass.—Further conferences scheduled for the present week between L. D. Pellissier, general manager, and S. D. Nevin, treasurer, of the Holyoke Street Railway and a committee of employees regarding

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the practical application of the recently effective "nine-hours-in-eleven" law indicated that a satisfactory solution of the matters at issue will be secured.

Hearing in Jersey City in Regard to Lower Steps.—Officials of the Public Service Railway, Newark, N. J., testified before the members of the Public Utility Commission in Jersey City on July 25 in regard to the expense that would be entailed to carry out the demand of the women's clubs of Hudson County that the steps and platforms of the cars operating in Jersey City be lowered to an average height of 15 in.

Through Routing Ordinance for Chicago Elevated Roads Signed.—Mayor Harrison of Chicago, Ill., has signed the ordinance providing for the through routing of elevated railroad trains. It is expected the companies will file their acceptance within the next few days. Nothing will be done by the local transportation committee relative to unified operation of the surface line companies and the Mayor's subway ordinance until September.

Center Side-Entrance Trail Car Proposed for Cincinnati.—W. Kesley Schoepf, president of the Cincinnati (Ohio) Traction Company, has notified the city that he hopes to work out plans for a center side-entrance trail car that will meet the needs of the city. The car, he says, will seat about seventy people. The company hopes to have a number of the cars in operation by the latter part of November or early in December.

Question of Limiting Car Capacity in Washington.—The question of whether or not the carrying capacity of cars operated by the electric railways in the District of Columbia shall be limited is to be discussed at a hearing to be held by the Public Utilities Commission at 10 a. m. on Aug. 11. The commission also will consider the question of permitting passengers to occupy the platforms of closed cars and the front seats and running boards of open summer cars.

Illinois Traction System Made a Member of the Illinois Freight Committee.—Effective on Sept. 1, the Illinois Traction System will become a member of the Illinois Freight Committee Association, a steam road organization which issues all interline rates within the State. The membership to this association brings with it all the privileges enjoyed by the steam road representatives and it makes the Illinois Traction System a party to all tariffs issued by this association and establishes joint rates with all the steam railroads.

City Demands That Tracks Be Sprinkled.—A unique case occurred in Sacramento, Cal., on July 19, when F. G. Wrightson, city street superintendent, swore out a warrant charging N. J. Hullin, superintendent of the local electric railway lines of the Pacific Gas & Electric Company, with maintaining a nuisance. The nuisance results from the alleged failure of the corporation to sprinkle the streets adjacent to its tracks throughout the city, as required by a municipal ordinance. The complaint recites that the dust resulting constitutes a menace to the public health.

Prepayment Cars in Interurban Service.—The Ohio Valley Electric Railway, Huntington, W. Va., has put ten pay-as-you-enter cars on its interurban line between Huntington, W. Va., and Ashland, Ky. It has also put eight new cars in city service in Huntington. The pay-as-you-enter cars are 50 ft. 7 in. long and 8 ft. 6 in. wide. The plan has been adopted of passengers paying 5 cents each on entering and the conductor collecting additional fares as needed in passing from district to district. The fare between Ashland and Huntington is 15 cents, so that two additional collections are necessary.

Headlight Ordinance Passed in Chicago.—The Council of Chicago passed on July 14 a revised ordinance which prohibits the use of headlights with parabolic or condensing lenses or reflectors unless the headlight is properly shaded so as not to blind or dazzle users of the highway. A fine of not less than $5 and not more than $50 is provided for violations. The ordinance was designed primarily to eliminate the use of high-power headlights on automobiles, and while it is broad enough to include electric railway cars, it does not affect the latter as they do not use headlights of the types considered objectionable.

New Chartered Car Tariff in Brooklyn.—The Brooklyn (N. Y.) Heights Railroad has filed with the Public Service Commission for the First District of New York a new tariff for chartered cars on the surface lines in Brooklyn, making a 25 per cent reduction for the months of July and August for such cars for orphan asylums of all denominations. The present rates for such cars, either open or closed, are $9 for one-way trip and $12 for round trip on 5-cent routes; $12 per one-way trip and $17 for round trip on 10-cent routes, and $18 per one-way trip and $23 for round trip on 15-cent routes. The orphan asylums will be allowed 25 per cent reductions from these rates.

Through Rates Between Indianapolis and Louisville by Oct. 1.—Following its recent decision in the case of the Louisville Board of Trade against the electric railways which operate between Louisville and Indianapolis, in which these lines were ordered to make through rates between those cities and points beyond Indianapolis, the Interstate Commerce Commission has ordered that the rates be agreed on by Sept. 1. This means that tariffs must be filed with the commission some time this month. With the required notice of thirty days to shippers the effective date of the new tariffs will be Oct. 1. The decision of the commission in this case was referred to at length in the ELECTRIC RAILWAY JOURNAL of July 19, 1913, page 118.

Increase in Wages in Birmingham.—The wages of motormen and conductors in the employ of the Birmingham Railway, Light & Power Company, Birmingham, Ala., were raised 1 cent an hour, beginning Aug. 1. The new rate of pay affects all motormen and conductors who have been in the service of the company more than a year. It was cited in the notice that the men who have been with the company less than a year have received great benefits under the minimum wage scale and therefore would not be raised at this time. The new scale of wages for motormen and conductors, according to this raise, is as follows: Eighteen cents an hour for the first year; 20 cents, second year; 21 cents, third year; 22 cents, fourth year; 23 cents, fifth year; 24 cents, sixth year; 25 cents, seventh year, and 26 cents, eighth year.

"Electric Railway Service" to Be Issued Semi-Weekly.—In its issue of July 29, 1913, *Electric Railway Service*, which has been published once a week in the interest of the Detroit (Mich.) United Railway, said: "With this issue *Electric Railway Service* becomes a semi-weekly publication. It will be placed in the little boxes of the cars and in the waiting rooms Tuesdays and Fridays of each week. Whether you believe in municipal ownership of street railways or whether you are opposed to this theory of civic government you are sure to find something of interest to you. Above all, you will find facts that it is important you should know whether you are or are not a property owner. There isn't a problem appertaining to street railway transportation that *Electric Railway Service* will refuse to discuss. The truths we tell are disturbing the plans of self-glory and the plans of self-gain of some people, but remember that not one statement or figure published by *Electric Railway Service* has been attacked by these people. Read *Electric Railway Service*. All good live news. No advertising."

Suit to Set Aside Fare Order.—The receivers for the Metropolitan Street Railway, Kansas City, Mo., have filed suit in the federal court at Topeka to set aside the order of the Kansas Utilities Commission for joint rates over the Kansas City Western Railway and the Metropolitan Street Railway from Chelsea Junction in Kansas City, Kan., to any point in either of the two cities. Some time ago at the instruction of the City Commissioners of Kansas City the city attorney in an effort to secure an adjustment of rates over the two lines went before the utilities commission, which ordered a single 5-cent fare. The fare over the Leavenworth lines formerly was 10 cents from Chelsea Junction to other points in either of the two cities. A 5-cent fare was demanded at Eighteenth Street, where the Kansas City Western Railway connects with the lines of the Metropolitan Street Railway. The Metropolitan Street Railway carried passengers by different routes from Chelsea Junction for 5 cents. The receivers assert that the order is confiscatory. The receivers also charge that changing the fare would call for a readjustment of the traffic and that the matter is within the jurisdiction of the Interstate Commerce Commission.

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Personal Mention

Mr. Jacob Kahler has been appointed roadmaster of the Northampton Traction Company, Easton, Pa., to succeed Mr. James O'Connell.

Mr. James H. McKnight has been appointed general freight agent of the Norwich & Westerly Traction Company, Norwich, Conn.

Mr. George P. McNear has been elected treasurer of the Petaluma & Santa Rosa Railway, Petaluma, Cal., to succeed Mr. Thomas Archer.

Mr. W. Lennox has been elected vice-president of the Colorado Springs & Interurban Railway, Colorado Springs, Col., to succeed Mr. A. G. Sharp.

Mr. William P. Zehner has been elected secretary of the Bloomsburg, Millville & Northern Railway, Bloomsburg, Pa., to succeed Mr. C. W. Miller.

Mr. V. F. Fabian has been appointed superintendent of the Westfield division of the Springfield Street Railway to succeed Mr. Everett I. Putnam.

Mr. J. A. Durham has been appointed general manager of the St. Francois County Railroad, Farmington, Mo., to succeed Mr. A. D. Brinkerhoff.

Mr. William E. Jones has been appointed master mechanic of the Chicago, Aurora & De Kalb Railroad, Aurora, Ill., to succeed Mr. William H. Harms.

Mr. H. J. Wightman has been appointed auditor, assistant secretary and assistant treasurer of the Trinidad Electric Transmission, Railway & Gas Company, Trinidad, Col., to succeed Mr. G. W. Parks.

Mr. J. A. Wilcox has been appointed superintendent of the Corning & Painted Post Street Railway, Corning, N. Y., to succeed Mr. H. H. Ryal. Mr. Wilcox was formerly master mechanic of the company.

Mr. Harry S. New has been elected vice-president of the Indianapolis & Northwestern Traction Company, Indianapolis, Ind., to succeed Mr. Robert I. Todd, who has been elected president of the company.

Mr. A. L. Kasemeier, formerly auditor of the Cincinnati (Ohio) Traction Company, the Ohio Traction Company and the Cincinnati Car Company, has been transferred to the Cincinnati Car Company as auditor exclusively.

Mr. Arthur Bremmen has been appointed chief engineer of the power station of the Hartford & Springfield Street Railway. Warehouse Point, Conn., to succeed Mr. Fred M. Du Bois, who continues with the company as master mechanic.

Mr. W. H. MacAlister, who was vice-president of the Cincinnati Car Company, has been made treasurer of the Cincinnati Traction Company, the Ohio Traction Company and the Cincinnati Car Company, to succeed Mr. H. L. Sanders.

Mr. E. T. Schuler, who has been secretary and treasurer of the Alabama City, Gadsden & Atalla Railway, Gadsden, Ala., has also been elected president of the company to succeed Mr. G. H. Schuler, who has been elected vice-president.

Mr. J. C. Daigen has resigned as master mechanic of the Cleveland & Eastern Traction Company, Cleveland, Ohio, after seven years of service to become lubricating expert with the Universal Lubricating Company, with headquarters in Cleveland, Ohio.

Mr. E. H. Henning, superintendent of the Niagara Falls division of the International Railway, Buffalo, N. Y., has been promoted to the position of superintendent of interurban lines of the system. Mr. Henning entered the employ of the International Railway as a motorman eighteen years ago.

Col. George W. Goethals, chairman of the Isthmian Canal Commission and chief engineer of the Panama Canal, has consented to accept the honorary presidency of the International Engineering Congress and will preside in person over the general sessions to be held in San Francisco, Sept. 20-25, 1915.

Mr. Harold F. Cook has been appointed assistant to the president of the Ottawa, Rideau Lakes & Kingston Railway, Ottawa, Ont., which is under construction. Mr. Cook was born at Croydon, Eng., on June 13, 1888. He was graduated in civil and mechanical engineering at the Central Technical College, London, Eng., in 1909.

Mr. R. R. Ritchie has resigned as supervisor of safety of the Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind. Mr. Ritchie has been with the company for two years, and through his efforts the safety first movement was established on the system. Mr. Ritchie will become connected with the Mobile Railway & Light Company, Mobile, Ala., which operates 58 miles of electric railway in that city.

Mr. O. J. Cherry, who has been superintendent of the Lockport division of the International Railway, Buffalo, N. Y., for several years, has resigned, and Mr. J. W. Andrews has been appointed as assistant to Mr. E. H. Henning, the superintendent of the interurban lines of the company, vice Mr. Cherry. Mr. Andrews was formerly with the Public Service Commission of the Second District of New York.

Mr. R. S. Mahan has been appointed claim agent for the Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo. Previous to assuming his present duties Mr. Mahan was in the employ of the Wyandotte Construction Company, which secured the right-of-way for the Kansas City, Clay County & St. Joseph Railway, built the road and later had charge of the Platte River quarries, where all of the crushed rock ballast for the St. Joseph division was secured.

Mr. H. L. Sanders has been made auditor of the Cincinnati (Ohio) Traction Company and the Ohio Traction Company, to succeed Mr. A. L. Kasemeier. Mr. Sanders has been with the Cincinnati Traction Company for about six years, having entered the service of the company from the accounting department of the Atlantic Coast Line. Mr. Sanders came to the Cincinnati Traction Company as assistant purchasing agent and was made treasurer about two years ago. He was made auditor of both the Cincinnati Traction Company and the Ohio Traction Company last month.

Mr. C. E. Palmer, who has been connected with the Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., for the last two years as superintendent of transportation, has resigned, effective on Aug. 1. Previous to being connected with the Fort Wayne & Northern Indiana Traction Company Mr. Palmer was at Pottsville, Pa.; with the Ohio Electric Railway at Cincinnati, and the Chicago, Lake Shore & South Bend Railway. Mr. Palmer intends to spend the next month at his home in Middletown, Ohio, expecting to take a position in the Southwest about Sept. 1.

Mr. A. D. Brinkerhoff is now acting in the capacity of secretary and treasurer of the National Light & Power Company, St. Louis, Mo. This company was until recently acting in the engineering and managing capacity for the St. Francois County Railroad. These latter duties have recently been taken over by the management of the M. R. & B. T. Railway. The National Light & Power Company is now operating a number of electric light, water and ice plants in Kentucky and Missouri, and is doing a general electric and mechanical engineering consulting business in the Middle West.

Mr. A. de Sola Mendes, vice-president and general manager of the Georgia Coast & Piedmont Railway, has succeeded Mr. H. F. Dunwody as general manager of the Mutual Light & Water Company and City & Suburban Railway, Brunswick, Ga. Mr. Mendes was born in New York and started his career in the banking business with J. F. Lisman & Company, of that city. He entered the railroad business fifteen years ago under Mr. Samuel Hunt. After handling the accounting and traffic departments of several short lines Mr. Mendes took charge of the Georgia Coast & Piedmont Railway in 1908. Mr. Dunwody, it is stated, will devote himself in the future largely to his law practice.

OBITUARY

D. F. Webster, formerly electrical engineer and master mechanic of the Sedalia Light & Traction Company, Sedalia, Mo., is dead.

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Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Alton & Southern Railroad, East St. Louis, Ill.**—Incorporated with a capital stock of $10,000 to build a railway from a point opposite the city of St. Louis through East St. Louis to a point at or near the east banks of the Mississippi River in Madison County. The incorporators are C. B. Fox, Gilbert McCullough, C. E. Rodgson, C. W. Souder, R. S. Sherwin, W. Abt and W. H. Hebenstreit.

***Evanston (Ill.) Traction Company.**—Incorporated with a capital stock of $10,000 to own and operate street railways. The incorporators are Frank M. McCulloch, Bertram W. Rosenstone and Claude O. Netherton.

***Olympian Springs Railway, Power & Light Company, Olympian Springs, Ky.**—Incorporated to build and operate an electric railway between Olympian Springs and Olympia, a station on the Chesapeake & Ohio Railway 4 miles from the springs. J. D. Wilson, Greensburg, Ky., is president, and A. J. Heliker, Louisville, and J. Frank Taylor, Glasgow, Ky., are stockholders. S. F. Crecilius, Louisville, is engineer for the company, which has begun a survey for the line.

***Quebec (Que.) Rapid Transit Company.**—Incorporated to build a system of radial lines from Quebec serving Limoilou, Beaufort, Charlesbourg, Rivière Jaune, Lake St. Charles, Indian, Lorette, St. Foy, Cap Rouge, Montcalmville, St. Grégoire, St. Anne de Beaupré and the Isle of Orleans. Nothing has been done in the way of arranging for construction. A. Taschereau, Quebec, is interested.

***Farmers' Traction Company, Sioux Falls, S. D.**—Incorporated in South Dakota with a capital stock of $350,000. The route of the proposed line has not been announced. Incorporators: Frank L. Richardson, E. Stout and H. F. Fellows.

FRANCHISES

Gadsden, Ala.—The Gadsden, Bellevue & Lookout Mountain Railway has received a street railway franchise in Gadsden.

Glendale, Cal.—The Pacific Electric Railway has received a fifty-year franchise to construct a street railway over certain streets in Glendale.

Pittsburg, Cal.—The Oakland, Antioch & Eastern Railway, Oakland, has received a franchise from the trustees to operate through Pittsburg.

San Diego, Cal.—The Los Angeles & San Diego Beach Railway, which proposes to electrify its line, has filed applications for franchises on the La Jolla division and the San Diego city division, which would extend the present franchises to Dec. 31, 1952.

San Diego, Cal.—The San Diego Electric Railway has filed an application with the City Council for a franchise to construct a double-track line from F and Twelfth Streets to El Cajon Avenue.

San Francisco, Cal.—The Ocean Shore Railroad has applied to the Board of Supervisors for a fifty-year franchise to extend its line from Twelfth Street south of Mission to the block bounded by Twelfth, Mission, Eleventh and Market Streets, on which it proposes to erect a terminal depot.

Bunker Hill, Ill.—The St. Louis, Belt, Bunker Hill & Eastern Railroad has received a franchise to construct an interurban line through the city.

Brainard, Minn.—George Reid, president of the Minnesota Central Railway, has applied to the Council for a street railway franchise in Brainard. [E. R. J., July 12, '13.]

Linden, N. J.—Application will soon be made by the promoters of the proposed Linden-Warner Station line for an electric railway franchise in Linden. [E. R. J., May 17, '13.]

New York, N. Y.—The Board of Estimate has adopted a resolution granting a franchise to the Brooklyn & North River Railroad for the construction and operation of a double-track street railway from Flatbush Avenue extension along Fulton Street to Nassau Street, in Brooklyn, and over the Manhattan Bridge to Canal Street, in Manhattan.

Everett, Wash.—The Northern Pacific Traction Company has received a franchise to construct an electric railway in Everett.

Huntington, W. Va.—The Huntington & Charleston Railroad will apply for a franchise for an extension in Huntington.

Huntington, W. Va.—The Ohio Valley Electric Railway will apply for a franchise to double-track several of its lines and build a new single-track line in Huntington.

TRACK AND ROADWAY

Northwest Arkansas Railway, Bentonville, Ark.—It is reported that the promoters of this company have arranged for a lease of the St. Louis-San Francisco Railroad tracks between Rogers and Bentonville, and will use them for the line which they expect to have in operation in the near future. The line will be extended at Bentonville out to the Park Springs Hotel, a distance of about 1 mile. The company secured franchises from Bentonville, Rogers and Cave Springs last fall, but nothing has been done up to the present time. Storage battery cars will be operated. H. L. Cross, Bentonville, is said to be interested in the project. [E. R. J., Dec. 21, '12.]

Fresno (Cal.) Traction Company.—This company has applied to the Railroad Commission for permission to build the Biola line. The grading has already begun and is well under way. The extension will be about 8½ miles in length, extending from Muscatel to the new townsite of Biola.

Clear Lake Railroad, Lakeport, Cal.—This company has applied to the Railroad Commission for authority to issue a sufficient amount of its stock and bonds to build an electric railway from Hopland, in Mendocino County, to Lakeport. There already has been expended on the project about $37,000, and it is estimated that there will be required to complete it the additional sum of $396,300. The surveys have been completed, and almost all of the rights-of-way secured. The company has an authorized capital stock of $500,000 and an authorized bond issue of $400,000.

San Rafael & San Anselmo Valley Railway, San Rafael, Cal.—S. J. Norton, who has completed the preliminary work for the building of the 6-mile line between San Rafael and San Anselmo, announces that a charter will be applied for at once. It is planned to operate storage battery cars for the present. The necessary franchises through the county and towns have been secured and the bonds filed. The company will be capitalized at $100,000. The following directors have been elected: E. S. Rake, S. J. Norton, A. E. Scott, Louis Peter, Prentiss Grey, Frederick Croker and Frank Riede. S. H. Cheda, president of the Marin County National Bank, was temporory treasurer. [E. R. J., Aug. 2, '13.]

Augusta & Edgefield Electric Railway, Edgefield, Ga.—This company plans to build from Augusta, Ga., north, via North Augusta, S. C., Ropers, Edgefield, Pleasant Lane and Kirksey, to Greenwood, 55 miles, with permission to use either steam or electricity for the motive power. C. W. Requarth, Charlotte, N. C., will have charge of the survey and obtaining right-of-way. There will be two bridges, one over the Savannah River at Augusta, Ga., and one over Turkey Creek. William P. Calhoun, Edgefield, is chairman of the survey committee.

Quincy & Western Illinois Railway, Quincy, Ill.—This company is said to have begun work on 3 miles of track for a belt line. Henry Dayton, Quincy, president. [E. R. J., July 6, '12.]

Hutchinson & Western Interurban Railway, Hutchinson, Kan.—This company has received permission from the Public Utilities Commission to issue stock to the amount of $375,000 and $1,500,000 in bonds. The proceeds will be used for the construction of its proposed interurban line between Hutchinson and Hudson. [E. R. J., Dec. 28, '12.]

Kansas Central Traction Company, Topeka, Kan.—This company has made arrangements for financing construction and will begin work on the proposed line Sept. 1. It will extend from Coffeyville to Parsons, through Edna and

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Altamont, with a branch from Altamont to Oswego. The main power plant will be located at Altamont. Philip Strack, Indianapolis, Ind., president; O. C. Randal, Altamont, treasurer. [E. R. J., June 15, '12.]

***Bowling Green, Ky.**—W. H. Brashear, Bowling Green, has projected the construction of a 3-mile electric railway from Bowling Green to Beech Bend Park, Ky. Either a power plant will be built or arrangements for current made with the Bowling Green Railway. It is also possible that the Bowling Green Railway will purchase and operate the line when it is completed.

Portland (Maine) Railroad.—The erection of a $1,000,000 bridge between Portland and South Portland is practically assured owing to the decision of the Portland Terminal Company, a corporation representing the Boston & Maine Railroad and the Maine Central Railroad to pay $400,000 toward the work. The county of Cumberland will pay $500,000 as its share of the bridge, and the Portland Railroad, which is to operate cars over the bridge, will give $100,000. The matter of constructing the bridge, or rather agreeing to the proportionate payment of all interested parties, has been a subject of legislative discussion for several years, and it was finally settled by the last Legislature.

Brandon (Man.) Municipal Railway.—The City Council has decided to extend the present lines, which have only recently been completed, on several streets.

Winnipeg (Man.) Electric Railway.—This company has under construction 8 miles of single track on various lines in Winnipeg and St. Boniface, and 6 miles of suburban track in St. Vital and Fort Garry.

Minneapolis, St. Paul, Rochester & Dubuque Traction Company, Minneapolis, Minn.—This company has awarded a contract for grading on 8 miles of its extension to Frederick & Barnard, Minneapolis, and sub-contracts to Dale & Baumgardner, St. Paul, and to McCollough & Cheney, Minneapolis. The company now operates a line from Minneapolis south, and plans to build an extension southwest, via Rochester and Cresco, toward Dubuque.

***Red Lodge, Mont.**—It is stated that the residents of Red Lodge have interested H. A. Glasmacher and C. L. Mayo, Seattle, Wash., in a plan to promote an electric railway from Red Lodge to the Bearcreek coal fields. The line would be about 6 miles long.

Manhattan & Queens Traction Company, New York, N. Y.—This company has received permission from the Board of Estimate to extend its line from the present terminus, at Fulton Street and Hoffman Boulevard, to the Long Island Railroad station at Guilford Street. The board acted favorably upon the engineer's report on the route of the Manhattan-Jamaica line.

New York & North Shore Traction Company, Roslyn, N. Y.—In an item published in the ELECTRIC RAILWAY JOURNAL of July 26, page 164, it was stated that the New York & North Shore Traction Company was considering plans to build a line between the railroad station and Great Neck Village. The company states that it is not contemplating the building of any such line.

Cleveland (Ohio) Railway.—The directors of the Cleveland Railway have accepted the franchise granted for the East Seventy-ninth Street cross-town line between Hough Avenue and Kinsman Road.

Columbus, Kenton & Toledo Traction Company, Kenton, Ohio.—Surveys have been completed by this company on its line between Columbus, Findlay, Richwood, Kenton, Toledo and Magnetic Springs. It will connect at Findlay with the Toledo, Bowling Green & Southern Railway. [E. R. J., Aug. 10, '12.]

Toronto & Eastern Railway, Toronto, Ont.—This company announces that the line from Bowmanville into Toronto will be ready for operation early next spring. The grade between Bowmanville and Pickering will soon be completed, and nearly four hundred men will be set at work on the grade from Pickering west of Toronto. The rails are already laid from Bowmanville, ½ mile west, and a large force of men are now to be placed at work laying the rails between Bowmanville and Pickering.

Medford, Ore.—Construction of an electric railway from Medford to Siskiyou Heights has been begun by S. S. Bullis & Sons, holders of an electric railway franchise in Medford. The line will be completed as far as the Heights by November. The company also has a franchise to construct a line in certain portions of Jackson County.

Portland Railway, Light & Power Company, Portland, Ore.—This company will begin the construction of a line through the residence district lying east of East Thirty-seventh Street to the city limits, and between Tillamook Street on the north and Hassalo Street on the south.

***Prineville, Ore.**—A contract has been closed by the citizens' committee, representing the business interests of Prineville and vicinity, and H. P. Shell, Tacoma, Wash., for the construction of a 30-mile electric railway from Metolius to Prineville.

Johnstown (Pa.) Traction Company.—This company is said to be preparing plans for double-tracking part of the Winder branch at King's Station, Johnstown.

Somerset (Pa.) Street Railway.—It is stated that G. C. Winslow has completed surveys and other preliminary work for the projected 45-mile line between Somerset, Rockwood and Johnstown. [E. R. J., Aug. 10, '12.]

Montreal & Southern Counties Railway, Montreal, Que.—The Board of Railway Commissioners has authorized the company to operate its cars, carrying passengers, baggage, express and other traffic over the Central Vermont Railway between the east end of its Southwark yards, St. Lambert and Richelieu, Que., 12 miles, and to use the Central Vermont Railway passenger and freight stations, yards and other facilities.

Three Rivers (Que.) Tramways.—Construction is about to be begun by this company, it being the intention to build about 7 miles of line on several streets in Three Rivers, Que., and also outside of the city to the Cap de la Madelaine. The authorized capital stock is $500,000, of which $400,000 has been subscribed. The officers are L. P. Normand, president; R. Bournival, secretary and treasurer, Three Rivers.

Regina (Sask.) Municipal Railway.—The Council has under consideration plans for the extension of the line into the Canadian Pacific Railway annex, crossing the Grand Trunk Pacific Railway at Thirteenth Street. The line is also being extended on Young Street to the new power house at Winnipeg and Twentieth Streets.

Dallas Southwestern Traction Company, Dallas, Tex.—The organization of this company, which proposes to build a 90-mile line from Dallas to Glen Rose, has been perfected by the election of the following officers: E. P. Turner, Dallas, president; William Poindexter, D. M. Sansom and C. A. Dunn, Dallas, vice-presidents; B. B. Cain, Dallas, treasurer; George Williams, secretary; E. M. Gleason, general manager. [E. R. J., July 26, '13.]

SHOPS AND BUILDINGS

Los Angeles & San Diego Beach Railway, San Diego, Cal.—This company, which proposes to electrify its line, has secured a site near Pacific Beach for its machine shops and carhouse.

San Diego (Cal.) Electric Railway.—A new carhouse, 200 ft. x 300 ft., will be erected at once by this company on University Heights. The buildings will be divided into three sections with fireproof walls. Each section will contain five tracks. The entire building will be equipped with automatic sprinklers. Accommodations for motormen and conductors also will be provided. The carhouse will have a storage capacity of 100 cars. The contract for the excavating has been awarded to M. D. Goodbody.

Manhattan City & Interurban Railway, Manhattan, Kan.—During the next few weeks this company plans to build a new carhouse in Manhattan.

Saginaw-Bay City Railway, Saginaw, Mich.—Plans are being made by this company to remodel its carhouse on North Washington Avenue, Saginaw. The work will include a new front and a second story, 80 ft. x 60 ft., to be used as offices. A reading room, 24 ft. x 30 ft., will also be installed, and there will be lockers and bathrooms. In the carhouse proper seventeen tracks will be installed with accommodations for 100 cars.

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Oregon Electric Railway, Portland, Ore.—This company has placed a contract with Moore Brothers, Portland, for the construction of a brick passenger depot in Eugene. The structure will cost about $25,000.

Philadelphia (Pa.) Rapid Transit Company.—The Unit Construction Company has received a permit to build a one-story and two-story motormen's and conductors' building for the Philadelphia Rapid Transit Company at Fifty-ninth Street and Callowhill Street. It will be 148 ft. x 140 ft. and it is estimated will cost $55,000.

Williamsport (Pa.) Passenger Railway.—Plans have been completed and bids will be asked shortly by this company for the construction of a carhouse in Williamsport. The structure will be one story high, 225 ft. x 50 ft., and will contain four tracks.

Eastern Texas Traction Company, Greenville, Tex.—This company has purchased a site in Greenville for an interurban station. The structure will be 54 ft. x 208 ft. and will contain a passenger station, ticket offices and general offices of the company.

Gray's Harbor Railway & Light Company, Aberdeen, Wash.—Work has been begun by this company on its new carhouse at Electric Park in Hoquiam. The structure will have concrete floors, steel frames and concrete roofs and will be 105 ft. x 110 ft. The carhouse of the company is at present located in Aberdeen, but is being moved to Electric Park on account of the greater convenience of handling the traffic.

POWER HOUSES AND SUBSTATIONS

Birmingham, Ensley & Bessemer Railroad, Tuscaloosa, Ala.—This company will add to its equipment considerable power plant and substation apparatus consisting of two 1500-kw Curtis turbo-generators with a 35-kw turbo-exciter and 50-kw motor-generator exciter set, two "spiro-flow" condenser equipments, one 500-kw rotary converter, transformers, switchboard panels and accessories. All the apparatus is being built and will be installed by the General Electric Company.

Los Angeles & San Diego Beach Railway, San Diego, Cal.—A power plant will be erected by this company near Pacific Beach.

United Railroads, San Francisco, Cal.—This company has ordered from the General Electric Company substation equipment consisting of a 1500-kw rotary converter, three 525-kva air-blast transformers and new switchboard apparatus.

Louisville (Ky.) Railway.—This company is interested in a plan of the city for straightening and deepening the channel of Beargrass Creek as a means of preventing floods. The power plant of the company, on Jacob Street, was seriously threatened by the high water which invaded that section last winter, though it was not actually put out of commission. By the new plan the danger from this source would be eliminated. The Louisville Railway will probably donate certain land to be used in the improvement work.

International Railway, Buffalo, N. Y.—This company has purchased from the General Electric Company a 1000-kw rotary converter, 1050-kw air-blast transformer and switchboard panels.

Interborough Rapid Transit Company, New York, N. Y.—The Westinghouse Machine Company has received a contract to supply the Interborough Rapid Transit Company with three turbo-generator sets of 30,000 kw each, the turbines to be manufactured by the Westinghouse Machine Company and the generators by the Westinghouse Electric & Manufacturing Company.

Philadelphia (Pa.) Rapid Transit Company.—This company has filed plans with the building department for a substation to be erected at Thirty-second Street and Dauphin Street.

Utah Light & Railway Company, Salt Lake City, Utah.—This company will add to its substation equipment a 560-kva, 720-r.p.m. three-bearing motor-generator set and four 300-kw transformers, switchboard panels, etc., the order for all of which has been placed with the General Electric Company.

Manufactures and Supplies

ROLLING STOCK

Halifax (N. S.) Electric Tramway has ordered six 21-ft. car bodies from the Nova Scotia Car Works.

Citizens' Traction Company, Oil City, Pa., is reported as expecting to purchase new equipment.

Washington (D. C.) Utilities Company is in the market for five 50-ft. center-entrance double-truck interurban cars.

Peoria (Ill.) Railway has placed an order with the St. Louis Car Company for four passenger cars mounted on No. 99-B single-motor trucks.

Bartlesville (Okla.) Interurban Railway has placed an order with the St. Louis Car Company for one 21-ft. car body, mounted on its No. 72 trucks.

Meridian Light & Railway Company, Meridian, Miss., has placed an order with the Southern Car Company for four semi-steel, single-truck car bodies.

Clinton (Ia.) Street Railway has placed an order with the St. Louis Car Company for seven 40-ft. passenger cars mounted on St. Louis-Warner trucks.

Indianapolis Traction & Terminal Company, Indianapolis, Ind., has ordered twenty-five 33-ft. 2½-in. double-truck, closed cars from the Cincinnati Car Company.

Chicago, Ottawa & Peoria Railway, Peoria, Ill., noted in the ELECTRIC RAILWAY JOURNAL of Aug. 2, 1913, as expecting to purchase three interurban cars, has ordered these cars from the St. Louis Car Company.

Interurban Railway & Terminal Company, Cincinnati, Ohio, has placed an order with the Cincinnati Car Company for five 50-ft. combination passenger, smoking and baggage cars and two 50-ft. express cars.

Decatur Railway & Light Company, Decatur, Ill., noted in the ELECTRIC RAILWAY JOURNAL of July 19, 1913, as being in the market for four double-truck cars, has ordered these cars from the St. Louis Car Company.

Peninsular Railway, San José, Cal., noted in the ELECTRIC RAILWAY JOURNAL of June 2, 1913, as expecting to purchase eight interurban cars, has ordered these cars from the Jewett Car Company. These cars, which will have a seating capacity of sixty-four, will have a length over all of 55 ft. 6¼ in., a width over all of 9 ft. 8 in., and will be equipped with four 150-hp, 308-D-3 Westinghouse motors.

Chicago (Ill.) Railways, noted in the ELECTRIC RAILWAY JOURNAL of July 26, 1913, as having ordered fifty cars from the Southern Car Company, has specified that these cars are to have a seating capacity for fifty-eight persons, to weigh about 37,000 lb. complete, wheelbase 21 ft., length of body 32 ft. 5 in., length over all 48 ft. 5 in., width over all 8 ft. 6 in., height sill to trolley base 8 ft. 10½ in. The body will be of wood and metal and the underframe entirely of metal.

TRADE NOTES

W. R. Kerschner, New York, N. Y., has been appointed Eastern sales manager for the Keyes Products Company, manufacturer of the Neva-Split panel for car-head linings.

Edison Storage Battery Company, Orange, N. J., has appointed H. S. Thompson vice-president. Mr. Thompson was formerly manager of the railway department of the company.

Galena Signal Oil Company, Franklin, Pa., has appointed J. C. Tipton as Canadian representative of the company with offices in the Shaughnessy Building, Montreal, Que., succeeding A. Lichtenheim, deceased.

Tungstolier Works of the General Electric Company, Cleveland, Ohio, have moved their general offices from Conneaut, Ohio, to the above address, where a salesroom for wholesale business will be maintained in the Euclid Building.

Hall Switch & Signal Company, New York, N. Y., has opened a branch office in the new Birks Building, Montreal, Que., in charge of B. H. Richards. Previous to this time all Canadian business of the company has been handled through its main office.

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Atlas Preservative Company of America, New York, N. Y., has received recent large orders for its Atlas-A weed killer and track preservative from the Connecticut Company and the Northwestern Pennsylvania Railways, which is being applied under the supervision of the company.

William Wharton, Jr., & Company, Inc., Philadelphia, Pa., have announced the opening of a branch office in the Chandler Building, Atlanta, Ga., in charge of H. F. McDermott as engineer and district sales manager to handle their business in that territory.

St. Louis Surfacer & Paint Company, St. Louis, Mo., was noted in the ELECTRIC RAILWAY JOURNAL of Aug. 2, 1913, through error, as having lost its entire plant by fire. While the company did suffer considerable loss by this cause it is still doing business and filling orders with its usual promptness.

Railway Products Corporation, Buffalo, N. Y., has filed papers of incorporation. Its capital is $300,000. It will manufacture and sell railway products, railway cars, passenger, freight and street cars and equipment, appliances and accessories. The directors of the company are: Thomas B. Wheeler, Christopher M. Baldy, George V. Harmon and Guy Williams, all of Buffalo.

Dossert & Company, New York, N. Y., report a large increase in the exports of their solderless connectors. They have recently completed orders for the Manila Electric Railway & Light Company in the Philippines; the Sao Paulo Tramway, Light & Power Company, Brazil; the Trans-Isthmian System, Panama, and for installations in Cuba, Chile and Japan. The order for Sao Paulo is the largest export shipment ever made by Dossert & Company, totalling 8000 connectors for conductors ranging in size from No. 8 to 500,000 circ. mil.

George H. Anger, managing director of the Anger Manufacturing Company, Preston, Lancashire, England, will sail for New York on Oct. 5, 1913, in the interests of his company. Mr. Anger will attend the convention this fall of the American Electric Railway Association, where the Anger improved automatic brake adjuster will be exhibited by the Ackley Brake & Supply Company, which is sole manufacturer and agent for this device in the United States. Later Mr. Anger expects to take an extended trip visiting many of the electric railways in Canada.

General Electric Company, Schenectady, N. Y., has recently received orders for four-motor car equipments and straight air brakes from the following companies: Capital Traction Company, Washington, D. C.; Cedar Rapids & Marion City Railway, Cedar Rapids, Ia.; Tri-City Railway, Davenport, Ia.; Alton, Granite & St. Louis Traction Company, East St. Louis, Ill.; Virginia Railway & Power Company, Richmond, Va.; Springfield (Ohio) Railway; Bay State Railway, Boston, Mass.; Detroit (Mich.) United Railway; Atlantic City & Shore Railroad, Atlantic City, N. J.; Belt Line Railway Corporation, New York, N. Y.

Electric Service Supplies Company, Philadelphia, Pa., has placed on the market a car-lighting switch of improved design to provide for the increased capacity required by modern car-lighting installation. The adoption of a switch mechanism rated at 5 amp gives sufficient capacity to control several series of lamps. This mechanism is of the barrier type which will successfully handle 600 volts at considerably above the rated ampere capacity. This is accomplished by operating the switch blades in a narrow slot between two porcelain barriers, allowing a very small air space which is virtually a vacuum and which the arc cannot follow. Spring clips provide for a 5-amp inclosed fuse which may be quickly replaced. These switches have bases 3⅛ in. by 4 in. and are 1⅞ in. deep, with a cover in place, excluding the handles. The bases, covers and handles are made of chocolate-colored porcelain presenting an attractive appearance.

ADVERTISING LITERATURE

Esterline Company, Indianapolis, Ind., has recently issued Folder No. 272, illustrating and briefly describing its graphic meters. Many applications for these instruments are shown.

Railway Utility Company, Chicago, Ill., has issued illustrated Catalog No. 400, which describes the economy secured by its utility electric thermometer, which controls electric car heaters.

Ohio Brass Company, Mansfield, Ohio, has issued its *O-B Bulletin* for June-July, 1913, which contains leading illustrated articles on "A Trip Over the Liberty Bell Route" and "A Notable Transmission Project."

Union Electric Company, Pittsburgh, Pa., has issued a price list and discount sheet covering its lines of electrical supplies and apparatus. The booklet is well printed and the arrangement of headings excellent.

Wendell & MacDuffie Company, New York, N. Y., has issued a very attractive pamphlet entitled "A Job for the Russell," describing the Russell snow plow and containing a series of interesting photographs which are self-explanatory in illustrating the efficiency of this snow plow.

Union Switch & Signal Company, Pittsburgh, Pa., is issuing Bulletin No. 68, which explains that the company has established a copy service department to aid such of its customers as wish to avail themselves of its service in the preparation of copy for advertisements, write-ups for news stories, booklets or other descriptive matter by which the attention of the public may be drawn to signals. The service will be entirely free to those who use the apparatus of this company.

The J. G. Brill Company, Philadelphia, Pa., prints in the July, 1913, issue of the *Brill Magazine* an illustrated biography of Constantin de Burlet, president of the International Union of Tramways & Local Railroads. Among the feature articles are the following: "Conditions Which Govern the Type of Car for City Service in Jersey City, N. J.," "Santa Barbara, California, Adopts the Center-Entrance Car," "Further Use of Prepayment Principles by Detroit United Railway," "Fast Autobus Service in the Lehigh River Valley," "Single-Truck Prepayment Cars with Straight Sides in Muscatine, Iowa," and "New Design of Prepayment Car for Springfield, Ill."

General Electric Company, Schenectady, N. Y., has issued Bulletin No. A4093, which describes its generators for electrolytic work and supersedes its previous bulletin on that subject. Bulletin No. A4124 contains a detailed description of its automatic starter for alternating-current motors and automatic control panels for squirrel-cage induction motors and slip-ring induction motors, float switches for remote control of automatic starting panels or rheostats and pressure governor panels, also for remote control. Bulletin No. A4130 describes and illustrates its adjustable speed direct-current motors, designed to meet the requirements of individual drive of machine tools. Bulletin No. A4135 describes its lightning arresters for electric railways. Bulletin No. A4139 gives a detailed description of its central station oil switches of high rupturing capacity. The switches are both automatic and non-automatic and for voltages from 15,000 to 70,000. The bulletin also contains a large list of central stations in which these switches are in use.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., has just issued Leaflets Nos. 3572 and 3660, covering the electrification of the New York extension of the Pennsylvania Railroad and the New York, New Haven & Hartford Railroad, respectively. These leaflets cover the salient points of both roads together with a description of the more important parts of the equipment. They are well illustrated and contain maps showing the territory covered by both of the electrified systems. Descriptive Leaflet No. 3571 describes in some detail the commutating-pole rotary converter, explaining its advantages with particular reference to the commutating pole and the method of starting. "Electric Arc Welding Processes" (catalog section 3049), issued by the industrial and power department of the Westinghouse Electric & Manufacturing Company, is a reprint of an article which appeared recently in the technical press by C. B. Auel, director of processes, standards and materials of the company. This paper, which is well illustrated, explains in an interesting manner the different processes employed in are welding, their advantages and limitations, and gives some interesting figures of comparison of arc and blacksmith welding.

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Electric Railway Journal

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FACTORY RUSH-HOUR TRAFFIC

A number of efforts have been made in different cities to bring about a diversity of traffic movement in factory districts during the rush hours. In these districts it is usually the custom to open and close factories at the same hour. This creates a condition that is so trying to street railway operators that the co-operation of owners of factories has been asked in order to establish, if possible, slight differences in opening and closing hours. The effect of these, of course, would be to allow the street railway company, say, five or ten minutes' leeway after it cared for the traffic of one factory before the next factory rush occurred. Such a change is in the interest of the factory employees just as much as of the company, and it is also in the interest of the general riding public in the community. Inasmuch as factory owners generally have been unwilling, when approached by the company, to make changes in their hours to effect the improvement desired in this direction and it is a matter of general public concern, we suggest that it be taken up through the public authorities in places where the conditions are particularly trying. This could be done appropriately in cities or states where the public authorities have assumed a large measure of control over the operation of cars, even if it is not undertaken in other cities where virtual control of the operation is still retained by the company.

SAFEGUARDING POWER STATION PASSAGEWAYS

Among the minor features of power-station work which are often overlooked in betterment studies, the safeguarding of passageways deserves emphasis. Under normal conditions platforms and runways may be used without the least approach to an accident for months at a time, but under the stress of a machinery breakdown haste in movements from one part of the plant to another succeeds the ordinary pace, and unless passages are continuous and free from obstructions the results may be serious. In a representative case the runway in a boiler room consisted of a double line of planks laid across the tops of the successive boilers. The runway changed direction twice, and, as it was in a dark location, the danger of falling upon the tops of the boilers in case of a misstep was great. Further, safety valves on two boilers were so placed that should they blow while a man was on the runway he might be swept off or badly scalded. Finally, the runway had been moved about 3 ft. out of line of a permanent iron ladder, so that in case the lights failed or in the event of a safety valve blowing with a man on the boiler a bad accident was easily possible. A straight runway with a solid hand rail was built and the latter placed at the end of the new structure. The cost of placing toe boards around the edges of platforms and runways so that loose tools and materials cannot be knocked off upon persons working below and of keeping all passageways free from accumulated nails, wood and other refuse is so small that there is little excuse in this direction for oversight which may lead to distressing and expensive casualties.

CONSERVING LABOR SUPPLY

One of the Eastern trunk lines has found it necessary to take steps to conserve its source of labor supply by appointing an expert to investigate the foreign labor on its lines, more particularly the Italians. The latter, not so long ago considered among the less desirable of day laborers, are now so highly regarded that the railroad wants to keep those whom it has and draw others into its service. The first duty of the labor expert will be to make the Italian laborer feel that the road takes an interest in his welfare, considers him "one of the family" and wants to know when he has anything to complain about. This is a radical change in the usual attitude toward the day laborer and one that is worth thinking about. Up to the present the foreign laborers on maintenance and construction work have existed in the minds of managements and contractors mainly as so many numbered brass tags, but perhaps this is one reason why this class of labor has been so unsatisfactory. Modern humanitarianism and the effort to establish a good understanding between employer and employed has gone only so far down the line. It has stopped before it got to the day laborer. Now, either because humanitarianism is expanding or because labor of any kind is getting scarcer, the desire to go clear to the bottom is manifested in the striking way already noted. There may be a suggestion in the incident for other employers who upon consideration may find, as did the steam road in question, that they know little or nothing about the lives, the troubles or even the names of their foreign laborers, and that this information once obtained and used as the basis for a better understanding would be productive

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of more loyal and better service. To expect loyalty and good service from an employee in whom the employer takes so little interest that even his name is unknown is to ask too much of human nature, whether it is domestic or imported.

SPECIAL SPECIFICATIONS

In the purchase of equipment the problem of preparing suitable specifications is intimately connected with the initial cost of the selected apparatus and for this reason deserves thorough and critical study. Operating men without factory experience seldom realize how much it costs to depart even in small details from so-called standard apparatus in the manufacturing plant, and unless such departures can be supported by the best of reasons they are little less than luxuries. Nothing could be simpler to the purchaser in the average case, for instance, than the production by the manufacturer of standard transformers supplied with voltage taps multiplied according to the whims of the prospective user. Electrically it would seem to be feasible to bring out from three to a dozen taps without the slightest difficulty; yet, when the designer faces the problem, the question of suitable insulation and above all the provision of sufficient space, the use of existing case sizes, selection of bushings and the availability of tools and jigs must all be thought over in seeking to produce the equipment at a reasonable price. The same condition has notoriously existed in the past in connection with rail sections. The variety of opinions of city engineers and railway engineers as well as to the proper form of head has resulted in an unnecessary multitude of forms of rail heads.

Again, in purchasing car bodies from reliable builders too much care cannot be taken to avoid specifications which insist upon trifling modifications in dimensions which are not vitally necessary and which tend to increase the first cost of the rolling stock. The average manager and master mechanic must fall back upon the experience of the specialist in these matters and accept the recommendations of the latter sometimes when local and personal notions would perhaps dictate modifications not really essential from well-tried designs and types of construction. Initial specifications often can be modified to advantage by informal consultation with prospective bidders, and the time required to go over these matters is well spent. Naturally, each bidder desires to have the special features of his product which are the chief basis of its worth incorporated in invitations for tenders, but the commercial instincts that prompt this desire need not be given sway by the prospective purchaser. There is no getting away from the fact that before purchasing can be done along the most efficient lines existing manufacturing standards and resources must be thoroughly canvassed. Otherwise, insistence upon unimportant modifications in details may run the price up 25 or 33 per cent and extend the date of delivery to inconvenient lengths. Special equipment has its proper place, of course, and without it no progress would be made; but a good many engineers of the less experienced sort have yet to learn that where stock material and apparatus will fill the bill satisfactorily, nothing short of unusually compelling reasons should be allowed to cause such equipment to be forsaken.

PUBLICITY IN THE ELECTRIC RAILWAY FIELD

Although we have at various times emphasized the value of publicity in regard to electric railway companies, the subject is of such importance that even one more reiteration will scarcely suffice. As noted in another column of this issue, the associate editor of the Cleveland *Plain Dealer* recently congratulated the Cleveland Engineering Society on its friendly attitude toward newspapers and assured it that "this alliance is highly gratifying on the newspaper side of the once impassable dead line." Such a union of interests between engineering and newspaper work is praiseworthy indeed, and we hope that it is indicative of an ever-increasing desire on the part of engineering organizations and public utilities to respond cordially to overtures from the newspapers.

The word "overture" is used advisedly, for only recently direct attempts have been made by two important metropolitan newspapers to secure business and technical news. The Philadelphia *Public Ledger* has established in various sections of the country men whose sole business it is to cover the financial, commercial and industrial news in their respective localities. The New York *Times* has adopted a slightly different method in making a general appeal direct to the public for "business news that interests business men everywhere." "Business news in New York," says the announcement of the business news department, "vitally concerns the business man in Seattle, Denver, New Orleans and Bangor, and vice versa; there is no sort of news so directly affecting so many Americans and no class of news the public can furnish so well." These are certainly steps more than half-way to form a connection with the great throbbing lives and centers of business activity in this country, and such a response as has been manifested in Cleveland should follow these other appeals. The plan of the American Electric Railway Association, as outlined in these columns, to compile monthly reports of financial operations and other statistics for public dissemination, and thus to counteract popular misconceptions concerning electric railways, is another case in point and shows the willingness of the electric transportation companies to meet the demands of the daily press for this class of information. It remains now only for individual companies to learn what information the newspapers desire and to supply it.

Of course, any steps marking a change of conditions, even toward improvement, will meet with some opposition. Thus, at a recent hearing before the Texas Railway Commission, a member of that body attempted to criticise the railroads of Texas for having made large outlays for newspaper advertisements giving their side on disputed points on the ground that the public in paying the railroads' expenses would be called upon to pay for its own education. Such an objection is absurd. If utilities appeal to the public it is good evidence that their cases are strong, and the public is glad to have all the facts. The fundamental idea underlying advertising and publicity, too—that of establishing a permanent prestige—demands absolute truthfulness, and the very fact that it obliges a manager to consider his case from the standpoint of the public and outline his attitude in a way which will carry instant conviction to those who read what he has to say may lead him to

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see certain phases of his policy in a different light and to make some changes in it. Altogether, the plan is good for all concerned.

THE SYSTEM OF THE CONNECTICUT COMPANY

The extended article upon the transportation features of the Connecticut Company published elsewhere in this issue possesses especial interest at this time on account of the recent criticism by the Interstate Commerce Commission upon the ownership of these lines by the New York, New Haven & Hartford Railroad Company. Whether one agrees with the wisdom from a financial standpoint of the purchase of these lines or not, he cannot but be impressed with the broadness of the conception from a transportation standpoint which initiated the acquisition of these properties. At the time when their purchase was begun upon a large scale, the New Haven Railroad, owing to a series of consolidations, had come into possession of practically all of the steam railroad mileage of the State, and its prosperity became peculiarly dependent upon that of the community which it served. The idea, once held by some, that the trolley lines in Connecticut formed or might form a nucleus for a through competitive line between New York and Boston had passed away. Their light construction, their use of the streets in the city and of the highways in the country and their consequent slow speed and inability to transport heavy loads forbade their use for any such purpose. As rivals and as competitors of the New Haven Railroad for any business which that road could profitably carry they were insignificant. But as allies and feeders to the steam railroad lines they could be made to be very helpful to it if developed systematically and as a comprehensive unit with the large financial resources possessed by the New Haven Railroad.

A glance over the reports of Mr. Mellen to the board of directors at the time of the inauguration of this policy of acquisition shows that one underlying reason for it was the industrial condition in the State. Although the average density of population in Connecticut is large, the industrial activity and the greater part of the population are in the large cities which are located on the shore and in the valleys of the three rivers which cross the State. That is to say, the development of this character in the State as a whole has been along a few definite arteries of travel. On the other hand, in many other parts of the State, and especially in the rural districts, there are some evidences of a decrease in population during the past few decades, as in many other sections of New England. The cause has been a lack of transportation facilities and a sterile soil, which together have caused a large part of the original farming population to settle in the cities or else take up agriculture in the more fertile regions in the West or Northwest.

The reclamation of these abandoned farms, either for their original purpose or as homes of those who desire to live part or all of the year in the country, and the repopulation of other sparsely settled parts of the State seemed therefore the logical function of the trolley lines from the broad standpoint of the development of the State as a whole. It was also one which, up to within the last few months at least, would have been regarded as sound political economy, because it tended to the conservation of capital in the development of the transportation facilities of the State. The railroad as a whole would be benefited because any loss through this pioneer and development work incurred by the trolley lines would be more than recouped through the increased demands for transportation which the larger population and industrial activity would bring to the steam lines. Finally, the territory seemed particularly well adapted for such a development, because of its compactness, and to possess the characteristics which have always been associated with those suitable for the establishment of a "natural" monopoly.

The correctness of this theory has been proved by the results, certainly so far as the communities served are concerned. The trolley lines have been combined into a harmonious whole, as the map showing the extensions built under the New Haven management and published in this issue shows. The physical condition has been greatly improved under a policy which considered the future more than the immediate present, and standards for cars and other parts of the equipment have been adopted. Finally, short sections of steam railroad track have been used for trolley service where such a plan seemed desirable in the interests of general efficiency. Some business may have been deflected from the steam railroad part of the system as a result of these changes, but most of the trolley traffic is composed of passengers who would not, in any event, have used the steam roads. We are glad to learn also that from an investment standpoint as well the policy has proved satisfactory. The task was a large one and from many points of view was conducted under very disadvantageous conditions. Nevertheless, the properties are already practically earning the interest on their purchase price in spite of very liberal charges for maintenance, and as further use is made of the improvements already installed this profit should grow. That the system is meeting the needs of the community is shown by the increase in gross earnings, which were 32.6 per cent greater in 1912 than in 1907, or an increase of 6½ per cent per year. This is in spite of the facts that most of the large city properties were acquired before 1907 and that the additions in trackage since that date have been largely of a suburban character.

One of the most notable features of the statistics of the Connecticut Company, published in this issue, is the possibility of comparing the extent to which the frequent service provided by electric cars will develop traffic between two cities whose interurban service was previously provided by steam trains at infrequent intervals only. Such a situation exists in the case of Meriden and Middletown, towns of 33,000 and 21,000 inhabitants respectively, located some 12 miles apart. The line between these two cities was formerly operated by steam, and in the last year of steam operation 4433 passengers were carried. In 1908 the line was equipped electrically, and during the past fiscal year the total number of through passengers on the electric cars between Meriden and Middletown was 330,250. These figures are very significant of the possibilities of electric traction and the kind of work which is being done by the Connecticut Company in furnishing transportation to parts of the State and over routes which practically were without facilities of this kind before.

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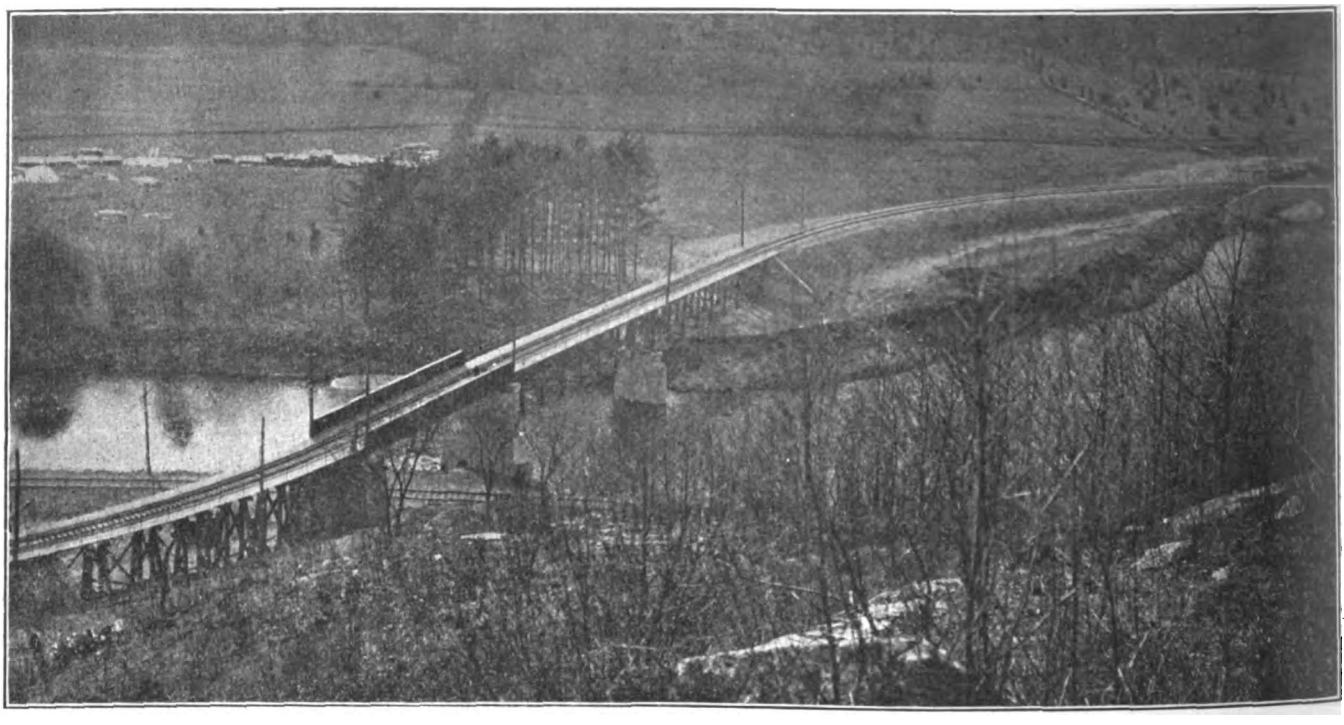
Traffic Improvements of the Connecticut Company

An Account of the Consolidation of the Various Trolley Lines in Connecticut Which Resulted in the Organization of the Connecticut Company—An Analysis of the Financial and Operating Results Secured

The Connecticut Company is one of the main operating constituent organizations of the New York, New Haven & Hartford Railroad Company's system. It is a combination of local, suburban and interurban electric railway properties developed so as to supplement to the best advantage the through service afforded by the strong railroad corporation by which it is controlled. It is one of the most conspicuous examples in the country of that form of control of electric properties.

This article is not concerned with the policy of expansion adopted by the controlling corporation in other directions, except that its action in respect to the electric railway lines in Connecticut may be taken as indicative of its general broad purpose. Viewed from the standpoint of the present day, the policy of control of other avenues of transportation appears to have been, in part at least, a matter of development. When the company first began to develop this policy, a few properties were bought in individual instances where acquisition seemed to be justified. The individual properties needed connections with other parts of the system, and this led to further purchases, with the final result that the present large property was formed. When the greater policy of expansion was adopted, however, the acquisition of properties proceeded steadily until the outlines of the present comprehensive system had been completed.



Connecticut Company—General View of Steel Bridge Over Naugatuck Railroad and Naugatuck River Near Thomaston

The first electric railway acquired by the New York, New Haven & Hartford Railroad was the Stamford Street Railroad, which was bought in June, 1895. About the same time the Nantasket Beach Railroad, with 7 miles of track, was electrified. In October of that year the company bought control of the Meriden Electric Railroad Company. These were small properties and of very little importance compared with the operations of the system as a whole. No other line was bought until September, 1902, when the control of the Worcester & Connecticut Eastern Railway Company was acquired.

Policy of Electric Railway Control

As a matter of fact, it was not until the election of Charles S. Mellen as president of the New York, New Haven & Hartford road that a sharply defined policy on the subject of electric railway control was developed by this company. Up to that time there had been investments in the few localized properties mentioned, but no such widespread acquisition of properties as took place afterward. Mr. Mellen was elected president in the fall of 1903, and in the spring of the following year the company acquired the capital stock of the Fair Haven & Westville Railroad Company, which controlled the city street railway system in and about New Haven, Conn. Steps looking to the corporate unification of the few street railway properties controlled by the corporation were taken shortly afterward, and in his annual report for the fiscal year ended June 30, 1904, Mr. Mellen stated that all of the interests acquired by the company in street railways had been transferred to the Consolidated Railway Company, whose capital stock was owned by the New York, New Haven & Hartford Railroad Company. He added:

"So far as the operation of the properties since their acquisition discloses anything, the investment appears to be a wise one from a financial standpoint and it protects and supplements the system of roads operated by your company in a way that must be of great value in the future."

The incorporation of the Consolidated Railway Company was evidently arranged in anticipation of continued expansion.

The Fair Haven & Westville Railroad stock, as stated, was acquired in April, 1904. From July to September,

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1904, the company bought the group of properties in and about New London and Norwich, consisting of the Norwich Street Railway, the Montville Street Railway and the New London Street Railway. Toward the end of the same year the control of the Middletown Street Railway was bought. These properties were acquired directly by the newly formed Consolidated Railway Company. In January, 1905, the control of the Greenwich Tramway Company was acquired, and about the same time the control of the New York & Stamford road was purchased. Between April and July, 1905, the company purchased the control of the Hartford Street Railway, the Suffield Street Railway and the Branford Light & Water Company.

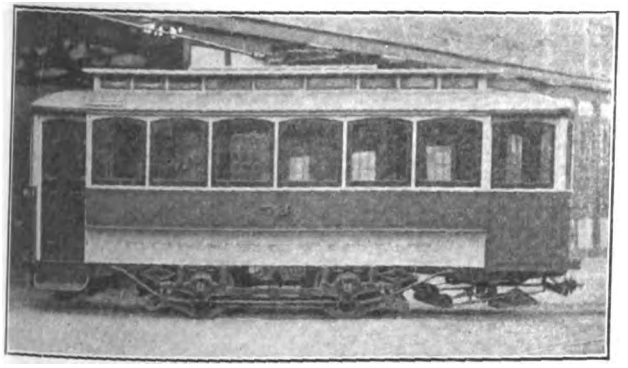
The increasing scope of the operations of the Consolidated Railway Company is shown by the fact that in the year ended June 30, 1905, its gross earnings were $4,567,979. Mr. Mellen said in his annual report for that year:

"Considering that the year was the one wherein the system of roads was acquired and merged, and that the advantages of concentrated control and the economies resulting were not available, there is every reason for satisfaction at the showing and confidence of improvement in the future."

In October, 1905, the control of the Willimantic Traction Company was bought. In January, 1906, the Hartford, Manchester & Rockville Street Railway and the Stafford Springs Street Railway were acquired. In June of the same year the Torrington & Winchester Street Railway Company was secured. The purchase of the stock of the Meriden, Southern & Compounce Tramway Company took place in December, 1906, while the control of the Waterbury & Pomperague Valley Street Railway, which was then under construction, was acquired in April, 1907.

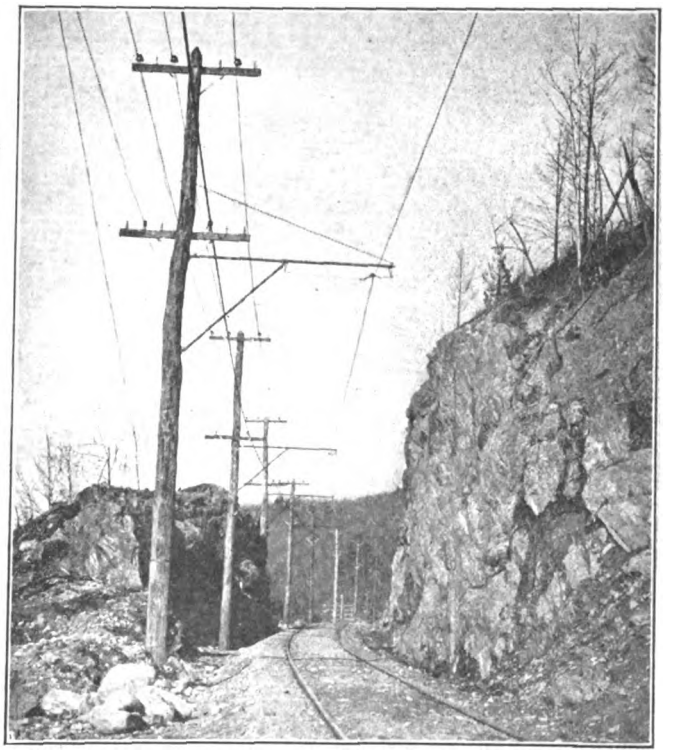
During the same period the company was acquiring control of electric railways in other parts of New England reached by its lines. The principal system acquired about this time was that of the Connecticut Railway & Lighting Company, the property of which was leased by the Consolidated Railway Company on Dec. 19, 1906, for a period of 999 years from Aug. 1, 1906. At the time of acquisition this property consisted of 193 miles of urban and suburban electric railway lines, together with various electric lighting and gas plants located at different points in the State of Connecticut. In speaking of the acquisition of the properties of this company and several other properties of the same class, Mr. Mellen said in the annual report for the year ended June 30, 1907:

"It is believed these properties in themselves will eventually become a source of profit, though a deficit in the returns from their operation was estimated to result for a short time immediately following their acquisition. Their control was important to the protection and growth of other properties in which your company was largely interested, and the increased value of these properties should more than offset any direct loss occurring."



Connecticut Company—Type of Old Car Retired from Service

It may be assumed that the general purpose in the beginning was the acquisition of lines that were either competitors of the steam road or had potential possibilities of competition in the future. In this case, however, as in the other notable instances of the acquisition of electric railway mileage by stronger steam railroad corporations which felt that the newer lines were encroaching upon their territory, the point of view changed when the purchase was perfected. Where it had been believed before the purchase took place that the logical place of the electric lines in the transportation activities of the localities would be to supplement the activities of the steam railroad lines, it was found that the best ends of the unified property and of the public as a whole were frequently served by complete subordination of the steam railway lines in certain localities to the electric railway lines. It was found in other localities that transportation facilities were better if the electric railway lines were subordinated to steam railway facilities. In still other places it was found that steam railroad mileage could be made to serve the best ends if it was electrified and used by the electric lines for the same character of service that they were giving in other places. In other words, experience showed that an actual merger permitted a form of development whose possibilities had not been fully appreciated in the beginning, and this was carried out without the duplication of facilities that would have existed if the properties had been developed along like lines under separate instead of combined ownership.



Connecticut Company—Rock Cut Near Beacon Falls

POLICY ACTUATING PURCHASE OF PROPERTIES

Writing in regard to the policy of the company as it existed on Jan. 4, 1908, Mr. Mellen said:

"With regard to the trolley lines that have been acquired since I came to this property, that is, since Nov. 1, 1903, let me say: They were acquired under a general plan which was adopted by our board of directors, that the trolleys were desirable as feeders to the steam lines, that they collected traffic through their frequent service and brought the same to points from which the steam service could be used, and thus developed adjoining territory and made the steam railroad of itself more prosperous. Likewise they distribute the traffic brought to various points of connection by the steam railroad lines.

"They were being developed in a desultory sort of way

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and not upon lines calculated to promote the best results, and, after long consideration, it was thought desirable they should be developed more vigorously and with a view to supplementing existing steam transportation lines.

"It is further my own opinion, and in that I may say I am supported by my associates in the board of directors, that the ultimate system of suburban development is by the trolley, and the interchange between cities in close proximity will be best promoted by the service upon the street railway lines in the various cities, thence by high-speed transportation through use of the steam railroad tracks between cities, and we have been hoping, and still believe, there will ultimately be such a use of the steam railroad tracks, whereon electric lines may be run on frequent headway—that is, at five, ten, fifteen or twenty-minute intervals, as the amount of traffic will justify—and thus there be established that ideal intercommunication between congested localities which is most desirable for their development.

"Particularly, I would call attention to the situation in the Berkshires; that is, in western Massachusetts. There is a locality greatly endowed by nature that has lain fallow and dormant for a century. A few spots are highly developed, but the outlying districts, through lack of transportation, are probably as little developed to-day as was the case fully a hundred years ago; indeed, I am inclined to think that in many localities, judging by the remains of industries that were formerly prosperous but are now abandoned, the situation may have been more highly developed industrially a hundred years ago than at the present time.

"It was the intention of our company in acquiring the Berkshire Street Railway, had we not been interfered with by the opposition of the Commonwealth of Massachusetts, to extend branch lines into the various outlying country districts, where the natural advantages would attract people in the selection of summer homes, and thus have greatly assisted in the development of that territory, which probably is as accessible as any other district for this purpose and has greater natural advantages than any other territory accessible to the great metropolitan district of New York.

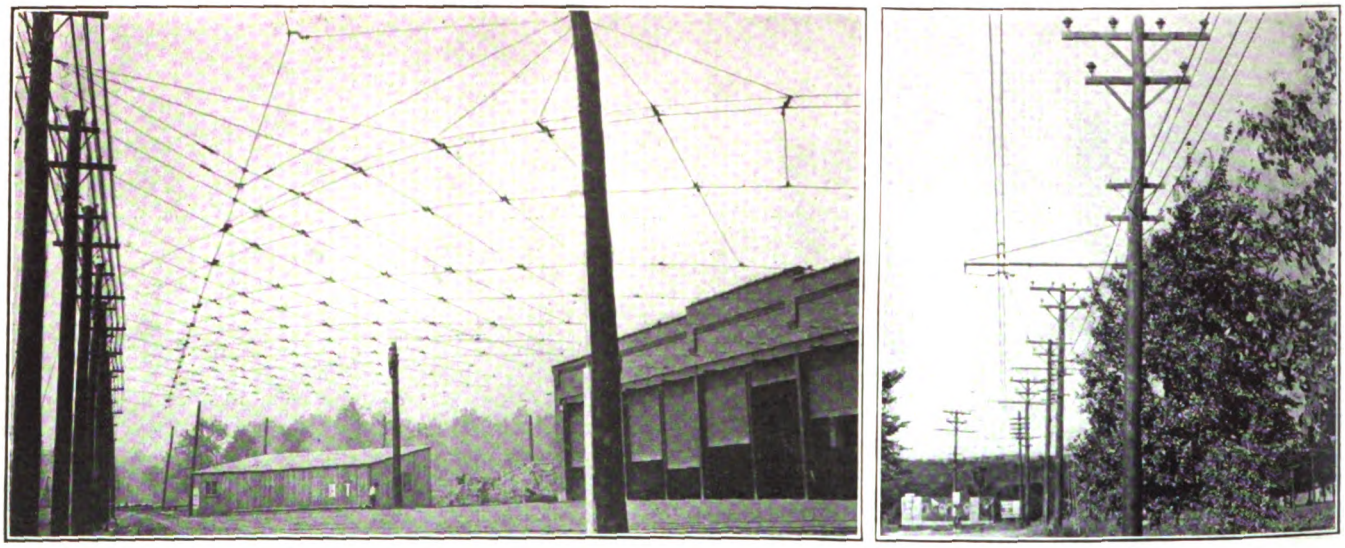
"In the policy to which I have alluded we were not working without thought of gain, although we were well aware that the electric lines of themselves could never probably be profitable investments, but, owning and operating as we do a line by steam from the same district to New York City, we believed the development of the territory in question would greatly increase the value of the business done upon the steam line, and thus indirectly would recover more than the direct loss through the non-paying electric lines.

"It is absolutely necessary if the Berkshire country is to be developed, as would seem to be most desirable in the interest of every one, that it be by some company having the money and disposition to lose the direct return for the benefit of the indirect one, and I believe no other company is so situated that it can afford to do what our company would like to.

"I think an examination will result in the conclusion being formed that no part of the trolley lines of New England has been more highly developed or better kept as an efficient agency of transportation than have those that have been acquired by the New York, New Haven & Hartford Railroad Company. Not only has the physical condition been greatly improved, but the equipment and the service generally have been improved as well, and this has been done in most instances to the detriment of the immediate net return; in other words, the properties have been handled with a view to the ultimate return, rather than a present one, and they have been built up, generally speaking, in all respects as a result of their acquisition by our company, and for that reason have not been showing in net results the return they will in a short time.

"Indeed, had it not been for the necessity the company was under, after having acquired many of the properties, of practically rebuilding them, and including largely the expense of such rebuilding in the cost of operation, the properties of themselves would have returned to the treasury of our company in excess of the interest upon their cost. This is particularly true of one large property acquired in Connecticut, and it will be several years before the expenditures necessary for the rehabilitation of the same will be at an end and the cost of that rehabilitation will be included in the operation and maintenance expense of the properties so long as the net income of the New York, New Haven & Hartford Railroad will permit.

"Much of the expense that has heretofore gone into the maintenance of the trolley properties could have justly been capitalized, and, as a result, a much more favorable showing been made in the net earnings of the New York, New Haven & Hartford Railroad Company."



Connecticut Company—Port Chester Carhouse and Typical Trolley Line Construction

DEVELOPMENT OF SERVICE

As indicated in the foregoing, many of the properties acquired were in poor physical condition and required radical reconstruction and development. This was under way for a period of several years and its completion placed the properties in position to take proper care of existing traffic and to aid in greater developments in the future. In several articles the Electric Railway Journal has described the physical improvements made in various parts of the

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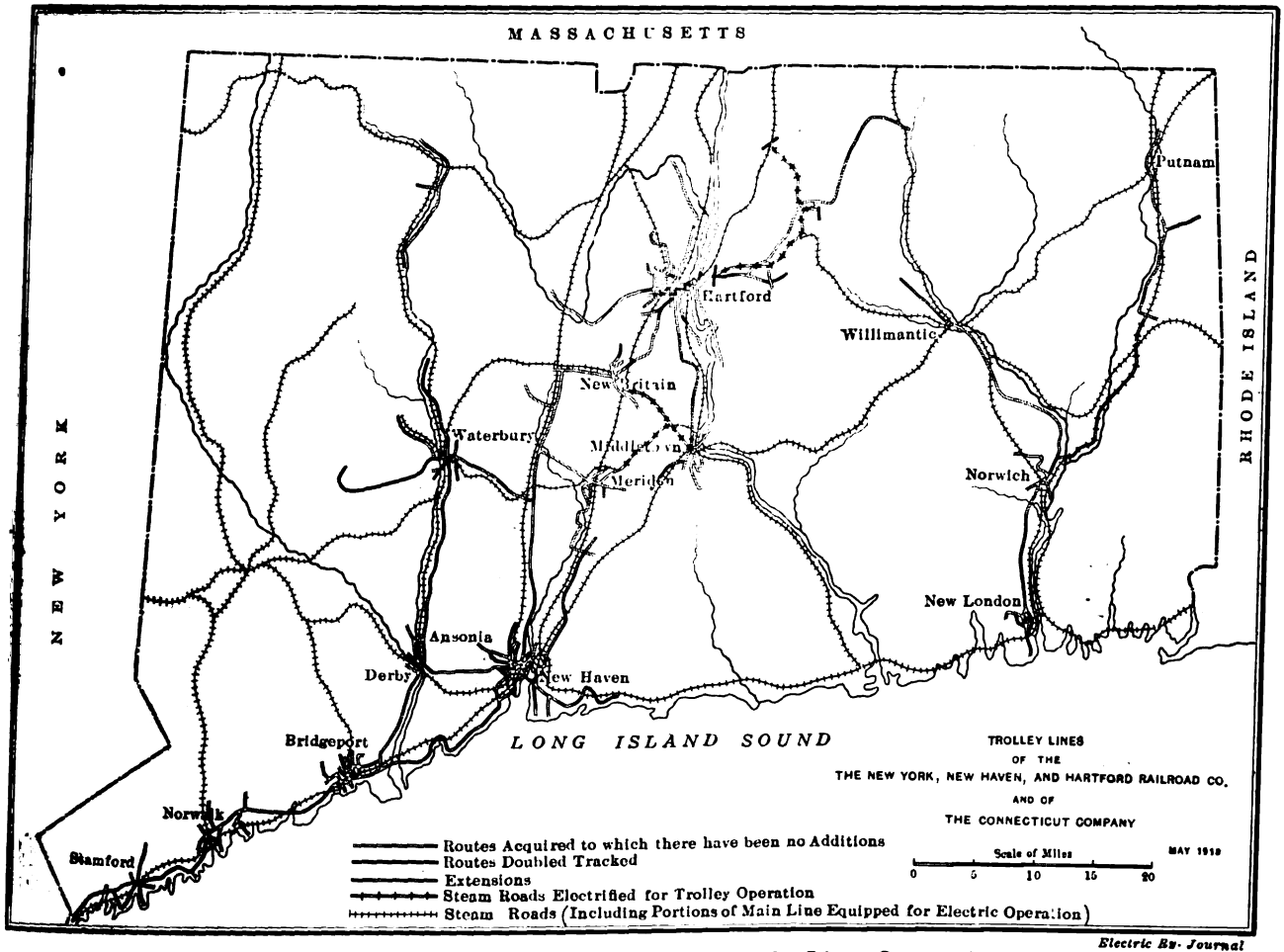
property since the acquisition and consolidation into an operating whole took place, and some of these improvements are shown in accompanying photographs.

In most instances such development of the individual properties as had taken place was local in character and was not so directed as to fit the lines in the best way to transport passengers through from one community to another, and to promote unified long-distance operation so far as that was practicable in view of the traffic and the territory. The work of the new owners of the properties, therefore, comprised not only the physical reconstruction which it was evident was necessary but also the study of route and traffic needs in order that development might progress along the lines best calculated to serve the public in the future. The accompanying map illustrates the scope of the lines of the Connecticut Company and indicates in some measure what has been accomplished in the way of development of improved traffic facilities. Prior to the acquisition of properties generally by the parent company, very few of the independent lines located in the central part of Connecticut had any physical connections. Where such a connection existed, as for instance in the case of the New Haven and the Waterbury lines, double-track facilities were lacking, and as a result inferior service was given. Double track has been added at numerous points on the system in order to facilitate the movement of traffic. Among the notable instances of this character are those on one of the lines between New Haven and Waterbury, at Greenwich, Bridgeport, New London and Norwich, the lines in the vicinity of Hartford and New Britain, and the lines in the vicinity of Waterbury. A number of extensions built to connect existing lines have permitted great improvements in the electric railway service between communities that were not connected before.

One of the most interesting developments of the situation from an economic standpoint is the electrification of steam railroad mileage for operation by trolley. A number of lines have been improved in this way.

One of the old lines of the New York, New Haven & Hartford Railroad, which was formerly operated by steam but has since been electrified and is now operated by trolley, is the one between Meriden and Middletown, which was electrified during 1908. This affords a remarkable illustration of successful adaptation of old steam mileage to modern electric railway operation. In the last year of operation of this line by steam two trains were run daily in each direction on week days without any service on Sunday, and the total number of passengers carried during the twelve months was 4433. In the last fiscal year the Connecticut Company operated twenty-three trips in each direction on week days and twenty-one trips in each direction on Sundays, carrying a total of 330,250 passengers.

Connecticut is a state of small area and the distances between its cities and other communities are relatively short.



Connecticut Company—Map Showing Character and Extent of the Lines Operated by the Company

There are no high-speed interurban lines operated on the methods followed by those properties in the Central West, and up to this time the traffic prospects have not appeared to warrant developments of this nature, although some of the lines are termed interurban and are more nearly of that type of property than suburban. These might properly be termed "inter-city" lines. Much of the track outside of the cities and incorporated communities is located on public highways.

Much the heaviest part of the passenger business of the company is furnished by the city lines. In a typical month, October, 1912, the city and town lines carried 11,001,251 passengers, as compared with 4,583,138 passengers on the interurban lines. The city lines of heaviest traffic, in their order, are New Haven, Hartford and Bridgeport. The heaviest interurban traffic in the typical month selected was on the line from New Haven to Waterbury via Derby, which passes through a region of beautiful scenery. During the

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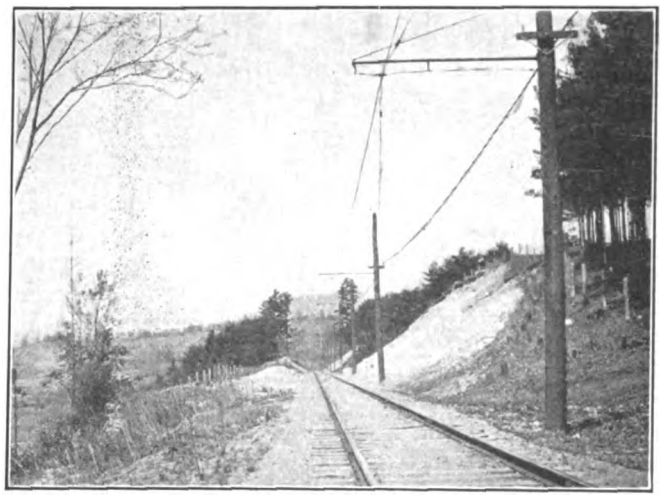
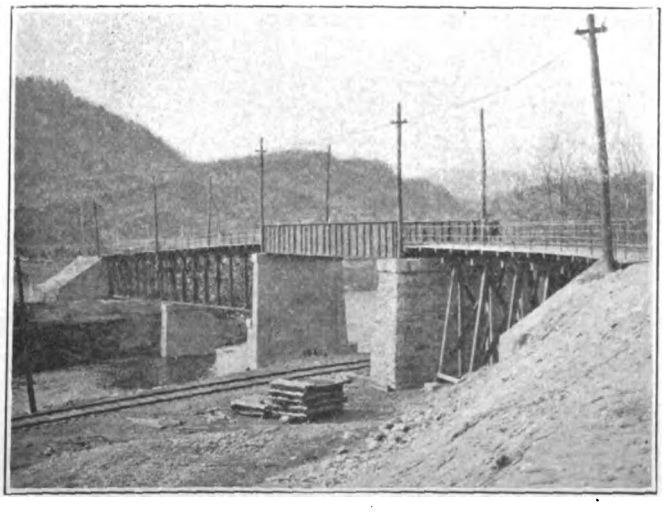
month named the traffic in the three cities of New Haven, Hartford and Bridgeport amounted to 70 per cent of the passengers carried in all the cities and towns served by the company and to 49 per cent of the total traffic of the company on all lines. The widespread territorial distribution of traffic is shown by the statement in Table I.

Some of the traffic which is given separately for towns in the list of cities and towns is really tributary traffic to or



Connecticut Company—Typical Track and Overhead Line Construction

from one of the larger cities. For instance, Branford is a small community located 9 miles from New Haven, and it is probable that nearly the entire number of passengers reported for this village were those who were bound either to or from New Haven. The same statement applies to Wallingford. It is rather difficult to separate the traffic at all points. Some of the passengers reported at New London and Norwich may be through passengers from one of those cities to the other, although a separate report is shown for the line between New London and Willimantic, which



Connecticut Company—Bridge Over Naugatuck Railway and Naugatuck River

passes through Norwich. Passengers in Portland and Middletown are reported separately, although the transportation reported for Portland arises entirely from the service between Portland and Middletown, as the two communities are practically one, Portland being the portion of Middletown which is situated east of the Connecticut River. Separate figures are given for Windsor and Rainbow and Manchester, although in all these cases the traffic is composed very largely of through riding to Hartford, as these villages are entirely tributary to that city. The riding reported in Watertown is practically altogether through riding to Waterbury. Nearly all of the passengers reported for Torrington and Winsted were through passengers.

There was marked diversity in the density of traffic on the interurban lines. It will be noted from the list of interurban lines that two lines are operated between New Haven and Waterbury, with a material difference in the density of traffic. The first line, that which is operated by way of Derby, runs through the densely populated territory of the Naugatuck Valley and carries very few through passengers. The running time between New Haven and Waterbury on this line is two hours and fifteen minutes, whereas the second line shown in the list, that which runs

Table I—Distribution of Traffic Passengers Carried During a Typical Month (October, 1912)

On Interurban or Inter-City Lines:	Number of Fare Zones	Number of Passengers
New Havent to Waterbury via Derby	8	690,675
New Haven to Waterbury via Cheshire	7	422,199
New Haven to Bridgeport via Milford	5	343,581
Meriden to New Britain via Lazy Lane	5	319,149
Milldale to Cheshire	1	32,843
New London to Willimantic	8	474,552
Central Village and West Thompson	6	136,082
Tafts and Central Village	6	113,764
Willimantic and South Coventry	2	34,013
Danielson and East Killingly	1	18,921
Central Village and Moosup	1	20,743
Middletown and Middlefield	2	34,035
Middletown and Meriden	3	84,242
Middletown and Hartford	5	331,409
Hartford and Glastonbury	3	172,615
Hartford and Rockville	4	143,706
Hartford and Stafford	10	71,260
Hartford and New Britain	2	243,433
Hartford and Unionville	4	155,172
Hartford and Rockville (interurban)	5	125,912
Stamford to Norwalk (Newtown Avenue)	3	115,924
Bridgeport to Norwalk	5	191,403
Bridgeport to Derby via Shelton	4	125,037
Waterbury to Woodbury	5	98,329
Waterbury to Thomaston	3	84,139
Total		4,583,138

In Cities and Towns:	Number of Passengers
New Haven	3,523,852
Branford	227,982
Derby	117,124
Ansonia	117,124
Meriden	263,675
Wallingford	103,960
New London	173,031
Norwich	117,555
Middletown	77,322
Portland	38,173
Hartford	2,437,226
Windsor and Rainbow	163,683
Manchester	322,888
Stamford	290,861
Norwalk and South Norwalk	204,403
Bridgeport	1,738,980
Westport	36,314
Waterbury	681,991
Watertown	144,106
New Britain	139,226
Torrington	54,517
Winsted	27,258
Total	11,001,251

between the same points by way of Cheshire, makes the through trip in one hour and thirty minutes. As the small village of Cheshire is the only community between the two terminals on the latter line and the running time between New Haven and Waterbury is so much shorter than on the Derby route, nearly all the riding is through riding. The traffic on the line between New Haven and Bridgeport, by way of Milford, is not through business, as this line serves the local communities located along the shore between the two terminal cities. The line between Meriden and New Britain includes very little through business. This line passes through a territory of close population and many small villages, and its business is made up almost entirely of traffic between the villages rather than through riding from terminal to terminal. A number of small communities are served by the lines between Central Village and West Thompson, so that in this case also a very small portion of the passengers were through passengers. Two lines are shown between Hartford and Rockville, one of which is termed an interurban line. This line is made up of a combination of electrified steam road and street railway

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service in the terminal cities. The interurban line carries almost entirely through passengers, as it makes better time than the other line, which carries largely local passengers from one small community to another.

The line between Hartford and Rockville, which is called an interurban line, is a fair specimen of the type of interurban property which exists in Connecticut. Better speed is made on this line than on the great majority of the other lines, which are operated more nearly as suburban lines than as interurban lines, as those properties are known in the Central West. The line between New Haven and Waterbury, by way of Cheshire, is another example of the type of line on which the company makes better speed than on the more highly localized suburban lines. Other lines of a similar type are those between Hartford and New Britain, between Hartford and Middletown, between Middletown and Meriden, and between Hartford and Stafford Springs.

TABLE II—CARS TAKEN OUT OF SERVICE AND CHARGED TO OPERATING EXPENSES SINCE ACQUISITION OF PROPERTIES

Closed cars	*151	Power and line cars	4
Closed cars	†19	Wrecking cars	5
Open cars	*102	Work cars	6
Combination cars	†2	Flat cars	12
Express cars	2	Dump cars	2
Baggage cars	1	Sprinkler cars	1
Snow plows	21		
Sand cars	8	Total	338
Salt cars	2		

*Single truck. †Double truck.

In addition to the improvements effected in routes of traffic, the company has made other changes looking to the betterment of service and the improvement of the financial position of the property. Since the New Haven road acquired control of the street railway lines, 338 cars have been retired from service. The value of these cars has been deducted from the value of the property through charges to operating expense accounts. The total net charge on this account, after deduction of the amount realized in scrap value, has been $475,000. The company followed the policy of charging against current operating revenues a sum sufficient to retire two cars per month, and this was continued until all cars of the older types acquired in the purchase of the properties were retired. A list of the cars which were treated in this way is shown in Table II.

One of the important respects in which service has been improved is through the adoption of new schedules on the trolley lines, in order that the convenience of patrons of the through line steam road trains might be met. Such changes have been made throughout the system of the Connecticut Company wherever it seemed to be advantageous to introduce new schedules and also on the New York lines reaching the stations used by commuters. In the latter case, where schedules on the through line to Grand Central Terminal, New York City, are changed periodically, the street railway schedules are changed with the same frequency in order to afford as close connections as possible. So far as possible schedules have been arranged in these cases in order to allow an interval of three minutes between the arrival of the through road trains and the departure of the trolley cars. A number of typical examples in which changes of this nature have been made effective on the lines of the Connecticut Company are shown in the following:

AT NEW LONDON

Since Dec. 21, 1912, an extra car has been operated from Putnam to Danielson in order to accommodate passengers arriving on the New Haven road train due at Putnam at 12:42 p.m. Since the same date a similar service has been operated to accommodate passengers arriving on the New Haven road train due at Putnam at 6:42 p.m., as cars on the regular schedule did not connect without a delay for either of these trains.

Beginning Dec. 2, 1912, the car due to leave Norwich at 5:17 a.m. was put ahead so as to leave Norwich at 5 a.m. in order to make connections with the New Haven road train at New London at 6:10 a.m. This train had previously left New London at 6:25 a.m. and takes mail and passengers from the Norwich-New London cars.

Since Feb. 23, 1913, the car due to leave Willimantic at 10:25 p.m. for Norwich has been held five minutes, if necessary, on Sunday nights for the steam train due at Willimantic at 10:15 p.m. if the latter was late.

AT STAMFORD

On all lines except that to Shippan Point the schedule is of sufficient frequency to make reasonable connections with trains. The Shippan Point line is operated on a twenty-minute headway during a portion of the day and a forty-minute headway during the remainder, and the schedule has been rearranged to make connections with the trains.

AT BRIDGEPORT

One car that operates between the village of Westport and the Saugatuck railroad station, which is the railroad station serving Westport and vicinity, is operated entirely for the purpose of serving patrons going to and from the railroad station, and makes connections with all trains. At Bridgeport there are two trains, one due at 12:30 a.m. and one at 12:45 a.m., east-bound and west-bound respectively. Up to about three years ago only two cars were connected with these trains, but since that time cars have been run later to make connections with these trains, so that now practically all city lines are served.

AT NEW BRITAIN

Beginning Jan. 16, 1911, crews were instructed to wait five minutes past the half hour at Plainville to accommodate passengers coming from the east on "dinkey" trains and destined for points south.

Effective Feb. 25, 1911, the service out of West Main Street as far as Garden Street, New Britain, was extended fifteen minutes for the accommodation of people who might arrive from New York on the train due at 11:15 p.m.

Effective Oct. 30, 1912, the car scheduled to leave Berlin Street at 11:35 p.m., due at the Berlin station at 11:45 p.m., is held eight minutes on Sundays if the New York train is late.

TABLE III—RESULTS OF OPERATION OF THE CONNECTICUT COMPANY

Year Ended June 30:	1907	1908	1909	1910	1911	1912
Gross receipts	$6,054,282.46	$6,548,492.01	$6,841,425.16	$7,235,728.78	$7,615,065.44	$8,030,620.94
Operating expenses	4,094,321.65	4,213,928.77	3,968,258.64	4,461,589.69	5,287,225.97	5,112,299.90
Net revenue from operation	1,959,960.81	2,334,563.24	2,873,166.52	2,774,139.09	2,327,839.47	2,918,321.04
Capital expenditures	3,574,044.19	3,287,409.86	1,516,757.86	1,180,143.72	3,479,137.43	2,034,239.28
Maintenance way and structures	731,713.31	709,124.39	572,107.44	834,047.90	998,871.63	972,974.21
Maintenance way and structures per car mile—cents	2.95	2.72	2.18	3.06	3.52	3.39
Maintenance way and structures, per cent gross receipts	12.08	10.83	8.36	11.53	13.20	12.13
Maintenance equipment	$489,440.37	$524,316.58	$450,555.63	$518,725.12	$877,589.75	$630,432.99
Maintenance equipment per car mile—cents	1.97	2.01	1.72	1.90	3.09	2.20
Maintenance equipment, per cent gross receipts	8.08	8.01	6.60	7.17	11.60	7.85
Total maintenance per car mile—cents	4.92	4.73	3.90	4.96	6.61	5.59
Total maintenance, per cent gross receipts	20.16	18.84	14.96	18.70	24.80	19.98

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Effective Dec. 16, 1912, the car north-bound due to leave the Berlin station at 6:10 a.m. is held three minutes to make connections with the New Haven road electric train from Middletown.

Since Feb. 15, 1913, the car scheduled to leave Berlin Street at 7 a.m. and arrive at the Berlin station at 7:10 arrives at the Berlin station at 7:08 to make connections with the train bound to New York leaving Berlin at 7:11.

Table IV—Unit Results

	1907	1908	1909	1910	1911	1912
Gross earnings per mile of track	$9,716	$9,028	$9,011	$9,703	$10,015	$10,467
Operating expenses per mile of track	6,570	5,809	5,240	5,983	6,934	6,663
Passengers per car mile	4.78	4.92	5.07	5.19	5.19	5.36

RESULTS OF OPERATION

Table III shows various results of the operations of the company from 1907 to the last fiscal year ended June 30, 1912. It will be noted that gross earnings increased from $6,054,282 in 1907 to $8,030,621 in 1912. This is equal to 32.6 per cent. The operating expenses rose from $4,094,322 in 1907 to $5,112,300 in 1912, or an increase of 24.9 per cent. Net operating revenue was $1,959,961 in 1907 and $2,918,321 in 1912, or a gain of 48.9 per cent. The operating ratio excluding taxes was 67.6 per cent in 1907 and 63.7 per cent in 1912. During the first year reported, that ended June 30, 1907, the company made capital expenditures to the amount of $3,574,044. In the following year the total was almost as large. In the 1909 and 1910 fiscal years much less was spent, but in the year ended June 30, 1911, the total spent was almost $3,500,000. For the entire period of six years for which the figures are given the aggregate capital expenditures have reached a total of over $15,000,000.

Expenditures for maintenance charged to operating expenses have also been liberal during this period, and in fact larger than is the practice with most electric railways, so that the physical condition of the entire system has been improved materially. During the period of six years the aggregate expenditures for maintenance of equipment and of way and structures have increased from 14.96 per cent to 24.8 per cent of the gross receipts. The average per year was 19.68 per cent. The average yearly expenditure on maintenance of way and structures during this period was 11.35 per cent of the gross receipts. The average yearly expenditure on maintenance of equipment during this period was 8.22 per cent. Table III also shows the maintenance expenditures per car-mile. These extended from 3.9 cents in the 1909 fiscal year to 6.61 cents in the 1911 fiscal year. The average per year for the entire period of six years was 5.12 cents. The average annual expenditure per car-mile for maintenance of way and structures during this period was 2.97 cents. The average annual expenditure per car-mile for the maintenance of equipment during this period was 2.15 cents.

Table V—Changes by Years

		Percentage Increase Over 1907				
	1907	1908	1909	1910	1911	1912
Gross receipts	$6,054,282.46	8.2	13.1	19.6	25.2	32.6
Operating expenses	$4,094,321.65	2.8	*2.2	9.0	28.0	24.9
Maintenance of way	$731,713.31	*3.1	*22.1	14.1	36.2	33.0
Maintenance equip't	$489,440.37	7.8	*7.9	6.1	80.2	28.8
Operation of cars	$1,604,800.61	2.5	1.2	8.2	14.9	17.0
Power	$685,801.83	14.3	9.8	14.2	48.1	36.0
Car miles	24,780,159	5.8	2.9	9.9	12.4	17.7
Kilowatt-hours	68,559,635	11.1	20.0	24.4	38.0	48.3
			Percentage Increase Over 1908			
	1908					
Net income	$2,702,101.93		33.8	*7.2	*58.6	*43.8

*Decrease.

The opening of new lines affected the showing of average gross earnings per mile of track. Table IV shows these results from 1907 to 1912, together with the operating expenses per mile of track and the passengers carried per car-mile. It will be observed that the opening of new lines caused a decrease in gross earnings per mile of track in 1908 and 1909, but that in 1911 and 1912 there was a fair betterment as compared with the earlier years. The earnings per mile of track in 1912 showed an increase of 7.7 per cent over 1907. There was a steady improvement in the number of passengers carried per car-mile, although the total is still low.

Table V, published herewith, shows the year by year changes in percentages of a number of the principal operating results during the period of six years ending with 1912.

Table VI shows the detail results for the fiscal year ended June 30, 1912. While, of course, the largest portion of the revenue was received from passenger business, the returns from other sources equaled 5.6 per cent of the entire gross returns. The revenue from freight amounted to 2.8 per cent of the gross revenue from all sources. During the year the operating ratio was 63.7 per cent. Of this proportion 19.9 per cent was devoted to maintenance of way and structures and equipment. Operation of power plants took 11.6 per cent of the gross; operation of cars cost 23.4 per cent. General expenses reached 7 per cent, while miscellaneous expenses amounted to 1.8 per cent. Taxes aggregated 5.6 per cent of the total operating revenue. The net income after the payment of interest and rental was equal to 3.8 per cent on the outstanding capital stock, all of which is owned by the New York, New Haven & Hartford Railroad Company. It will be noted that this is a little under the 4 per cent which it is calculated is required in order that the property shall properly pay for the carrying cost of the investment. If the property develops to a point where it earns more than this return it will yield a profit on the cost as compensation for the risk above the cost of carrying the investment.

Table VI—Operations in Year Ended June 30, 1912

Operating revenue:		
Freight revenue	$224,018.74	
Passenger revenue	7,582,024.54	
All other revenue from transportation	122,907.26	
Revenue from operations other than transportation	101,670.40	
Total operating revenue		$8,030,620.94
Operating expenses:		
Maintenance of way and structures	$972,974.21	
Maintenance of equipment	630,432.99	
Operation of power plants	932,975.41	
Operation of cars	1,877,614.42	
General expenses	562,485.00	
Miscellaneous expenses	135,817.87	
*Total operating expenses		5,112,299.90
Net operating revenue		$2,918,321.04
*Taxes		449,247.41
		$2,469,073.63
Income from other sources		62,541.28
Total income		$2,531,614.91
Deductions from income:		
Interest, rentals, etc		1,012,539.29
Net income		$1,519,075.62

*The operating expenses and taxes were 69.25 per cent of the total operating revenue.

RESULTS ACCOMPLISHED

Some of the results accomplished are indicated in excerpts from a letter written by L. S. Storrs, vice-president of the New York, New Haven & Hartford Railroad, in charge of subsidiary lines. Mr. Storrs says:

"The trolley holdings of the New Haven road can be divided into two classes, developing lines and those on which the development has been practically completed, with the exception of such minor extensions of trackage as may be required to take care of growing communities.

"The developing lines are those of the New York & Stamford Railway, which are rapidly being double-tracked all the way from Stamford to New Rochelle in order better to serve this growing suburban territory and thus afford better facilities to the suburban residents and render New Haven territory more popular to this rapidly increasing class of New Yorkers. It is hardly to be expected that this property will earn any dividends on its stock for the next three

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years owing to the extremely heavy charges against operations necessitated by the reconstruction of existing trackage incident to the double-tracking. Upon the completion of this work, with the rapidly increasing settlement throughout the territory served, the returns to the stockholder (the New York, New Haven & Hartford Railroad Company) will be vastly greater than any trolley line of like mileage outside of the cities of New York, Boston and Chicago.

"The situation in connection with the Westchester Street Railroad is very similar, the lines being through another part of the New York suburban zone, and one in which the development will doubtless be very rapid owing to the increase in transportation facilities provided by the completion of the New York, Westchester & Boston Railway, which the Westchester Street Railroad serves as a distributing agency at its White Plains terminal.

"The other developing property is the Berkshire Street Railway, on which the earnings will hardly serve to do more than maintain the property and provide for the fixed charges. This property serves a territory immediately adjacent to the various steam roads in the western part of Massachusetts, and extensions are now being constructed to provide transportation to a very large area that has been entirely shut off since the earliest days of railroad development in the Commonwealth, but which prior to that time was one of the most prosperous portions of the country—an area through which it would be impossible to construct steam lines, but one that can be well served by the trolleys. The settlement and advance of such a large area is relied upon to bring to the New Haven's lines proper a traffic that will compensate it for the loss on the investment necessary to develop same. This was thoroughly understood at the time of the enactment of legislation permitting the New Haven to acquire the property, and no criticism was made of the New Haven at that time.

"The other properties, those in Connecticut and Rhode Island, are developed lines and are in a position to return to the New Haven a reasonable interest upon the investment.

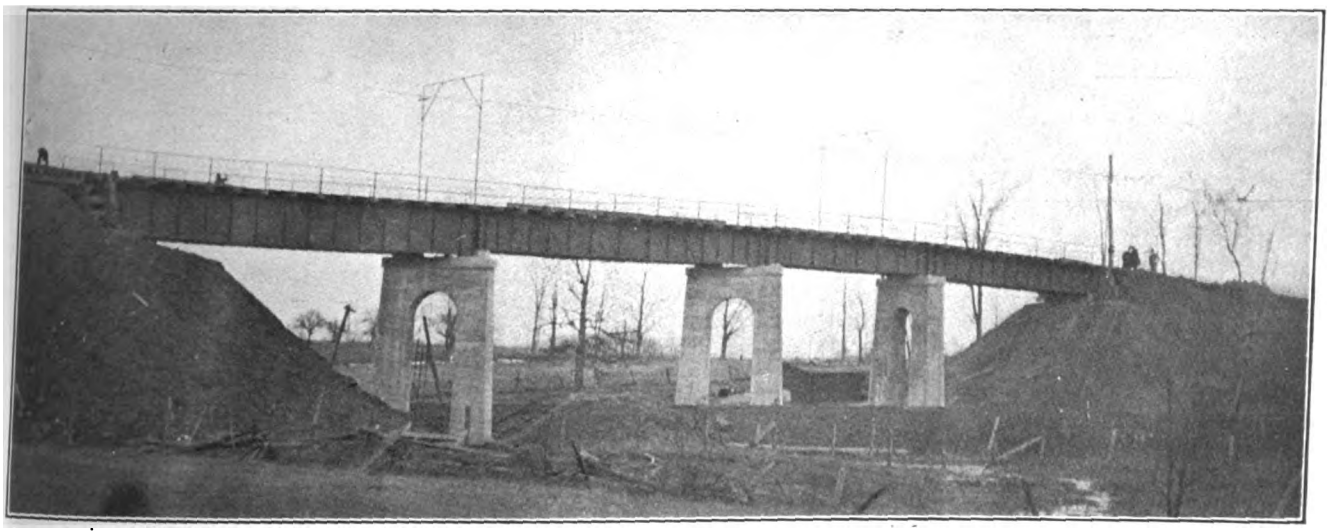
"The properties now composing the Connecticut Company were purchased by the New Haven just at the time they were coming into the period of complete renewal, and, rather than spread this renewal over a great number of years, it was decided to make the most liberal appropriations for the work in order that the property might be in a superior physical condition and thus able to provide adequate service to the rapidly growing territory.

"Had the policy of gradual rehabilitation been adopted as it was on other large properties in New England, the returns to the New Haven would have been very much greater, for since the acquisition of these properties by the New Haven there has been spent for maintenance of the properties and charged against current operations an annual average of 19.58 per cent of the gross receipts, and during the same period the amount so charged by the trolley companies in Massachusetts has been but 14.83 per cent, a figure which, if followed in Connecticut, would have resulted in a further divisible income in the five years 1907 to 1911 of $1,630,000, or an annual average of about 1 per cent on the capital stock.

"In addition to the above policy the property has been liberally enlarged in many ways, such as:

"Double-tracking of lines in order to provide facilities for improved service, 8 per cent additional mileage having been added in such construction. During this period 18 per cent additional mileage was constructed to reach territory theretofore without trolley facilities, this at a time when one-fourth of the entire mileage was rebuilt.

"At the time the lines in the large cities were acquired the cars owned had a seating capacity of 29,600. There have been purchased cars with seating capacity of 36,300. The service performed shows an increase of 20 per cent in car mileage. The increase during the same period in Massachusetts was 5 per cent, as shown by the records in the Railroad Commissioners' office. A large amount has, of necessity, been spent for additional power and carhouses and shops.



Connecticut Company—Viaduct Over Central New England Railroad Tracks at Bloomfield, Conn.

"The period of reconstruction has passed and the charges for such account can now be reduced to a normal amount, in addition to which full effect can be obtained from the normal increase in gross business, thus bringing the property to a point where a reasonable return may be maintained on the investment, the return last year having been increased from 2½ per cent to 3¾ per cent with further increase probable for this year, notwithstanding a very much increased charge for labor, the advances of this year having been settled upon for two years. As these properties were purchased with funds provided by issuance of debentures bearing a low rate, a return of 4 per cent on the capital will render the properties self-sustaining as far as the New Haven is concerned; 4 per cent on the Connecticut property requiring but $1,600,000 and on the Rhode Island property less than $1,000,000, one of the properties having already reached this rate of return, and the others being in a position to reach that return without question in one more year.

"Specific reference has not been made to the Rhode Island situation further than the broad statement that within a year the property should be approximately on the basis of returning 4 per cent to the New Haven on its investment."

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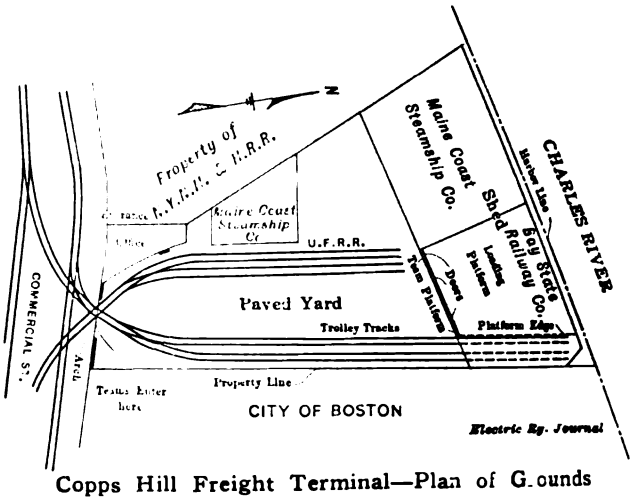
The gross earnings of the Connecticut Company of $8,030,621 in the fiscal year 1912 are based on 767.25 miles of track. These results compare with estimated Connecticut intrastate earnings of the New York, New Haven & Hartford Railroad of $12,135,000, based on 865 miles of track. The results per mile of track averaged $10,467 for the electric line as compared with $14,029 for the steam road. During 1913 the lines of the New London division, covering a mileage of 105 miles, were leased for a long period to the Shore Line Electric Railway interests.

In summing up, it may be stated that the properties now comprised in the Connecticut Company system have undergone thorough physical rehabilitation. They have been developed along substantial lines and operation has been unified and put on a basis where the lines not only supplement each other but supplement and are supplemented by the through steam lines of the controlling company. They have been put on a basis where their credit is good, and their ability to finance needed improvements to meet the demands of traffic is unquestioned. They are operated as a cohesive whole, rather than as a collection of widely separated properties without sufficient common interest to justify the proper development of through routes or the creation of other physical conditions which promote traffic growth.

NEW ELECTRIC FREIGHT STATION AT BOSTON

The Bay State Street Railway Company has recently opened a station on the Boston waterfront for the exclusive handling of electric freight service in connection with the facilities for merchandise transportation operated by the company on the lines south and west of the city. In the Dec. 21, 1912, issue of this paper an article was printed describing the beginnings of electric express service at Boston, and the opening of the freight station in co-operation with the Harrison Avenue express terminal described in the above issue represents another forward step toward the development of a large and important service throughout eastern New England. Both installations are somewhat temporary in character in view of the necessity of economizing on the initial outlay prior to the growth of a large service.

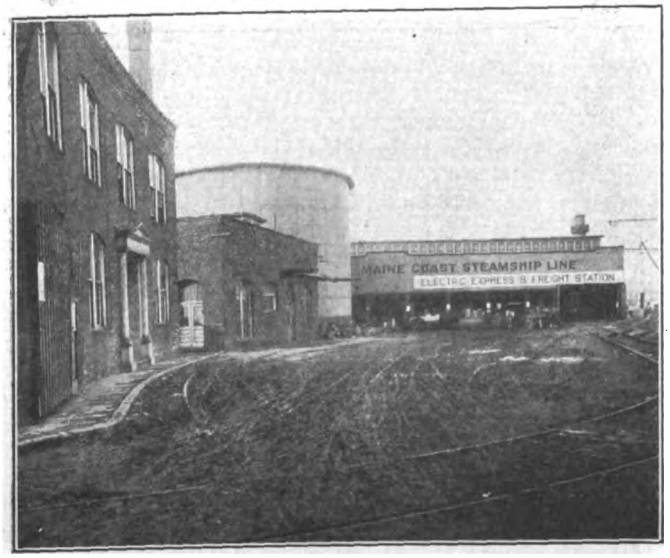
The waterfront station is located on Copps Hill Wharf, about midway between the South Boston freight yards of the New York, New Haven & Hartford Railroad and the Charlestown freight yards of the Boston & Maine Railroad, which insures the shortest average haul for teamsters and trucks delivering or receiving goods to or from the steam railroads. The tracks of the Union Freight Railroad Company, a steam transfer organization handling freight cars in the Boston wholesale and railroad terminal district, enter the new terminal and enable reshipments between the steam and electric lines to be made with comparative ease. The station consists of a transfer shed one story in height, 80 ft. wide and 200 ft. long, with teaming platform, car platform and two electric railway tracks parallel-



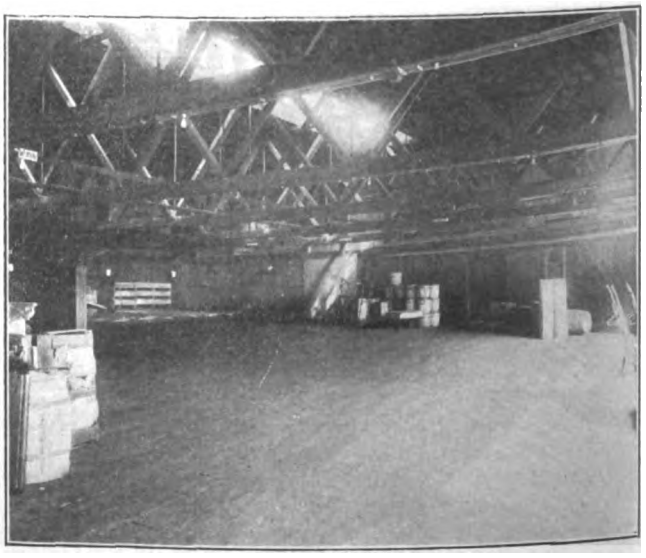
Copps Hill Freight Terminal—Plan of Grounds

ing the latter, about 45,000 sq. ft. of real estate including a partially paved yard, and an office building. The latter contains quarters for the general agent, clerks, cashier, solicitors and auditor, five solicitors being employed at the station. The freight transfer house is of wooden construction throughout and is provided with six shipping doors 9.5 ft. high and from 10 ft. 9 in. to 15 ft. wide. It is planned to extend the service in the future to points on the coast of Maine with regular interchange at the Boston station.

The station has facilities for loading and unloading eleven teams at a time, and the tracks inside the building have a total capacity of four cars, the yard tracks holding five cars. The platform along the greater portion of the teaming yard is 3 ft. 6 in. high, while on the track side it is 4 ft. above the pier, there being a slight ramp downward away from the cars toward the teaming space. The freight station proper is illuminated by a monitor 8 ft. wide and 7 ft. high and by about thirty-two 16-cp lamps supplied from the Edison service and carried on the under sides of the roof trusses. A set of Fairbanks scales with a capacity of 11 tons is located in the freight station. Hose connections and



Copps Hill Freight Terminal—Exterior



Copps Hill Freight Terminal—Interior

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fire pails are provided, and the lamps are installed at an average height of 11 ft. above the floor. A drop light is installed over the scales, and the available depth of water at the wharf is 18 ft. at low tide. From ten to fifteen truckers, loaders and helpers are required in the daily service of the station, the number of these depending upon the volume of traffic handled. Perishable freight is kept either in the foreman's office or in a car during cold weather. The cars used are similar to those described in connection with the Harrison Avenue station in the previous article. Through service is given several times daily between the Copps Hill Wharf station, Brockton and points south and over the Boston & Worcester Street Railway to Worcester. The Boston Elevated Railway Company furnishes a pilot motorman for all electric express and freight cars run upon its lines, the waterfront station being upon its system, as is the Harrison Avenue terminal. An extra car is kept constantly at the Copps Hill station for emergency service.

The general express and freight agent of the company has issued to the shippers located on the system a circular letter upon which is printed the map of the Bay State lines and connections. The letter reads as follows:

"Our new freight terminal located in the shipping center of Boston at Copps Hill Wharf, 529 Commercial Street, is now open. Cars leave this terminal daily at 8 a. m., 11 a. m. and 5 p. m., and give a fast, frequent and safe service between Boston and the above points on our lines. Our solicitors will gladly call and explain the service, if you will so notify by telephone Richmond 2477."

Plans are now being prepared by the management of the Bay State company for establishing a trolley freight and express service on the lines north of Boston, and franchises have been granted by fifty-three municipalities in the territory of the old Boston & Northern Street Railway for this class of service. On the south side of the city, in the former Old Colony company's territory, twenty-nine municipalities are receiving electric express service. The company has twenty cars either ordered or engaged in the express business. The Boston & Worcester Street Railway is handling a co-operative service on a fast schedule and there will probably be a striking increase in this branch of electric transportation in eastern Massachusetts during the present year.

NEW PLANS IN THE CLAIMS DEPARTMENT, BUFFALO

The claims department of the International Railway Company, of Buffalo, N. Y., has had good success recently in collecting information regarding accidents. In the first place the claims agent has instituted a competition in the various carhouses, giving the percentage of the largest number of names of witnesses to accidents secured by the men assigned to each carhouse. By this means at least twice as many names are now received as formerly. Lists of the percentages of witnesses secured by crews in the different carhouses are posted in a bulletin once each month. A second feature is the sending of a letter to every witness on a great many of the reports as soon as they are turned in to the claims department. To most of these letters answers are received from witnesses, and much expense is saved by the reduction in the number of calls which otherwise would have to be made by the investigators. These returns are made by the witnesses on a printed form, and very interesting information is furnished. The letters keep the claim agent informed as to the actual facts and serve as a basis of further examination of claimants. The letters signed by actual witnesses have much weight with claimants, who very often are prompted by unscrupulous lawyers to make claims which they really consider unseasonable. When they know that the information possessed by the claims department comes from unbiased witnesses they are apt to take a reasonable view of the situation. The letters read as follows:

"We are informed that you were a witness to an accident supposed to have happened about ..... We are making every effort to prevent the occurrence of accidents upon our lines, and in order to fix the responsibility, it is necessary that we be in possession of all the facts in each case. To this end we ask your co-operation by answering as fully as possible the questions on the other side of this sheet, assuring you that your courtesy in the matter will be greatly appreciated. A return stamped envelope is inclosed."

The printed form on the back includes questions as to other witnesses of the accident, exact time and place of the accident, position of the witness and speed of car. A request for a description of the accident as seen by the witness and his opinion as to the cause is made in addition.

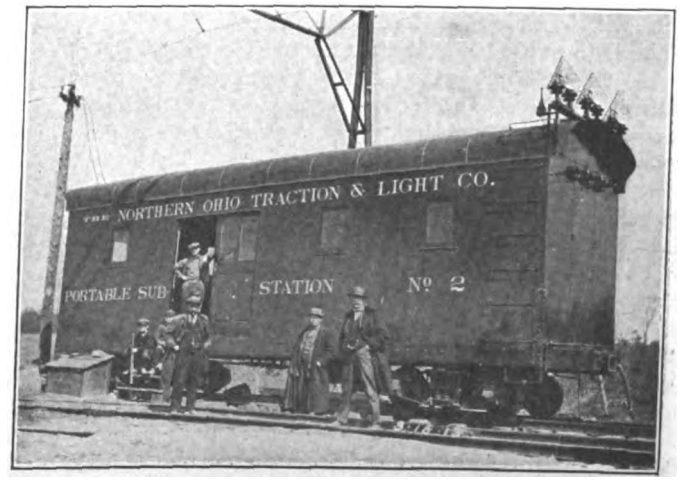
There has been a large decrease of a certain class of accidents, which is to be credited to the near-side car. These cars, in fact, have eliminated entirely boarding and alighting accidents. On the Grant line, for a period of thirteen months prior to Feb. 1, 1911, there were seventy-three such accidents. During the thirteen months following that date there was one accident. The accidents have also been reduced by the exercise of increased care throughout the system.

PORTABLE SUBSTATION FOR THE NORTHERN OHIO TRACTION & LIGHT COMPANY

BY V. W. SHEAR, ELECTRICAL ENGINEER

An all-steel portable substation recently placed in service by the Northern Ohio Traction & Light Company, operating out of Akron, Ohio, is chiefly interesting because of the large capacity per square foot of car floor space and because it is an excellent example of the adaptability of modern standard electrical apparatus to conditions for which it was not primarily designed.

The all-steel car itself, built by the McGuire-Cummings Company, is 36 ft. in length over all, 34 ft. over corner posts, 8 ft. 6 in. over side posts and 13 ft. 1½ in. from top of running board to rail, giving a maximum inside height of 10 ft. 6¼ in. Limitations from track clearances and low bridges, on the one hand, and the transformer height of 9 ft. 8½ in., on the other hand, compelled the use of a narrow



Portable Substation—Northern Ohio Traction & Light Company

car and small wheels. For hauling the car from the manufacturer's plant to its destination over steam roads 33-in. wheels were used and also M. C. B. couplers, as required by railroad regulations. These parts were later replaced by 24-in. wheels and the Northern Ohio Company's standard draft gear. The trucks are of the diamond M. C. B. arch type, having 60,000-lb. capacity. Inasmuch as a 500-kw rotary converter is installed in this car, it will be seen

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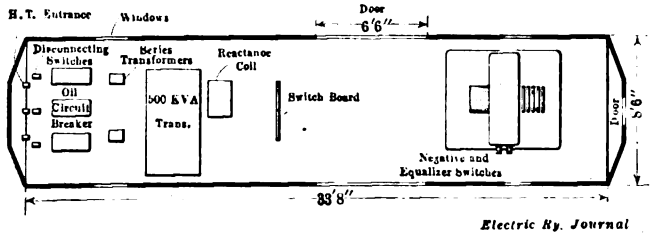
that a capacity of 1.73 kw per square foot of loading space is obtained. The average figure for portable substations of which descriptions have been published appears to be about 1.3 kw per square foot, and for some the figure is as low as 0.85 kw per square foot.

The entire equipment, with the exception of the lightning arresters and slate for switchboard panels, was one of two converters which had been purchased by the company and delivered for a stationary substation but had not been installed on account of proposed changes in line locations. Very little work was required to select and arrange the necessary apparatus for satisfactory operation under quite different circumstances as to spacing and layout from those contemplated when the apparatus was purchased. It would indeed have been difficult to select apparatus, especially for a portable substation, at a material reduction from the actual total cost aside from a possible saving by use of an outdoor type of transformer.

It will be noted from the layout of apparatus within the car that the transformer and rotary are on opposite sides of the car. This was necessary to make sufficient passageway to enable the operator to get around them. The transformer weighs approximately 14,700 lb., while the rotary weighs 18,000 lb. Therefore, by offsetting them toward opposite sides of the car, the required space was readily obtained and the unbalanced weight became negligible. The positive and equalizer switches on the rotary frame are on the same side as the passageway, so that no danger from contact is incurred.



Portable Substation—Plan

The commutator end of the rotary is placed toward the switchboard as the commutator needs more attention than any other part of the machine. At the same time ample space is provided between rotary and switchboard so that there will be no danger from flash-overs.

The high-tension line characteristics are 22,000 volts between phases, three phases, sixty cycles, and a grounded neutral. Lightning protection is obtained by means of a Burke type combined lightning arrester and choke coil mounted on the roof at the end of the car. The mounting is so made that the arrester can be quickly dismantled and placed inside the car if low bridges are to be passed. The high-tension lines are further protected by a 5/16-in. double-galvanized steel cable strung over the transmission lines and grounded about every 500 ft.

The recent development of a powerful type of high-voltage circuit-breaker, safe to install without inclosing compartments of brick or concrete, rendered easy the installation of this very important part of the control equipment. It is a Westinghouse Type "E" breaker with remote mechanical control, series tripped from the current transformers and rated at 35,000 volts and 300 amp. This circuit-breaker will be equipped with a no-voltage-release coil as an additional safeguard in case the high tension should go off and go on again before the d.c. circuit-breaker was tripped and the reverse-current relay should fail to act.

The transformer is designed for a three-phase, 22,000-volt high-tension line with suitable starting taps for the rotary. All leads enter the side of the transformer, and the usual wheels were removed to reduce the height as much as possible. A trap door is provided in the car roof, and the transformer is easily put in place or removed by use of the crane in the power house.

A separate reactance is provided and controlled by a double-throw three-pole switch so that it can be cut in or out of the circuit as desired, in order to obtain the required compounding in the rotary. The regulation required will depend upon the location of the substation. The transformer contains sufficient inherent reactance for most conditions.

The rotary converter is rated at 500 kw at 600 volts d.c. and is designed for six phases, sixty cycles, a.c. It operates at 900 r.p.m., is self-starting and is equipped with mechanical oscillator and speed-limiting device. The probable locations include some considerable grades; therefore a leveling device consisting of a heavy plate with jack-screw and holding-down bolt is placed under each corner of the rotary, permitting a vertical adjustment of several inches on each side of the machine.

The small switchboard needs little comment. For sake of space economy it is furnished with the fewest instruments and simplest arrangement of connections possible with safe operation and consists of one a.c. and one d.c. panel. The value of the reverse-current relay has been demonstrated in this station. The positive d.c. leads pass out through the rotary end of car, while negative and equalizer leads rise directly through floor to switches on the rotary frame.

Two lighting circuits are provided, one on the d.c. side for use when the a.c. power is cut off as in early hours of the morning, and the other on the a.c. rotary circuit. Heating is furnished by a small stove or electric car heaters. On account of noise the telephone is installed on a support outside of the station with a large gong inside.

The cut shows the station located on a temporary siding, materially aiding the main line cars to maintain schedules while permanent substations are being completed. This substation will be available over approximately 80 miles of interurban lines as well as in several towns and cities, including Akron.

Some practical points may be noted which, if they are observed when a steel portable substation is being planned, will prove of value. If exact measurements of all holes and openings through the steel walls and floors are given to the car builder, the cutting, which is hard to do with hand tools, will be done without additional expense, and this will save costly and exasperating delays and changes. Openings through steel for cables, operating rods, etc., should be amply large to allow for the use of larger cable than is contemplated if necessary to save time, etc. It is not easy securely and safely to mount heavy porcelain bushings in a thin steel wall unless the most suitable type of bushing and support have been selected. Specifications cannot be too carefully drawn covering any items concerning which there may be ambiguity, such as whether the purchaser or manufacturer will furnish the conduit under the car, pay the freight, furnish the supporting framework for various pieces of apparatus, etc. Foresight in these matters is useful not so much on account of the money involved as to prevent delays due to oversight in the preparation of the necessary parts.

The new Loetschberg tunnel route through the Alps, which was officially opened on June 20, has already begun to carry regular traffic. Three express trains are run from Nancy, in France, through Berne to Milan in eleven hours. New direct service, saving three hours, will also be established between London and Genoa by way of the following route: Through northern France vie Rheims, Nancy, Epinal and Delle; through Switzerland via Biel, Berne, Thun, Spiez, Loetschberg tunnnel to Brique, Simplon tunnel to Isella, Italy; then via Milan to Genoa. The Loetschberg tunnel is 9 miles long, the third longest in Europe. The electric locomotives used on the new route between Spiez and Domodossola, Italy, are operated at 15,000 volts single phase.

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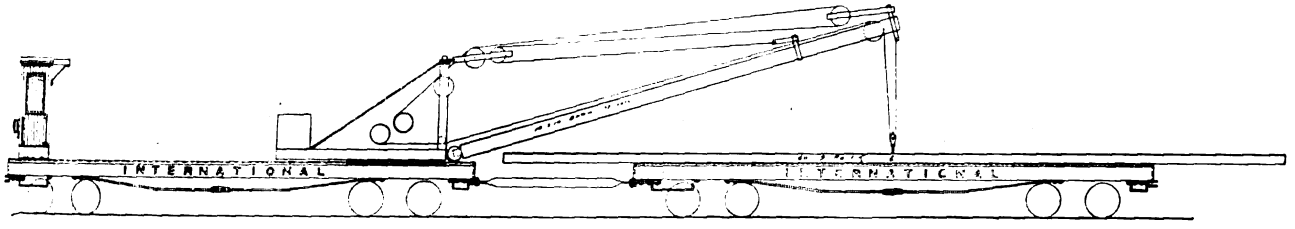
Track Rehabilitation on the International Street Railway

Extensive Rehabilitation of the Street Railway Track Has Been Under Way in the City of Buffalo, the Work Being Carried Out Under the Direction of the Department of Maintenance of Way and Line, Which Has Developed Special Plans for Handling Large Quantities of Supplies

During the present year large expenditures are being made in Buffalo for track reconstruction under the direction of the department of maintenance of way and line. The track mileage totals 376, of which 124 miles are double track, the rest being in single track and in carhouses, sidings and cross-overs. Of this mileage at least one-ninth will be replaced during the current year.



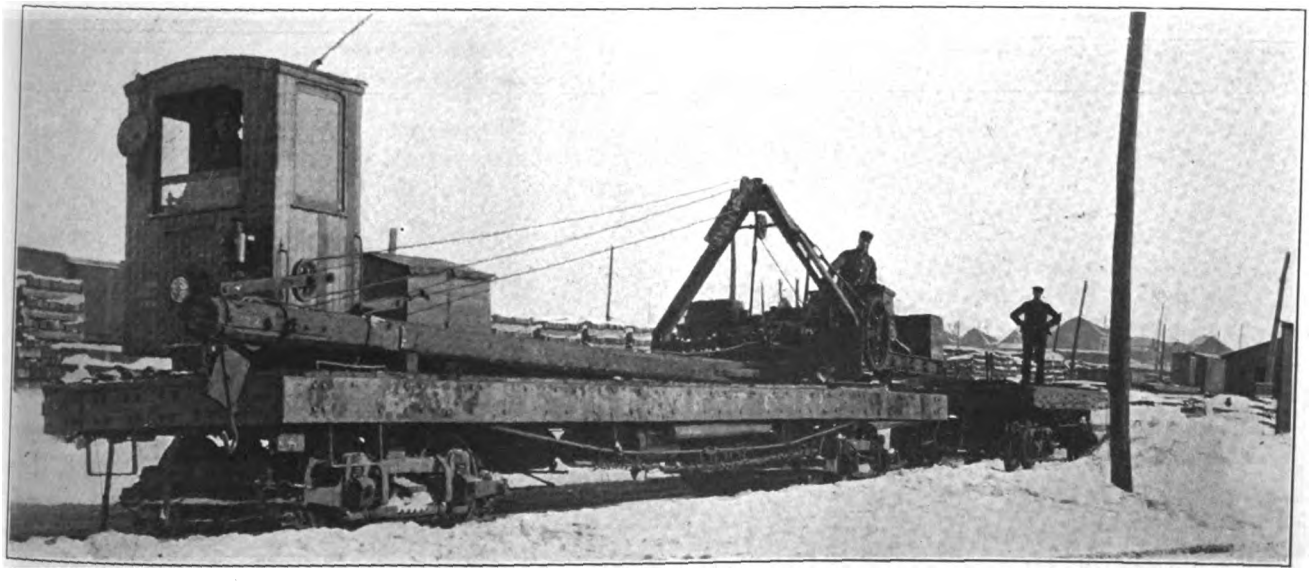
Buffalo Track—Derrick Car and Trailer for Handling 60-ft. Rails

The new track is constructed along the lines which have proved to be the best for local conditions and consists of 124-lb., 9-in. girder rails laid on 6-in. x 8-in. x 7-ft. long-leaf yellow pine untreated ties, spaced 2 ft. between centers. The ties are supported on a foundation of concrete 8 in. thick, consisting of one part cement, three parts sand and five parts coarse broken stone. Between the ties and sub-base is 2 in. of 1¼-in. crushed stone for tamping. A concrete paving base is laid on top of the crushed stone around the ties, and outside of the track this is brought up to a height to suit the style of paving, the asphalt commonly used requiring a space of 3⅜ in. below the top of the rail. Continuous rail joints are being used, and the rails are held down with Fetter drive screw spikes. The rods are spaced every 6 ft. Below the sub-base is an 8-in. x 8-in. trench containing a 4-in. tile laid in a hemlock trough and surrounded by 1¼-in. crushed stone. Over this in the concrete a drainage hole is molded every 10 ft.

For this new construction the estimates called for the following supplies to complete about 50 miles of single track: 7500 tons of rail, 130,580 ties with corresponding numbers of tie plates, 123,079 bbl. of cement, 19,265 cu. yd. of sand, 57,477 cu. yd. of gravel, 17,161 cu. yd. of 1¼-in. crushed stone, 1020 kegs of spikes, 61,529 tie rods, 453,300 drive screws, 6797 joints, 140,555 4-in. farm tiles, 145,555 ft. of 1-in. hemlock plank.

The company has devised a number of efficient plans for handling large quantities of supplies. Among these is the use of derrick cars of original design for handling rails, sand, etc. Two of these derrick cars, one double-truck and one single-truck, are now in use and a second double-truck car is under construction. The details of these cars are shown in the illustrations accompanying this article.

The car has a strong underframe floored with heavy planking and mounted upon standard trucks. At one end it carries a circular derrick track 7 ft. 7½ in. in diameter of 80-lb. T-rail. The circular track is centered directly over one truck and it rests upon the side sill I-beams. An operating cab is placed on the flat car at the end opposite from the derrick track. At each end of the car is a simple drawhead.



Buffalo Track—View Showing Derrick Car with Boom Swung Into Position for Running

On the circular track is mounted a derrick with an 8-ft. mast and a 32-ft. boom. The derrick consists of a steel underframe mounted upon four wheels which roll upon the circular track, a heavy cast-iron center bearing keeping the derrick centered on the track. The weight of the

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boom and load is counterbalanced by a weight made up of concrete and scrap iron mounted on the end of the platform.

The derrick is rotated by means of a large spur gear mounted on the flat car, and this meshes with a motor-driven pinion on the under side of the derrick platform. A 15-hp motor, which is operated by a controller on the derrick platform, drives a standard two-drum hoist.

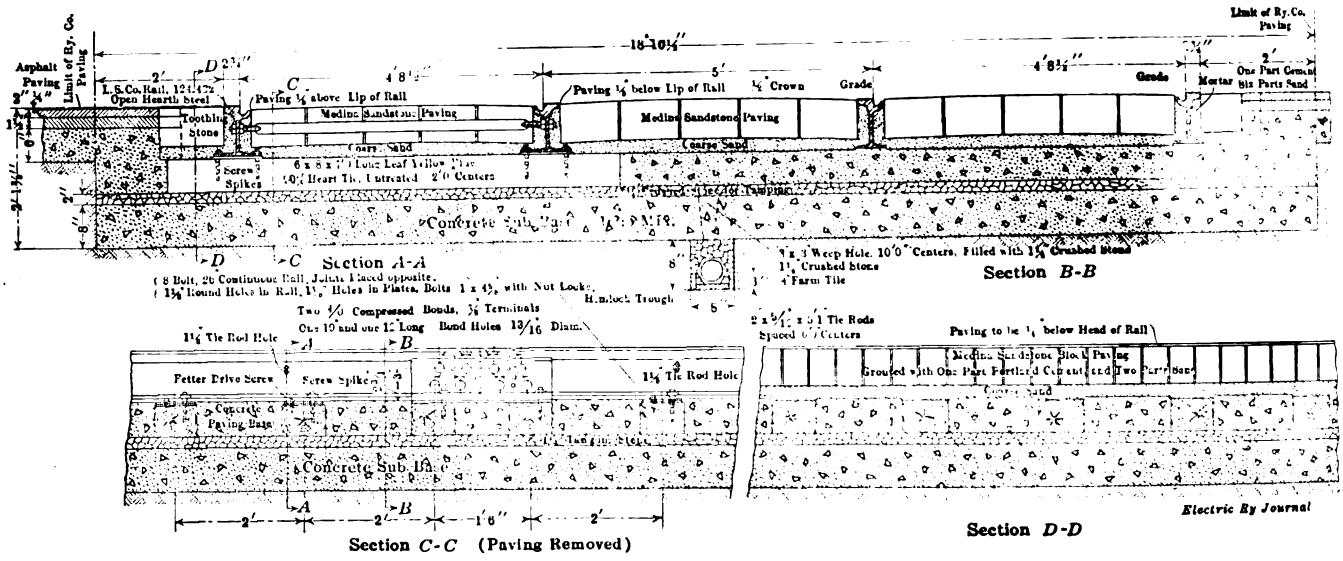
In use the derrick car is coupled to a trailer by means of coupling bars long enough to enable the trailer to accommodate 60-ft. rails. The derrick will lift a load of 6000 lb. and will swing it practically through a complete circle.

In using the derrick car for unloading rails from gondolas it is operated on a track parallel with the steam railroad track at one side of the storage yard. The rails are picked up from the gondolas and piled in the yard at a cost not exceeding 10 cents per ton. Before the installation of the derrick cars rails were unloaded by hand at a cost of more than $1.50 per ton. It has been found by the company that in practice four men are sufficient to operate a derrick car.

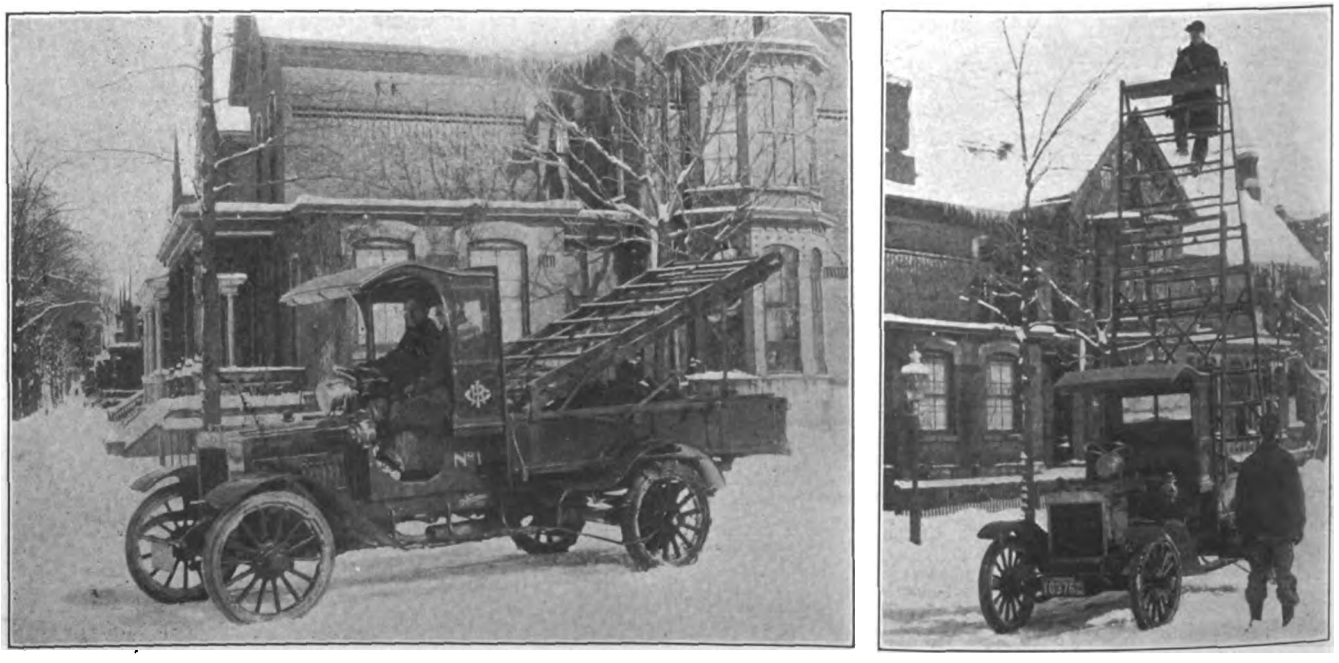
The department uses several auto trucks for line and track repairs. The ladder truck, illustrated herewith, is somewhat different from those usually used in that it combines the folding ladder with a wagon body fully equipped with all necessary apparatus for replacing cars, repairing line, etc.

In keeping up the track and line no special methods of inspection are employed. Upon completion of new work this is assumed to be good for five years without special attention. However, the general foreman of repairs keeps watch over the track with the assistance of the division superintendent. The transportation department has regular inspectors who report track conditions to the way department, and their reports receive prompt consideration. The regular switch men and curve greasers are also expected to report defects.

The type of construction to be installed in Buffalo has been tried out under severe conditions during the past three years and has proved entirely satisfactory. When this construction is completed it will put the Buffalo track in excellent condition for the nearly 300 new near-side cars which have been recently put into commission and are considerably larger and heavier than the cars which they replace.



Buffalo Track—Standard Construction for New Work



Buffalo Track—Emergency Line and Track Wagon

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Service Equipment and Operation in Chicago

An Abstract of a Report Made by the Board of Supervising Engineers—New Cars, Schedule Provisions, Through Routes. Traffic Analysis, Running Speed, Elimination of Stops and Removal of Snow Are Considered

In reply to an order passed by the City Council of Chicago requesting a report from the Board of Supervising Engineers, Chicago Traction, as to what has been done by the board toward carrying out the purport of a Council order passed March 11, 1912, respecting improvements in service, operation and equipment of the surface companies, the board made a detailed report on July 3. The report is signed by Bion J. Arnold as chairman, and says in part:

"The physical properties of the companies are being continually modernized and perfected, the systems extended and the methods of operation improved, and Chicago to-day enjoys a higher physical standard of its traction properties than other large cities in the country. In spite of this fact, the existing service and routing into the principal business district are admittedly deficient and rapidly becoming more so. This board is fully cognizant of these conditions and will assist so far as it can in applying reasonable remedies.

"Notwithstanding this great improvement in the physical properties of the surface companies (made in compliance with the 1907 and subsequent ordinances), and the improvement in service necessarily resulting therefrom, interpretation of the figures presented shows that the city of Chicago now faces a problem in local transportation as serious as ever before in its history. With the surface railway traffic increasing at a rapid and growing rate, largely as a result of the recent rehabilitation, there are no adequate means available now for alleviating the increasing congestion and inadequate street capacity except through: (1) Complete unification of transportation lines, segregated as far as practicable into short-haul and long-haul traffic between surface and rapid transit systems respectively; (2) additional bridges and tunnels, and finally (3) the construction of downtown subways, terminal and storage facilities. The immediate relief to be found by comprehensive through routing has already become quite apparent through discussion of these matters before the local transportation committee.

"Incidentally, with reference to this question of storage, attention is directed to the fact that the demand for rapid transit terminal facilities finds its most rational outlet under Grant Park, west of the Illinois Central Railroad right-of-way, and that this space should be reserved for such purposes.

"While under the 1907 ordinances, this board has ample powers regarding engineering and construction matters, as well as the supervision of accounts, the ordinances not only do not give to this board the power of initiating service regulations, but, further, the board must await a request from the City Council regarding any specific operating condition before the board is authorized to make recommendations thereon, and even then it has no power of enforcement, nor has it, under the ordinances, any means of ascertaining whether its recommendations have been carried out to the satisfaction of the City Council.

"To remedy this condition and to facilitate prompt action, a permanent traffic force should be organized for the purpose of maintaining systematic records of changing conditions of travel throughout the city.

"In order to facilitate as far as possible co-ordination of the work of the transportation committee and this board, pending the establishment of an effective traffic force such as the Council may see fit to authorize, this board will undertake to make investigations and within thirty days from the date of its recommendations to notify the local transportation committee whether such recommendations have been carried out, so that the committee may be fully and promptly informed.

"Much of the beneficial work eventually possible must necessarily be deferred until at least unified operation of the properties is put into effect, if not unified ownership. Until then the most efficient system of through-routing and the universal adoption of adequate standards of service already established by this board will be handicapped and difficult of execution without effective co-operation of other city departments in continuing the work of clearing the transit thoroughfares of existing obstructions and providing additional street facilities as rapidly as justified by the development of traffic. The work of the traffic police and especially the mounted police has proved of great value in relieving traffic congestion along the heavier lines, and this work should be extended into other parts of the city."

IMPROVEMENTS IN SERVICE

The detailed report sent by the board mentions several improvements in service and adds concerning them:

"With all of these improvements, it is apparent, from a review of all the records, that for some reason the recommendations of this board have not been productive of direct and adequate results in some cases. In April, 1913, the schedules of seventeen lines were thirteen cars short of the recommendations of 1912 in spite of the rapid growth of traffic in the interim; and although at the present writing the schedules have been further increased, this apparent margin is quite insufficient to meet the growing traffic.

TABLE I—COMPARATIVE OPERATING AND TRAFFIC RECORD

	Fiscal Year	Chicago Railways	Chicago City Ry.	Both Companies
Per cent increase	1910 to 1911	*18.4 (8.2)	6.0	13.2
Total passenger traffic, yearly	1911 to 1912	5.8 (6.5)	6.0	5.9
Per cent increase in car mileage	1910 to 1911	11.7	3.4	8.3
	1911 to 1912	3.5	5.2	4.2
Total passengers per car mile	1910	9.56	9.267	9.40
	1911	9.94	9.572	9.85
	1912	10.28	9.58	10.01
Total passengers per car hour	1910	77.85	87.91	79.4
	1911	88.45	84.97	87.1
	1912	92.40	86.30	89.9
Average operating speed m.p.h.	1910	8.19	8.84	8.50
	1911	8.79	8.93	8.74
	1912	8.98	9.00	8.90

*Chicago-Consolidated Traction Company traffic absorbed Dec. 28, 1910, resulted in 10 per cent increase in Chicago Railways traffic.
Total passengers includes transfers; car miles refers to revenue only.

TRAFFIC AND SERVICE RECORDS

"Since 1910, the total passenger traffic of the principal Chicago companies has actually increased 6 to 8 per cent per year. An additional 10 per cent increase in the Chicago Railways traffic resulted from the absorption of the Consolidated Traction lines. At the same time, the relative car-loading factor has likewise steadily increased as shown in Table I by the ratios of passengers per car mile and per car hour, i.e., increase in passengers carried has been faster than the car miles operated.

"But the most conclusive evidence is offered by the results of traffic counts of passengers leaving the downtown district during the evening rush hour, shown in Table II. The 1907 and 1911 counts concern the 'loop' district traffic only, those of 1912 the mile zone only; hence these are not directly comparable.

"These observations indicate that the rush-hour 'loop' travel outbound has increased from 61,000 to 67,000 passengers (1907 to 1911) and for the mile zone has reached

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as high as 83,000 passengers per hour (1912) for only 31 out of 47 lines. The average load per car was sixty-two passengers (1911) for the 'loop,' and for the mile zone eighty-seven passengers (1912), this average load rising as high as ninety-eight passengers per car during the heaviest ten-minute period (5:40 to 5:50 p. m.). Or, considered on a basis of relative loading as compared with seating capacity, the loading in the 'loop' district increased from 1.4 to 1.6 passengers per seat (1907 to 1911), while for the mile zone the average (1912) reached 2.12 passengers per seat.

"These results clearly indicate that there is no net improvement in service standard, as measured by the ratio of seats to passengers carried, due to the fact that the increase of traffic has exceeded the capacity of the greatly improved facilities which have been provided under the 1907 ordinance. Hence the present situation manifestly calls for immediate and comprehensive treatment along the broadest possible lines.

"A tentative standard of service has been established in which the various board representatives have practically concurred for the purposes of a unified property. This standard provides for as many seats as passengers during any fifteen-minute period of the non-rush hours, and an average of not over seventy passengers per standard double truck car during any thirty-minute period of the rush hours. Under present conditions of independent operation and existing street congestion, this standard cannot yet be universally applied, especially in the 'loop' district, owing to the physical limitations of existing track capacity. In such cases, it is the practice of this board, in its recommendations, to limit the individual car loads to the 'comfortable maximum' of 80 passengers per car.

CAR EQUIPMENT AND NEW CARS

"At the present writing, the entire consignment of 215 new standard cars for the Chicago Railways Company and 125 near-side cars for the Chicago City Railway are in regular service. The Chicago City Railway will purchase fifty or more new cars during the present year, and contracts for 200 new cars for fall delivery have been placed by the Chicago Railways Company.

"These Chicago Railways cars will embody some modifications over previous types. The car will be 48 ft. 5 in. in length over bumpers with platforms 8 ft. in length, giving an unrestricted entrance passageway of about 40 in., thus insuring very rapid loading.

"In the endeavor to secure a lower entrance and exit step, the diameters of the driving wheels are reduced to 32 in. and the car floor is slightly inclined, resulting in step heights as follows: Ground to first step, approximately, 12½ in.; first step to platform step, 11 in.; platform step to car floor, 10 in. As wear takes place and the diameter of the wheels is reduced, the height of the first step will be lowered still further to a maximum of 1 in., making the minimum possible height of the first step 11½ in. and an average height of 12 in. With this improvement, it is expected that even faster loading than at present will be possible, less than one second per passenger for ordinary groups up to ten or twelve passengers. The front exit step will be raised automatically by the closing of the door as the car starts, which will tend to reduce accidents.

"This car is about 30 per cent lighter than the present standard cars of the largest type. It will seat forty-eight passengers in the car body with five additional seats on the front platform, and while having a maximum comfortable capacity of eighty-two passengers, it will be able to carry 132 passengers in an emergency without intolerable over-

TABLE II—COMPARATIVE RECORD OF EVENING RUSH-HOUR TRAVEL

	Chicago Rys. Co.			Chicago City Ry. Co.			Both Companies		
	Loop District		1 Mile (a) Outside	Loop District		1 Mile (a) Outside	Loop District		1 Mile (a) Outside
	July and Aug., 1907	July and Aug., 1911	April, May, Sept., 1912	1907	1911	1912	1907	1911	1912
Routes counted	all	all	31/47 only	all	all	all	all	all	52/68 only
Units per hour counted	490 (b)	695	593	341 (b)	384	368	831 (b)	1,079	961
Cars per hour counted	676	695	593	364	384	368	1,006	1,079	961 (d)
Seats per hour	26,062	26,463	23,472	16,907	15,504	15,844	42,969	41,967	39,316
Passengers per hour	36,490	42,949	53,790	24,823	23,811	29,430	60,855	66,760	83,220
Passengers per car	54.0	61.8	90.8	68.2	62.0	80.0	60.55	61.9	86.6
Average seating capacity	38.5	38.2	39.6	46.2 (c)	40.4	43.0	42.7 (c)	38.9	40.8
Passengers per seat	1.401	1.62	2.29	1.467	1.54	1.86	1.417	1.59	2.12
Per cent seated load	70.4	61.7	43.6	68.1	65.1	53.8	70.6	62.8	47.2

NOTE—(a) Outer district bounded by Chicago-Halsted-Twelfth Streets; inner loop district by Kinzie-Clinton-Harrison Streets.
(b) Some trailers still in operation in 1907.
(c) High seating capacity due to fifty-seat summer open cars.
(d) Sixteen routes of Chicago Railways Company not counted totaled 155 cars per hour, 5884 seats, as per schedule.

crowding. Over two-thirds of the entire seating capacity is in cross seats.

"Field control motors will be used. Thermostatic regulators for the automatic control of car heating will further economize the power requirements for heating which are very heavy during the winter months, averaging as much as 15 per cent of the actual net power requirements of the car for traction. With motor-driven ventilating fans, this equipment is expected to meet the ordinance requirement regarding ventilation.

SCHEDULED EQUIPMENT

"Except for temporary fluctuation in schedules necessary to meet variable traffic conditions from month to month, the basic schedules operated by the two principal companies have called for a continual increase in equipment. On Feb. 27, 1913, the net reserve equipment available for winter operation by all companies, exclusive of all extra cars in shops for repairs, was as shown in Table III.

"The companies usually prefer to order a large number of cars at a time in order to reduce the price per car. But if the reserve equipment on hand at the time of placing the order is too low, this method leaves a long period unprovided for, during which time the reserve cars are absorbed by the growth of traffic and a car shortage then occurs before delivery of the new cars begins. On this plan of ordering cars, a greater reserve is necessary to meet in-

TABLE III—NET RESERVE EQUIPMENT

	Chicago Railways Company	Chicago City Railway	Both Companies	Calumet & So. Chicago Railway Co.
In operative condition				
Double truck	1586	957	2543	92
Single truck	75	274	349	20
Total	1661	1231	2892	112
Net reserve				
Double truck	60	57	117	14
Single truck	28	111	139	3
Total	88	168	256	17
Per cent reserve				
Double truck	3.78	5.95	4.60	15.2
Single truck	37.40	40.5	3.98	15.0
Total	5.30	13.65	8.85	15.2

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creasing schedules than if cars are added month by month. Generally speaking, for surface railways, a total reserve of from 7 to 10 per cent should be provided according to frequency of additions. And with carhouses as well distributed as in Chicago from 3 to 5 per cent will be required as net reserve only, i.e., exclusive of all equipment undergoing repair, painting or other overhauling in the car shops. While the present net reserve in single-truck equipment is ample, that of the double-truck equipment will be somewhat improved by the additional equipment now on order.

ADDITIONAL EQUIPMENT

"The car requirements of both present and future have already been determined by this board in connection with the re-organization merger plan for surface lines. In this analysis, the actual car shortage of the operating schedules of 1912 was determined from traffic counts on most of the heavier lines. Assuming this shortage to have been made up at that time, the future equipment requirements were then proportioned to the estimated growth in passenger traffic.

"Three service standards are considered in this estimate: First, a maximum of seventy passengers per forty-seat car during any thirty-minute rush-hour period; second, a maximum of eighty passengers per car under the same conditions; third, a maximum of eighty passengers per car for the maximum thirty minutes and seventy for the remaining thirty minutes of the rush-hour periods.

"The first-named standard was recommended on the above date by the majority of the board under the assumption of complete through-routing and zone operation in the outlying residence territory contingent upon unified management of the properties. The second represents a so-called maximum comfortable loading, which ought not to be exceeded at the present time even in the absence of unified management. The third represents a compromise standard, the necessary equipment which ought to be provided in the near future. On this compromise basis, the actual requirements for the next five years will increase, in round numbers, from 140 to 160 cars per year not including this reserve nor the shortage of about 200 cars in 1912 which has not yet been made up.

"It is unquestionable that with complete unification and re-routing of the system so much more effective use of cars would be possible as to provide a large increase in actual service rendered for the same amount of equipment operated, as compared with the present time, i.e., that, relatively speaking, a large saving in cars for the same service would result together with correspondingly decreased street congestion.

"Now that the unification of the properties has temporarily been deferred, considerable new equipment is required to absorb the present shortage and to meet the needs of the immediate future. For this purpose, the compromise service standard (eighty passengers, maximum thirty-minute period) represents the minimum that should now be considered. The new cars on order by the Chicago Railways Company and to be ordered by the Chicago City Railway will only suffice to absorb the shortage of 1912 and the growth up to the present time (although complete deliveries can hardly be expected until the close of the present year) and not to meet the growth of traffic as herein estimated.

THROUGH ROUTES

"All of the through routes designated in the revision ordinance of July 15, 1912, are being operated strictly in accordance therewith with the exception of five (1, 3, 6, 9, 23) which are also in operation but are permitted alternative routing or temporary terminals to be later extended further into outlying territory. Obviously the fullest use of the advantages of the through-routing plan cannot be realized until unified operation of the properties is brought about; for there are practical difficulties in the establishment of complete through-route service under divisional operation that the companies do not seem as yet able to remove.

"The results generally indicate that through routes are extremely sensitive to changes in location but when properly routed respond quickly to the increase in service and that, with a headway longer than ten or fifteen minutes, the route is practically killed for through-route purposes, especially when operating on streets giving quicker local service with transfers. Thus many of these through-routed cars become inconvenient for other than local service and the fundamental purposes of the through-route plan are only partially fulfilled. Under unified operation the unbalancing of traffic and earnings that now concerns the companies in every proposed change will disappear.

ADDITIONAL TRACKAGE

"An analysis of the disposition of additional cars recommended indicates that about 86 per cent of them should reach the mile zone business district during rush hours on the present basis of operation. This means that in the absence of universal through-routing track facilities must be found for accommodating about 265 additional cars on the 70/70 standard or 170 cars on the 80/70 standard, equivalent to 15 per cent increase in the existing loop service. It is idle to consider the addition of all this equipment to the present tracks in the center of the loop unless a subway is provided, for the present surface tracks have neither the required capacity nor freedom from traffic obstructions. However, the expansion of the return loop (or short run tripper) service to meet these conditions is entirely feasible and represents the only possible method of relieving the loop district prior to the construction of subways.

TABLE IV—RUSH-HOUR TRIP—OUTBOUND—EVANSTON AVENUE LINE

5:28 p. m. Trip from Dearborn and Monroe Streets

Section of Line	Average Stops per Mile (a)	Average Speed, m.p.h.	Remarks
Dearborn and Monroe Sts. to South End tunnel	18.85	4.24	Loop district
Michigan St. to Chicago Ave.	21.10	6.27	Track congestion
Chicago Ave. to North Ave.	5.0	9.23	Unusually free running
North Ave. to Fullerton Ave.	4.63	10.81	Along park
Fullerton Ave. to Diversey Blvd.	13.24	9.06	
Diversey Blvd. to Grace St.	10.48	10.72	
Grace St. to Wilson Ave.	10.27	11.68	
Wilson Ave. to Balmoral Ave.	7.98	9.35	Cars bunched
Balmoral Ave. to Devon Ave.	8.76	12.57	
Average		9.6 m.p.h. for trip	

Length of run 8.6 miles.
Average stops per mile = 9.27. Actual stops = 82.4 per cent.
Maximum stops per mile = 11.24.

(a) Including street stops and stops due to obstruction of track by vehicles, etc.

"At the present time over 95 per cent of the total rush-hour equipment entering the mile zone also traverses the inner loop district. But, from the comparative traffic counts it develops that at least 25 per cent of the total evening rush-hour passenger travel from the downtown district originates somewhere in the district between the inner loop and the outer or mile zone; in other words, the total traffic leaving the mile zone is fully one-third higher than that of the inner loop only. This fact is reflected in an average car loading about one-third higher at the boundaries of the mile zone than those at the loop zone.

"For the return loops certain curves and track connections are absolutely essential and the companies have endeavored for sometime past to secure the necessary trackage rights but without success owing to the obstructions interposed by certain property owners who withheld property consents in order to permit freer use of the streets for delivery purposes.

OPERATING SCHEDULES AND SUPERVISION

"During the past three years the average car speed has increased from 8.50 m.p.h. (year ending Jan. 31, 1911), to

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8.99 m.p.h. (year ending Jan. 31, 1913), that is, the entire city of Chicago is now operating on practically a schedule of 9 m.p.h. This increase is the result of improved operating conditions due to track rehabilitation, completion of river tunnels and extensions into outlying districts. It seems proper to emphasize here that increased schedule speed does not necessarily mean increased maximum speed, but rather reflects the results of more efficient operation, elimination of unnecessary delays and a better condition of physical property. Much of the recent improvement has resulted from investigations by the companies of prompt and efficient acceleration and braking to minimize the effects of the numerous stops on the schedule speed made by the cars.

ELIMINATION OF UNNECESSARY STOPS

"In Chicago, the standard subdivision for a section one mile square usually results in a tract eight blocks long by sixteen wide. Fortunately, in perhaps the majority of subdivisions, the long dimensions of these blocks have been located along trunk lines requiring street car service. This particularly applies to the South Side lines leading out of the business district and the limited number of stops at street crossings contributes greatly to the rapid transportation desired. On the other hand, the North and West Side lines are distinctly handicapped in operating through the 'close-in' districts, where the blocks vary from twelve to sixteen per mile, resulting in an excessive number of stops on these important trunk lines. In the example shown in Table IV, the actual number of stops represents 82 per cent of the possible number.

"In view of the condition existent, this board is of the opinion that rapid surface transportation in Chicago would be very generally improved if permissible stops could be confined to the standard subdivisions of eight blocks per mile or thereabouts. Irregular stopping points should be distinctly indicated by means of colored poles or posts, suspended signs or other distinctive methods, especially in all districts where stops are not made at every street intersection. Much improvement has already been made by the exclusive adoption of the near-side stop, where formerly full stops were made on both near and far side.

SNOW REMOVAL

"In an endeavor to meet the conditions of the 1907 ordinances, various modern methods of snow removal have been investigated and tests made with a snow-melting apparatus, using high temperature steam. The results have been very unsatisfactory both in regard to economy and rapidity of operation. In view of the enormous mileage involved and the resulting investment in special equipment that would remain idle throughout the year, the board regards it as necessary to exercise great caution in authorizing such investment until a thoroughly efficient apparatus has been developed.

ELECTRIC SWITCHES

"For some years electric switches have been in use in Chicago, and over 100 of these switches are now in use by the traction companies with successful results. Additional switches are being added from time to time.

EXTENSIONS OF SERVICE

"The companies, as a whole, have been active in extending their lines, particularly the Chicago Railways, which has built about 32 miles of new extensions since the end of its rehabilitation period against a maximum of 23 that could be called for by the city under the 1907 ordinance. The Chicago City Railway since its rehabilitation period has constructed about 17 miles of new extensions against a possible maximum of 22 miles under its ordinance and in lieu of additional new extensions added to its system by purchase 18 miles of track which extended the 5-cent zone to the extreme southwest limits of city, thus making a total additional mileage of 35 miles since 1910. Considering the three years' construction season, 1910 to 1912 inclusive, it appears that the total new track construction has just about kept pace with that stipulated by the 1907 ordinance for the post-rehabilitation period.

SUMMARY

"It is necessary to state in conclusion that these facts should not be misinterpreted by assuming present conditions to be due to failure of the companies to keep pace with transit growth. Rather, the absence of adequate rapid transit development may be regarded as the prime cause of the present limitations in transit facilities. Admittedly the growth has been faster than expected and continuously involves questions of raising the money for necessary capital expenditures which it has been a duty of this board to supervise. But any surface transit system can be developed, as such only to the extent that there are streets available for its occupancy, and it then cannot fulfil the demands of rapid transit. The surface line system has been perfected to its present state by the expenditure (in addition to its original cost of $55,775,000) of more than $80,000,000 within a period of six years and has reached a state of development unparalleled in this country, not only in actual mileage of track construction, number of cars installed and auxiliary equipment provided, but also in the methods and efficiency of operation as evidenced by the ability of the system under the present handicaps to give the class of service it is now giving in handling over 1,000,000,000 passengers per year."

IMPROVEMENTS ON DETROIT UNITED RAILWAY'S INTERURBAN LINES

The Detroit (Mich.) United Railway has completed so far this year or has in progress track improvements on its interurban lines which will approximate in cost $250,000 for labor and material. The following review of this work is contained in *Electric Railway Service,* which is published in the interest of the company and distributed to the public.

Detroit, Jackson & Chicago Railway.—A new switch in Ann Arbor; rails have been renewed around the campus at Ann Arbor; a double track has been constructed through Dearborn; the old steel bridge on Congress Street, Ypsilanti, has been replaced with a double-track concrete arch bridge; the track at Foster curve, dangerous because of the obstructed view, has been straightened; a very heavy fill is being made on the Stellwagon property, west of Wayne, for which a right-of-way was purchased, to eliminate a dangerous curve and save time on the Jackson division schedules.

Detroit, Monroe & Toledo Short Line Railway.—A grade is being prepared for double track from Milan to Rockwood and four old bridges being rebuilt with concrete and steel; the track on Elm Avenue, Monroe, from Anderson Street to Lincoln Avenue, is being reconstructed with the most modern standard construction; a double track is being constructed between State and Kay switches; the grade from the Toledo north city limits to Shantee Creek is being prepared; a new sand dryer plant is being built at the Oakwood yards to dry the lake sand which is used in construction.

Rapid Railway System.—A double track has been built from Hagadorn switch to South Park Y; a loop track has been constructed near Glauker's Point, Grosse Pointe, to be used in connection with city car service and develop the property through improved facilities.

Pontiac Division.—A new waiting room and freight house has been built at Long Lake road, and shrubbery has been planted to improve the appearance of the grounds round the building.

Orchard Lake Division.—The track at Cass Lake curve, a dangerous curve, has been straightened.

Flint Division.—A new wash house building, to be used for the washing of cars, has been built at Rochester.

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CROSS-TIE DATA FOR 1911

Forest Products Bulletin No. 8, dealing with cross ties purchased in 1911, has just been issued by the Department of Commerce, Bureau of the Census, in co-operation with the Department of Agriculture, Forest Service, Henry S. Graves, forester.

CROSS TIES PURCHASED IN 1911

The total number of cross ties purchased by the steam and electric railroads of the United States in 1911 was 135,053,000. This represents a decrease of 13,178,000, or 9 per cent, as compared with the number purchased in 1910, but is 11,302,000, or 9 per cent, greater than the number reported for 1909. Only 11,041,324 ties, or 8.2 per cent, were for new track—the lowest percentage since 1908. In 1910 over 22,000,000 ties, or 15 per cent of the purchases, were for new track. Both steam and electric roads reported decreased purchases for this purpose in 1911, the steam roads reporting 9,271,954 and the electric roads 1,769,370. This is the smallest number reported by the electric roads for new track during any of the years covered by the table.

TABLE I—CROSS TIES PURCHASED, BY KINDS OF WOOD; 1907 TO 1911

Kind of Wood	1911	1910	1909	1908	1907
Oak	59,508,000	68,382,000	57,132,000	48,110,000	61,757,000
Southern pine	24,265,000	26,264,000	21,385,000	21,530,000	34,215,000
Douglas fir	11,253,000	11,629,000	9,067,000	7,988,000	14,525,000
Cedar	8,015,000	7,305,000	6,777,000	8,172,000	8,954,000
Chestnut	7,542,000	7,760,000	6,629,000	8,074,000	7,851,000
Cypress	5,857,000	5,396,000	4,589,000	3,457,000	6,780,000
Tamarack	4,138,000	5,163,000	3,311,000	4,025,000	4,562,000
Hemlock	3,686,000	3,468,000	2,642,000	3,120,000	2,367,000
Western pine	2,696,000	4,612,000	6,797,000	3,093,000	5,019,000
Redwood	1,820,000	2,165,000	2,088,000	871,000	2,032,000
Gum	1,293,000	1,621,000	378,000	252,000	15,000
Maple	1,189,000	773,000	158,000	151,000	.....
Beech	1,109,000	798,000	195,000	192,000	52,000
All other	2,682,000	2,895,000	2,603,000	3,421,000	5,574,000
All kinds	135,053,000	148,231,000	123,751,000	112,466,000	153,703,000

Table I shows the total number of cross ties purchased each year from 1907 to 1911, distributed according to kinds of wood arranged in the order of numbers purchased in 1911. Ten kinds of wood supply 95 per cent of all ties purchased. The more durable woods are preferred, although the growing practice of treating ties with chemical preservatives is reflected in the figures for gum, maple and beech, which were reported in very small numbers a few years ago.

No reports were obtained upon the average cost of ties. In 1909 the average cost was 49 cents, the prices by kinds of wood ranging from 33 cents for hemlock to 53 cents for redwood and for Western pine. It is stated that as a whole prices have not changed considerably since that time, although there have been fluctuations in many tie-producing localities.

The number of ties of each kind purchased by the electric railroads in 1911 was as follows: All kinds, 8,898,000; oak, 3,174,000; southern pine, 1,441,000; douglas fir, 491,000; cedar, 909,000; chestnut, 1,670,000; cypress, 188,000; tamarack, 59,000; hemlock, 21,000; Western pine, 81,000; redwood, 777,000; gum, 8000; maple, 6000; beech, 5000, and all other, 68,000.

The steam railroads purchased 93 per cent of the total number of ties, which is somewhat smaller than the proportion reported in 1910. The purchases of the electric railroads have shown a regular, though slow, increase in recent years, reflecting the steady development of these lines, while the purchases by the steam railroads have fluctuated considerably according to industrial conditions. The electric roads use the same kinds of wood as the steam roads, but in somewhat different relative quantities. This is due principally to the fact that the development of the electric lines has not been uniform throughout the territory covered by the steam roads. Oak, Southern pine, chestnut, cedar and redwood supply the greater part of the ties required by the electric lines. The increasing electric mileage has been followed by an increased demand upon the durable species. The competition of the roads for tie material was greater in 1911 than in 1910 in the purchase of Southern pine, cedar, chestnut, redwood and gum; while the purchase of other species showed a decline. The steam roads showed increased purchases of cedar, cypress, hemlock, maple and beech.

TIE PRESERVATION, ETC.

Of 112 treating plants of all classes of record in 1912, nearly ninety were well-equipped plants operating in representative sections of the country from coast to coast, but chiefly in the Eastern States. Most of these plants treat cross ties, piling, poles, construction timber, paving blocks and miscellaneous material under contract, but the steam roads operate twenty-two plants to meet their own needs, chiefly in the treatment of cross ties. A few electric roads, mining companies and firms handling poles also operate a number of relatively small plants, usually for the treatment of their own material.

In 1911 more than 73,000,000 gal. of creosote oil (70 per cent imported), the principal preservative used, was reported by the wood-preserving plants of the United States. Large quantities of cross ties, construction timbers and miscellaneous material are also treated with zinc chloride in water solution or receive a combination treatment with creosote oil and zinc chloride. More than 16,000,000 lb. of zinc chloride, all of domestic manufacture, was used by preserving plants in 1911.

Crude petroleum was employed extensively by one large railroad and to a limited extent by several small companies. Water-gas tar, corrosive sublimate, preservatives sold as carbolineum and a number of other substances were reported.

In 1911 cross ties formed 74 per cent of all material receiving a preservative treatment from the plants reporting to the forest service. The numbers of ties treated before and after purchase by the steam and electric railroads of the United States in each year, 1907 to 1911, inclusive, is shown in Table II. The table clearly indicates the progress being made by tie consumers in the use of treated ties and the growing tendency toward the treatment of ties after purchase, presumably in plants owned by the railroads. In 1911 over 31,000,000 ties, or 23 per cent of the total purchased, were treated either before or after purchase. Each of the years from 1908 to 1911, inclusive, except 1909, has shown, as compared with the preceding year, an increase in the proportion of ties treated. The number reported by the steam roads represented only a slight gain over that for 1910, a year in which there occurred a very considerable increase in the number of ties treated. The number treated by the steam roads after purchase increased greatly, however, reflecting the tendency of the steam roads to build and operate their own plants.

The electric roads continue to report more treated ties each year, and, since these roads have few plants, most of their ties are treated before or after purchase in commercial plants.

TABLE II—CROSS TIES PURCHASED—NUMBER ALREADY TREATED OR TREATED AFTER PURCHASE, BY CLASSES OF RAILROADS PURCHASING; 1907 TO 1911

Class of Railroad Purchasing	Total Treated	Treated Before Purchase	Treated After Purchase
1911:			
Steam railroads	30,759,000	4,197,000	25,562,000
Electric railroads	1,382,000	773,000	609,000
1910:			
Steam railroads	29,359,000	10,770,000	18,589,000
Electric railroads	1,185,000	874,000	311,000
1909:			
Steam railroads	21,198,000	7,081,000	14,117,000
Electric railroads	835,000	582,000	253,000
1908:			
Steam railroads	23,157,000	10,566,000	12,591,000
Electric railroads	619,000	407,000	212,000
1907:			
Steam railroads	19,192,000	7,975,000	11,217,000
Electric railroads	664,000	414,000	250,000

Ties of Southern pine, oak and Douglas fir constituted in 1911 nearly 80 per cent of the total number treated. These woods are also the leading species used without treatment. Western pine, gum, beech and lodge-pole pine are generally

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treated before being used for cross ties, but most of the remaining woods shown in the table are used in greater numbers untreated. The figures show plainly that large numbers of ties of the less durable woods are being used without treatment. In fact, preservative processes are being employed principally to increase the service of the relatively durable woods commonly used without treatment, and full advantage is not being taken of the opportunity which these processes afford for the use of woods not naturally resistant to decay.

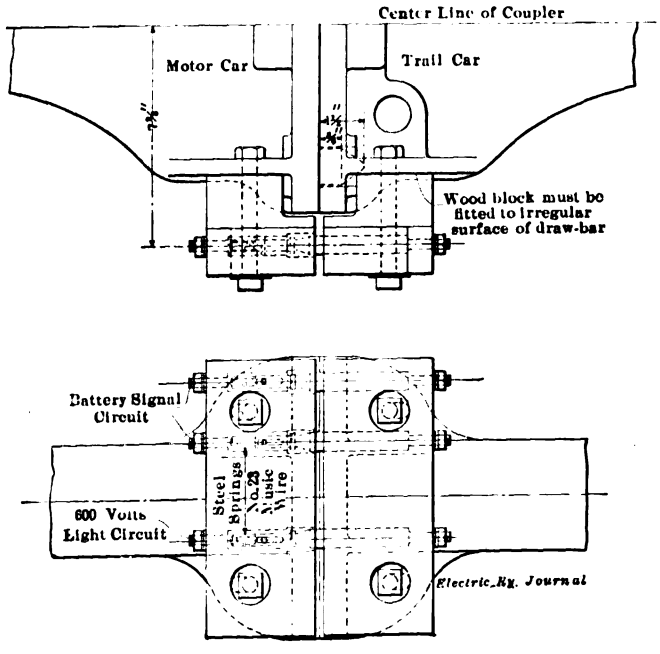
More than half (56.6 per cent) of the preserved ties were treated with creosote oil, 27.8 per cent with a solution of zinc chloride, and the remainder with combinations of these preservatives, crude oil or various other materials. Southern pine, oak and gum are generally creosoted, although large numbers of ties made from these woods are treated with zinc chloride. Nearly all of the Douglas fir ties were treated with zinc chloride. Large numbers of Western pine ties were treated with one or the other of these preservatives or with crude petroleum. Table III shows the number of cross ties treated in 1911 by electric railways, by kinds of wood and by kinds of preservative.

TABLE III—CROSS TIE PRESERVATION BY ELECTRIC RAILWAYS IN 1911

Kind of Wood	Total	Kind of Preservative: Creosote	Zinc Chloride	Creosote and Zinc Chloride	Miscellaneous
Southern pine	831,607	578,725	67,438	5,000	180,444
Oak	401,795	208,585	.....	15,000	178,210
Douglas fir	80,402	.....	.....	.....	80,402
Western pine	8,000	8,000	.....	.....	.....
Gum	5,550	4,650	.....	.....	900
Tamarack	42,334	3,400	.....	.....	38,934
Beech	4,595	3,452	243	.....	900
Birch and maple	500	.....	.....	.....	500
Elm	900	.....	.....	.....	900
Spruce	5,000	.....	.....	.....	5,000
White pine	1,000	1,000	.....	.....	.....
Chestnut	200	.....	.....	.....	200
All kinds	1,381,883	807,812	67,681	20,000	486,390

COUPLER WITH SIGNAL AND LIGHTING ATTACHMENTS

In equipping its new trailers the United Railways of St. Louis has greatly simplified the coupling of motor and trail cars by some home-made additions to the standard form of Tomlinson coupler. As shown in the accompanying drawing, the coupler has been provided with two wooden blocks carrying three spring contacts. Two of these contacts are used for the signal circuit and one for the lighting circuits. Thus at one operation the coupler couples the cars, air, lights and signals.



St. Louis Coupler with Signal and Lighting Connections

COMMUNICATIONS

A QUESTION OF NAMES

DOBBS FERRY, N. Y., Aug. 10, 1913.

To the Editors:

In your issue of Aug. 2, 1913, you have an article entitled "Single-Phase Traction for Norfolk & Western Railway." It is therein stated that it is the intention of this road to use twenty-five-cycle, single-phase currents at a potential of 11,000 volts at the trolley, with induction motors on the locomotive.

Why is it that this thing is not called by its proper name? From all the information available, this motor is our old friend the polyphase motor in disguise. As a matter of fact, a single-phase motor, whether of the commutator or of the induction type, could not economically be built for the heavy work required by this railway. According to the best information, these locomotives are to be equipped with polyphase motors and with a phase-spitting or phase-converting device which will enable them to make use of the single-phase current in a manner similar to what I outlined several years ago.

The motor is the decisive part of any railway equipment. If the Norfolk & Western equipment goes in as now planned, it will be just as truly a polyphase equipment as, for instance, the Great Northern equipment. If the Great Northern decides to experiment with the phase-splitting device, it will not call itself a single-phase road on that account.

The use of single-phase currents for transmission and distribution purposes may or may not justify itself in the end. But, in any event, the mere fact that single-phase currents will thus be used for transmission purposes should not be a reason for calling this Norfolk & Western equipment a single-phase equipment. It would be practically just as sensible to call the New York Central equipment a three-phase equipment because the New York Central generates and transmits its energy in the form of three-phase alternating currents.

The fact that the single-phase enthusiasts want to let themselves down easily should not be allowed to mix up our already complicated railway vocabulary. Nor should this attempt to christen a polyphase line as a single-phase line be allowed to mislead our brethren across the ocean, who might thus come to think that American engineers have gone back to the single-phase delusion.

C. L. DE MURALT,
Professor of Electrical Engineering, University of Michigan.

CHOICE OF GEAR RATIO

VIGO ELECTRIC TRAMWAYS.
VIGO, SPAIN, July 5, 1913.

To the Editors:

In view of your undoubtedly competent judgment in matters relating to electric traction, we make free to consult you in regard to a little problem which we are anxious to solve. The matter concerns the electrical equipment of our street railway system, the necessary data being as follows:

Track gage, 1 m. (37.37 in.); motor cars equipped with Brill 21-E rigid trucks; weight of a train (motor car and trailers, inclusive of load), about 19 tons; grades up to 65 per 1000. The minimum radius of curves on the line is 20 meters (65.6 ft.). The trolley wire carries 550 volts d.c.

One dealer offers us inclosed motors (two for each car) with series winding and auxiliary poles, developing 36 hp per hour with 550 volts and 540 r.p.m., with a gear ratio of 1:5.1, and gear cases. The efficiency under full load is 89 per cent. The power is understood to be measured in accordance with the regulations of the Association of Ger-

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man Electricians. Another dealer recommends motors of similar description, but with a gear ratio of 1:6.25. Our cars are to run at a speed of 9 km per hour (5.57 m.p.h.) in the city streets, and of 13 km per hour (8.1 m.p.h.) on the highways or suburban roads.

In view of the physical features of the territory covered by our system, which has long and steep grades as well as long sections that are practically horizontal, we think that a ratio of gearing of 1:6.25 would not give our cars sufficient speed unless compensation is provided by increasing the motor speed, a measure which would result in an increased cost of maintenance.

What gear ratio will be the most desirable for us, and what are the advantages or disadvantages of each of the types of equipment proposed?

MARTIN ECHEGARAY,
Chairman of the Board of Directors.

REPLY

To select a proper motor for this service, speed-time and power curves should be plotted for the two types of service, city and suburban. To do this accurately, in addition to the information furnished, it would be necessary to have characteristic curves of the motors and to know the diameter of the driving wheels, the number of stops per kilometer and their average length, also the length and character of the grades. We have taken the characteristic curves of a standard 35-hp railway motor having an armature speed of 575 r.p.m. when taking a current equal to its one-hour rating and have corrected these curves for gear ratios of 1:5.1 and 1:6.25, assuming the diameter of the driving wheels as 30 in. (750 mm) and the average voltage at the motor terminals as 500 volts. From these curves, shown in Fig. 1, we have worked out the speed-time and current curves shown in Fig. 2 for runs on level tangent track at a schedule speed of 13 km per hour.

Curve 1, Fig. 2, is the speed-time curve for a train with 1:5.1 gearing running 300 m (984 ft.). Curve 2 is for a train with 1:6.25 gearing running 300 m and curve 3 is for a train with 1:6.25 gearing running 400 m (1312 ft.). Curve 4 shows the current taken per motor with 1:5.1 gearing and curve 5 the current per motor with 1:6.25 gearing.

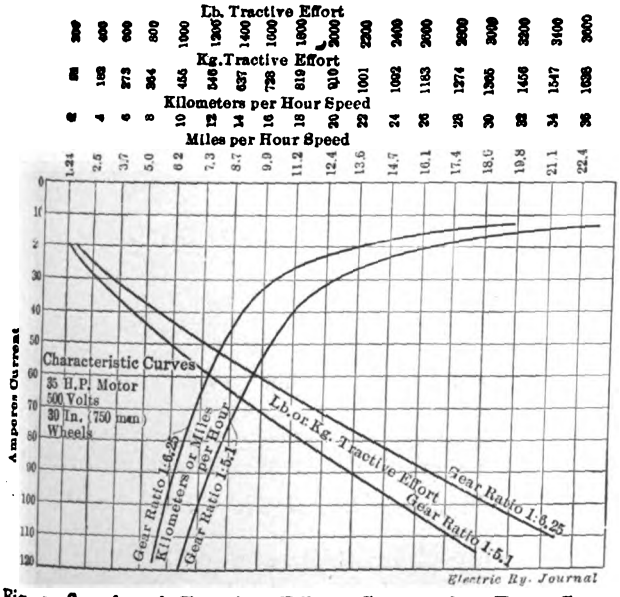

Fig. 1—Speed and Tractive Effort Curves for Two Gear Ratios

These curves are calculated for the conditions shown in the accompanying table.

Curve 2 shows that a train equipped with the 1:6.25 gearing can make a schedule speed of 13 km an hour with a twenty-second stop every 300 meters and still have a reasonable margin for making up lost time, as the coasting time for this run is 28 per cent of the total time consumed.

By comparing curves 4 and 5 it is found that the accelerating current per motor is 71 amp with 1:5.1 gearing, and 62 amp with 1:6.25 gearing, and that the average current per motor for a run of 300 m, including stop, is 12.8 amp with 1:5.1 gearing and 11.4 amp with 1:6.25 gearing. The low-

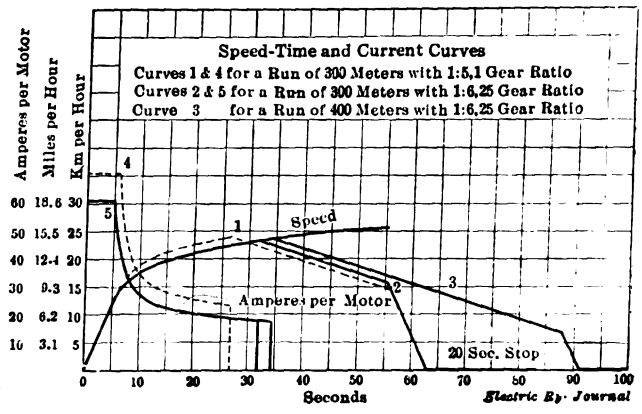

Fig. 2—Speed-Time and Current Curves with Two Gear Ratios

speed gearing thus shows a saving in energy consumption besides greatly reducing the temperature of the motors. This advantage will be much more pronounced with the short runs and low schedule speed of the city service and will also prove of far greater advantage on the long, steep grades.

The most common error in the selection of gearing has been to gear for high speed when the service gave no opportunity for using it to advantage. This improper selection of gear ratios alone has caused a loss of hundreds of thousands of dollars due to overloads and consequent burn-outs of motors and the apparatus in power houses and substations. Line losses have been greatly increased and large motors have been used where much smaller ones would have done equally well if properly geared. The best practice is to provide for rapid acceleration, short coasting and rapid braking, and after the selection of a motor which is suitable for this service the best gear ratio to use is the lowest speed gear which will give the desired schedule speed with a reasonable margin for safety.

Weight of train, including equipment and live load	19 tons
Average motor voltage	500 volts
Length of run	300 m and 400 m
Length of stop	20 seconds
Schedule of speed	13 kw (8.1 miles) per hour
Initial acceleration	2.4 kw (1.5 miles) per hour per second
Braking rate	2 kw (1.5 miles) per hour per second
Track	20 lb. (10 kg) per ton
Train resistance	Straight and level

Characteristic curves of motors as shown in Fig. 1.

The curves which we have given will serve to illustrate the effect of different gear ratios. We would further suggest that you consider motors arranged for field control, as they are particularly well adapted to just such service conditions as you have. You would thus be able to use a slow-speed motor with high-gear ratio to its greatest advantage. Field control would produce more economical running in the slow-speed city sections, permit the use of a high-gear ratio for the grades and with the same gearing produce a higher speed for the suburban districts than could be obtained with the same size non-field control motor geared for the local schedule.—EDS.

The record of passenger train performances on the steam railroads of New York State for June, 1913, shows that during the month the number of trains run was 66,325. Of the number of trains run 84 per cent were on time at the division terminal. The average delay for each late train was twenty-five minutes and the average delay for each train run was four minutes.

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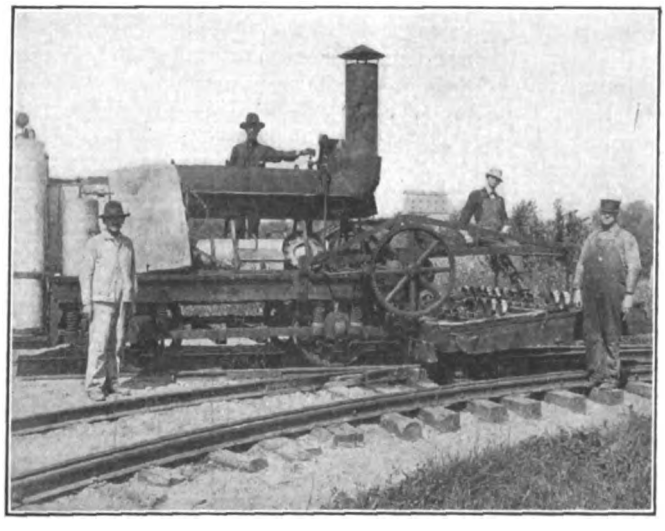
A NEW RAILROAD WEED BURNER

The Waynco railroad weed burner, manufactured by the Wayne Process Company of Fort Wayne, Ind., is an improved form of the apparatus often used for burning weeds from the tracks of railroads. Its fuel is common kerosene oil which is vaporized in a large coil mounted on the car. This, by special design, is reported to avoid the difficulty heretofore encountered in all vaporizing burners in the frequent renewal of the vaporizing chamber made necessary by the effect of the decomposition of the oil upon its walls. The vapor-generating coil contains several hundred feet of pipe which is heated by an auxiliary self-vaporizing burner. Oil under a pressure ranging from 50 lb. to 75 lb. per sq. in. is supplied from pressure tanks on the car to the coil and the coil is connected to a battery of burners on the rear of the car.

Each burner produces a flame 4 in. in diameter and 2 ft. long, and the burners are so arranged that the several flames uniformly spread over the ground and weeds. They are inclosed by a hood which is lined with asbestos, and this serves to retain the heat of the flames and reflect it onto the ground, thereby greatly intensifying the effect. The high temperature, over 2000 deg., wilts the green weeds down as



Kerosene Weed Burner for Interurban Lines

the car travels along, and if necessary, after they are permitted to dry a little, the burner is again run over them in order that they shall be consumed.

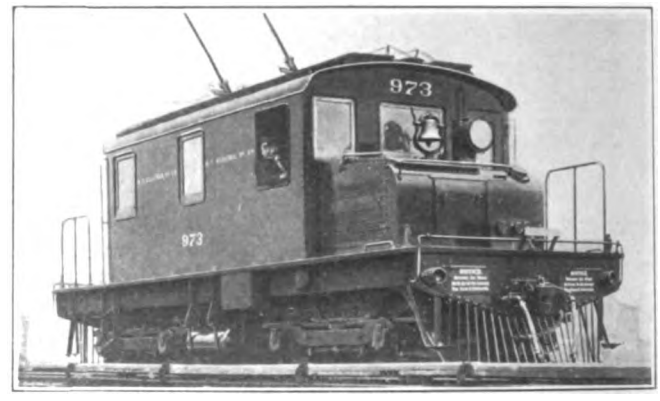
A throttle valve in the connection between the coil and the burners controls the passage of the vapor to the burners and as many of the burners may be lighted as the operator may choose. The car may be driven at a speed of 3 m.p.h. or more, according to the height and quantity of the weeds, and 50 gal. to 60 gal. of oil an hour is consumed when the apparatus is running full blast.

The air under pressure is furnished by a standard air-brake compressor, and as it does not flow out of the tank but simply forces the oil from the tank into the vaporizing coil, the pump is run only to keep the pressure above a minimum point, being controlled by a standard type of governor. Consequently the constant operation of the compressor is not required as it is in the case of atomizing devices. A compressor that will furnish 60 cu. ft. per hour is ample for the needs of the machine.

The accompanying illustration shows the equipment mounted on a short single car, but it may be applied to a double-truck car equally well. The auxiliary burner is started with alcohol or gasoline, and after it has reached the vaporizing temperature it becomes self-vaporizing. Its flame does not strike the large coil but heats a bushing within it, and the bushing in turn heats the large coil to vaporize the oil which flows into it.

50-TON, 600-1200-VOLT FREIGHT LOCOMOTIVES FOR BRITISH COLUMBIA

Five 50-ton electric freight locomotives have recently been built for the British Columbia Electric Railway Company, Vancouver, B. C., similar to the 60-ton locomotives of the Southern Pacific Company which were described in the ELECTRIC RAILWAY JOURNAL for Oct. 5, 1912. They

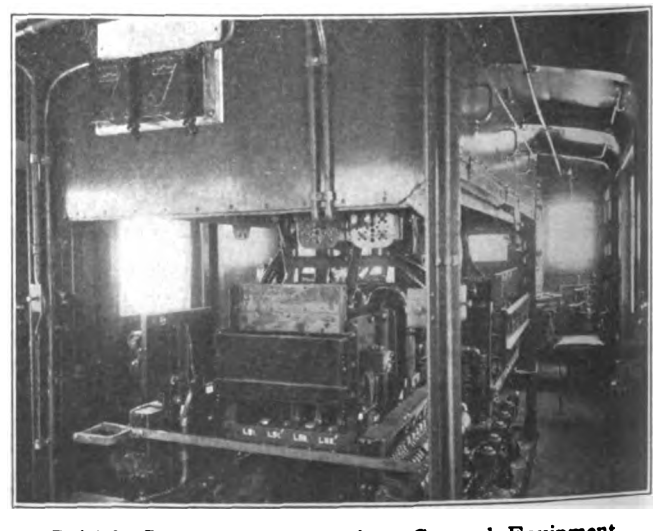


British Columbia Locomotive—Side View

are of the double-truck type with a steel central cab of steeple form.

Each locomotive is equipped with four Westinghouse No. 308-D-3 box-frame commutating-pole 600-1200-volt railway motors and type HB unit switch control. For 1200-volt operation two motors are permanently connected in series. The control equipment consists of the following apparatus: two master controllers, two switch groups, two reversers, one series-parallel switch, one line switch, one control resistor, two hand-operated change-over switches and two sets of storage batteries (ten cells, each set giving 20 volts).

All control equipment, except the master controller, is inclosed in a wire cage supported by an angle-iron framework in the center of the locomotive cab. The grid re-



British Columbia Locomotive—Control Equipment

sistors are mounted in the roof of the locomotive cab over the unit switch apparatus in a portion framed off and ventilated through the roof by means of two ventilators. The two master controllers have three running notches on 600 volts and two on 1200 volts.

An interesting item of this equipment is the series-parallel switch. This switch is controlled by a single-pole, double-throw knife switch at either end of the cab. On 1200 volts the connections are so arranged on the change-over switch that the series-parallel switch is in the 1200-

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volt position connecting two motors in series regardless of the position of the knife switch. On 600 volts the connections on the change-over switch are so altered on changing over to the 600-volt position that the motors of each pair by means of the series-parallel switch may be thrown either two in series or two in parallel, whereas in the 1200-volt position the motors are two in series only. This is of particular advantage on 600 volts in accelerating heavy loads. The motors are first connected four in series until the train is started. The controller is then returned to the off position, and the series-parallel switch is thrown to connect the motors of each pair in parallel. The master controller is then operated to connect in series parallel and finally in parallel. In changing over from 1200 volts to 600 volts the resistances are paralleled and the dynamotor circuits are also adjusted for 600 volts. All of this is done by the two change-over switches.

The dynamotor-compressors are used to furnish compressed air for the brakes and to control the blower fan (attached to the dynamotor shaft) which furnishes the air for ventilating the main motors. One of these sets is mounted under each end hood.

These locomotives are designed to negotiate curves of 40-ft. radius, when running without trailing loads. Their principal dimensions are as follows: Wheelbase, rigid, 7 ft. 4 in., total, 25 ft.; driving wheels, diameter, 36 in.; journals. 5 in. x 8 in.; width over all, 10 ft.; height of top of cab, 12 ft., and length between coupler knuckles, 36 ft. They weigh 100,000 lb. each. The equipment includes air and hand brakes on all wheels, air sanders, a pilot and head light at each end, a bell gong and air whistle. The 600-volt locomotives of this company were described in the ELECTRIC RAILWAY JOURNAL for Jan. 6, 1912.

ELECTRO-PNEUMATIC VALVE FOR A.-C. CURRENT

The "Z" armature electro-pneumatic valve magnet shown in the accompanying illustration has just been developed by the Union Switch & Signal Company for the control of electro-pneumatic switch and signal apparatus by alternating current. It consists essentially of a "Z" armature rotating in a magnetic field, both armature and field cores being made of laminated iron. Through a lever the armature drives a crank of which one arm appears in the illustration and the other arm of the crank presses down on the head of the pin valve stem when the magnet is energized. The whole instrument is pronounced to be very compact, neat and efficient. The cover is made of aluminum and is designed to be screwed into place very readily. A spring is attached to the cover to prevent it from working loose.

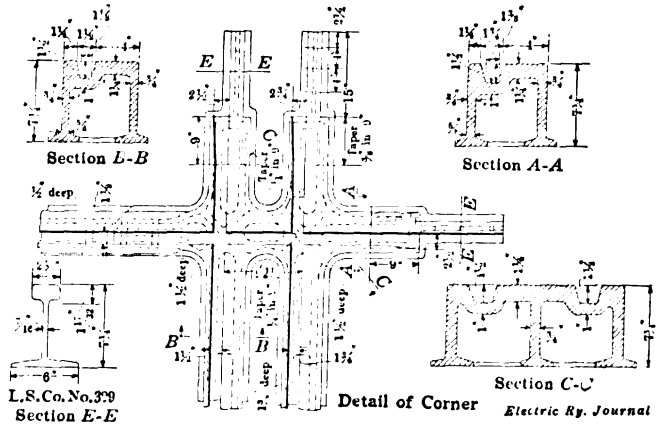
Magnet Valve

UNION CLAMPS FOR METAL BLADES

A clamp for holding metal signal blades in place has recently been put on the market by the Union Switch & Signal Company. The clamp is made of steel, stamped cold, sherardized and painted in two lengths suitable to the taper of the blade grip with which it is to be used. Both lengths fit accurately in the corrugations of the blade, and the spacing of the bolt holes is the same in each. The detail parts of the clamp include protecting pads of cow hair which are placed between the clamps and the blade to protect the enamel from abrasion and to take up any strain due to inequalities of the metal. These pads are of different lengths, corresponding to the clamps under which they are used. Two pads are placed between the blade and the spectacle at right angles to the other two pads. Nut locks made of sheet steel are also used. A portion of the clamp is raised to act as a stiffener and to keep the bolt heads from turning. The nut locks, bolts and nuts are sherardized. All of these parts can be made to fit any spectacle or metal blade.

TYPE OF SOLID MANGANESE STEEL CROSSING INSTALLED BY PACIFIC ELECTRIC

Owing to its unusually heavy rolling stock, which is operated in trains of six cars, the Pacific Electric Railway has found crossing frog maintenance a serious problem. In its recent practice the company has used solid manganese steel crossings to obtain maximum life, but it has also given a great deal of attention to methods of strengthening even this type of crossing. The chief trouble experienced has been that the points of impact in the crossing, when constructed in the usual way, are not directly



Supported Hard-Center Crossing Installed by Pacific Electric Railway at Los Angeles

supported from below, and, in consequence, have dropped slightly. Hence the way department of this company has developed and installed a design of manganese crossing which provides supports for the points of impact. This support is obtained by replacing with diagonal webs the four-sided or box-like web support in the old design. The intersection of these diagonal webs comes directly under the point of impact or the intersection of the gage lines of the running rails.

The specifications call for a crossing cast of solid manganese steel free from shrinkage cracks and blow holes and perfect as to surface and alignment. The manufacturers found these requirements especially hard to meet owing to excessive shrinkage in manganese steel castings. To replace the boxed web support with the diagonal webs produced a critical condition so far as providing for shrinkage was concerned, making it difficult to obtain perfect castings. This trouble has been overcome, however, and satisfactory crossings are being manufactured. Plan and sections of this crossing are shown in the illustration.

In explanation of the two running rails at 1-ft. 2½-in. spacing shown in the illustration, it should be said that while the Pacific Electric Railway Company operates only standard-gage cars, the city line in Los Angeles is equipped with a narrow gage (3 ft. 6 in.) and the crossing illustrated is for a crossing of the two lines. The details shown in the drawing are to fit the Lorain Steel Company's section No. 399. The crossing shown has been manufactured by the Edgar-Allen Manganese Steel Company, Wm. Wharton, Jr., & Company, and the St. Louis Steel Foundry.

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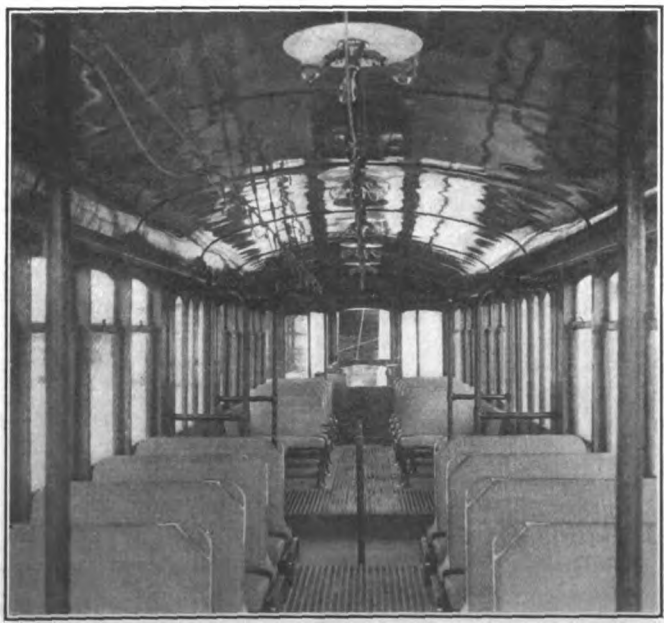
CENTER-ENTRANCE CARS FOR BUTTE, MONT.

Four center-entrance cars of the type shown in the accompanying illustrations were recently shipped to the Butte (Mont.) Electric Railway by the Niles Car & Manufacturing Company. The cars seat fifty-two passengers each and have already carried comfortably a total of 100 passengers, although their length over the end sheathing is but 40 ft. 10 in. The weight of a completely equipped car, including four 40-hp motors and air brakes, is about 36,000 lb., or 692 lb. per seated passenger; the weight of the car body alone is 14,000 lb. The trucks are of the railway company's type as designed by J. S. Wathey, superintendent.

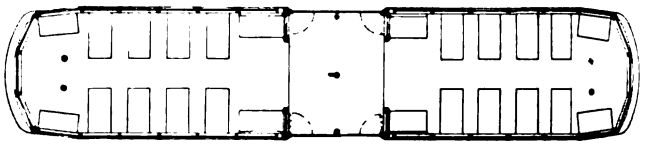
The principal framing members of this design are two center sills of 6-in. I-beams, which are bent downward under the center vestibule or well and which extend the full length of the car from buffer to buffer. The side sills are reinforced with ½-in. x 6-in steel plates, cut out under the center vestibule, and 2-in. angles, also by under truss rods with turnbuckles. Quartered oak and bronze trimmings



Butte Center-Entrance Car—Interior View

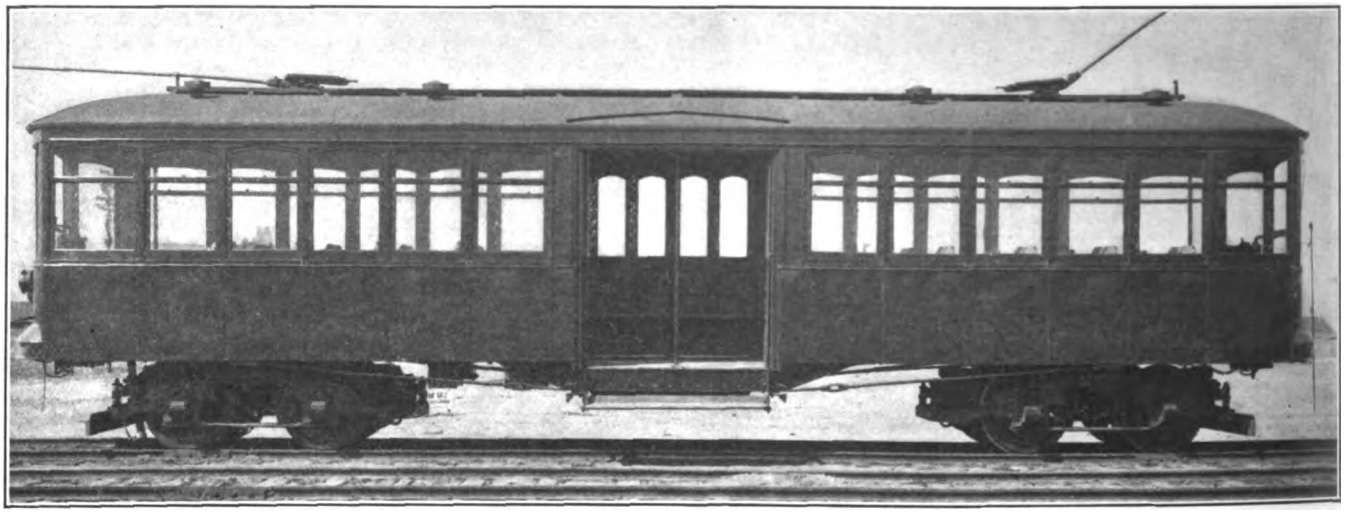
are used for the interior finish of the car and agasote for the single-arch ceiling. The roof carries eight Globe ventilators. The upper sashes are stationary, while the lower sashes are arranged to drop.

The center vestibule is 6 ft. long for the full width of the car and is 9 in. below the main floor. Each side is fitted with two-panel doors which fold inward in connection with a folding step, all controlled by means of handles at the conductor's station in the center of the vestibule. A folding seat extends along the devil-strip side of the vestibule, thus



Butte Center-Entrance Car—Plan

increasing the seating capacity and preventing the opening of the idle doors. At the front end, the motorman is separated from the passengers by means of iron pipe rails and



Butte Center-Entrance Car—General Exterior View

light-excluding curtains. The same control space at the rear of the car is utilized by standing passengers. The principal dimensions of these cars follow: Length over the burfers, 41 ft. 10.; width over the side sheathing, 8 ft. 3¾ in.; width over all, 8 ft. 5½ in.; width of aisle, 23¼ in.; length of seats, 34 in.; distance between seat centers, 29½ in.; distance between bolster centers, 26 ft.; height under sills to top of roof, 8 ft. 3⅜ in.

TELEPHONE AND TROLLEY WIRES IN ENGLAND

The Municipal Tramway Association of England has lately accepted a proposal from the Postmaster-General with reference to trolley wires crossing telephone wires, which in England are now under the control of the Post Office Department. This proposal stated that there was now available an insulation material which will admit of the insulation of each wire crossing a power circuit at a comparatively low cost. While not so satisfactory in some ways as guard wires, the department was prepared to adopt it on certain conditions. On the new system the cost of insulating a span of one circuit of two wires would be about $2.75. The department suggested that when a tramway contractor desired to avoid the erection of guard wires he should pay a first and final charge for each post office crossing averaging sixteen wires (that is to say, any arrangement of wires under which all wires are terminated on one side at least on the same support) of $21.85 when the post office is the first-comer and one-half that amount when it is the second-comer. The proposal to use insulated wire does not for the present apply to trunk wires and wires running parallel to power circuits for considerable distances. The department has agreed to charge $2.75 per circuit for second-comers and $1.38 for first-comers.

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News of Electric Railways

Railway Men in Automobile Accident

As the result of an automobile accident near Detroit, Mich., on the evening of Aug. 9, Louis E. Beilstein, until recently general manager of the Toledo Railways & Light Company, and James T. Ross, consulting engineer of the Northern Ohio Traction & Light Company and the Lake Shore Electric Railway, lost their lives and J. F. Collins, vice-president and general manager of the Michigan United Traction Company, and Edward F. Wickwire, sales manager of the Ohio Brass Company, Mansfield, Ohio, were seriously injured. Howard Davis, the chauffeur, was killed. Mr. Wickwire, who was able to talk after reaching the hospital, said that a ditch was encountered suddenly on the outskirts of Wyandotte. The driver endeavored to turn the machine out, but the right front wheel collapsed and the machine turned over. Mr. Beilstein was thrown clear of the car, but his neck was broken by the fall. Messrs. Ross, Collins and Davis were pinned under the car. Mr. Wickwire was thrown clear of the wreck. Messrs. Ross and Davis were dead when the car was righted and Mr. Collins was in a serious condition. He was taken to Emergency Hospital at Ford City, near Detroit, while Mr. Wickwire was taken to Solvay Hospital at Delray. The bodies of Messrs. Beilstein, Ross and Davis were removed to their homes.

The plans for the trip from Toledo to Jackson, Mich., were made in the office of the Lake Shore Electric Railway at Cleveland. Charles Currie, general manager of the Northern Ohio Traction & Light Company, accompanied the members of the party to Toledo by train, but returned home when they started on the auto trip. With the exception of Mr. Collins the victims of the accident left Toledo early on Aug. 8 for Jackson, where they were joined by Mr. Collins. The party spent the afternoon of Aug. 8 and the morning of Aug. 9 inspecting the line of the Michigan United Traction Company and on Saturday afternoon started for Toledo.

Mr. Collins, who sustained a broken thigh, and Mr. Wickwire, who has a broken ankle and is suffering from severe strains, were both reported on Aug. 14 to be doing well and no serious complications are expected to develop.

Findings of Buffalo Arbitrators Modified

Following the rejection by the employees of the award of the board of arbitration named to settle their grievances with the International Railway, Buffalo, N. Y., Edward G. Connette, president of the company, announced that he would hold a conference with a committee of the men. Conferences were held on four days during the week ended Aug. 9, and an agreement was reached under the terms of which certain provisions in the report of the board were modified and the term of contract between the men and the company was reduced from five years to three years. Provision is also made in the agreement for an increase of 2 cents an hour in the wages paid to the shopmen and barnmen. This will give them a minimum wage of 24 cents an hour. No provision for an increase in wages for these employees was made in the findings of the board of arbitration. Although the agreement was made in writing, both sides say they are bound to secrecy until after the modified agreement has been ratified at a general mass meeting of the men. It was expected that this meeting would be held on Aug. 14 or 15.

As soon as the agreement was reached, Edward G. Connette, president of the company, issued the following statement on its behalf: "All questions raised have been settled satisfactorily and in accordance with the findings of the board of arbitration, except as to the term of the contract, which has, with the assent of the majority of the board of arbitration, been reduced from five years to three years."

William B. Fitzgerald, upon whose recommendation the men refused to accept the findings of the board, said:

"Everything is now settled satisfactorily. The modified agreement will not be made public until it has been ratified by the men. I have recommended that the new agreement be ratified. It provides for wage increases not included in the original findings of the board of arbitration."

Special Legislative Session in Minnesota

Governor A. O. Eberhart, of Minnesota, has announced that he will call a special session of the Legislature this fall, principally to secure action on the proposed public utilities bill which a special legislative committee is now investigating. It has been charged that the committee is attempting to foster opposition to the creation of a public utilities commission. Representative H. H. Flowers, Cleveland, Minn., a member of the House public utilities committee, has protested to Governor Eberhart concerning a letter sent out under the committee's authority by its secretary, D. H. Holbrook, Minneapolis, the objectionable portion of which follows:

"The Governor has announced his intention of calling a special session of the Legislature to enact a general public utility law. In a general way the plan proposed contemplates the appointment by the Governor of a commission of three men, who shall have complete control over the regulation of all water, electric and gas plants, street railways and telephone systems in the State, whether publicly or privately owned, this commission to have the power to value plants, fix rates and regulate service. It is further proposed to take away from the municipalities the right they now have to regulate utilities and grant franchises. This is a radical departure from the policy hitherto pursued in this State, and the committee is anxious to get an accurate indication of public sentiment on this point. Do the people of the villages and cities of Minnesota wish to continue to regulate their utilities or do they wish to surrender that privilege to an appointive state commission?"

The committee is also sending out circulars to mayors, city clerks and other persons of prominence over the State.

H. A. Blair on the Chicago Traction Situation

Henry A. Blair, chairman of the board and of the finance committee of the Chicago (Ill.) Railways and a member of the governing committee of the Chicago Elevated Railways, was quoted as follows by the Chicago *Daily News* on Aug. 7 in a special dispatch from Paris, France:

"After tramping through the streets of London and Paris I am convinced that the chief transportation advantage of these cities over Chicago is the speed with which cars are allowed to run in the busiest thoroughfares. In centers where the traffic is nearly twice as heavy as on the most congested corners in Chicago, street cars and autobuses push along at high speed the moment the crossing policeman signals. I saw in Piccadilly, London, a continuous procession of autobuses as far as the eye could reach, moving quickly and continually and yet without the slightest inconvenience to themselves or to pedestrians.

"Speed regulations in Chicago are foolish and must be revised before the city will have adequate transportation. If the cars were allowed to run faster not only would the passengers get to their destinations more quickly, but a crew could make another trip before the end of the shift, resulting in a considerable saving to the company and also permitting many more cars to run.

"The more I see of transportation in European cities the more I am convinced that the proposition we have made to the city of Chicago is the most remarkable ever made anywhere. Chicago now has an exceptional opportunity to consolidate all its transportation lines. Of the Chicago City Railway's stock 97 per cent is held by J. P. Morgan & Company, New York. Now that Mr. Morgan is dead the stock could readily be obtained, but once the trustees dispose of it throughout the country it would be extremely difficult to reassemble.

"All the elevated railway stock is held by Frank R. Vanderlip, Samuel McRoberts and myself, so there is no difficulty there. The Chicago Railways securities are held by some 3000 stockholders, but I am chairman of the finance committee and so probably could influence this organization. We, therefore, offer to consolidate all the lines with 5-cent fares and universal transfers, and also to begin work on the subway system, extending it as the city's needs grow. In

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return we ask 7 per cent profits and an indeterminate franchise, but give the city the right to take over the whole business at any time.

"The city, however, will allow only 5 per cent profit and a twenty-year franchise. The truth is that it is impossible to operate a traction system on such a basis, for the people will not buy shares at such a low rate of interest and the banks will not take such a huge quantity of bonds falling due in twenty years. That is an absolute fact.

"The trouble is that politicians of both parties use the traction question to gain the people's sympathies, whereas they do not know the first thing about running traction systems, which is not a mere engineering feat but an intricate business proposition requiring high technical knowledge. In the meantime, while the politicians orate and hinder progress, the people suffer."

The Value of Publicity

The *Journal* of the Cleveland Engineering Society dated July, 1913, contains the paper, "The Value of Publicity," presented before the members of the society on June 10, 1913, by W. R. Rose, associate editor of the Cleveland *Plain Dealer*. Mr. Rose referred to the once supposed impassable dead line between the newspaper and the engineering societies. Continuing, he said:

"It appears that the Cleveland Engineering Society has been a pioneer in its friendly attitude toward newspapers. It can be congratulated on this fact. It can accept the assurance that this alliance is highly gratifying on the newspaper side of the once impassable dead line.

"Science, a little obtuse at times, will learn that newspapers are not entirely devoted to baseball and casualties, to politics and gossip. The newspaper reaches out in countless directions. It wants the best that is available and it wants it in prodigious variety. It stretches a warm hand to science. It realizes that the annals of invention and technical achievement put romance to shame. It knows that the soldiers of science, bridge spinners, canal diggers, are the dauntless skirmish line of advancing civilization. The newspaper stretches a hand for your copy, assuring you that the public is interested in your proceedings because they advance public welfare. The newspaper offers you space in its columns, leaving to your judgment the selection of matter best calculated to interest the layman reader. It asks you to refrain in your reports from puzzling technicalities—that the copy reader may rise and call you blessed—and as far as possible to cover a variety of the themes that should make a popular appeal."

Developments in Connection with the Buffalo & Lake Erie Traction Reorganization

The Canadian-American Power Corporation, with principal offices in Niagara Falls, has been incorporated in Albany to develop and distribute electricity in Erie, Niagara, Orleans, Monroe, Chautauqua and Cattaraugus Counties. The corporation is capitalized at $4,000,000. The directors of the company are: Edward G. Connette, president of the International Railway, Buffalo; S. Reading Bertron, Marshall J. Dodge and Francis T. Homer, New York, and Rodman E. Griscom, Haverford, Pa. Mr. Connette says that the Canadian-American Power Corporation has been organized to bring to the American side of the Niagara River 46,000 hp of electrical energy developed by the Electric Development Company, Niagara Falls, Ont., for use by the reorganized electric railways out of Buffalo.

Condemnation proceedings have been started by officials of the Frontier Electric Railway, which proposes to construct an electric railway from Buffalo, N. Y., to Niagara Falls to connect with the Canadian Northern from Niagara Falls, Ont., to Toronto and points east, to secure a right-of-way through a parcel of land north of North Tonawanda, Niagara County, N. Y., and La Salle. The company has bought one parcel of land outside of North Tonawanda and officials of the company say they have more than 98 per cent of the right-of-way. Work on the line may be started next spring. The franchise through the villages of North Tonawanda and Tonawanda will be void if work is not started before June 1, 1914.

Recommendation to Enter Into Agreement with Detroit Company Adopted

By a vote of 22 to 4, the Common Council of Detroit, Mich,. in special session on the evening of Aug. 7 repealed the ordinance requiring the payment of rental of $300 a day by the Detroit United Railway and adopted the recommendation made by Mayor Marx to enter into an agreement with the company on the terms proposed by the company on Aug. 5. The action of the Council will put into effect on Aug. 15 the plan of seven tickets for 25 cents, under the terms noted in the Electric Railway Journal of Aug. 9.

W. D. Mahon has presented a communication to the Mayor in which the employees of the company complain that they were not provided for in the agreement. According to their view, they were not considered by the city administration or the company. A meeting had been fixed for the evening of Aug. 9 to consider the matter. The men propose to ask an increase in wages from 30 cents to 35 cents an hour maximum and a ten-hour workday to be completed in twelve consecutive hours.

Toronto Street Railway Rates

The *Mail and Empire*, Toronto, Ont., published the following editorial on Aug. 7:

"The Acting Mayor of the city of Toronto is reported to have said that he is prepared to favor a flat 1-cent rate for the whole civic system of street railways. Possibly he takes the view that so long as the city receives upward of $1,000,000 a year from the Toronto Railway it ought to make the operation of its own lines a charge on that revenue. But if the city acquired the Toronto Railway's system and operated the entire street railway service, it is not to be supposed that Mr. Church or any other member of the Council would be in favor of lower fares than those at which the company now carries passengers. If any member of the present Council, or any candidate for a seat in the next Council, would favor for an all-city service, supplied by the municipality, lower rates than those charged by the company, now is the time for him to say so.

"For some time the Mayor has been negotiating for the purchase of the Toronto Railway. In these columns it has long been contended that the only way in which Toronto can proceed to provide itself with an extended, well-developed, unified street railway system such as it now needs is by acquiring the Toronto Railway's rights and property here. We have not been led to that view by any partiality for public ownership. Toronto's experience of public ownership is a warning against it. But the city has already extended its ownership into street railway enterprise and is operating lines at a loss. That venture has added confusion to a street railway situation that was already unsatisfactory. The street railway agreement provides for less than half of the area now included within Toronto's bounds. The large proportion of the Toronto Railway's gross earnings that goes into the city treasury ought to be used to develop the system. But, of course, the company, which has to surrender that money, cannot so use it, and the City Council, which has the use of it, can hardly say what it does with it. At the same time, the population grows at the rate of more than 20,000 a year and expands over a constantly widening site. There must be a change, and we can see nothing better than the application to the whole of the public ownership that has been applied to the part.

"The *Mail and Empire* would strongly oppose any scheme that would put the control of the system in the hands of the City Council. Unless a properly constituted commission is provided for in advance of the purchase and unless men of the highest trust and business capacity are selected the purchase should be opposed. In the hands of the City Council the system would be administered by statesmanship of the 'one-cent flat rate' type."

Chicago Convention Train Arrangements

The transportation committee for Chicago, northern Illinois and Wisconsin has arranged with the Pennsylvania lines to run a special all-steel train from Chicago to the Atlantic City convention. The train will consist of compartments, observation car, library, club car, baggage car, stand-

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ard sleepers and two dining cars, and will be electric lighted throughout. The train leaves Chicago at 10.30 a. m. Sunday, Oct. 12, and will arrive in Atlantic City about 9.30 a. m. the following day. Harry L. Monroe, of the General Electric Company, has been elected chairman of the entertainment committee, and he and his assistants will undoubtedly do everything possible to entertain all the delegates and guests.

New Long Island Road Opened.—The Freeport Railroad has been completed and placed in operation between the depot of the Long Island Railroad and the terminal of the Great South Bay Ferry Company. Thomas P. C. Forbes, Jr., is president of the company and Roland M. Lamb is treasurer.

Municipal Railway Terminal Proposed for San Francisco.—The Board of Supervisors of San Francisco, Cal., has adopted a resolution directing the city engineer to make a preliminary study of the amount of ground required to provide a suitable railway terminal at the foot of Market Street under municipal control.

Compulsory Electrification Bill Introduced at Washington.—Representative Charles M. Thompson, a Progressive Republican, of Illinois, has introduced a bill in the House at Washington to compel railroads entering Washington to electrify their lines within a radius of a score of miles of the border of the District of Columbia.

Progress on New Road.—The new interurban electric railway between Grand Rapids and Kalamazoo and the Allegan division of the Michigan Central Railway from Allegan to Battle Creek are both one enterprise. The property is in process of construction or alteration by the Michigan Railway Engineering Company, Jackson, Mich., and it is expected in the near future to operate between Grand Rapids, Kalamazoo, Battle Creek and Allegan. It is understood that the property will be known as the Michigan & Chicago Railroad.

Mr. Mitten on the Philadelphia Transit Plans.—Thomas E. Mitten, chairman of the executive committee of the Philadelphia (Pa.) Rapid Transit Company, has written to Transit Commissioner Taylor to the effect that the question as to participation of the company in the elevated and subway development plans prepared by Mr. Taylor cannot be answered until the return of E. T. Stotesbury, chairman of the board, who is now in Europe. Mr. Mitten is reported to have said that he intends to analyze the recommendations in order to prepare a report on them for the consideration of the directors of the Philadelphia Rapid Transit Company.

Bus and Coach Line Certificates.—The Public Service Commission of the Second District of New York is in receipt of a large number of applications for certificates of convenience and necessity from persons and corporations desiring to operate stage coaches and auto bus lines over what are commonly known as "good roads" in various sections of the State. All operating lines over improved state highways are required by Chapter 495 of the Laws of 1913 to apply to the commission for a certificate as the basis of their operation. In many counties such stage coaches and auto bus lines are being operated without apparently any attention to this legal requirement, but the commission is in daily receipt of new applications.

Baltimore Company Wins Paving Case.—The Court of Appeals of Maryland has announced that the United Railways & Electric Company will have to bear no part of the $5,000 000 now being expended by the paving commission in improving local streets. The court flatly decided that the city cannot hold the company for any portion of the money so to be spent. The estimated saving to the company is $1,500,000. The decision of the Appellate Court is merely a memorandum opinion to the effect that the city cannot hold the company for the cost of repaving Linden Avenue, between Dolphin Street and North Avenue. The ground on which the decision was based will not be known until next October, when the court reconvenes.

Probable Controversy as to Value of Tracks.—The Sutter Street Railway, San Francisco, Cal., has presented to the city of San Francisco a demand for $25,000, as the city's share of the purchase of the outer tracks on lower Market Street. The city uses the tracks for the Geary Street Municipal Railway, and the Sutter Street cars of the United Railroads also run over them. The demand was referred to the city engineer by the public utilities committee of the Board of Supervisors, which maintained that the company's figures, $51,706, probably represented the actual cost of the roadbed and tracks, without allowance for depreciation. Half of the company's appraisement is $25,853, but by the terms of the agreement with the railway the city's share was to be no greater than $25,000.

Successor Commission to the Ohio Public Utilities Commission.—On Aug. 8 the Public Utilities Commission of Ohio passed out of existence to give place to another commission, provided for in a law passed by the Legislature last winter. The members of the new body have not been named and Governor Cox has stated that the members of the old commission will hold over until new members are named. It is said that he has practically decided upon Judge Dechant, Middletown, and Oliver Hughes, Columbus. Both are Democrats and the latter was a member of the old commission. John L. Sullivan, East Liverpool, has been spoken of for the third member. Governor Cox, it is said, will appoint a member of the so-called Progressive party to work with the two Democratic members.

Interborough Company Power Improvements.—As previously noted in the ELECTRIC RAILWAY JOURNAL, the Interborough Rapid Transit Company, New York, N. Y., has awarded to the Westinghouse Machine Company the contract for three 30,000-kw steam turbo-generator units for installation in the Seventy-fourth Street station to assist in supplying energy for operating the enlarged New York subway. It is understood that the company expects to put all the generating equipment for the new subways in the existing power station, this being possible on account of the smaller area taken by the modern units. It is not expected to add any more room for boilers. The additional steam capacity will be secured from superheaters and improved grates and stokers, and it is not thought likely that any material changes will be necessary in the boilers.

Newark Franchise Grants in Connection with Terminal Plans.—Five of the twenty-nine franchises sought by the Public Service Railway, Newark, N. J., in connection with the proposed electric railway terminal have been granted by the Board of Works. Action was deferred on other franchises that have passed first and second reading, and the public hearing on some was continued for one week, while six applications remained untouched. The franchises granted are for fifty years and will become effective if accepted by the company within twenty days. While none has any immediate bearing on the terminal, they will all be employed in the operation of the system that will be created when the terminal becomes a reality. The company has substituted a new application for the franchise to run an elevated structure over Pine Street to the second floor of the terminal in Park Place.

Consent Asked for Additional Tunnels Under East River.—The Public Service Commission for the First District of New York has written to the Secretary of War asking the consent of the United States government to the construction of two tunnels under the East River, for operation by the Interborough Rapid Transit Company and the New York Municipal Railway Corporation under the dual system contracts. As the War Department has jurisdiction over navigable streams, its consent is necessary before the city can proceed with the construction of a tunnel under any such stream. One of the tunnels will be built under the river from Old Slip, on the Manhattan side, to Clark Street, on the Brooklyn side. This will be used by the Interborough Rapid Transit Company and will connect through William Street and Park Place with the proposed West Side extension of the existing subway up Seventh Avenue, on the Manhattan side, and with the existing subway in Brooklyn. The other tunnel will run from Whitehall Street, Manhattan, to Montague Street, Brooklyn. It will be operated by the Brooklyn company, and will connect on the Manhattan side with both the Nassau Street extension of the Centre Street Loop subway and the subway running up Broadway. On the Brooklyn side it will connect with the Fourth Avenue subway. These tunnels will be built not less than 45 ft. below the mean low-water mark, as established by the government.

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Financial and Corporate

Stock and Money Markets

Aug. 13, 1913.

In the early trading on the New York Stock Exchange to-day persistent buying forced many issues to new high levels. During the afternoon the tone became irregular, with a decrease in the buying. A number of specialties made material gains for the day, but the majority of the issues, after some vigorous advances, showed slight net losses in the final dealings. Rates in the money market to-day were: Call, 2 @ 2½ per cent; sixty days, 3½ @ 4 per cent; ninety days, 4½ @ 4¾ per cent; four months, 4¾ @ 5 per cent; five months, 5½ @ 5¾ per cent; six months, 5½ @ 5¾ per cent.

All the Philadelphia stocks closed dull but firm, with slight recessions from the top prices.

Stocks were strong in Chicago to-day and bonds were steady.

In Boston stocks opened dull to-day. There were a few recessions from the previous day's closing prices. Later there was a broadening of interest in the market.

The Baltimore market as a whole tended higher to-day. Pennsylvania Water Power issues were a feature. The stock transactions totaled 1370 shares; the transactions in bonds amounted to $47,000.

Quotations of traction and manufacturing securities as compared with last week follow:

	Aug. 6.	Aug. 13.
American Brake Shoe & Foundry (common)	90¼	91
American Brake Shoe & Foundry (preferred)	129	131
American Cities Company (common)	37½	37⅜
American Cities Company (preferred)	65½	66
American Light & Traction Company (common)	345	350
American Light & Traction Company (preferred)	104	104
American Railways Company	38	38
Aurora, Elgin & Chicago Railroad (common)	39½	41
Aurora, Elgin & Chicago Railroad (preferred)	82	82½
Boston Elevated Railway	91	91
Boston Suburban Electric Companies (common)	7½	7½
Boston Suburban Electric Companies (preferred)	55	56½
Boston & Worcester Electric Companies (common)	*8	*8
Boston & Worcester Electric Companies (preferred)	*42	42
Brooklyn Rapid Transit Company	88½	89⅝
Capital Traction Company, Washington	115	115½
Chicago City Railway	*165	170
Chicago Elevated Railways (common)	*25½	25
Chicago Elevated Railways (preferred)	*75	70
Chicago Railways, ptcptg., ctf. 1	*92	92
Chicago Railways, ptcptg., ctf. 2	27⅛	26½
Chicago Railways, ptcptg., ctf. 3	*7½	7
Chicago Railways, ptcptg., ctf. 4	*2½	3
Cincinnati Street Railway	a110	105
Cleveland Railway	a102¾	103¾
Cleveland, Southwestern & Columbus Ry. (common)	*6	a5½
Cleveland, Southwestern & Columbus Ry. (preferred)	*29	a30
Columbus Railway & Light Company	18	18
Columbus Railway (common)	a69	69½
Columbus Railway (preferred)	a90	88
Denver & Northwestern Railway	*107	104
Detroit United Railway	a70	a80
General Electric Company	140	142½
Georgia Railway & Electric Company (common)	a114¾	114¼
Georgia Railway & Electric Company (preferred)	*82½	83
Interborough Metropolitan Company (common)	15¾	15⅜
Interborough Metropolitan Company (preferred)	58¼	60⅞
International Traction Company (common)	*30	30
International Traction Company (preferred)	*95	95
Kansas City Railway & Light Company (common)	*15	18
Kansas City Railway & Light Company (preferred)	*36	37
Lake Shore Electric Railway (common)	*9	5
Lake Shore Electric Railway (1st preferred)	*90	92
Lake Shore Electric Railway (2d preferred)	*25	26
Manhattan Railway	126	130
Massachusetts Electric Companies (common)	*14½	16½
Massachusetts Electric Companies (preferred)	74½	72
Milwaukee Electric Railway & Light Co. (preferred)	*90	95
Norfolk Railway & Light Company	25	25
North American Company	70½	72
Northern Ohio Light & Traction Company (common)	a70	a70
Northern Ohio Light & Traction Company (preferred)	a100	a100
Philadelphia Company, Pittsburgh (common)	42	43½
Philadelphia Company, Pittsburgh (preferred)	40	40
Philadelphia Rapid Transit Company	23⅜	23½
Portland Railway, Light & Power Company	*58	55
Public Service Corporation	108	109
Third Avenue Railway, New York	35¾	36¾
Toledo Railways & Light Company	*12	a6
Twin City Rapid Transit Co., Minneapolis (common)	104½	104
Union Traction Company of Indiana (common)	*4½	5
Union Traction Company of Indiana (1st preferred)	*80	80
Union Traction Company of Indiana (2d preferred)	*30	26
United Rys. & Electric Company (Baltimore)	26⅞	27
United Rys. Inv. Company (common)	*23	25
United Rys. Inv. Company (preferred)	*42	45
Virginia Railway & Power Company (common)	53	52½
Virginia Railway & Power Company (preferred)	*89	90½
Washington Ry. & Electric Company (common)	91	91
Washington Ry. & Electric Company (preferred)	88¼	88
West End Street Railway, Boston (common)	72	71¼
West End Street Railway, Boston (preferred)	88	88
Westinghouse Elec. & Mfg. Company	63½	68
Westinghouse Elec. & Mfg. Company (1st preferred)	111	112

*Last sale. a Asked.

ANNUAL REPORT

Havana Electric Railway, Light & Power Company

The Havana Electric Railway, Light & Power Company, Havana, Cuba, has published a report for the period ended Dec. 31, 1912. In this report F. Steinhart, president of the company, says in part:

"It is well known to many of you that for some time past the management of the Havana Electric Railway has had under consideration the question of entering into the electric lighting and power business in the city of Havana and its suburbs, and as well the method of raising the large amount of capital required for that purpose, and that one of the propositions considered was the amalgamation of the interests of the shareholders of that company with those of the stockholders of the Compañia de Gas y Electricidad de la Habana, which company controls practically all the lighting, both gas and electric, in the city.

"After careful consideration, bearing in mind that many of the leading families of Havana have their fortunes invested in stocks of both the companies mentioned and to avoid great harm to the money value of said securities, a plan for the amalgamation of the Havana Electric Railway and the Compañia de Gas y Electricidad de la Habana was formulated by Messrs. Speyer & Company of New York, under date of March 8, 1912, and as a result thereof your company, the Havana Electric Railway, Light & Power Company, was incorporated under the laws of the State of New Jersey under date of March 26, 1912, with the objects, among many others, of acquiring and holding $5,000,000 par value, or any less amount, of the preferred capital stock of the Havana Electric Railway, $7,500,000 par value, or any less amount, of the common capital stock of the last mentioned company, and $6,000,000 of the capital stock of the Compañia de Gas y Electricidad de la Habana, and to construct in the West India Islands, acquire, improve, develop, operate and manage railways, wharves, piers, docks, warehouses, harbors, dams, tunnels, bridges, viaducts, subways, conduits and pipe lines in said islands, together with any other buildings or works capable of being advantageously used in the transportation or care of freight or passengers, or the laying of cables, wires, pipes, etc., to generate, accumulate, distribute and supply electricity and gas for light, heat, power, signals and other purposes; to construct, own and operate lines for the conveyance of electric current for telegraph, telephone, cable and other purposes; to construct, own and operate electric telephone exchanges; to make, own, sell or lease the machines, instruments, apparatus and other equipment necessary for the generation, distribution, accumulation and employment of gas and electricity or either of them for any purpose; to manufacture, use and sell gas and electricity or either of them for any and all lawful purposes, etc.

"The fusion or amalgamation was agreed upon to date from April 1, 1912, and consequently this first report covers only a period of nine months.

"The plan formulated by Speyer & Company, New York, has met the approval of all, as is shown by the fact that on Dec. 31, 1912, 59,279.74 shares of the Compañia de Gas y Electricidad de la Habana had been deposited for the purpose of exchange for securities of your company, and of the Havana Electric Railway stock 49,455 preferred and 74,462.12 common shares had been deposited for like purpose.

"Negotiations have been entered into for the construction of a new and modern 37,500-kw electric power plant, also for a new enriched water-gas plant consisting of two duplicate units, each with a capacity of 3,500,000 cu. ft. per day.

"It is expected that the gas plant will be completed and ready for operation in July of the coming year and that the electric plant will be in regular service early in 1914.

"The island of Cuba is in a highly prosperous condition. Investments in productive industries have yielded most encouraging returns and are being extended on a large scale. Important and long-needed improvements are being carried out in the harbor and water front of Havana which will increase the capacity and effectiveness of the port, in connection with which the railroad freight terminals are being extended and have already been greatly improved during the past year. A new and modern union passenger terminal has just been put into operation.

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"The growth of population in Havana and its environs has been large and wholesome as shown by the unusual amount of building construction, especially in the newer residence districts, and the extreme scarcity of unoccupied buildings of any sort, together with the steady increase in the street railway traffic.

"There is every reason to believe that the prosperity and confidence felt throughout the island and especially in this city, its commercial center, will be reflected in the earnings and growth of your company, which is prepared with every necessary element in order to meet whatever demands of a private or public nature will be made upon it in the illumination and transportation necessities of the city and its suburbs.

"In conclusion we wish to express our sincere appreciation of the earnest and untiring efforts of the management and the entire staff of employees during the period covered by this report, which the heavy demands incident to the consolidation and reorganization of the company, in addition to their usual duties, have made exceptionally difficult and arduous to all."

A table was attached to the report, from which was obtained the following revenue and profit and loss statement for the nine months ended Dec. 31, 1912:

Earnings:		
Sale of electricity	$959,781	
Sale of gas	529,795	
Miscellaneous	163,567	
Gross earnings		$1,653,144
Operating expenses:		
Electric light department	$278,989	
Gas department	261,481	
Total operating expenses		540,470
Net earnings from operation		$1,112,674
Income from securities owned		487,247
Total income for period		$1,599,921
Deductions from income:		
Taxes	$41,624	
Interest	476,047	
Total deductions from income		517,672
Net profits		$1,082,249
Dividend No. 1, 3 per cent on $15,000,000 of preferred stock, Nov. 16, 1912	$450,000	
Dividend No. 1, 2¼ per cent on $15,000,000 of common stock, Nov. 16, 1912	337,500	
Total dividends		787,500
Profit and loss balance		$294,749

Appended to the above report there was also a statement from Warren Bicknell, president of the Havana Electric Railway, which was one of the parties to the amalgamation forming the new corporation, the Havana Railway, Light & Power Company.

This statement regarding the Havana Electric Railway follows in part:

"The gross earnings of the railway and stage properties of the Havana Electric Railway for the years 1907-1912, inclusive, were as follows:

	Earnings	Increase in Percentage Over Previous Year
1907	$2,143,122	....
1908	2,276,807	6.23
1909	2,488,647	9.30
1910	2,656,979	6.76
1911	2,991,501	12.59
1912	3,144,141	5.10

"The following is a condensed statement of the results of operation of the properties of your company for the year 1912:

Gross earnings		$3,144,141
Operating expenses		1,626,380
Earnings less operating expenses		$1,517,761
Fixed charges and taxes		493,873
		$1,023,888
Other income		26,502
Surplus earnings for the year available for use of company		$1,050,390
Surplus Jan. 1, 1912, adjusted	$1,327,208	
Amortized bond discount	201,616	
		1,125,592
Total		$2,175,982
Dividends paid during year 1912:		
6 per cent on preferred shares	$300,000	
6 per cent on common shares	450,000	

	Miles
Single-track mileage owned Dec. 31, 1912	65.70
Revenue track mileage owned Dec. 31, 1912	55.90
Average revenue track mileage operated during 1912	55.15

	Operating Railway Mileage	Gross Railway Earnings per Track Mile	Net Railway Earnings per Track Mile	Ratio Operating Expenses to Gross Earnings (per Cent)
1906	50	$31,406	$12,252	60.98
1907	50	36,218	16,923	53.27
1908	50.4	38,448	19,168	50.15
1909	51.5	40,908	22,360	45.34
1910	51.5	44,128	23,600	46.52
1911	53.9	48,016	25,535	46.82
1912	55.15	49,939	26,165	47.59

Stage Lines:	1911	1912
Gross earnings	$403,451	$390,001
Operating expenses	307,617	315,279
Net earnings	$95,834	$74,722

"The statements of earnings contained in this report are exceedingly gratifying to your officers and directors, and when the difficulties attending the operation of the property are taken into consideration, it will be appreciated that great credit is due to General Manager Steinhart and his operating organization for the excellent results which they have obtained with the property.

"It affords me gratification to report that the plans formulted for the amalgamation of the properties of the Havana Gas & Electric Company and the Havana Electric Railway have received the hearty approval of the shareholders of your company, evidenced by the deposit of shares aggregating over 99 per cent of all outstanding shares for conversion into shares of the new corporation, which it is proposed will be known as the Havana Electric Railway, Light & Power Company.

"It is contemplated that the legal steps necessary for the complete fusion of the Havana Electric Railway with the Havana Electric Railway, Light & Power Company will be taken at an early date."

Calgary Municipal Street Railway

The city clerk of Calgary, Can., has compiled a manual of 166 pages in regard to the municipal undertakings of the city, a considerable part of which is devoted to a review of the Calgary Municipal Street Railway. Figures of earnings are presented from July 5, 1909, to June 30, 1910, from July 1, 1910, to June 30, 1911, from July 1, 1911, to June 30, 1912, and for the four months ended Oct. 31, 1912. The system in Calgary was placed in operation on July 5, 1909, with two cars. On July 1, 1910, there were fifteen cars in service; on July 1, 1911, twenty-two cars; on July 1, 1912, forty-eight cars, and on Dec. 31, 1912, fifty-four cars. The system as first opened comprised 3 miles of track, whereas on Dec. 31, 1912, there were 59 miles of track. Service was begun with sixteen employees, whereas on Dec. 31, 1912, there were 269 employees. Since 1905 the population has increased from 12,500 to 85,000 for 1913, estimated. The system is operated by the city commission, consisting of Mayor J. W. Mitchell, chairman; A. G. Graves and S. J. Clark as commissioners, with T. H. McCauley as superintendent.

The power department is operated separately from the railway and supplies the city with light and power and charges the railway for such power as it uses at 2 cents per kw-hr. Five classes of tickets are sold, namely, school tickets, good to and from school for adults and any time for children, ten for 25 cents; work tickets, good morning and evening, eight for 25 cents; ordinary tickets, good any time, six for 25 cents; ordinary tickets in book form in lots of twenty-five at $1, and pads of civic employees' tickets, thirty for $1, the latter charged to the departments in which they are used. No passes are issued. Transfers are made over the different routes at ten different points in the city and the establishment of a special labor fare between 12 noon and 2 p. m. is being considered. Employees are paid a sliding scale as follows: first three months' service, 28 cents an hour; second six months, 30 cents an hour; second year, 32 cents an hour; third year, 34 cents an hour, and after the third year, 35 cents an hour. A sick benefit association has been established among the men and free club rooms have been provided.

The statement of earnings from July 1, 1911, to June 30, 1912, as contained in the report, shows the surplus from operation to be $196,639 and the net profit to be $107,253. During the year mentioned 12,941,530 passengers were carried and the car mileage was 1,643,328.

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Birmingham-Tuscaloosa Railway & Utilities Company, Birmingham, Ala.—The Birmingham-Tuscaloosa Railway & Utilities Company, which was incorporated in Alabama in February, 1913, with $3,500,000 of capital stock, has filed a mortgage to the Fidelity Trust Company, Philadelphia, Pa., as trustee, to secure an issue of $5,000,000 of 5 per cent bonds, dated March 1, 1913, and due March 1, 1938, and has pledged the entire lot as collateral for an issue of $3,500,000 of 6 per cent three-year notes dated May 1, 1913, due May 1, 1916. The notes are subject to call on and after Nov. 1, 1913, at 101 and interest. The proceeds of the notes will be used for improvements and additions to the plants in Tuscaloosa and to extend the electric railway to Birmingham, more than 50 miles. The Birmingham-Tuscaloosa Railway & Utilities Securities Company was incorporated in Virginia in March, 1913, as a holding company with $3,500,000 of stock and owns the entire stock of the Birmingham-Tuscaloosa Railway & Utilities Company.

Brantford (Ont.) Street Railway.—Court actions have been commenced by the city of Brantford against the Brantford Street Railway to recover this year's street railway taxes. The street railway owes the city approximately $29,000, and two actions have been entered to recover same. A campaign has been started to have the city acquire the street railway.

Cincinnati (Ohio) Street Railway.—Alfred J. Becht, secretary and treasurer of the Cincinnati Street Raiway, has been elected a director of the company to succeed Briggs Cunningham, deceased.

Cleveland (Ohio) Railway.—The statement of the Cleveland Railway for June shows receipts of $605,800. Owing to the large amount of maintenance work done and the cost of arbitration, the statement shows an actual deficit of $53,900 and a book deficit of $36,436. To liquidate the cost of arbitration $5,000 was taken from the operating allowance and $14 561 from the interest fund. The amount gained for the month toward making up a deficit of $28,000 in the operating fund was $801. The amount now in the interest fund is $616,365.

Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio.—The Cleveland, Southwestern & Columbus Railway has been authorized by the Public Service Commission of Ohio to issue and sell its twenty-five-year 5 per cent first consolidated mortgage gold bonds of the aggregate principal sum of $251,069, the proceeds to be used to reimburse the petitioner's income for expenditures aggregating $122,310, and to acquire real estate and extend and improve the company's interurban lines, such bonds to be sold for the best price obtainable, but for not less than 85.

Dominion Traction & Lighting Company, Ltd., Toronto, Ont.—The Dominion Traction & Lighting Company, incorporated on Jan. 16, 1913, with an authorized capital stock of $12,500,000, has acquired the total capital stock and $1,000,000 of bonds of the Windsor (Ont.) Gas Company, Ltd., and all of the $750,000 of first mortgage bonds of the Windsor, Essex & Lake Shore Rapid Railway. The share capital issued and fully paid up consists of $500,000 of preferred stock and $2,500,000 of common stock. The Investment Registry, Ltd., London, Eng., recently offered for the company at 93 per cent $1,250,000 of its present issue of $1,450,000 of first mortgage thirty-year 5 per cent gold bonds of 1913. The officers of the Dominion Traction & Lighting Company, Ltd., are William C. Kennedy, president; Charles T. King, Edmund I. Sculiy, Thomas P. Pincard and T. Le Suer, directors.

Lehigh Valley Transit Company, Allentown, Pa.—It is reported that practically all of the recently offered first mortgage 5 per cent bonds of the Lehigh Valley Light & Power Company, a subsidiary of the Lehigh Valley Transit Company, have been sold. The Lehigh Valley Light & Power Company is a merger of light and power companies controlled by the Lehigh Valley Transit Company. The Light & Power bonds are dated April 1, 1913, and are due April 1, 1943, the authorized issue being $2,000,000. By creating a separate organization for its light and power companies the Lehigh Valley Transit Company is able to finance its light and power requirements without drawing upon bonds reserved in its refunding and improvement issue, which will thus be available for use in extensions and improvements of the railway department.

Medfield & Medway Street Railway, Westfield, Mass.—Receiver Eugene H. Mather gives legal notice that, pursuant to a decree of the Supreme Court entered on July 11, 1913, in the case of the Old Colony Trust Company vs. the Medfield & Medway Street Railway, defendant, he will sell the road at public auction on Sept. 15 at the office of Hayden, Stone & Company, Boston.

New York Municipal Railway Corporation, Brooklyn, N. Y.—The Public Service Commission for the First District of New York has approved a further issue of $400,000 of the capital stock of the New York Municipal Railway Corporation. This company's total authorized capital is $1,000,000, and when it was organized the commission allowed an issue of $100,000 to cover preliminary expenses. With the $400,000, just allowed, the company now has permission to issue one-half of its total capital stock. In granting permission to issue this $400,000, the commission stipulates that it shall be sold at not less than par, that it shall be issued for money, and that the proceeds shall be applied only to the following purposes: "For acquisition of property, or for construction, completion, extension or improvement of its facilities, or for the discharge or lawful re-funding of its obligations."

Northern Illinois Light & Traction Company, Ottawa, Ill.—The Northern Illinois Light & Traction Company has increased its capital stock from $250,000 to $750,000.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—The Oakland, Antioch & Eastern Railway has applied to the Railroad Commission of California for a ruling to determine whether $500,000 of its bonds placed on contract were legally issued. The $500,000 in bonds are part of the issue the proceeds of which were used to construct the line from Bay Point to Sacramento. The directors of the company have called an assessment of $5 a share on the 100,000 shares of capital stock outstanding, the $500,000 so realized to be devoted to the purchase of equipment. At the same time an assessment of $10 a share was called on the 35,000 shares outstanding of the Oakland & Antioch, a subsidiary. The Oakland, Antioch & Eastern Railway owns 34,500 shares of this stock.

Ohio Traction Company, Cincinnati, Ohio.—Application has been made by the Ohio Traction Company to the Public Service Commission for permission to issue $300,000 of additional preferred stock. The reason for the issue is the prospective changes in Cincinnati caused by the general re-routing of the city lines, the company estimating its expense at $302,312. If allowed, this will bring the total outstanding stock to $8,800,000.

Pacific Gas & Electric Company, San Francisco, Cal.—The Railroad Commission of California has authorized the issue by the Pacilc Gas & Electric Company of $5,000,000 of general and refunding mortgage gold bonds, maturing on Jan. 1, 1942, to bear interest at the rate of 5 per cent per annum, payable semi-annually, under the terms of the mortgage made on Dec. 1, 1911, to the Bankers' Trust Company, New York, corporate trustee, and Frank B. Anderson, San Francisco, individual trustee. The authorization of the company is dependent upon execution of the following conditions: (1) The Pacific Gas & Electric Company may sell $1,590,000 of bonds to net the company not less than 85 per cent of the par value of the principal thereof, besides interest accrued thereon, or, as an alternative, shall have the right to pledge the bonds as security for notes of a period of less than twelve months, this indebtedness to be not less than 75 per cent of the face value of the bonds pledged. The proceeds of the sale or pledge of said bonds shall be applied only for the discharge or re-funding of obligations of the company incurred for the acquisition of property, the construction, completion, extension or improvement of facilities and the maintenance of service during March, April and May, 1913. (2) The Pacific Gas & Electric Company may sell $3,410 000 of bonds for not less than 85 per cent of the par value of the principal thereof besides interest accrued thereon. The proceds of this sale should be applied only to discharge or re-fund similar obligations of the company incurred subsequent to May 31, 1913. The authority given to issue bonds shall apply only to bonds issued on or before June 1, 1914.

St. John (N. B.) Railway.—The St. John Railway is issuing $200,000 of new stock to cover the cost of extending

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its lines. Some time ago efforts were made by the company to float a bond issue of the same amount, but under present conditions in the money market the bonds were not taken up and a stock issue was substituted. Present holders of stock have the right to subscribe for the new issue on the basis of one share of new stock to four of their present holdings at par.

Springfield, Clear Lake & Rochester Interurban Railway, Springfield, Ill.—The property of the Springfield, Clear Lake & Rochester Interurban Railway was sold for junk on Aug. 2 to Abraham Barker, Springfield, for $12,650. It is estimated that about $6,650 of this amount will be distributed among the bondholders. The rest will be consumed in court costs. The road has not been operated for about a year.

Toronto (Ont.) Civic Lines.—A nominal profit of $1,477, with an actual deficit of more than $10,000, is shown in the report of Acting City Treasurer Patterson for the first seven months of the operation of the Toronto Civic Car Lines on Gerard Street. The cost of the line was $283,000. The revenue for one month in 1912 and six months in 1913 was $16,296, while the expenditures during that period were $14,819. Charging of interest and sinking fund at 7 per cent, the figure given by the treasury department, leaves a deficit of approximately $10,000.

Washington (D. C.) Utilities Company.—A mortgage has been made by the Washington Utilities Company to the United States Mortgage & Trust Company, New York, N. Y., as trustee, to secure an issue of $1,500,000 of one-year 5 per cent collateral gold notes dated May 1, 1913, and due May 1, 1914, but subject to call on any interest date at par and interest as a whole or in principal amounts of $50,000 or multiples thereof. The notes are secured by the pledge of 27,500 shares of the common capital stock of the Washington Railway & Electric Company.

Dividends Declared

Binghamton (N. Y.) Railway, 2 per cent.

Central Arkansas Railway & Light Company, Hot Springs, Ark., quarterly, 1¾ per cent, preferred.

Federal Light & Traction Company, New York, N. Y., quarterly, 1½ per cent, preferred.

Illinois Traction System, three-quarters of 1 per cent, common.

Rochester Railway & Light Company, Rochester, N. Y., quarterly, 1¼ per cent, preferred.

Portland Railway, Light & Power Company, Portland, Ore., quarterly, 1¼ per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

CLEVELAND, PAINESVILLE & EASTERN RAILROAD, WILLOUGHBY, OHIO

Period			Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m.,	June,	'13	$40,989	*$21,731	$19,257	$10,396	$8,861
1 "	"	'12	40,935	*22,360	18,576	9,977	8,599
6 "	"	'13	188,540	*106,540	81,944	62,544	19,400
6 "	"	'12	175,985	*108,704	67,281	59,429	7,852

DETROIT (MICH.) UNITED RAILWAY

1m.,	June,	'13	$1,186,156	$772,174	$413,982	$179,245	$234,737
1 "	"	'12	1,045,442	668,195	377,247	176,174	201,073
6 "	"	'13	6,394,670	4,214,029	2,180,641	1,076,108	1,104,533
6 "	"	'12	5,490,941	3,494,998	1,995,943	1,066,026	929,917

FEDERAL LIGHT & TRACTION COMPANY, NEW YORK, N. Y.

1m.,	June,	'13	$180,935	$108,230	$72,705	.....	.....
1 "	"	'12	162,894	97,774	65,120	.....	.....
6 "	"	'13	1,181,533	675,136	506,397	.....	.....
6 "	"	'12	1,038,339	601,389	436,950	.....	.....

LAKE SHORE ELECTRIC RAILWAY, CLEVELAND, OHIO

1m.,	June,	'13	$127,571	*$74,406	$53,165	$35,315	$17,850
1 "	"	'12	120,915	*64,294	56,620	35,138	21,483
6 "	"	'13	626,503	*404,767	221,735	210,286	11,449
6 "	"	'12	587,251	*358,532	228,719	208,874	19,845

NORTHERN OHIO TRACTION & LIGHT COMPANY, AKRON, OHIO

1m.,	June,	'13	$291,518	*$178,355	$113,163	$45,214	$67,949
1 "	"	'12	276,961	*154,489	122,472	43,817	78,655
6 "	"	'13	1,497,238	*928,458	568,780	270,724	298,056
6 "	"	'12	1,377,336	*792,830	584,505	262,925	321,580

REPUBLIC RAILWAY & LIGHT COMPANY, YOUNGSTOWN, OHIO

1m.,	June,	'13	$248,669	*$152,028	$96,640	$41,992	$54,648
1 "	"	'12	214,737	*129,177	85,559	43,943	41,616
12 "	"	'13	2,842,175	*1,723,933	1,118,242	535,029	583,213
12 "	"	'12	2,518,450	*1,511,712	1,006,738	531,378	475,360

*Includes taxes.

Traffic and Transportation

Dealing with the Rowdy in Baltimore

As the result of a complaint against conditions of rowdyism and unseemly conduct prevailing at times on the cars of the Westport branch of the John Street line of the United Railways & Electric Company, Baltimore, Md., the Public Service Commission of Maryland entered an order under date of July 22 directing the company to turn back some of its cars operated to Kline's Park as an experiment to learn whether or not that measure will afford patrons who board cars on Maryland Avenue reasonably comfortable facilities. The opinion by Chairman Laird is particularly interesting because it shows forcibly the effort of the company to deal with the rowdy element. Referring to this phase of the matter, the commissioner says, in part:

"The argument of the company is that it, as a common carrier, cannot refuse passage on its cars when demanded by a person who at the time is behaving in a proper manner, and this contention cannot be successfully combated. The company does not, however, seek to escape responsibility when disorder occurs, but uses every effort to have offenders arrested and prosecuted. According to the testimony of its assistant general manager, before the excursion season opens the matter is taken up with the chief of police of Baltimore City and the chief of police of Baltimore County, and extra patrolling of the line is provided for. In addition to this the company places inspectors on the line to observe conditions and assist the car crews in bringing violations of the law to the attention of the proper officers. Even within the city limits special details of policemen are stationed to watch the Westport cars.

"The United Railways & Electric Company has no power to keep the peace except by stimulating the police force to greater vigilance and activity and it seems to have exhausted its influence in that direction. An increase of the police force during the excursion season would undoubtedly have a salutary effect. The company is interested, as are the patrons, in having a service free from complaints, which are expensive in both time and money."

In conclusion the commissioner says:

"The suggestion is made by the complainants that a cross-over located on Maryland Avenue in the locality of the Farmers' Rest, and the running of a certain number of cars no farther than that point, would afford a considerable measure of relief, as the disorderly element being congregated farther on the route and having ample cars for its accommodation would give to those who board cars on Maryland Avenue reasonably comfortable facilities. The officers of the company argue that the relief would be so slight as to be negligible. Nobody knows what the effect may be. At least it will be an inexpensive experiment, and we think it is not going too far to require the company to put it into operation. Enough of the present excursion season remains to give it a fair trial, and it is the only plan which at the moment seems feasible."

An order in accordance with this opinion has been passed and the service was to begin not later than Aug. 1 and be operated from a cross-over switch to be installed on Maryland Avenue on the crest of the hill north of the turn into Fish House Road. Cars will be run both ways not more than fifteen minutes apart during the excursion hours. Transfers from this service to the cars which go on to the river resorts are forbidden. The latter provision, it is hoped by the commission, will prevent the excursion passengers from using the service intended for the residents.

Recent Publicity in Minneapolis

The Twin City Rapid Transit Company, Minneapolis, believes in the efficacy of advertising, both in newspapers and by circulars. In one recent newspaper advertisement it explains several changes necessitated in its lines by various building improvements which are about to be undertaken in that city. The Twin City Lines asks the indulgence of its patrons for the temporary and unavoidable irregularities of service that may occur during these municipal improvements. In another it calls attention to the re-routing of lines which will be made necessary by the building of the

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Minneapolis Union Passenger Station, and to the occasional necessity of single-track service on the Washington Avenue South lines, owing to repaving. Half a mile of the "Como-Harriet-Hopkins" line will also be reduced to single track because of municipal water mains and a sewer in process of construction along this line. Other recent newspaper advertisements describe the attractions of visits to Wildwood Park and Lake Minnetonka—reached by the Twin City Lines—and to the new Minnesota State Prison, about which this company is distributing a special pamphlet, outlined in the issue of the ELECTRIC RAILWAY JOURNAL of July 19, 1913, page 120.

Each advertisement contains the sentence: "Complaints and suggestions always receive prompt, courteous attention." This statement is followed by the name, address and telephone number of the general passenger agent, A. W. Warnock.

Employees' Field Meet.—The employees of the Beaver Valley Traction Company, New Brighton, Pa., held their second annual field meet at Junction Park on Aug. 5, 1913. More than 130 prizes, consisting of various small articles, were distributed among the winners of the events. There was a total attendance of about 500, 300 remaining for the dance in the evening.

Wisconsin Automobile Law Amended in Interest of Railway Passengers.—The Wisconsin Senate has concurred in an amendment by the Assembly to the automobile bill passed earlier in the session which provides that all automobiles must come to a full stop when coming up to a street car that has stopped and that the automobile must not proceed until the car has been started.

Fare Reduction Asked in Oregon.—Complaining that the residents of Wichita, Brookside, Stanley, Bell Luther and Watson are charged 10 cents car fare, while residents of Lents are charged only 5 cents, S. L. Mullan, secretary of the Wichita Club, recently asked the State Railway Commission to compel the Portland Railway, Light & Power Company, Portland, Ore., to give Wichita a 5-cent fare.

Hearing in Regard to Service in Camden.—At the hearing on Aug. 6 in regard to the adequacy of the service of the Public Service Railway in Camden, N. J., R. E. Danforth, general manager of the company, said that in comparison with other cities similarly situated the number of persons who are compelled to stand in Camden was extremely small. The commission announced that it would convene again on Sept. 16.

Complete Record of Philadelphia Co-operative Plan.—A complete record of the operations of the co-operative plan of the Philadelphia (Pa.) Rapid Transit Company is contained in four handsomely bound small volumes, prepared by the management, which contain all the co-operative bulletins issued to date, the text of the co-operative plan and details as to the pension and beneficial arrangements, operating rules, etc.

Birmingham Company Offers to Reduce Fare.—In a communication to the City Commission the Birmingham Railway, Light & Power Company, Birmingham, Ala., has offered to reduce its fare from Fairfield and Wylam to Birmingham from 10 to 5 cents. In the communication the company sets forth that as the two communities are growing ones, the reduction is made as an accommodation to the patrons of that section who have been paying 10 cents.

Employees' Relief Association in Richmond.—The employees of the Virginia Railway & Power Company, Richmond, Va., have formed a relief association, and there are already many applications for membership. The local organization is to be an extension of the association which already exists in Norfolk and Portsmouth. It is to include Petersburg, and will be known as the Richmond and Petersburg division of the Virginia Railway & Power Company's Relief Association.

Through Routes in Buffalo.—In an effort to relieve the congestion in the principal streets in the down-town section of the city, the International Railway, Buffalo, N. Y., has announced that car lines operating east of Main Street will join with lines operating west of Main Street, thus making through car lines from the East to the West Side of the city. Heretofore East Side cars made Main Street a terminal. West Side cars did the same. Under the new system the routes will be joined and cars will be operated across Main Street.

Agreement in Regard to Wages.—An agreement in regard to wages has been reached between the officers of the Boston & Worcester Street Railway, Boston, Mass., and the employees of the company. The trainmen will receive an increase in wages of 1½ cents an hour from Aug. 1 to Aug. 1, 1914, and 2 cents an hour from Aug. 1, 1914, to Aug. 1, 1915. The new scale is 23½ cents an hour for the first year, 24½ cents for the second year, 25½ cents for the third year, 26½ cents for the fourth year, 27½ cents for the fifth year and 28½ cents an hour thereafter. The increase is one-half cent an hour for the first five years' service, and 1 cent an hour after five years. This is the scale for motormen and conductors until Aug. 1, next year. The scale will be increased one-half cent at that time. Barnmen, shopmen and power station men in the employ of the company will receive an advance of 5 per cent.

Smoking Prohibited on Cars in Greater New York.—The Public Service Commission for the First District of New York has adopted an order directing all street railways in the city of New York to prohibit smoking or the carrying of lighted cigars, cigarettes and pipes on the cars or the platforms of cars operated by them, except the open cars having running boards along the sides and having seats accessible directly from such running boards. On such cars smoking will be permitted on the four rear seats of each car, including the seat on the back platform. The order also prohibits smoking or carrying lighted cigars, etc., in the stations, station platforms, station stairways, waiting rooms, waiting cars or shelters. The companies are required to enforce these regulations and to post conspicuously in cars and stations proper notices stating that such practices are prohibited. The order takes effect at once.

Free Transportation of Poor Sanctioned in Massachusetts.—Under the new Massachusetts railroad law there is some question whether the companies have a right to continue to give free transportation to the poor or representatives of the poor, and the Boston Elevated Railway and the Bay State Street Railway asked the Public Service Commission whether they would be permitted this year to be as charitable as in the past. The order of the commission authorizing the several companies to give free cars and free tickets this summer reads as follows: "After consideration, in view of the fact that railroad corporations have heretofore granted free transportation to such charitable organizations, and that such organizations have made their plans anticipating that no change will be made in that respect, it is ordered that the commission approve the giving of the free transportation specified in said petition and accompanying schedule, upon the understanding that this action shall not be construed as establishing a precedent for similar action in the future."

Full Bench to Consider East Boston Tunnel Toll Situation.—The full bench of the Massachusetts Supreme Court will sit upon the issue to enjoin the city of Boston from collecting a toll of 1 cent from every passenger in the East Boston tunnel. Representative Benjamin F. Sullivan has brought a bill in equity endeavoring to restrain the city from levying the above charge, which is added to the regular fare imposed by the Boston Elevated Railway and used to meet the interest and sinking fund requirements of the tunnel. An act was passed at the last legislative session authorizing the raising of $125,000 yearly by general taxation to enable the toll to be abolished, subject to the acceptance of the measure by the voters at the municipal election in January, 1914. The consent of the bondholders to a change of security is also required. One of the main questions to be argued before the court is the power of the Legislature in originally authorizing the collection of a toll in the East Boston when no extra charge is made for the use of the other Boston tunnels and subways.

Accident on Empire United Railways.—Thirty-five persons were injured, five seriously, when two cars on the Empire United Railways, Syracuse, N. Y., collided, head on, 2 miles south of the city of Oswego at 3:40 p. m. on Aug. 6, 1913. More than fifty passengers were on the two cars.

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The front portion of each car was torn to pieces, one telescoping the other. The two cars which came together were the southbound local, which left Oswego at 3.33 o'clock, and the northbound limited, due in Oswego at 3.45 o'clock. The following statement is attributed to W. C. Gray, operating manager of the Syracuse-Oswego division of the company: "The result of the collision was that the northbound car, being on a down grade, mounted the southbound car and telescoped it for a distance of 24 ft., indicating that the southbound car was proceeding at a considerable rate of speed. Fortunately the southbound car contained only eight passengers, who were mostly in the smoking compartment, which was on the rear of the car. This accounts for the few and slight injuries, as the body of this car was badly damaged. The principal damage to the northbound car was to the vestibule, which was demolished. The interior of this car is practically intact. Each motorman jumped before the collision."

Increase in Wages in Philadelphia.—The Philadelphia (Pa.) Rapid Transit Company announces the third increase in four months of the wages of its motormen and conductors. On Sept. 1 their pay will be increased 1 cent an hour Similar increases have already been granted on May 1 and July 1. Effective Sept. 1, the wages of motormen and conductors will be as follows: New men, 25 cents an hour; after one year, 26 cents an hour; after two years, 27 cents an hour; after three years, 28 cents an hour; after four years, 29 cents an hour; after five years, 30 cents an hour. Extra men will receive a minimum of $2 a day for each day they are requested to report. Motormen and conductors on the elevated system receive 3 cents more an hour than the surface car crews. Elevated guards in service three years will get 25 cents an hour Sept. 1, with a minimum wage of 22 cents an hour for new men. The increase in wages was discussed in the co-operative bulletin's report by Thomas E. Mitten, chairman of the executive committee of the company, who explains in detail how the seniority of runs has been carried out since the strike of 1910, men who remained with the company receiving preference over those who retired from the service and returned later. He refers to improvements of the "swing-run" system, to afford adequate service to the public during rush hours and work the crews the shortest number of hours possible. "Every man," Mr. Mitten says, "should now help to bury the hatchet, put his shoulder to the wheel and do his part in accomplishing the objects of the co-operative plan, which are to make the street car system of Philadelphia the pride of its citizens and the motormen and conductors the best paid and best satisfied carmen in America."

Date Set for Kansas Fare Hearing.—Sept. 22 has been set as the date for the hearing of the application of the receivers of the Metropolitan Street Railway, Kansas City, Mo., asking for an annulment of the order of the Kansas Utilities Commission requiring a joint passenger rate of 5 cents between the Metropolitan Street Railway and the local line of the Kansas City Western Railway, the Leavenworth line, in Kansas City, Kan. The Kansas City Western Railway terminus is at Riverview. It uses the tracks of the Metropolitan Street Railway into Kansas City, Mo. It has a stub line from Riverview to Minnesota Avenue and the westerly approach to the Intercity viaduct. When the Leavenworth line routed its cars over the viaduct it used this stub line from Riverside and carried passengers boarding its cars along the stub to Kansas City, Mo., for one fare, 5 cents. Over a year ago, when the Metropolitan Street Railway canceled its contract with the viaduct company and re-routed its own cars as well as those of the Leavenworth line over the elevated tracks, the Leavenworth line put a local service on its stub line and charged the usual fare of 5 cents between Riverview and the west approach to the viaduct. This 5-cent fare did not entitle passengers bound for Kansas City, Mo., to transfer on cars of the Metropolitan Street Railway and an extra fare of 5 cents was charged by the latter company for bringing passengers to Kansas City, Mo. Some time ago the Kansas utilities commission ordered the Metropolitan Street Railway and Leavenworth company to carry "stub line" passengers between the two cities for one fare and to make a division arrangement between themselves. The receivers of the Metropolitan Street Railway then appealed to Judge Hook.

Personal Mention

Mr. H. F. Kempfert, who has been auditor of the Grand Rapids (Wis.) Street Railroad, has also been appointed superintendent of the company to succeed Mr. E. C. Rossiter.

Mr. A. E. Stierly has been appointed chief engineer of the power station of the Newport News & Old Point Railway & Electric Company, Hampton, Va., to succeed Mr. H. I. Holleman.

Mr. P. J. McIntosh, New York, has been elected a director of the Montreal (Que.) Tramways. Mr. McIntosh is a director of the Halifax (N. S.) Electric Tramway and is private secretary to Mr. William Rockefeller.

Mr. T. W. Gregory has been appointed general passenger agent of the East St. Louis & Suburban Railway and the Alton, Granite & St. Louis Traction Company, with headquarters in East St. Louis, Ill. Mr. Gregory was formerly assistant secretary and assistant treasurer of the companies, the duties of which offices he will continue to fulfil.

Mr. Philip Dawson, author of several treatises on electrical subjects and consulting engineer of the London, Brighton & South Coast Railway, London, Eng., is planning to visit this country in October for a tour of inspection of the American heavy electric traction enterprises. He will be accompanied by Mr. Gerald W. Partridge, chief engineer and general manager of the London Electric Supply Corporation, which supplies the London, Brighton & South Coast Railway with electric power for the operation of its trains. Mr. Dawson and Mr. Partridge intend to include the Pacific Coast states in their itinerary while in this country.

Mr. William C. Baker has been appointed superintendent of transportation of the Ohio Valley Electric Railway, Huntington, W. Va., a newly created position with the company. Mr. Baker will have charge of transportation on the local lines in Huntington and on the interurban lines, leaving Mr. W. W. Magoon, general manager, free to devote all his time to his managerial duties and to the plans which the company has made for developing and extending the property. The new superintendent was formerly at North Yakima, Wash., where for the past year he was superintendent of the Yakima Valley Transportation Company, a city and interurban system. For four and a half years prior to that he was in the office of the assistant general manager of the Utah Light & Railway Company, Salt Lake City, Utah. There he was in charge of the transportation end of the system, which employs 350 trainmen. During his incumbency at Salt Lake the entire system, which includes 110 miles of city and interurban track, was rebuilt. Before going to Salt Lake Mr. Baker spent seven years with the Norfolk Railway & Light Company, Norfolk, Va.

W. C. Baker

Mr. John G. Williams has been appointed assistant superintendent of railway service of the Utah Light & Railway Company, Salt Lake City, Utah, to fill the vacancy occasioned by the promotion of Mr. George W. Manning into the superintendency. Mr. Williams began his service in Salt Lake City as motorman on the Murray line of the old Rapid Transit Company.

Mr. Joseph K. Choate, vice-president of the J. G. White Management Corporation, New York, N. Y., has been elected president of the Pottsville (Pa.) Union Traction Company to succeed Mr. W. J. Harvie, who retired as railway manager of the operating department of J. G. White & Company, Inc., some time ago to become assistant to the

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president and engineer of construction of the Hagerstown & Frederick Railway.

Mr. Fred A. Anderson, former religious work secretary of the Minneapolis Y. M. C. A., has been appointed supervisor of welfare work by the Twin City Rapid Transit Company, Minneapolis, Minn. In his work as religious secretary of the Y. M. C. A. Mr. Anderson conducted meetings regularly at the welfare rooms of the clubs organized among the employees of the company, and he is already well acquainted with the men. He will spend the remainder of the summer studying welfare work in street railway centers over the country and expects to have the new work in Minneapolis well under way early in the fall. The Twin City company will probably add gymnasiums, night schools and more reading rooms to the present establishments. Mr. Anderson has been associated with the Minneapolis Y. M. C. A. for the last seven years. He is secretary of the Federation of Church Men's Clubs and has acted as executive head of the Men and Religion Forward Movement in Minneapolis.

Mr. R. P. Stevens has resigned as president and general manager of the Lehigh Valley Transit Company, Allentown, Pa., which operates about 150 miles of electric railway from Philadelphia to Allentown, Bethlehem, Nazareth, Slatington and points in the Lehigh Valley, also several electric light plants located in the Lehigh Valley. He will, it is stated, become associated with Mr. Harrison Williams, head of the Williams Syndicate, which controls a number of electric railways in eastern Ohio and western Pennsylvania through the Republic Railway & Light Company and other properties through the Federal Light & Traction Company. Mr. Stevens was born in Eastport, Maine, on April 3, 1877. He attended school at Eastport and later studied at the East Maine Seminary, a preparatory school in Bucksport, Maine. During the time he attended high and preparatory schools, he conducted an electric wiring business, wiring hotels along the coast of Maine for electric bells, etc. He was graduated from the University of Maine with the degree of bachelor of mechanical engineering and electrical engineering. He took post-graduate work in the Massachusetts Institute of Technology and worked for the Electrical Wiring & Supply Company in Boston. Later he entered the employ of the American Bell Telephone Company in Boston, in the student's course, and subsequently served with the General Electric Company to prepare for construction work. He assisted in building a number of electric light plants for the General Electric Company in the South. He contracted fever and left the South, accepting a position with the Automatic Fire Alarm Company, Boston. Later he invented an apparatus for automatic fire alarms and was appointed superintendent of the Western department, with headquarters at Chicago. He went to Everett, Wash., in February, 1900, to rehabilitate the system of the Everett Railway & Electric Company, and was later appointed general superintendent. He supervised the construction of the interurban line and the electrification of the tracks of the Northern Pacific Railway from Everett to Snohomish under an agreement with the Northern Pacific Railway, the steam road operating freight and the electric company the passenger and express service. He left Everett to accept the position of general superintendent of the Auburn & Syracuse Electric Railroad, in Auburn, N. Y. He was later appointed general superintendent of the Auburn & Northern Electric Railroad and general manager of the Skaneateles Lake Transportation Company and manager of the Interurban Electric Express Company. He was elected president of the Lehigh Valley Transit Company in July, 1907. He will continue at Allentown until a successor to him has been appointed.

R. P. Stevens

OBITUARY

A. S. Michener, controller of the Puget Sound Traction, Light & Power Company, Seattle, Wash., was drowned on Aug. 3, 1913, while on a fishing trip up the Homahoma River near Seattle. He was a member of a party which included among others Messrs. J. P. Dabney, A. L. Kempster, A. W. Leonard and C. C. James of the Puget Sound Traction, Light & Power Company. Mr. Michener was born in Washington, D. C., in 1869 and was a son of the late Captain John E. Michener. After graduating in law from Georgetown University he entered the American Ordnance Company, leaving there later to join the staff of the Stone & Webster organization. At the time of his death he was vice-president and controller of the Puget Sound Traction, Light & Power Company, having left Boston for Seattle in 1912.

J. T. Ross, who was killed in the automobile accident at Wyandotte, Mich., referred to elsewhere in this issue, was consulting engineer of the Northern Ohio Traction & Light Company, Akron, Ohio. He was born at Watertown, Wis., but concluded his education in the high school at Coshocton, Ohio. He began his railroad career as a rodman on the Coshocton Southern Railroad in 1888. Subsequently he was connected with the Wheeling & Lake Erie Railroad and the Cleveland Frog & Crossing Company. In the fall of 1895 he entered the employ of the Everett-Moore syndicate in Detroit. Later he had charge of the construction of the Shore Line of what is now the Cleveland, Painesville & Eastern Railway and the Lorain & Cleveland line. He was also engineer of maintenance of way of the Cleveland Electric Railway for eighteen months, but in 1901 he resigned to take charge of the construction of the Detroit & Toledo Short Line, after which he was appointed consulting engineer of the Lake Shore Electric Railway, the Northern Ohio Traction & Light Company and the Cleveland, Painesville & Eastern Railway. During the Goff-Johnson negotiations in Cleveland Mr. Ross was employed as an expert adviser by Mr. F. H. Goff. He was subsequently appointed engineer to Mr. G. M. Dahl, then street railway commissioner of Cleveland.

Louis Edward Beilstein, who was killed in the automobile accident at Wyandotte, Mich., referred to elsewhere in this issue, was born in Cleveland on Aug. 9, 1868. He was educated in the public schools of Cleveland, and when sixteen years old went to work as an office boy for Mr. Henry A. Everett in the offices of the old East Cleveland Railway. Mr. Beilstein rapidly won promotion and within a few years was made cashier of the company. From the post of cashier he became successively assistant secretary and treasurer, assistant superintendent and, in 1893, secretary and treasurer of the East Cleveland Railway. It was soon after this that the consolidation of the several lines in Cleveland took place and the Cleveland Electric Railway became the controlling company with Mr. Everett at its head. Mr. Beilstein was next made assistant secretary, but in 1895 he was advanced to the position of secretary and treasurer of the Akron, Bedford & Cleveland Electric Railway, which was the first interurban line running out of Cleveland. He was also made secretary and treasurer of the Cleveland, Painesville & Eastern Railway, holding these positions until the latter part of the year, when he accepted the position of general superintendent of the Detroit Railway. Mr. Beilstein remained with this company until 1897, when he reassumed the positions of general superintendent of the Akron, Bedford & Cleveland Railway and of the Cleveland, Painesville & Eastern Railway, with headquarters in Cleveland. In May, 1899, he became general manager of the Northern Ohio Traction & Light Company, a consolidation of the Akron, Bedford & Cleveland line and the Akron Street Railway & Illuminating Company. He conducted the affairs of the Northern Ohio Traction Company until the Everett-Moore syndicate purchased the lines of the Toledo Railways & Light Company, when he was made vice-president and general manager. He remained in that position until about a year ago, when the management of the lines was taken over by the H. L. Doherty interests of New York. Mr. Beilstein was a member of the Century and Electric Clubs of Cleveland, and of the Toledo Club of Toledo. He was married to Miss Emma Reader, Cleveland, in 1893.

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Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Minnesota Central Railway, Minneapolis, Minn.**—Incorporated in Maine to build an interurban railway from Minneapolis to St. Cloud, Minn., with a plan for eventual continuation to the Cuyuna range and Mille Lacs. Capital stock, $1,000,000. Officers: E. G. Potter, Minneapolis, president; Edgar M. Nye, secretary, and Edwin M. Potter, treasurer.

***Newell Bridge & Street Railway, Newell, W. Va.**—Incorporated in West Virginia to consolidate the Newell Street Railway and the Newell Bridge Company and to build an electric railway and bridge across the Ohio River with the right to extend the railway in Newell. Capital stock, $500,000. Incorporators: Sterling Newell, Donald McBride, C. C. Owens, Ellis R. Diehm and Harold T. Clark, all of Cleveland.

FRANCHISES

Birmingham, Ala.—The Birmingham Railway, Light & Power Company has asked for a franchise to extend its East Lake line to Roebuck Springs and to take over the Rugby line in East Lake.

Los Angeles, Cal.—The Los Angeles Railway has asked the Council for a franchise for an extension of the West Adams and Hooper Street line.

San Diego, Cal.—The San Diego Electric Railway has asked the City Council and Park Commissioners for a franchise through Balboa Park in San Diego.

San Francisco, Cal.—The Ocean Shore Railroad has asked for a franchise to lay tracks in San Francisco into its grounds adjoining Market Street at Eleventh Street in order to provide for a depot which may be used in the future by all of the interurban lines entering San Francisco.

Oakland, Cal.—Efforts will soon be made by Mayor Mott to induce the officials of the San Francisco-Oakland Terminal Railways to apply for a franchise under the provisions of the new city charter for the short block of track in the extension of Washington Street necessary to connect the San Pablo Avenue lines with the Washington Street tracks in Oakland.

Connecticut Company, New Haven, Conn.—This company has asked the State Highway Commissioner for the approval of its plan for the reconstruction of the New Haven-Branford line on Main Street in Branford.

***Evanston, Ill.**—The L. E. Myers Company, Monadnock Building, Chicago, has asked the Council for a twenty-year franchise to build an electric railway in the west side section of Evanston and also along the old County Traction Company's right-of-way. This is part of a plan to build an electric line between Chicago and Evanston.

Evanston, Ill.—The Evanston County Traction Company has received a twenty-year franchise from the Council in Evanston. Frank M. McCullough is interested. [E. R. J., Aug. 9, '13.]

Rockford, Ill.—The Rockford City Traction Company has asked the Council for a ten-year extension of its franchise in Rockford. The company plans to extend its lines in the factory district in the West End and in the northeast section of Rockford.

Indianapolis, Ind.—The Union Traction Company of Indiana has received a franchise from the Council over certain streets in Indianapolis. It provides that the freight cars and the Fort Benjamin Harrison cars shall enter the city over Martindale Avenue and that passenger cars shall enter by Thirty-eighth Street and Fair Grounds Avenue to College Avenue.

New Orleans, La.—The New Orleans-Kenner Electric Railway has asked the Council for a franchise in New Orleans. This line will connect New Orleans, Shrewsbury, Harahan, Kenner and Hanson City. [E. R. J., July 5, '13.]

Billerica, Mass.—The Bay State Street Railway has asked the Council for a franchise on High Street in Billerica.

Alpena, Mich.—The Boyne City, Gaylord & Alpena Railroad has received a franchise over certain streets in Alpena.

Sault Ste. Marie, Mich.—The Trans-St. Mary's Traction Company has received permission to extend its line west on Portage Avenue as far as the Union Depot in Sault Ste. Marie.

West Orange, N. J.—The Mountain Railway has asked the Council for a franchise for an extension to Central Avenue in West Orange.

York, Ont.—The Forest Hill Electric Railway has received a twenty-year franchise from the Council in York.

***Farrell, Pa.**—The Sharon-Farrell Railways will ask the Council for a franchise over Fruit Avenue from Haywood Street to New Castle Street in Farrell. The company will also ask the Council in Sharon for a franchise over New Castle Street. This is part of a plan to build a line between Sharon and Farrell.

Dallas, Tex.—The Dallas Southern Traction Company has asked for a franchise from the southern end of Zang Boulevard, along Hutchins Avenue and Jefferson Street in Dallas.

Chehalis, Wash.—The Olympia & Southern Railroad has asked the Council for a franchise over certain streets in Chehalis. A similar application has been made by this company to the Council in Centralia. This line will extend from Olympia to the Columbia River in either Cowlitz or Clarke County, and a branch line will be built from Centralia to Willapa Harbor. F. R. Brown, Olympia, is interested. [E. R. J., July 19, '13.]

Parkersburg, W. Va.—The Parkersburg, Marietta & Interurban Railway has asked the Council for franchises to extend and double-track several of its lines in Parkersburg.

TRACK AND ROADWAY

Birmingham Railway & Light Company, Birmingham, Ala.—The new Owenton-Ensley line has been placed in operation by this company.

Edmonton (Alta.) Radial Railway.—This company has awarded a contract to W. H. Main, Edmonton, for setting about 400 steel poles.

Fresno (Cal.) Traction Company.—Orders have been placed by this company for track material needed for the line between Biola Junction and Biola. Orders have also been placed for the material needed for the construction of the bridges along the line. It is planned to have this extension finished by Sept. 15.

***Fullerton, Cal.**—Plans are being considered to build an electric railway between Fullerton and Anaheim, 3 miles, and then from Fullerton to Brea and from Fullerton out to the Yorba Linda district, making Fullerton a central point for all of these short lines. The names of those interested have not been announced.

Los Angeles (Cal.) Railway.—Residents of the district bounded by Fifty-first Street, Slauson Avenue, Central Avenue and Long Beach Avenue in Los Angeles have filed petitions asking the Council to take steps toward securing an extension of this company's West Adams and Hooper Street line.

Pacific Electric Railway, Los Angeles, Cal.—Right-of-way has been assured for this company for its line from Vineyard Junction to a connection with the Eighth Street line in Santa Monica, a distance of 9 miles. Construction has been begun by the company on its line to connect Magnolia Avenue with the Brockton Avenue line at Tibbitts station in Riverside.

Santa Barbara & Suburban Railway, Santa Barbara, Cal.—This company has awarded the contract to J. P. Donohoe, Santa Barbara, for the construction of its line in Santa Barbara to the Normal School. Work has been begun. R. H. Gaud, Santa Barbara, general manager. [E. R. J., Nov. 16, '12.]

Geary Street Municipal Railway, San Francisco, Cal.—The proposition to extend this railway from its present terminus at Ocean Beach to Oceanside has been approved by the public utilities committee of Supervisors of San Francisco and has been referred to the city engineer for a report on the cost. The plan is to run the cars across Golden Gate Park over the United Railroad's tracks at Forty-ninth Avenue, and thence into the Oceanside section along Forty-seventh or Forty-eighth Avenue.

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Big Four Electric Railway, Tulare, Cal.—This company has awarded the contract to W. H. Hahn & Sons Company, Modesto, to lay the rails for its 45-mile line between Porterville, Lindsay, Tulare and Visalia. [E. R. J., July 19, '13.]

Sacramento Valley West Side Electric Railway, Willows, Cal.—This company, which plans to build a 160-mile line between Solano City and Red Bluff, has sold $465,000 worth of stock along the proposed line. The construction of the first link of the line from Solano City, the southern terminus, to Woodland, 30 miles, will now be begun. [E. R. J., July 26, '13.]

Washington Railway & Electric Company, Washington, D. C.—This company is asked to consider plans for a 2-mile extension of its lines along Nicholas Avenue to the plant of the Washington Steel & Ordinance Company in Washington.

Butte, Boise & Winnemucca Electric Railroad, Boise, Idaho.—This company states that at present it plans to use steam as motive power for its line between Boise, Butte, Winnemucca, Salmon City and Idaho City. There is a great deal of power that can be easily developed along the route so that eventually this line will probably be electrified. L. O. Leonard, Boise, president. [E. R. J., July 19, '13.]

Chicago, Waukegan & Fox Lake Traction Company, Chicago, Ill.—Contracts have been awarded by this company for a 13-mile extension. The line now operating between Sycamore and Marengo is to connect Marengo and Woodstock, and when this is finished present plans call for additional construction between Woodstock and McHenry and from McHenry to Waukegan. The line would then be 85 miles in length. J. P. Mason, of Elgin, has been elected president, Michael Nelson, Chicago, vice-president, and M. W. Whittemore, secretary, counsel and general manager.

Woodstock & Sycamore Traction Company, Sycamore, Ill.—This company has awarded the contract to John Seymour to build a line between Woodstock and Marengo. Work will be begun at Woodstock. J. P. Mason, Elgin, president.

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind.—This company and the County Commissioners have agreed upon a contract relative to the erection of the new Main Street bridge in Fort Wayne and the contract will be approved by the commissioners at the next meeting.

Tri-City Railway & Light Company, Davenport, Ia.—It is announced that this company and the subsidiary companies will spend over $750,000 in improvements on its line during this year.

Waterloo, Cedar Falls & Northern Railroad, Waterloo, Ia.—Arrangements are being perfected by this company for an extension of its interurban line from Urbana into Cedar Rapids, a distance of about 22 miles. It is expected that contracts for the construction of the line will be awarded as soon as the result of the tax election is known.

Independence, Neodesha & Topeka Traction Company, Independence, Kan.—Grading will soon be begun by this company at a point west of Independence. Material is now being ordered.

Louisville (Ky.) Railway.—This company plans to extend its Brook Street line to Hill Street in Louisville. Application for a franchise will soon be made.

***Madisonville, Ky.**—The commercial club of Madisonville is advocating the construction of an interurban railway from Madisonville to Dawson Springs, Ky., via Nortonville. The railroad committee of the club has been authorized to secure subscriptions and rights-of-way and the proposition will be put into definite shape in the near future.

Olympian Springs Railway, Power & Light Company, Olympian Springs, Ky.—Bids will be received by this company about Sept. 1 to build its 4-mile line from Olympian Springs to Olympia. The line will connect at Olympia with the Chesapeake & Ohio Railway. Albert J. Heliker, 708 Paul Jones Building, Louisville, is interested. [E. R. J., Aug. 9, '13.]

***Smithland, Ky.**—J. B. Trail and J. E. Massey, Smithland, are considering plans to build an electric railway from Smithland through Livingston County. A meeting was recently held at Smithland with those interested at which plans for a commercial report on the territory to be reached were made. It was stated that the arrangements have been made to secure working capital for construction purposes.

Orleans-Kenner Electric Railway, New Orleans, La.—Plans have been completed by this company to build its 20-mile line between University Place, New Orleans, Shrewsburg, Harahan, Kenner and Hanson City. The line will be double-tracked in New Orleans. A. Smith Bowman, president. [E. R. J., July 5, '13.]

United Light & Railways Company, Grand Rapids, Mich.—B. J. Denman, superintendent for this company, who is making a tour of inspection on the Muskegon interurban line, has announced that it is planned to spend between $125,000 and $150,000 on the property during the coming year. Eventually the line may be double-tracked and the electric signal block system installed.

Muskegon-Casnovia Land & Development Company, Muskegon, Mich.—Right-of-way has been secured by this company for the proposed line between Muskegon, Saginaw, Egelston, Moorland and Casnovia. Norman B. Lawson, Muskegon, is interested. [E. R. J., July 5, '13.]

***Traverse City, Mich.**—Plans are being made to build an electric railway from Beulah to Traverse City, via Honor and Empire, and to convert the Empire & Southwestern Railroad into an electric line. Power for the proposed line would be furnished by the Benzie County Power Company's dam on the Betsie River, which will be completed by Sept. 1.

Electric Short Line Railroad, Minneapolis, Minn.—Grading is being done by this company on 22 miles of its line out from Minneapolis and contracts will be awarded soon for the construction of 18 additional miles. The line into Bird Island will soon be built as the necessary stock has been raised.

Minnesota Central Railway, Minneapolis, Minn.—This company, which plans to build an electric railway from Minneapolis to St. Cloud, has awarded a contract to Petrie & Smith Company, Osseo, for grading the section of the line from Robbinsdale to Champlin. E. G. Potter, Minneapolis, president.

Southern Railway & Light Company, Natchez, Miss.—This company contemplates an extension to the Duncan Memorial Park in the near future. Frank J. Duffy, general manager.

St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo.—An extension of the Wyatt Park line to within a block of the east entrance of Wyatt Park is being planned by this company.

Columbus, Kenton & Toledo Traction Company, Kenton, Ohio.—Surveys have been completed by this company for its line between Columbus and Findlay, and the matter is soon to be brought before the State Utilities Commission. The commission has already passed favorably upon the line from Magnetic Springs north to Findlay, where it is proposed that it shall connect with the Toledo, Bowling Green & Southern Railway under an arrangement already entered into with that company. The commission is yet to pass upon the line as planned from Magnetic Springs into Columbus. [E. R. J., Aug. 10, '12.]

Norman Interurban Railway, Oklahoma City, Okla.—Contracts have been awarded and work has been begun by this company on its line between Norman and Moore. The company plans to build from Oklahoma City to Guthrie in the near future and ultimately will build an extension to Shawnee, linking up all the important cities surrounding Oklahoma City with a network of electric railways. This company is a subsidiary of the Oklahoma Railway. [E. R. J., May 3, '13.]

***Stratford, Ont.**—Electric lines to Grand Bend, one from London and one from Stratford, were announced in Stratford on Aug. 1 as almost immediate projects, by C. T. McAlister, Chicago, Ill.

Middle Tennessee Traction Company, Franklin, Tenn.—Right-of-way has been secured and grading has been com-

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pleted by this company on 20 miles of its line, which will connect Franklin, Eagleville, Shelbyville and Fayetteville. P. E. Cox, general manager. [E. R. J., July 5, '13.]

Jefferson County Traction Company, Beaumont, Tex.—Work has been begun by this company laying rails on its 20-mile line between Beaumont and Port Arthur. [E. R. J., June 28, '13.]

San Antonio & Austin Interurban Railway, San Antonio, Tex.—Right-of-way is being obtained by this company on its line through New Braunfels. This 27-mile line will connect Austin and San Antonio via Kyle, Manchaca, Hunter and New Braunfels. Vories P. Brown, San Antonio, president. [E. R. J., July 26, '13.]

Southwestern Traction Company, Temple, Tex.—Estimates of the cost of construction of the line between Temple and Waco and Austin are being made by this company.

Charlottesville (Va.) Interurban Railway.—Surveys have been completed and most of the right-of-way obtained by this company for its 15-mile railway from Charlottesville to Alberene. Walter Washabaugh, Charlottesville, chief engineer. [E. R. J., June 21, '13.]

Virginia Railway & Power Company, Richmond, Va.—This company plans to build a loop around the Richmond College ground at Westhampton.

Monongahela Valley Traction Company, Fairmont, W. Va.—It is reported that this company has obtained the right-of-way for a line to cut across the southeastern end of Washington County to connect Millsboro and California, Pa.

Yakima Railway & Light Company, North Yakima, Wash.—Work will be begun at once by this company on a 1¼-mile extension in North Yakima.

SHOPS AND BUILDINGS

Oakland, Antioch & Eastern Railway, Oakland, Cal.—This company has opened its new passenger stations at Nichols, McAvoy and West Pittsburg for its new extension to Pittsburg.

Rockford & Interurban Railway, Rockford, Ill.—It is reported that plans are being considered by this company to build a new passenger and freight station in Freeport.

Orleans-Kenner Electric Railway, New Orleans, La.—This company plans to build a new terminal station in New Orleans to extend from University Place to Rampart Street. The structure will be 200 ft. x 200 ft. H. K. Johnson, chief engineer.

POWER HOUSES AND SUBSTATIONS

Connecticut Company, New Haven, Conn.—This company will place in operation in its substations at South Norwalk three 500-kw rotary converters, three 500-kw frequency-changer sets, six 100-kva and nine 185-kva transformers and switchboard panels. All this apparatus is being built and will be installed by the General Electric Company.

St. Louis, Springfield & Peoria Railroad, Peoria, Ill.—This company will install new substation apparatus consisting of an 1800-kw rotary converter, a 1000-kw, 2300-volt frequency changer set and a smaller 100-kw, 2300-volt set. This equipment has been ordered from the General Electric Company.

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind.—This company is increasing the capacity of its Spy Run power station by the installation of two 6250-kva Curtis turbines. Two 1000-kw motor-generator sets and switchboards will also be installed in substations. The General Electric Company will furnish the apparatus.

Morris County Traction Company, Morristown, N. J.—It is reported that this company is in the market for a large amount of substation and power station equipment.

New York (N. Y.) Railways.—This company is installing six 2000-kva air-blast transformers recently ordered from the General Electric Company.

Charlottesville & Albemarle Railway, Charlottesville, Va.—This company will add to its power plant equipment a 500-kw, 3600-r.p.m., 2300-volt Curtis turbo-generator and switchboard panels which have been purchased from the General Electric Company.

Manufactures and Supplies

ROLLING STOCK

Vicksburg Light & Traction Company, Vicksburg, Miss., has placed an order with the St. Louis Car Company for two 21-ft. cars.

United Light & Railways Company, Grand Rapids, Mich., is reported as expecting to purchase about $50,000 worth of new equipment.

Grand Rapids, Holland & Chicago Railway, Holland, Mich., is reported as expecting to purchase six passenger cars and three express cars.

Montreal (Que.) Tramways, noted in the ELECTRIC RAILWAY JOURNAL of May 3, 1913, as expecting to purchase 100 double-deck cars, has ordered twenty-five motor and twenty-five trail cars from The J. G. Brill Company.

Savannah (Ga.) Electric Company, noted in the ELECTRIC RAILWAY JOURNAL of July 5, 1913, as expecting to purchase three cars, has ordered these cars from the St. Louis Car Company. These cars will have a seating capacity for forty persons.

TRADE NOTES

International Oxygen Company, New York, N. Y., has appointed Philip J. Krowl its sales agent for the Pittsburgh district.

Davis-Bournonville Company, Jersey City, N. J., has removed its offices from 90 West Street, New York, N. Y., to Jersey City.

Goldschmidt-Thermit Company, New York, N. Y., has moved its San Francisco (Cal.) office from 432 Folsom Street to 329-333 Folsom Street.

Atlas Preservative Company, New York, N. Y., has received an order for its Atlas A weed killer and track preservative from the Milwaukee Northern Railway.

Thomas A. Edison, Inc., Orange, N. J., has appointed F. J. Lepreau assistant Western sales manager for the primary battery department for Central Western territory, with office in Chicago, Ill.

Union Switch & Signal Company, Swissvale, Pa., has received a contract from the Pacific Electric Railway for installing a block-signalling system on its Pasadena Short Line and Venice Short Line. Details of this equipment will follow in a later issue.

Brown Hoisting Machinery Company, Cleveland, Ohio, has issued Catalog K, describing Brownhoist locomotive cranes of various capacities, and showing by a series of interesting illustrations how the cranes are used in connection with Brownhoist patented grab buckets.

J. F. Stevens Construction Company, New York, N. Y., has filed a voluntary petition of bankruptcy through its president, John F. Stevens, and its secretary, E. P. Shannon. Joel Rathbone, vice-president of the National Surety Company, and Frederick W. Stelle were appointed receivers to continue the company's business for twenty days.

Eveland Engineering & Manufacturing Company, Philadelphia, Pa., has sold its entire production of electric riveters for the first year to Manning, Maxwell & Moore, Inc. The company is installing a large amount of new machinery to increase its output, and in addition to Eveland electric riveters will manufacture transformers and electric tempering and hardening machines.

Allis-Chalmers Manufacturing Company, Milwaukee, Wis., has transferred Irwin McNiece, formerly on the erecting engineering staff of the company, to its Salt Lake City office as hydroelectric sales engineer. Previous to his connection with this company Mr. McNiece was connected with the Utah Power Company, and before that time he was engaged in electric erecting work at Milwaukee, Wis.

Titan Copper Products Company, Buffalo, N. Y., has begun the manufacture of brass, bronze and aluminum castings. It has a well-equipped plant to meet the demand for a higher grade casting, involving familiarity with the finer principles of alloying non-ferrous metals to produce sound castings for specific requirements. The officers are: Charles V. Slocum, president; A. N. Slocum, vice-president; W. W. Slocum, treasurer; Frank P. Lund, general superintendent.

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Star Brass Works, Kalamazoo, Mich., have about completed a new factory on Fullford Street and expect to occupy the new plant early in September. The new building is a two-story brick structure, 110 ft. x 100 ft. in area, and is being equipped with the best machinery obtainable for use in making trolley wheels, which, as heretofore, will be the exclusive product turned out by the firm. The new plant will have twice the capacity of the old one, and because of its admirable location for shipping and its up-to-date equipment it is expected that the work of filling orders will be greatly facilitated. Every machine in the factory is to be equipped with individual motor drive.

Root Spring Scraper Company, Kalamazoo, Mich., reports that its business during the first six months of this year has been treble that of any previous year. Among the large orders recently received for No. 2 scrapers, for either air or hand operation, are the following: Boston Elevated Railway, 200; Boston & Northern Railway, 100; Preston Car & Coach Company, 27; Ottawa Car Company, 24; Laconia Car Company, 110; St. Louis Car Company, 13, and the Wason Manufacturing Company, 8. The pneumatic attachment has proved to be very efficient and many railways in the United States and Canada are making the air-operated scraper standard on all cars equipped with air.

Pyrene Manufacturing Company, New York, N. Y., on Aug. 8, 1913, gave a demonstration of its hand extinguisher before several city officials of Philadelphia. Among those present were George D. Porter, director of public safety, and representatives of several corporations, including the Philadelphia Rapid Transit Company. The demonstration was very comprehensive, including fires of all kinds of material. Through the courtesy of the Philadelphia Rapid Transit Company an electrical apparatus was erected to create an arc of 550 volts at 150 amp between copper bars. This arc was drawn about twenty times and was in each instance instantly put out by the extinguisher The company has received recent large orders for fire extinguishers from the following companies: New York, New Haven & Hartford Railway; New York, Westchester & Boston Railway; Pittsburgh & Lake Erie Railway; Pittsburgh, Harmony, Butler & New Castle Railway; Cornfield Railway; Syracuse & Suburban Railroad; American Locomotive Company; Westinghouse Electric & Manufacturing Company and National Tube Company.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., has introduced modifications of its standard fans, adapting them to railroad coach use. For use on private cars, sleepers, parlor cars, diners and day coaches the wall-mounting fans are used. The wall-mounting fans have drawn steel frames, inclosed end brackets and cast-iron bases. They are furnished in two sizes, the 9-in. size being used especially in smoking compartments and lavatories, and the 12-in. size in the main part of the car, and are wound for 24 to 30 or for 60 volts direct current as desired. A tooth joint with a thumb screw adjustment positively prevents the fan from tilting while the car is in motion. The fan can be readily removed from the bracket if desired. Either single-speed or three-speed fans may be used. For use on electric railway cars, including subway, surface, elevated and interurban, where 500 to 600 volts is the prevailing voltage, the standard railway coach fans, without switch, wound for 220 volts, are supplied with special resistor to take up the extra voltage. They have one lead grounded to prevent shock to any person coming in contact with the fan. The resistor also contains a choke coil to reduce the rush of current when the fan is first connected to the line. The operation of two fans in series on electric railways is not recommended owing to the danger of burning out both fans when one fails to operate. For removing smoke, dust and odors of cooked food from the kitchens of dining cars and from buffet cars, the standard single-speed 12-in. exhaust fan is recommended. This type is wound for 24 to 30 or for 60 volts direct current. A speed regulator to give two additional speeds can be furnished when desired.

ADVERTISING LITERATURE

D & W Fuse Company, Providence, R. I., has issued a leaflet describing its "Delta" insulating materials, which are "Deltatape," "Delta" sheeting, "Delta" insulating varnish and "Delta" plastic compound, for smoothing the surface and filling cavities of field coils prior to applying the outer insulation.

Electric Service Supplies Company, Philadelphia, Pa., has issued a folder describing, illustrating and listing its new improved Keystone sand drier. The new features embodied in this sand drier overcome many of the difficulties railway, mining and construction companies have met with in solving the problems of drying sand.

Edward B. Smith & Company, Philadelphia, Pa., are preparing for distribution copies of the new Pennsylvania public service company act, which was approved by Governor Tener on July 26. Applications will be filed and the pamphlet mailed as soon as possible. The Pennsylvania public service company act was digested in the issue of the ELECTRIC RAILWAY JOURNAL of Aug. 2, 1913, page 194.

Trussed Concrete Steel Company, Detroit, Mich., has issued an illustrated circular, entitled "Kahn System Standards," which describes in detail its new concrete reinforcement material, Seven-Rib Hy-Rib. This product is an important improvement over Four-Rib Hy-Rib, which it replaces, inasmuch as the sheets are 24 in. wide, over twice the former width, and the ribs are ⅛ in. deeper. It therefore saves labor, time and expense in installation and permits a wider spacing of supports owing to its increased stiffness.

Trolley Supply Company, Canton, Ohio, has recently issued an attractive forty-eight-page catalog, which completely illustrates and describes several of the products which the company manufactures, which include Knutson trolley retrievers Nos. 2 and 5, Ideal trolley catcher, Peerless roller-bearing trolley base No. 10, Star trolley base Peerless check valve, Peerless Junior headlight and semaphore incandescent headlights for city cars. The catalog also contains price lists of these products, together with special lists giving the price of each individual part which goes to make up these several devices. The company has also printed two folders, one describing and illustrating with dimensions its pressed steel dash headlight No. 14, the other its Simplex roller-bearing base.

Titanium Alloy Manufacturing Company, Niagara Falls, N. Y., announces the publication of *Rail Reports,* of which Bulletin No. 1, devoted to open-hearth rails, is ready for distribution. These reports will record the results of comparative laboratory and service tests of standard carbon rails and rails of the same general composition treated with ferro carbon-titanium. The present bulletin describes the findings on laboratory tests since Jan. 1, 1913, on samples of standard and titanium-treated open-hearth rails submitted by three railway companies. In each case both kinds of rails had been rolled by the same mill under the same specifications, with the single exception of the use of 0.10 per cent titanium in the treated steels. The series of sulphur prints, as reproduced in this bulletin, shows that in every case the sulphur in the untreated steel was badly segregated, while none of the treated steels shows any marked segregation. Further proofs of the value of the treatment are afforded by a series of photomicrographs and tables of physical properties which are contained in the publication "Rail Reports."

The Harbor and Subway Commission of Chicago issued a circular letter recently accompanying three pamphlets which set forth tentative plans for a system of subways which will cost $300,000,000 or thereabouts. The pamphlets are "Joint Report on Comprehensive System of Passenger Subways for the City of Chicago by the Harbor and Subway Commission and Sub-Committee of the Council Committee of Local Transportation, dated Sept. 10, 1912." "Supplemental Report on Comprehensive System of Passenger Subways for the City of Chicago by the Harbor and Subway Commission," dated Oct 30, 1912, and "Communication of Mayor Harrison to the City Council Recommending Submission of Questions of Alternative Construction of Subways to a Referendum Vote and Drafts of Ordinances Transmitted Herewith, Dated July 15, 1913." The last pamphlet contains the ordinance for downtown subways to be leased to the elevated roads and the ordinance for a comprehensive independent system of rapid transit subways.

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Electric Railway Journal

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A NOVELTY IN TURBO-GENERATOR DESIGN

The new turbines for the Interborough Rapid Transit Company, of which a preliminary account is given elsewhere in this issue, are distinctive not only on account of the capacity of each set, which is composed of two 15,000-kw units, but also because these machines apply the principles of the exhaust-steam turbine to completely new apparatus. The 30,000-kw set is, in fact, nothing more than a high-pressure reaction turbine exhausting into an entirely separate standard double-flow turbine operating at a lower speed. The advantages of such an arrangement, as applied to units of very large capacity, are obvious. Perhaps the most important is the fact that there is nothing untried about any of the apparatus unless it is that a high-pressure turbine of such a large capacity as 15,000 kw should be considered in the light of an experiment. The use of double units operating at different speeds is, of course, not new. In fact, in one of the present Interborough power stations, the original reciprocating engines coupled to slow-speed alternators are operated in parallel with more modern turbo-generators run by exhaust steam from the engines. This is, indeed, such a satisfactory arrangement from a thermodynamic standpoint that it would be interesting to know just what the results would be in case all of the apparatus was specially designed for the work. For high-pressure steam the engine is generally conceded to be more efficient than the turbine, the latter attaining its best results with vapor of lower density and without the tendency toward leakage between stages. On the other hand, it is quite possible that a 15,000-kw high-pressure unit may be made to eliminate many of the losses which have made the smaller high-pressure turbines less efficient than the rival prime mover. In addition, the experience of the past ten years has shown that the low maintenance charges of the turbine will go far to offset even a considerable loss in efficiency.

A QUESTION OF NOMENCLATURE

The prominence which has suddenly been assumed by the system of railway traction in which locomotives equipped with polyphase motors are operated by single-phase current has raised the interesting question whether such a system can properly be called a single-phase system. The question, of course, is one of nomenclature only, but it is discussed by correspondents in our issues of this week and last week, and it ought to be settled promptly because of the manifest desirability of having recognized standards in all matters of this kind. Otherwise there is great possibility of misunderstanding as to the meaning of certain terms. It seems to us that the kind of power used on the trolley wire, or working conductor, is the critical matter to be considered in this connection, and that this is the plan which has heretofore been generally followed in referring to electric railway systems. Thus in the past a 1200-volt railway has meant a railway on which 1200 volts were used on the working conductor, irrespective of whether the motors were wound for that potential or if two 600-volt motors were used in series. Again, as Mr. Murray says in a letter in our correspondence department this week, it is easy to conceive of three or four electric locomotives running side by side upon a railway equipped with single-phase overhead system and each locomotive having a different type of motor. But if Mr. de Muralt's theory was correct and each system took its name from the type of motor used on the locomotive, one set of electrical engineers might assert that the present New Haven road was a direct-current line because it uses direct-current motors, whereas another would probably insist that the New York Central road from Woodlawn to the Grand Central Station should be classified with the single-phase lines because it is traversed by the New Haven single-phase locomotives. If we are to use only a single term to describe a railway with single-phase current on the overhead wire and polyphase motors on the locomotives, let us choose our term from the most visibly conspicuous part of the equipment, the overhead system, and by all means say that the road is a "single-phase" line.

EXPERIENCED EMPLOYEES PREFERRED

Among the rumors circulated by alleged friends of labor during the late car strike at Buffalo was the statement that the International Railway Company had taken advantage of the sliding-scale system to discharge men who were receiving the maximum wage in order to replace them with new men at the minimum wage. This charge was utterly disproved during the inquiry into the strike causes made by the Buffalo Employers' Association. Testimony by the men themselves disclosed the fact that the company was so desirous of retaining its experienced men that more than 20 per cent of the present platform men were drawing the maximum wage. This is a good record,

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but the evident desire of the company to keep experienced men in its service is one which is shared by practically all electric railway companies. The charge that with a sliding scale companies will discharge the experienced men at the higher wage in order to employ inexperienced men at lower wages is ridiculous, but its innate absurdity does not prevent it from often deceiving, for a time at least, the unsophisticated layman. Few interests outside of electric railway management know that the most pressing problem of their claim and transportation departments, as publicly declared at convention after convention, is how to hold the men whose experience insures reasonable freedom from accidents and mistreatment of apparatus. A senior motorman who works, say, 3500 hours a year at 4 cents above the lowest rate receives an additional annual wage of but $140. If he is discharged, the company must spend $50 to $100 merely to school a man in the routine of platform operation, but his education is rarely completed until he has burned out a few armatures, bumped his car into a truck, thrown some passengers by a jerky start, or has even caused serious injury. In truth, no other occupation puts such a premium upon experience as does railway work, because the coolness of the veteran is the best insurance for the life and property which are placed in his care.

CARRYING INSURANCE FOR THE MEN

The employees' insurance plan of the Third Avenue Railway, New York, as disclosed elsewhere in this issue, is a noteworthy advance in welfare work along more practical lines than those afforded by a benefit association alone. Briefly, the railway offers to insure all of its men at the annual rate of $4 per $1,000, adding thereto a gift of $7 for every $4 paid in by its employees. This offer is the result of negotiations with a large insurance company which has agreed to accept, without examination by its own physicians, all of the men of any age whatsoever at the annual rate of $11 per $1,000 insurance. This low figure is made possible, of course, on account of the high average physical condition of the employees as a body, since the greater number are platform men who have already passed the tests of the railway company. It is evident that this insurance plan will be especially welcome to family men, as the lowest death payment is four times that of the employees' benefit association. Besides contributing such a substantial portion of the premium, the railway will arrange to collect the employees' share by withholding 15 cents a week from each policyholder's wages for every $1,000 insurance. In this way the men will not feel in any appreciable degree or be embarrassed by their contribution to the fund. Aside from the life insurance plan, the same underwriting company also offers the extremely low terms of 75 cents a year for accident indemnities up to $1,000. In each case the lowest terms are available only to members of the employees' benefit association, but other employees may participate upon paying a slight additional amount. Another liberal feature of the Third Avenue plan is that the policy may be continued by a man after he leaves the railway. In this event, he must pay the underwriters' usual rate for his age. But, on the whole, this method of co-operating with an established insurance company should prove less cumbersome than self-insurance, aside from the fact that violent fluctuations in the number of deaths and accidents are absorbed much more readily by a large fund than by a small one.

A NEW MOTOR FOR SINGLE-PHASE LINES

In this issue of the Electric Railway Journal important information is given regarding the coming electrification of a section of the Norfolk & Western Railway. As announced in our issue of Aug. 2, the single-phase system has been adopted, but the motors will be of the polyphase type. Thus the advantages of the single-phase transmission with one trolley wire carrying high-voltage current are combined with those of the polyphase induction motor, which is well adapted to low-speed, heavy mountain-climbing service. Up to the present time the Great Northern electrification in the Cascade Range has been the only place where polyphase motors are employed for traction purposes in this country. Two trolley wires are used in that case. The new combination is made possible by the use of a phase-splitting device of the rotary induction type. The theory of this method of operation is not new, but the same statement could have been made in regard to the commutator single-phase motor for railway work when it was first put upon the market. It was known at that time that a motor designed for direct-current work would run on an alternating circuit, but the principle had not been applied to commercial service because of supposed inherent difficulties, one of which was destructive sparking at the commutator. The improvements by which the commutator motor was made suitable for single-phase railway service were consequently changes in design rather than the discovery of a new principle.

In the same way it has long been known that by the introduction of inductive apparatus in the circuit of one set of poles in an induction motor it is possible to produce a phase displacement of 180 deg. in that circuit, so that if the poles of different polarity in the motor are grouped in their proper order an induction motor can be made to run on a single-phase line. This displacement of phase can be secured by either rotating or static apparatus, but up to this time the weight and size of equipment required for securing this result seemed to prohibit its practical application. The rotating apparatus is much lighter than the static apparatus required, but even with its use the capacity of the "phase-splitter" would have to be 25 to 30 per cent of that of the motor to which it is applied.

The details of the new apparatus are not yet forthcoming, but evidently a method has been devised by which polyphase apparatus can secure polyphase current from a single-phase line without this impediment in weight and size of the phase-splitting apparatus, or at least to the extent that it is not a serious objection. Finally, the fact that a contract has been closed for a large number of locomotives upon this principle indicates that the consulting engineers and the manufacturers are convinced that they have found the long-elusive solution to this difficult problem. The results will be of far-reaching significance, and the test to be conducted on a sample locomotive next spring will be awaited with interest.

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CALCULATION OF PROBABLE PROFITS

The day is past when an electric railway is built simply because some engineer or promoter has made a rapid survey of the ground and believes that it will pay. The bankers and capitalists who have to provide the funds for the enterprise must have a more definite knowledge of the probable results. It may seem difficult to the layman for anyone to determine in advance the traffic which a projected transportation enterprise will secure and its probable gross income and operating expenses. But if all the conditions are carefully considered in advance and the deductions derived from similar enterprises under similar conditions elsewhere in the country are applied, the problem is not so difficult.

We believe that a series of articles on the earning power of street railways in cities of various populations in this country, published in the STREET RAILWAY JOURNAL during the early nineties, was the first attempt toward an analytical consideration of the probable gross and net receipts of new local transportation enterprises of different sizes. In those articles the principle was developed that while local conditions, especially the topography and configuration of the city, exercise considerable influence upon the earnings of the different properties, yet allowances can be made for these variations, and there still exists a very close relation between the earnings of a property and the population of the city in which it operates. The fact was also developed, for the first time, we believe, in these articles that, considered broadly, the traffic on such transportation systems varies, on the average, approximately, according to the square of the population of the city. These principles have been elaborated and developed since that time, but the fundamental rules there laid down have not been disturbed.

The interurban electric railway, however, presents an entirely different aspect, and the problem of calculating the probable riding upon such a road is much more complicated. Here there is not only the population of the main terminal to be considered but the population of the secondary terminal or terminals, if any, as well as the intervening population. The traffic also naturally may be divided into "through" and "local" travel. At first, investigators were puzzled as to the allowance which should be made for the population of the main terminal, but the general practice now, as described in the article by Mr. Fischer elsewhere in this issue, is to omit it altogether in making the estimates.

This may seem illogical, but the somewhat curious fact was discovered early in the history of this class of investigation, from a comparison of the earnings of a large number of interurban roads entering cities of varying size, that after the terminal city had reached a certain population its size had no appreciable effect on the earnings of the interurban railway property. Then attempts were made to utilize in the statistics some proportion of the population of the main terminal city, the proportion depending upon the size of the city, but the conclusion was finally reached, and is corroborated by Mr. Fischer's analysis, that closer results can be obtained if this population is neglected absolutely. The reason, of course, is that while the main terminal city is a factor and a most important factor in the travel on the railway, every interurban railway may be assumed to have a large city as one terminal. Hence the omission of its population in all cases will not affect the ratio between the lines considered in the comparison.

In a similar way various plans have been proposed to calculate the intervening population on the line not contained in incorporated cities, towns or villages. In the attempt to do this many methods were proposed and employed. One was to obtain from the census reports the average population in the township not included in the incorporated cities, towns and villages in the township and to prorate this population according to the ratio which the total area of the township bore to the area of a strip 2 miles wide extending along the route of the railway and lying within. The theory of this method was that the patronage for the railway would be derived largely from such a strip extending back about 1 mile on each side of the track. Other investigators believed that the strip should be wider or narrower than 1 mile, while still others claimed that no calculation was reliable without a house-to-house count. Mr. Fischer solves this problem in the same way as that which involved the large terminal city. In other words, he believes that the population of the incorporated towns and villages may be considered as an index of the population outside of their limits and hence, in any comparative study, may be omitted because the denominators in all cases will be reduced in approximately the same ratio and thus the varying factor will be canceled.

The points mentioned and the method by which they have been solved are two questions only in the study of this important subject. Other vital matters are: the extent of riding which may be expected between two secondary terminals; the travel to be expected from the intervening population to and from the primary or secondary terminal; the practical limits in distance under present traffic conditions between secondary terminals and the main terminals; the effect of the character of the terminals themselves, that is, whether both are county seats or whether one is a county seat and the other a commercial or manufacturing town; the effect of different schedules or headways upon the probable traffic; the extent to which a freight, package or express service can be developed, etc.

As might be expected, the study of interurban electric railway properties in these respects shows that there is not any hard and fast law, but it also shows that most of the cases fall within such fairly definite limits, when a normal road is considered, that the results can be predicted by certain rules with a fair degree of accuracy. Beyond these bounds and for the abnormal roads a special study of the territory and of the riding habits of the population must be made. This is the province of the expert. As an effort to deduce the general principles of the problem as a guide, both to operating companies and those interested in new projects, Mr. Fischer's contribution is a noteworthy one. It is based not only on theoretical grounds, but upon an extended practical consideration of the subject, and as a pioneer in an extremely complicated but important field of research he is to be congratulated upon his excellent work.

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New Headquarters Carhouse of the Union Street Railway

Features of a Recently Completed Installation with Attractive Administrative Offices, Liberal Provision for Employees' Comfort, Noteworthy Instruction Room Facilities and Model Stores Department

One of the latest and most complete carhouses in New England has been placed in service recently by the Union Street Railway Company, of New Bedford, Mass., to accommodate the demands of a rapidly increasing traffic. The new installation is a fireproof structure equipped throughout with automatic sprinklers and adjoins the repair shops of the company at the intersection of Weld and Purchase Streets, approximately one-half mile from the business center of the city. In its provisions for the comfort of employees, equipment for the instruction of trainmen and stores facilities it compares favorably with any plant of the kind now in service in the country. The building has a capacity of 100 standard 40-ft. cars and cost about $150,000 or $1,500 per car, complete. The architectural work was handled by Louis Destremps, New Bedford, Mass., the general design and construction being completed under the direction of Elton S. Wilde, vice-president and general superintendent of the railway company.

New Bedford Carhouse—Exterior View, Showing Main Entrance

The building is a reinforced concrete structure two stories in height, with external curtain walls of pressed brick, the windows of the street floor being arched at the top, while those on the second story are rectangular. The trimmings are light granolithic, and the roof is bordered by a neat balustrade which adds much to the appearance of the structure. The building is about 362 ft. x 153 ft. in ground dimensions and is provided with connections at each end leading to the main north and south lines of traffic through the city. It contains two main interior subdivisions and thirteen tracks, six of which are provided with inspection and repair pits about 170 ft. long in each case, the pit tracks being about 11 ft. apart on centers. The main entrance, as shown in the accompanying illustration, extends diagonally across the corner of the building, the various tracks being fanned inside as shown in the interior view. The two interior sections are separated by a 16-in. brick fire wall which is carried as near the front of the building as is possible without interfering with the clearance of passing cars. The entire ground floor is devoted to car service, including sand and salt bins, with steam heating for the former, near the main entrance. On the second floor are the general offices of the transportation department, of the general superintendent, superintendent of transportation and storekeeper, the equipment department, a drafting room, storeroom, reading, locker and billiard rooms, and an auditorium containing a complete installation of car equipment for instruction in electrical and air-brake service. A large reserved area is available at the north end of the second floor for storage and other purposes.

INSTRUCTION FACILITIES

The instruction facilities are located in an assembly room about 55 ft. x 58 ft. in dimensions, and include apparatus for illustrating both the theoretical and practical sides of car operation. As shown by the views on page 295, the equipment is massed at one end of the room upon and at the rear of a broad platform, to facilitate observation of its working from seats in the main body of the auditorium. Practically the entire end of the room is required by the demonstrating equipment and auxiliary apparatus. To illustrate the theory of car operation, the connections of motors, use of resistances and effect of controller handling, a model four-motor circuit with lamps in the field windings and fan motors in the armature positions is shown, the model armatures being made of inverted wash basins attached to the shafts of the driving fan motors and the latter being located at the rear of the demonstration board. The circuits are connected through appropriate resistances to a controller from which all the combinations effected on a full-sized car can be made visually on the board. Each section of resistance is represented by a 115-volt, 16-cp

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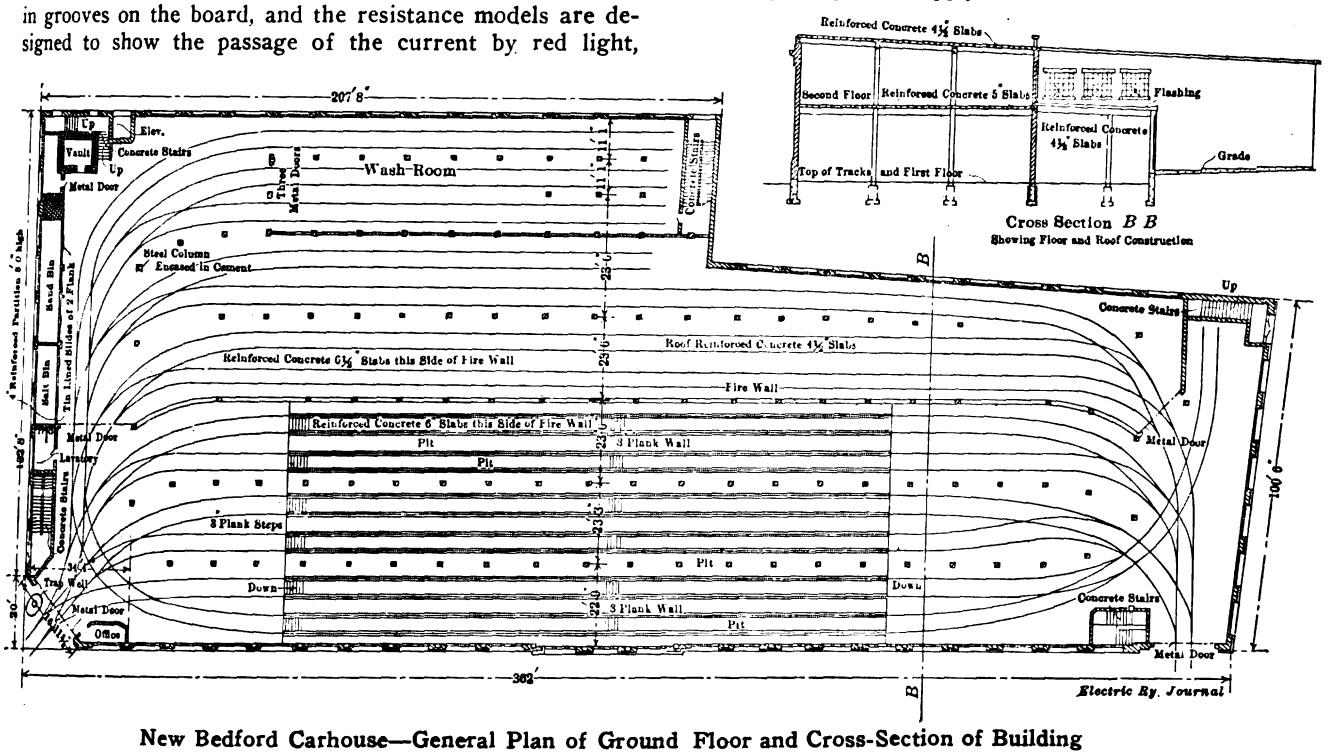
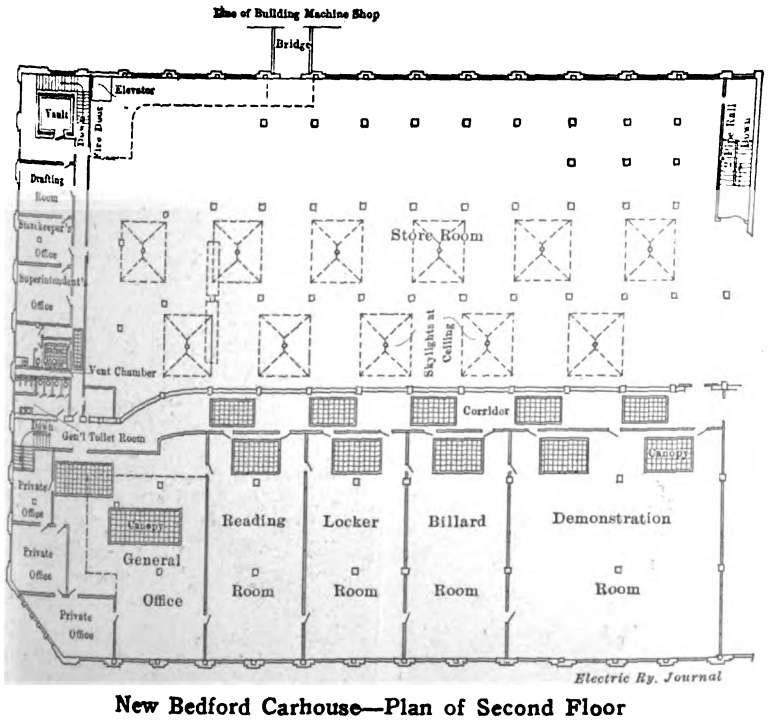
lamp, and, as in similar apparatus of this character, the arrangement enables the results of poor operation, behavior of motors in case of open circuits, etc., to be studied at length for both two-motor and four-motor equipments. The demonstration circuits are of No. 14 flexible wire carried in grooves on the board, and the resistance models are designed to show the passage of the current by red light, indicating a waste of energy on all but the running points of the controller.



New Bedford Carhouse—General Plan of Ground Floor and Cross-Section of Building

At one side of the board a full-sized truck equipped with two GE-800 motors is mounted, the usual 33-in. wheels being carried on two 6¾-in. x 3-in. idlers in each instance. Behind the truck is a car-control board upon which are mounted all the switches, contactor and resistance equipment required, and this apparatus is labeled as shown in the photograph, with cables run in an open molding along the face of the wall to the motors. A standard car controller wired to the supply circuit of the building enables the motors to be operated at the convenience of the instructor and permits the freest possible use of the equipment by inexperienced men receiving training. The motor leads are lettered as in a standard car-wiring installation. Another interesting feature of the room is a board showing the theory of power supply from the busbar through the feeder switch and overhead system to the car, giving the embryo motorman and conductor a clear idea of the meaning of the electric circuit. To illustrate the phenomena of the magnetic field a piece of an old axle has been wound with wire and connected through a snap switch with the electrical service of the building, and the establishment of lines of force as shown by iron filings, attraction and repulsion and the powerful mechanical pull exercised under proper conditions by a large number of ampere-turns are frequently exhibited. This apparatus is portable, and another portable equipment illustrated in one of the views on the next page shows the use of the magnetic blowout. In this case two arc-lamp carbons are mounted on a horizontal axis close to the tip of a powerful solenoid, the whole being shielded from the observer by a panel of red glass. A snap switch on the outside of the containing box and a flexible connection with the building circuits enable the phenomena of the magnetic blowout to be reproduced to great advantage and have proved of much assistance to the men in teaching them the methods of rupturing circuits carrying current under working conditions. Still a third portable equipment, illustrated herewith, consists of a full-sized car-lighting circuit with wiring carried in a grooved board, vestibule switches and a flexible connection by which the lamps may be illuminated as on a car, the circuit providing for both headlight and interior incandescents.



New Bedford Carhouse—Plan of Second Floor

General Electric and National air-brake equipments are exhibited in the auditorium, the apparatus being equipped with colored piping and mounted upon a frame with springs to absorb the power developed in the brake cylinders. There are three styles of brakes shown, all of which work automatically, and the gages, motormen's valves, etc., are piped to motor-driven compressors as in actual service. Another feature of the auditorium is a large bulletin board upon

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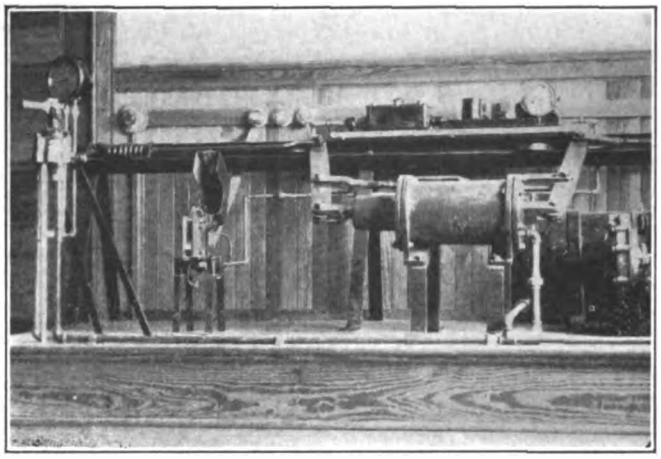
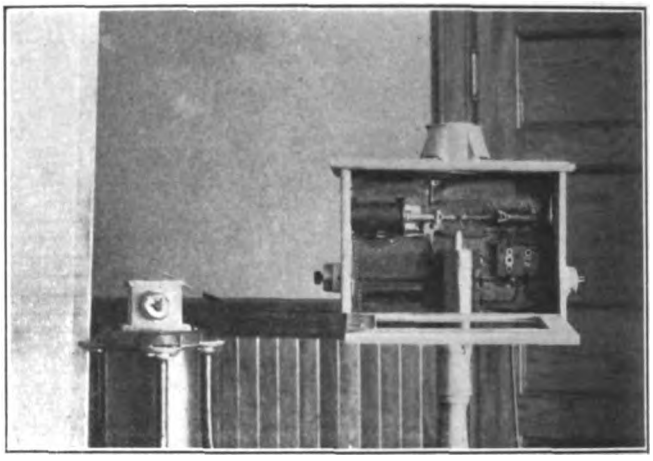
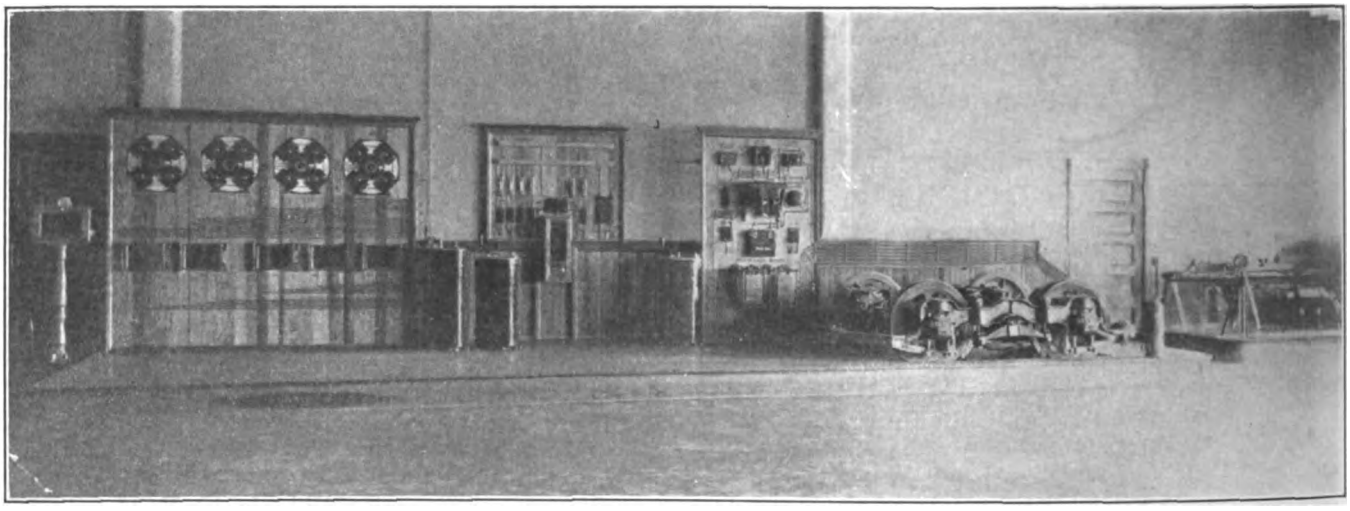
which are daily listed the causes of pull-ins, these being discussed at a weekly meeting of carhouse and other foremen. The room is also provided with a screen for lantern-slide and moving-picture exhibits, and these are used whenever desirable. It is the custom to give a special lecture to the men every fortnight upon some phase of car operation. Classes meet weekly to study the equipment problem. The apparatus in the auditorium also contains several switches by which open circuits can be established in the car wiring at various points so that the men taking the course of study can obtain practice in hunting down troubles. All the apparatus for demonstration was assembled by the em-



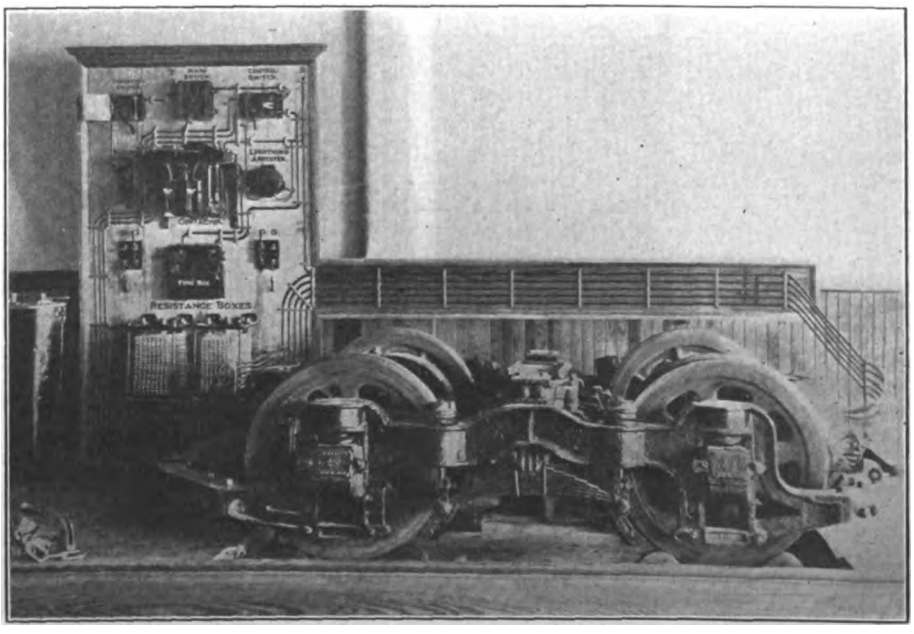
New Bedford Carhouse—Air-Brake Exhibit in Instruction Room



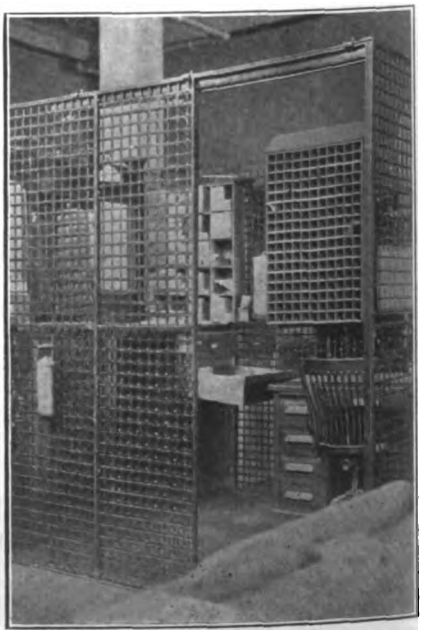
New Bedford Carhouse—Magnet Blowout and Solenoid Apparatus



New Bedford Carhouse—General View of Instruction Room



New Bedford Carhouse—Model Showing Controller Circuits



Cashier's Office

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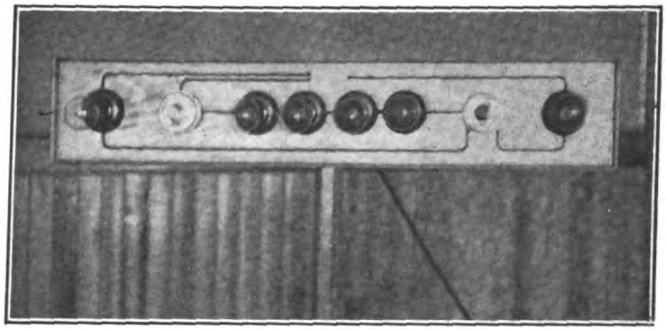
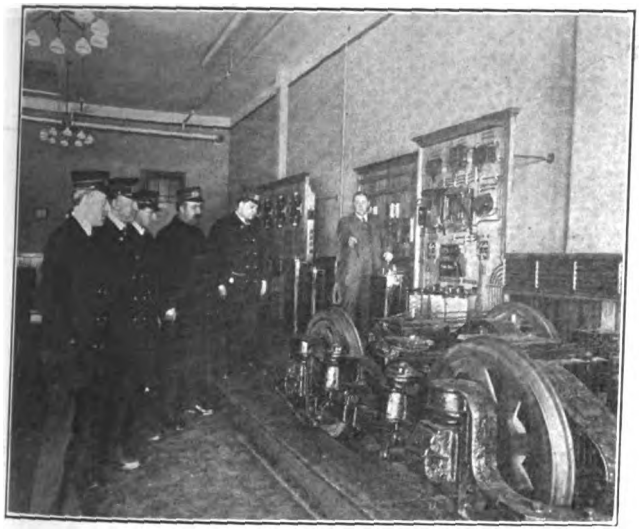
ployees of the railway company, many of the features specially mentioned above being original.

STOREROOM

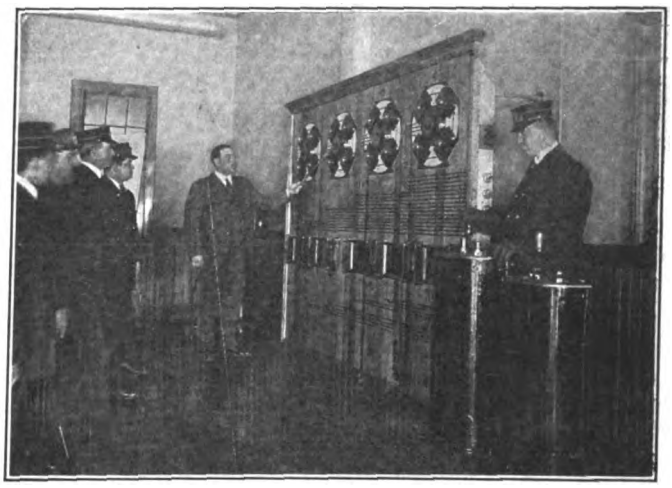
The storeroom is one of the largest of its kind in New England and contains accommodations ample for many a road of much larger size. Only a portion of the space available is as yet occupied, the quarters being 170 ft. long x 80 ft. in width. At present 3241 adjustable steel bins are in service, manufactured by the Lyons Metallic Steel Rack Company, of Aurora, Ill. In a single row of these bins along a part of one wall there are 995 compartments, the bins extending to a maximum length of 126 ft. and to a height of 9 ft. 6 in. In the center of the room the bins are placed back to back, representative rows being 36 in. deep per pair back to back, and from 21 ft. to 31 ft. long. The individual bins vary in size according to local requirements, the maximum range of adjustment being provided by bolts and holes in the steel sheeting, as shown in the accompanying illustrations. The rows are usually 3 ft. deep and about 6½ ft. high. Every bin has a number indexed in a card catalog listing all supplies carried in stock, and the largest bin above mentioned is provided with four ladders carried along the front on rollers to facilitate rapid and safe work at all heights. A novel feature of the work in this room is the use of roller skates in covering the extended floor area involved, these being worn by stockroom attendants and proving of great value in saving the time required to make trips around the premises. As shown in views on page 298, the use of skates in no way interferes with work on ladders, and in taking inventories of stock these devices have been of great use. The storeroom is open daily from 7 a. m. to 5 p. m., and is connected with the company's repair shops in an adjoining building by a short landing and stairway. An electric elevator is also provided connecting the storeroom with the street surface.



New Bedford Carhouse—Model Car-Lighting Circuit in Instruction Room

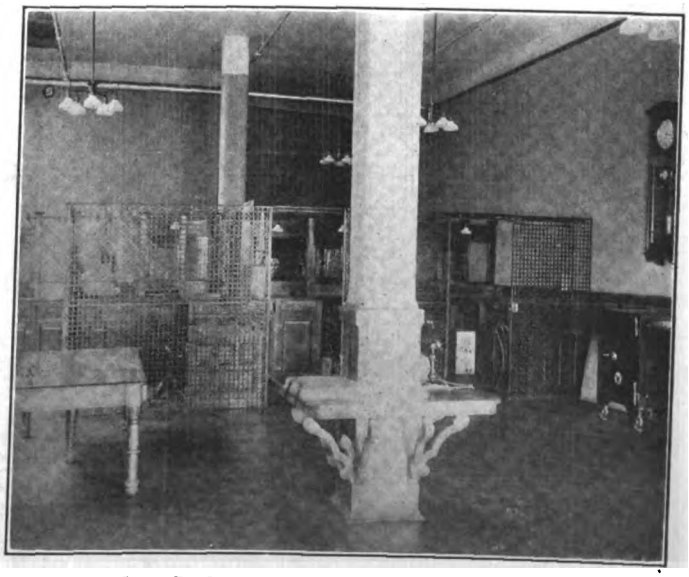


New Bedford Carhouse—Instruction Room



New Bedford Carhouse—Instruction Room

New Bedford Carhouse—General Offices



New Bedford Carhouse—General Offices

STOREROOM ACCOUNTS

The system of handling supplies is the result of long experience in the company's shops and merits brief description. Goods are received by a clerk in the stockroom, who

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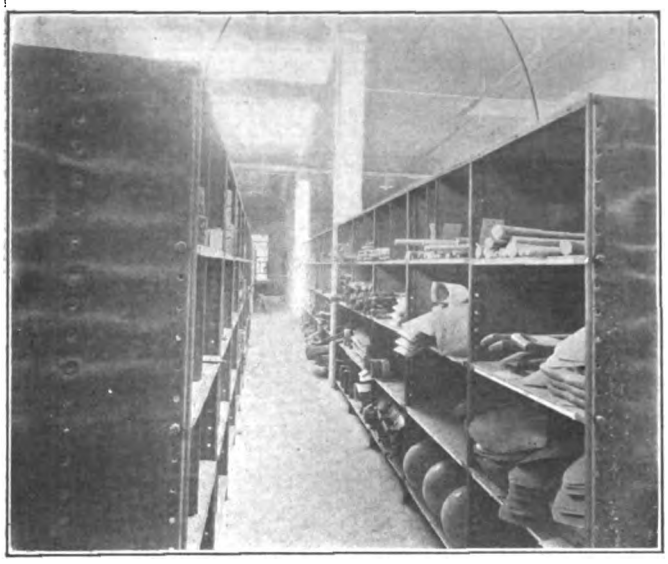
counts them and places them in the proper rack, making a record on the receiving manifest of their receipt. This manifest calls simply for the quantity, article shipped and carrier and states that the goods have been received in good condition. At the same time he enters a memorandum of their receipt upon a bin stock card, which is of the usual

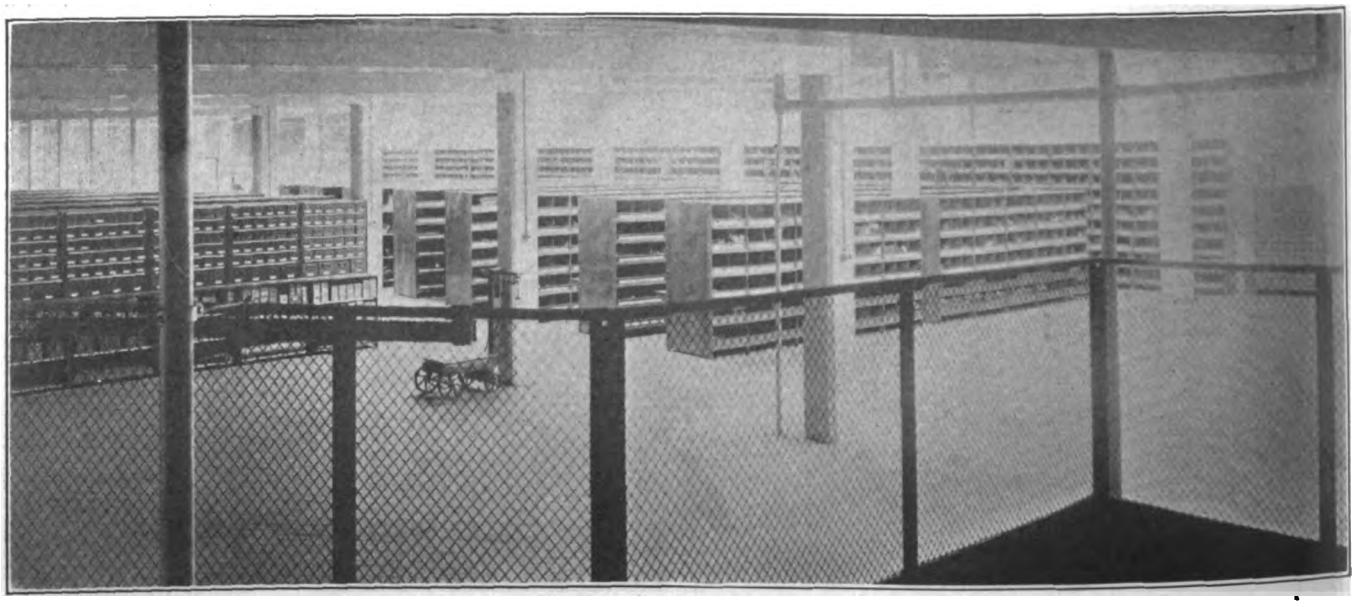


New Bedford Carhouse—Portion of Storeroom

New Bedford Carhouse—Portion of Storeroom

form, with the stockroom section number, bill number and name and catalog number of the article at the top and spaces below where the quantity in and quantity out can be entered. The quantity of material on the bin stock card is a check upon the goods on hand as well as the permanent stock card. At the close of each day the receiving manifests are sent to the general office, where all the bills are checked.

In checking the bills the general office first attaches to the bill an approval slip which has a space for the order number, audit number, check number, distribution and approvals. The bill is then checked with the order book to see if the same quantity and quality of goods as ordered have been billed, and the order entered on the approval slip. The clerk next checks the bill with the receiving manifest and if the goods have been received enters the invoice on the supply journal, whose headings are: audit number date of invoice, consignor, date received, description of goods, amount, total, order number, paid by voucher number. This journal is in duplicate so that the storekeeper can have a copy and enter the goods upon his stock cards, of which he has one for each bin with spaces for recording material in and out and its value. The supply journal is nothing more than a record of goods which the general office has charged the supply account. The duplicate record is retained by the storekeeper for reference, as by referring to the audit number, which is also shown on the stock card, the storekeeper can trace any invoice. No goods are delivered from the storeroom without an order which must be signed by a foreman, which shows the purpose of the requisition. These orders are presented to the stockroom clerk, who delivers the material and charges them out on the bin stock card already described. The orders are classified in accordance with various accounts to be charged, with reference to the stock cards, as the supply of material is drawn upon. At the same time a record is made on a supply sheet which the storekeeper sends once a month to the general office as a record of supplies given out and with which the supply account should be credited.



New Bedford Carhouse—General View of Storeroom

GENERAL OFFICE AND TRAINMEN'S ROOM

The general office, trainmen's lobby and poolroom are illustrated herewith and provide unusually roomy accommo-

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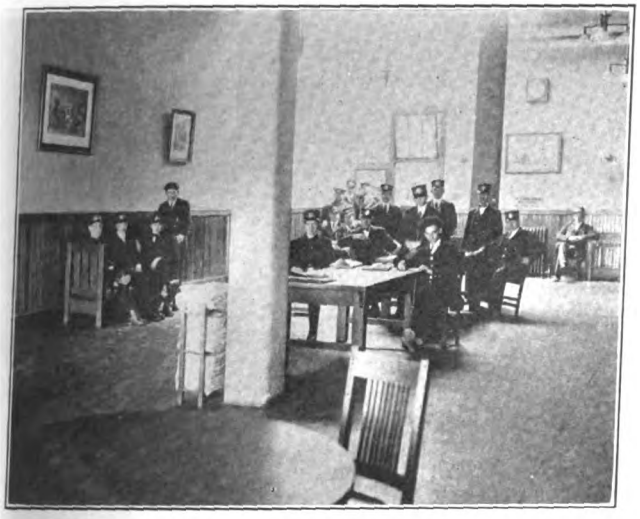
dations. The general office is equipped with three cashiers' cages, the usual size being 20 ft. x 9 ft., and contains the company's local private branch telephone exchange, with a board of sixty jacks. A fifteen-station "autocall" is in service, by which signal bells calling officials to the offices

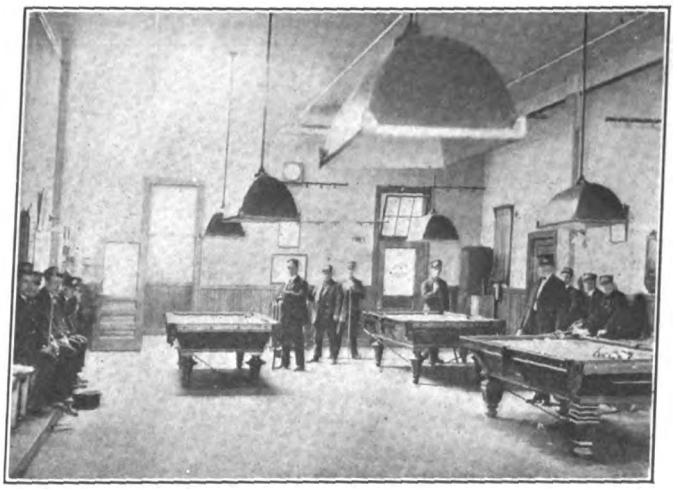


New Bedford Carhouse—Reading Room and Lobby

are rung in the various departments, through an automatic alarm mechanism at the telephone switchboard. An information bureau and lost article window are also provided in the general office. The floors of these rooms and the offices of the general superintendent, trainmaster, storekeeper, etc., are covered with battleship linoleum ¼ in. thick. The motormen and conductors' lobby or reading room, 23 ft. x 68 ft., contains half a dozen writing tables, two card tables, sofas, settees and bookcase, with magazines and papers, and an adjoining locker room contains 146 metal lockers of the open grill-work type. In the pool room, illustrated herewith, are three tables, with facilities for card and checker games. The pool tables are illuminated in each case by five 16-cp lamps installed in a 22-in x 36-in. reflector whose bottom is carried 4 ft. above the table. Electric clock service is used throughout the carhouse and shops.

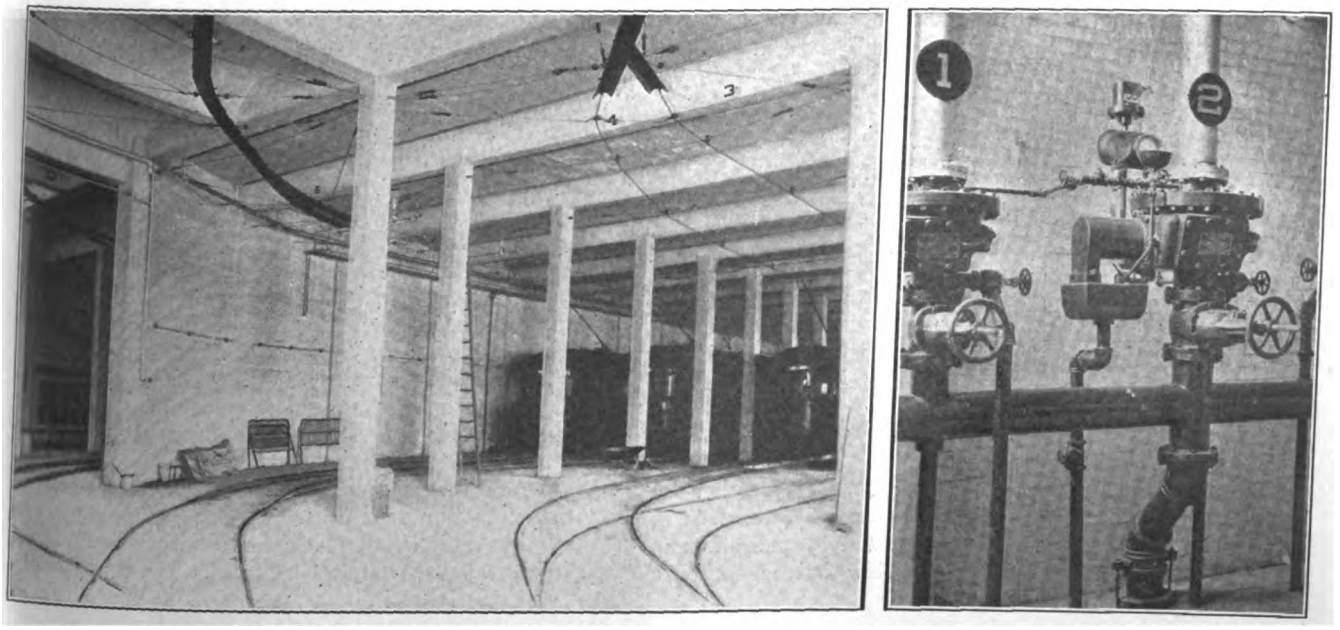
OTHER EQUIPMENT

The minor apparatus in the carhouse includes an electrical wind-direction indicator, connected through suitable resistances and contacts with a weather vane on the roof of the carhouse. At night this device gives the transportation department a close check upon the behavior of the wind, bringing the indications of the weather vane to the office desk and doing away with the difficulties of trying to read an overhead vane in the dark in the work of anticipating car service to meet possible changes in the weather.



New Bedford Carhouse—Pool Room

The carhouse is equipped with 1251 sprinkler heads of the Grinnell type, installed by the General Fire Extinguisher Company, of Providence, R. I. The lower floor is equipped mainly with the dry pipe system, the wet pipe system being installed on the second story. City water is used in this service, and a 20,000-gal. storage tank installed 36 ft. above the roof provides the necessary storage and pressure regulation. The tank is connected by a 6-in. pipe with the city main, and the distributing system is supplied through a similar pipe. The heads are installed on the average about 10 ft. apart and about 20 ft. above the floor. No aisle sprinklers are used, but the customary automatic alarm service and subdivision of sections through appropriately labeled valves is employed. A view is shown of a representative dry valve installation.



New Bedford Carhouse—View of Entrance to Typical Bay; Dry Valves and Sprinkler System

All the lighting of the building is supplied from the railway company's circuits, there being 1370 lamps in the carhouse, the greater part being 23-watt tungsten lamps. On the lower floor are installed 765 lamps, including those used in pit lighting. Pit lamps are installed 3 ft. 6 in. above the

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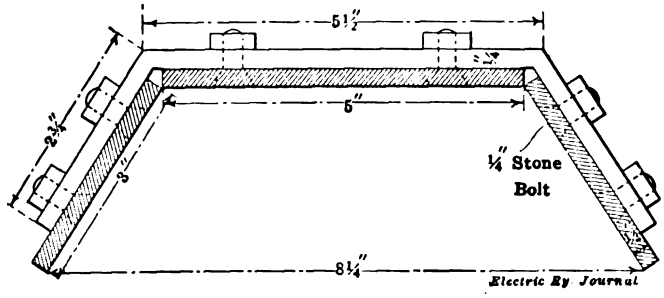
floor and 36 in. apart, there being forty lights per pit, or twenty on each side. Single lamps for general interior illumination are spaced about 3 ft. apart and are in general carried 10 ft. from the floor in horizontal runs in the carhouse proper. All the lamps are controlled from a 5-ft. 6-in. x 4-in. panel. This is mounted on a raised platform just inside the main entrance of the carhouse and carries a watt-

New Bedford Carhouse—Use of Roller Skates by Attendants in Storeroom

hour meter totalizing the input for lighting service, switches and fuses for the various circuits. About sixty circuits are run from this board in iron conduits. Inside the carhouse a fabricated iron trolley trough, illustrated in the accompanying drawing, is used above all tracks. This is



New Bedford Carhouse—Section of Trolley Trough

assembled from ¼-in. stock and is fastened together by stove bolts, being 5 in. wide at the top and 8¼ in. wide at the bottom, the suspension being effected by pull-offs and strain insulators, illustrated in the view of the carhouse interior on page 297.

Owing to the extreme drought which has prevailed in most parts of the central districts of the country, a good deal of trouble has been experienced by electric railways in securing water for power plant operations. At Charlestown, Ind., where the Louisville & Northern Railway & Lighting Company has a power station, the spring which supplied the cistern used by the company ran dry, making it necessary to haul water in tank cars to the plant.

SINGLE-PHASE-POLYPHASE MOTORS FOR THE NORFOLK & WESTERN

As announced in the issue of the Electric Railway Journal for Aug. 2, a contract has been closed between the Norfolk & Western Railway and the Westinghouse companies for the equipment of a mountain division for single-phase electrical operation for freight service. The locomotives will be designed to handle freight trains of 3250 tons weight exclusive of the locomotive at a speed of 14 m.p.h. on a 2 per cent grade, and they will be operated at speeds up to 28 m.p.h. on lighter grades. Four locomotives will be used on the heaviest grades, two in front and two at the rear of each train. They are to be arranged for multiple-unit operation in pairs, but no electrical connection will exist between the two ends of the train.

NEW TYPE OF MOTORS

The motors for these locomotives, which are now in process of construction by the Westinghouse Electric & Manufacturing Company, present a novel departure from the existing practice in design for traction purposes. They will be constructed without commutators and will follow the principles of the standard polyphase induction motor, retaining all the advantages in ruggedness and absence of complication which are characteristic of the latter type. As they will, however, receive power which will be originally in single-phase form, as received from the overhead conductors, the current will be passed through a phase-splitting device before reaching the motors so that the equipment as a whole may be properly described as of the single-phase-polyphase type.

In detail, the electrical equipment of each locomotive will comprise four polyphase induction motors of a total continuous rating which will approximate 1300 hp at 14 m.p.h. Each motor will have windings for producing either four or eight poles so that the speed may be changed accordingly and will be equipped with a wound secondary in order to provide for the insertion of resistance and for connection in cascade for producing low speed at starting and for switching service. There will thus be two running speeds, 28 and 14 m.p.h., and a switching speed of 7 m.p.h.

The motors will be geared in pairs through a jack shaft, crank and side rods to the driving wheels, the gear ratio being 18 to 85 and the driving wheels 62 in. in diameter. Each pair of motors will be mounted on a truck with two driving axles and a pony axle, the latter carrying 30-in. wheels. The two trucks are to be coupled together through a Mallet hinge.

As mentioned in previous accounts of the Norfolk & Western installation, the trolley voltage will be 11,000 and the frequency twenty-five cycles per second. Part of the trolley wire will be supplied direct from the 11,000-volt generator in the power house at Bluefield and part through transformers lowering the pressure from 33,000 volts, at which the outlying parts of the line will be supplied. On each locomotive will be a single transformer stepping the voltage down from 11,000 to approximately 750, provision being made for a slight adjustment of the secondary voltage. From this secondary current will pass through a rotating induction apparatus for transforming the phase relation, provision being made for suitable adjustment for keeping the phase voltages balanced. The polyphase current will then pass into the motors. These, as previously stated, will have wound secondaries and slip rings arranged for cascade connection.

SPECIAL ADVANTAGES OF THIS TYPE OF MOTOR

This type of induction motor, while quite unusual in the traction field, has been very successful in different forms in rolling-mill work and the like. It has an advantage in this case for several important reasons. In the first place, the grades to be encountered are unusually heavy and regenerative control will be a considerable advantage. This

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is true not so much on account of the saving in power as from the consideration of safety in descending grades. Incidentally there will undoubtedly be quite a saving in wear of brakeshoes and tires. In descending grades the two units comprising the head locomotive will be connected to pump back into the line and they will be loaded to their full capacity. When other trains are to be in the electric division this saving will probably be considerable as it will lighten the load on the station and improve its load-factor. When the descending train is the only one on the line the power will be absorbed in suitable rheostats in the power plant.

MOTOR CONTROL

The control of the motors will be accomplished through rheostats connected in the secondary circuits. For starting and for speeds up to 7 m.p.h. the motors on each truck will be connected in cascade and the two sets of cascades will be connected in parallel. Resistance also will be inserted in the secondaries at starting. In this combination of connections the primaries will be arranged for eight poles. With the combination of connections for the first running speed of 14 m.p.h. all motors will be in parallel, with the primaries connected for eight poles. With the second speed combination of connections the four-pole arrangement will be used, giving a speed of 28 m.p.h., resistance being used on all intermediate steps.

SPACE LIMITATIONS AND COST

The use of the induction motor in place of the commutator motor for this installation involves an important consideration, in addition to those mentioned, namely, that of cost. On account of the space limitations combined with the particular speed specified, the induction motor worked out cheaper than the commutator motor. The space limitations dictated a long motor, small in diameter, and although a commutator motor would have been entirely practicable it would have been more expensive than the induction motor at the low speed required. At a somewhat higher speed the condition might have been reversed. Hence a decision between two types depended not upon the basis of their operating characteristics alone, but upon these combined with cost under space limitations.

The detailed designs for the motor have already been worked out and they are practically ready for the shops. Details of the construction and of the phase-splitting induction apparatus will be given in a later issue of the ELECTRIC RAILWAY JOURNAL. In accordance with the custom of the manufacturing of such apparatus the first locomotive will be submitted to the railway company for test and approval before the entire order is completed. The manufacturer expects to complete the first one about Jan. 1, 1914. The carrying out of this contract will give form to one of the most important projects of steam railroad electrification yet undertaken. It calls for the manufacture and delivery of twenty-six 130-ton electric locomotives of the single-phase-polyphase type, together with all required power house generating machinery and transmission apparatus.

TRAFFIC CONDITIONS

The use of the two running speeds of 14 m.p.h. and 28 m.p.h., which will be to a large degree maintained very closely, will under the circumstances existing in this case be peculiarly applicable for the service, as the locomotives are intended for handling only "tonnage trains." These will be loaded with coal originating in the vicinity as the Bluefield-Vivian division serves the celebrated Pocahontas coal region, one of the largest coal fields in the world. The shipments of coal handled amount to 65,000 tons per day, necessitating the trains weighing as much as 3250 tons, and it is to facilitate the handling of this heavy traffic that the electrical operation has been decided upon.

As mentioned before, there are a number of grades on this section, the maximum being 2 per cent, and at the present three Mallet locomotives, the most powerful type of steam locomotive built, are required for each train. One locomotive is used at the head of the train and two for pushing. Only two electric locomotives will be required for this service and the present speed will be doubled. The extent to which this quick train movement will enlarge the capacity of the railroad is quite apparent. In addition one of the present impediments to rapid operation of this section of the road is the existence of a 3100-ft. tunnel which is difficult to ventilate. This tunnel under electric operation will, of course, owing to the absence of smoke and noxious gases offer no impediment to frequent train movement.

In consequence the traffic conditions of this section of the road are especially well adapted to electrical operation. It is in reality a separate engine division at present and can be operated electrically without affecting the cost of engine service on other sections of the line. Conditions that are conducive to high economy in such an electrification are as follows: Traffic requirements permit a minimum electrical equipment to give practically continuous service; fewer engine crews are needed per train; the speed of operation over the division will be nearly doubled; the capacity of the electrified section is increased; the electric locomotives are not limited to such short hours of service, on account of boiler and fire conditions, as in steam locomotives; watering and coaling delays incident to steam operation will be entirely eliminated; the general reliability of locomotive operation will be considerably improved.

Power for the entire electrified section will be generated in a central power house located at Bluestone, W. Va., with an installed capacity of 27,000 kw in turbo-generators, supplied by the Westinghouse company.

The Norfolk & Western development has been worked out by co-operation between the consulting engineers, Gibbs & Hill, on the one side, and the Westinghouse Electric & Manufacturing Company and the Westinghouse Machine Company on the other. The project represents a distinct advance in the development of steam railway electrification, combining, as it does, the advantages of the single-phase transmission with the excellent qualities of the polyphase motor, and the results will be watched with interest by steam and electric traction officials.

WAGE AGREEMENT ON AURORA, ELGIN & CHICAGO

After negotiations extending over practically eight weeks, the Aurora, Elgin & Chicago Railroad has reached a wage agreement with its employees for a period of three years beginning June 1, 1913, as follows:

Third-rail division between Elgin and Chicago: first-year men, 28 cents per hour; second-year men, 31 cents; third year, 34 cents. Additional increases for employees at the close of the second year beginning June 1, 1914, and thereafter: first-year men, 30 cents per hour; second year, 33 cents; third year and over, 36 cents. Switchmen are to have a ten-hour day with the following scale of wages: first year, 30 cents; second year and over, 32⅔ cents, with 10 cents per hour additional for all overtime.

On the Fox River division, Aurora & Elgin trainmen will receive 5 cents per hour extra for overtime when assigned work by the dispatcher after the regular schedule is completed. Delay in completing regular scheduded runs is not figured as overtime. Trainmen on the line between Aurora and Elgin will receive for the first and second year 29 cents per hour; third year and thereafter, 30 cents. On the lines between Aurora and Yorkville and between Elgin and Carpenterville trainmen will receive 28 cents per hour for the first year contract and thereafter. Trainmen on city lines at Aurora and Elgin will receive during first year of contract the following: first-year men, 23 cents per hour; second year, 24 cents; third year, 26 cents. For the second year of contract and thereafter an increase of ½ cent per hour is given to each grade of trainmen.

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THE FUNCTIONS OF PUBLIC SERVICE COMMISSIONS

At a meeting this week of the Michigan Section of the National Electric Light Association William J. Norton, secretary of the research committee of that association and formerly first assistant secretary of the Public Service Commission, First District, New York, read a paper entitled "The Two Epochs of Rate Regulation." He took the fact of the appointment of ten new public commissions during 1912-13 as the text for discussing the proper function of such commissions. The vast amount of purely administrative detail which the new commissioners must master upon taking office was sufficient, according to the speaker, even if these new commissioners were well-trained executives, to occupy a year without any other work. But the chances are that they would have important cases thrust upon their dockets, or, in the attempt to create the impression that they are accomplishing something, they will demand of the companies under their jurisdiction enormous quantities of information, including complete summaries of books of account, entire inventories of all property, and a great mass of other information. These demands will involve the companies in great expense, although, as a rule, the commissions will be utterly unable for a long time, if ever, to digest the information thus secured.

In the speaker's opinion, public service regulations should be divided into two separate epochs, namely: (1) the preparatory period of regulation and (2) the final period of regulation. Continuing, he said in part:

"The states for years have had the right to regulate the public service companies. It is only recently, however, that they have seen fit fully to exercise this right and delegate the regulating authority. In the meantime the utilities under the law have established certain methods of doing business.

"Rates were originally on a purely bargain basis, but they have slowly emerged, with the efforts of the companies themselves, to a point where most schedules are published and, with the exception of certain old contracts, are not discriminatory. Many companies have also established proper depreciation or reserve funds, and, while perhaps not always adequate, a good beginning has been made. This also has been without any suggestion or help from the state.

"Few companies have been able to make complete valuations mainly because they have felt that they could not afford out of operating revenues to incur the expense. But uniform accounting methods have been started, and the bookkeeping of the more recent years is correct in that it shows a proper discrimination between capital and operating charges. Here also no assistance, encouragement or advice was received from the state.

EXPECTATIONS OF THE PUBLIC

"The public, on the other hand, believes that with the establishing of the commissions all problems will be settled immediately and all rates reduced. Unfortunate indeed is the commission that shares in such belief. The really successful commissions, and the ones which have enjoyed the best reputation, are the commissions that have considered that a period of preparatory regulation must be allowed, and that their main duty in this preparatory period consists in making such orders that the public service companies can adjust themselves to the new set of theoretical conditions which heretofore have not obtained. This is not at all a new theory. Wisconsin and the Second District New York Commission have undoubtedly had this idea in mind in all of their regulation. The Massachusetts Commission has always refused to accept the modern theory of valuation as a panacea for troubles and, for a period of over twenty-five years, has attempted to regulate the companies under its jurisdiction to the point where they could accept the theoretical regulation without having an undue burden placed upon them.

"It is a striking fact that the Massachusetts Commission, which started to regulate electrical companies in 1887, has not yet completed its work of adjusting the companies under its jurisdiction, and that this preparatory period is still in existence. Yet some of the new commissions may attempt, immediately upon their appointment, to apply in important cases the most theoretical regulation, and hopefully to trust that the company will survive.

VALUATION

"Few companies have valued their own plants, and when the commission is confronted by a rate problem some of the laws require that it must solve the problem by valuing the plant of the utility. The result of a valuation is a matter in which engineers honestly disagree in most cases by about 50 per cent, and the Supreme Court says the subject is still up in the air. The commission might better establish a joint valuation board which would have the confidence of both the commission and the companies. Such a board without any undue haste could begin to establish values throughout the state where such work was considered absolutely necessary or required by law. The men in charge of such valuation should be men of experience and integrity, and the bases of valuation should be carefully worked out. The history of the utilities should be fully studied, and every element of value should be investigated.

"Capitalization as it exists should be considered not as a crime committed by the company, but as a method of finance heretofore approved and often encouraged by the laws of the state. If there are any elements in the capitalization which cannot be approved in the future, the commission should provide means for the gradual amortization of such capitalization during the preparatory epoch of its regulation. Through it all there should be the greatest amount of co-operation between the companies and the commission. The advice of the ablest utility operators in the state should be frankly sought and considered by the commission in the effort to reach the second epoch of theoretical regulation as early as possible.

DEPRECIATION

"Many companies will be found to have no depreciation funds or inadequate ones, generally through a lack of surplus income rather than any direct intent. The commission must now start to help such companies build up their funds to a normal position. And here a liberal policy will be the best. It is always a most difficult matter to build up a depreciation fund, and both the public which is being served and the company are better off if a fund is too large rather than too small. Any minute discussion of the advantages of such theories as the sinking fund basis or straight line basis, etc., in the early preparatory epoch is entirely out of place, and the commission should direct that depreciation funds be built up just as fast and just as liberally as the rates will allow.

RATE OF RETURN

"Utility companies of the country have in general been operating since their establishment upon the usual commercial basis, which has made a virtue of making as much money as is possible. The modern theory of regulation demands that, as utilities are monopolies, the commercial basis should be discarded and a strict and definite rate of return should be established immediately. The municipalities generally, and the commissions sometimes, entirely neglect to consider that this means a complete reversal of the entire financial and executive policy of the company, and if the newer policy is a good one and is to be maintained commissions should again make such adjustment as would allow the companies in their financial transactions slowly but gradually to accommodate themselves to the stated rate of return. The public in the end is better served by liberality on this score, even if such liberality is only temporary, than it would be by a ruling so drastic that it would injure the financial stability of the company and make future extensions and development difficult."

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Determination of Probable Operating Revenue

An Analytical Study of the Probable Operating Revenue of a Proposed Interurban Railway, Based Upon an Examination of Results Obtained from Typical Existing Lines

BY LOUIS E. FISCHER, CONSULTING ENGINEER, ST. LOUIS, MO.

More than 20,000 miles of electric suburban and interurban railways are now in operation in the United States, and their operating records for the most part are available in various state commission reports or can be obtained from other sources. Nevertheless, there is little information of actual and established value so compiled as to be useful to the great number of persons, residing in almost every community, who are promoting, or are encouraging the promotion of, electric interurban railways. That is the purpose of this study. But, before any conclusions can be drawn, it will be necessary to define exactly what is herein to be considered as an electric interurban railway, in order to have a definite foundation upon which to base further discussion.

DEFINITIONS

An electric interurban railway is an electrically operated line connecting two or more independent distant communities and organized and operated to carry passengers, baggage, United States mail, express and freight in broken shipments. It is distinct from an urban or a suburban railway, in that the latter serve only the inhabitants of a city, or of a city and its suburbs, for the purpose of carrying passengers and their ordinary hand baggage. It also differs from a commercial railway in that it neither carries on nor undertakes to carry on a general bulk and interchange freight business.

This division of the electric railway field into four parts, urban, suburban, interurban and commercial, and the stating of the lines of demarcation between interurban lines and the others does not complete the analysis. Even when the three other classes have been eliminated, it will be found that the residual railways, although properly termed electric interurban railways, still possess diverse characteristics that necessitate a further subdivision. As a most comprehensive and yet clear-cut classification I shall adopt that of "the normal" and "the abnormal."

The general characteristics of a normal electric interurban railway are as follows: (1) entrance into cities, towns and villages by franchises over streets; (2) private right-of-way outside of cities and villages; (3) roadbed constructed with reasonable curves and gradients; (4) track laid with 70-lb. or 80-lb. rail and standard ties, 2-ft. centers; (5) power house of ample size and constructed for economical operation; (6) car equipment ample and of modern type; (7) well-constructed primary distributing system and overhead, or third-rail, secondary distributing system; (8) substantially hourly service, with local trains operating alternately with limited trains and limited schedule practically equal to the local schedule of the competing steam railway lines; (9) one or more broken package freight movements each way per day, and (10) a rate of fare approximately 2 cents per mile, with a reduction of from 10 to 25 per cent on round-trip tickets.

The abnormal electric interurban railway has one or more of these characteristics: (1) no entrance into the principal cities served; (2) construction on highways; (3) roadbed of such curves and gradients as to constitute a barrier to the procurement of a reasonable portion of the available business; (4) track construction such as to constitute a similar barrier; (5) power house inadequate and unsuited to generate current at reasonable cost; (6) car equipment obsolete, insufficient and uncomfortable; (7) insufficient primary and secondary distributing systems to maintain reasonable voltage for movement of cars; (8) two-hour, or less frequent, service, and (9) no broken package freight movements.

These, then, are the distinguishing points of the two types of electric interurban railways, the normal and the abnormal. The same differentiation, however, may be made in the case of the territories served as with the electric interurban railways themselves.

A normal territory is made up of cities, towns and villages which are supported by varied agricultural, manufacturing or mining industries, and which are free from the fluctuating influences of summer, health or amusement resorts or other similar traffic-creating centers, and which are also free from serious business depressions due to local industrial conditions.

An abnormal territory, on the other hand, is composed of cities, towns and villages, one at least of which is a large pleasure-drawing center, or is in a state of industrial decay due to local conditions, or is located where the principal industries are of such a nature as to be subject to long periods of business depression or to unsettlement brought about by prolonged strikes.

OPERATING REVENUE

The Interstate Commerce Commission, in accordance with Section 20 of an Act to Regulate Commerce, has prescribed a classification of the operating revenues of electric railways as follows:

General accounts:

I. Revenue from transportation.

II. Revenue from operations other than transportation.

Primary accounts:

I. Revenue from transportation:
- (1) Passenger revenue.
- (2) Baggage revenue.
- (3) Parlor, chair and special car revenue.
- (4) Mail revenue.
- (5) Express revenue.
- (6) Milk revenue.
- (7) Freight revenue.
- (8) Switching revenue.
- (9) Miscellaneous transportation revenue.

II. Revenue from operations other than transportation:
- (10) Station and car privileges.
- (11) Parcel-room receipts.
- (12) Storage.
- (13) Car service.
- (14) Telegraph and telephone service.
- (15) Rents of tracks and terminals.
- (16) Rents of equipment.
- (17) Rents of buildings and other property.
- (18) Power.
- (19) Miscellaneous.

RELATION BETWEEN "REVENUE FROM TRANSPORTATION" AND "REVENUE FROM OPERATIONS OTHER THAN TRANSPORTATION"

Very few of the existing electric interurban railways earn an appreciable amount of revenue from operations other than transportation, except through the sale of power. It is quite usual for an electric interurban railway to serve a territory from which considerable revenue can be earned by the sale of power, but as the development of this item of earning is very dependent on the management of the property, and therefore not general, it will be eliminated from further consideration.

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RELATION BETWEEN "PASSENGER REVENUE" AND "OTHER THAN PASSENGER REVENUE," POWER SALES ELIMINATED

The one section of the general accounts, revenue from operations other transportation, being thus considered a negligible quantity in this discussion, there is left the other main heading of revenue from transportation. The most natural question arising in this connection is in regard to the relation of the passenger revenue to the other revenue, such as that from baggage, freight, express, etc. The following table on this point has been prepared for ten cases indiscriminately selected from normal roads serving normal territories:

TABLE I—SHOWING "PASSENGER REVENUE" AND "OTHER THAN PASSENGER REVENUE" FOR TEN TYPICAL SELECTED CASES

Case	Passenger Revenue	Express, Freight and Other Non-Passenger Revenue	Total Gross Revenue	Percentage Express and Freight to Gross Revenue
(1)	$405,979	$5,720	$411,698	1.384
(2)	1,210,170	77,992	1,939,521	5.597
(3)	570,632	35,923	606,555	5.922
(4)	823,346	13,977	858,135	1.618
(5)	286,185	28,212	355,077	9.855
(6)	872,566	86,467	959,033	9.016
(7)	930,600	137,618	1,068,219	12.882
(8)	346,205	59,685	405,890	14.704
(9)	498,994	121,574	620,568	19.580
(10)	197,405	37,111	234,516	15.821
Average	$614,208	$60,428	$691,321	8.732
Average on 243,229 miles of steam road in 1911:	631,340,776	2,155,338,840	2,786,679,616	77.344

From the typical cases above tabulated it is apparent that the predominating item in the revenue account of electric interurban railways is passenger revenue. In the present stage of development of such lines, with their limited operations in the express and freight fields, all the items composing revenue from transportation are of such little consequence compared with passenger revenue that only the latter will be considered in this general review.

POSSIBILITY OF GENERAL FREIGHT BUSINESS FOR ELECTRIC INTERURBAN RAILWAYS

The electric interurban railway, as we have defined it, maintains only an express and broken package freight service, yet in the mind of the public there is a good opportunity for it to take up a general freight service. In view of this misconception of the true sphere of the electric interurban railway and the exaggerated ideas of the possibilities for extensions of electric railway activities along such a line it will be well to point out briefly at this point the fundamental elements that are essential to a road which engages in a general freight traffic.

General freight traffic involves the movement of commodities in carload lots in reasonable numbers, with reasonable frequency, from the producer to the consumer, independently or jointly with other carriers by interchange agreement. To make such a movement independently, both the producer and consumer must be served by the line. On the other hand, to carry on such a movement jointly with other carriers involves interchange relations with these carriers in the making of which electric interurban railways are handicapped by the fact that they are mostly parasites of the pioneer steam railroads in the sense that they serve the same territories by parallel lines and compete to a certain degree for the same traffic. Even though the interchange relations with other carriers exist, still the superior facilities of the steam railroads make it difficult for the electric interurban railways to procure any material portion of the available business.

The point may be raised that electric interurban railways serving large cities qualify for a general freight traffic in the sense that they have both the producers and consumers of bulk freight in the territory served by them. This is true, but as electric interurban roads generally enter their terminals over the city streets, the producers and consumers of bulk freight can be served by them only through the medium of transfer wagons. The steam railroads, on the contrary, almost invariably serve the industries over their own switch tracks and thereby place the electric interurban railway at a tremendous disadvantage.

On the assumption, however, that an electric interurban railway has a lack of destructive steam road competition and such liberal franchises as will enable it to engage in the general freight traffic, still the question of the proper construction and equipment to handle such traffic is not a small one. The movement of trains of freight cars involves a far more elaborate power system and diversity of equipment than does the movement of trains of cars of one or two units handling merely passenger, express and light freight traffic. The additional cost of providing the necessary power appliances and freight equipment, together with the handicaps encountered in procuring any great volume of bulk freight traffic, constitutes a barrier against engaging in such traffic which very few of the electric interurban railways have attempted to surmount. Some electric railways have developed into commercial railways by engaging in the bulk freight traffic, but they are not procuring such economical results as will lend much encouragement to the promotion of new lines on the theory that the freight traffic revenue can be made a material part of the total gross revenue.

RELATION EXISTING BETWEEN OPERATING REVENUE AND POPULATION SERVED

The preceding discussion has emphasized the point that the substantial part of the revenue of electric interurban railways has come, and, on account of the peculiar limitations of these lines, must generally come, from the passenger traffic. It follows logically therefrom that the character of the population served by such lines has a distinct bearing upon operating revenue. Hence, an analysis of the population into its characteristic components is a quite necesssary step in establishing the details of this relationship.*

The population served by an electric interurban railway, other than its tributary farming population, may be divided into three general classes, as follows: primary terminal population, secondary terminal population, and intermediate town and village population. The primary terminal population consists of the population of the principal city into which the railway operates—in other words, the population of that city which is of the greatest commercial importance in the sense that it is a metropolis for the greater portion of the system served. The secondary terminal population is the population of the other important terminal or terminals, exclusive of the principal terminal, which are also of such commercial importance as to attract business from a considerable portion of the territory served but not to the same extent as the principal terminal. The intermediate town and village population is made up of the population of cities, towns and villages served by the line, beyond and between (when there are both primary and secondary terminals), but not including the primary and secondary terminals.

The tributary farming population residing within the territory served by the line is excluded from consideration in the above triple division. The reason for this is that in a normal farming territory the value of this tributary population from the viewpoint of its traffic productiveness is reflected in the size and character of the towns and villages which constitute the intermediate town and village population.

Much importance has been attached to the density of the farming population, and it has been quite customary to approximate its aggregate within arbitrary distances of the line, varying from 1 mile to 4 miles. Aside from the fact that such estimates are extremely crude, there are so many local conditions which influence the extent of the

*The most reliable data of the statistics of population are the United States census reports. These census reports should be used as a basis for determining the population, allowing reasonable growth, predicated on some known existing condition, since the date of the last census.

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zone limiting the tributary population that no uniform principle for considering its value on that basis can be established. On the other hand, the towns and villages constituting the intermediate town and village population will reflect all of the characteristics of the farming community that contribute to their support. If such a territory has fertile lands, it will support a greater number of townspeople, and if the roads are good in a farming community, the sphere of the commercial activities of the town will be increased and a larger population will result. Even though a town or village may be largely developed because of manufacturing or mining industries, yet to the extent that it has been supported by the tributary farming population it will reflect with reasonable accuracy the value of the farming population as to its traffic productiveness.

The tributary farming population being thus eliminated from discussion, we have, as stated above, the threefold division of the population served by an electric interurban line into the primary terminal, the secondary terminal and the intermediate town and village populations. The character of each of these has an important bearing upon the

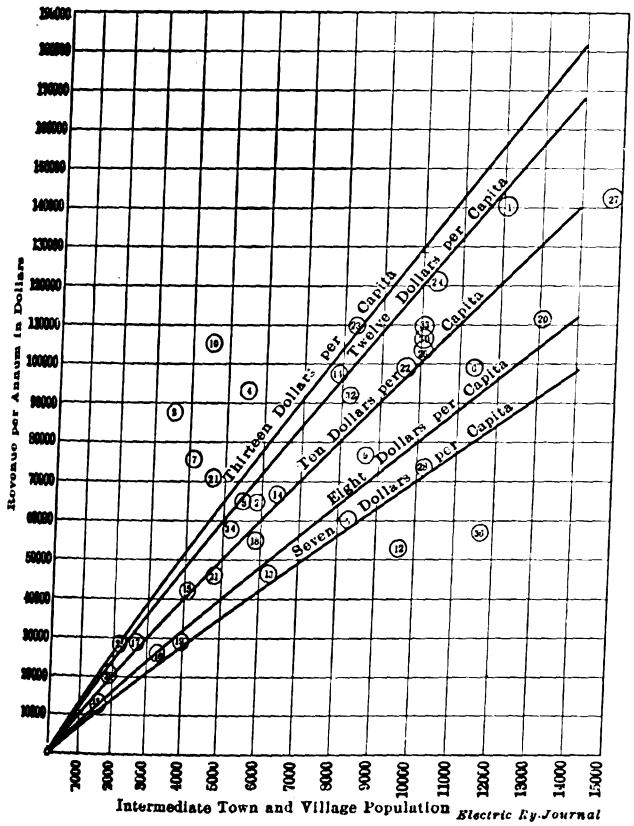

Chart Showing Relation Between Revenue and Intermediate Town and Village Population

operating revenue of the serving line, but it is the various phases of the traffic movement created between these divisions by the intercommunication of inhabitants that more effectively illustrate the relation between operating revenue and population served.

The traffic created by the population of an electric interurban railway may be said to be consequent to the following general movements:

Source I:

(a) The intercommunication of the population of the primary terminal and the intermediate population served.

(b) The intercommunication of the population of the intermediate centers only.

Source II:

(c) The intercommunication of the population of the secondary terminals and the intermediate population served.

(d) The intercommunication of the population of the primary terminal and the population of the secondary terminals.

(e) The intercommunication of the population of the secondary terminals alone (if more than one).

It will be noted that the traffic created by (a) and (b) of Source I is consequent to the existence of the primary terminal and the intermediate population, while the traffic created by (c), (d) and (e) of Source II is consequent to the existence of the secondary terminal population.

STATISTICS OF REVENUE OF LINES PRODUCTIVE OF EARNINGS ONLY FROM SOURCE I

In tracing out the relation between the population served and operating revenue, we shall discuss first the case of electric interurban railways having traffic movements arising from Source I, or from a primary terminal and intermediate town and village population but no secondary terminal. The following table has been compiled from ten cases indiscriminately selected from normal roads of this class serving normal territories:

TABLE II—SHOWING STATISTICS OF GROSS OPERATING REVENUE OF TYPICAL LINES WITH A "PRIMARY" TERMINAL AND INTERMEDIATE POPULATION, BUT NO "SECONDARY" TERMINAL

Case	Location	Miles of Track	Primary Terminal Population	Intermediate Town and Village Population	Gross Operating Revenue
(1)	Iowa	76	86,368	12,071	$140,120
(2)	Michigan	16	13,194	5,811	64,839
(3)	Missouri	22	248,341	3,633	88,889
(4)	New Jersey	18	44,461	5,506	92,146
(5)	New Jersey	15	8,336	8,173	59,317
(6)	New Jersey	17	13,298	11,223	99,346
(7)	New York	17.6	11,504	4,040	75,023
(8)	New York	16.5	37,176	5,458	64,958
(9)	New York	12.5	6,420	8,651	77,215
(10)	West Virginia	19.3	41,641	4,589	105,394
(11)	Connecticut	13	13,502	7,882	96,869
(12)	Connecticut	50	133,605	9,517	52,379
(13)	Connecticut	11	19,659	6,213	46,732
(14)	Oklahoma	17	13,000	6,312	66,750
(15)	Illinois	11	14,548	4,055	41,776
(16)	Illinois	19	6,090	3,191	25,516
(17)	Illinois	12.5	22,789	2,700	29,585
(18)	Illinois	14	11,456	5,884	54,300
(19)	Illinois	7	8,102	3,926	29,175
(20)	Indiana	32	24,005	13,053	111,048
(21)	Indiana	23	63,933	4,671	70,618
(22)	Indiana	31	19,359	9,701	99,200
(23)	Indiana	25	69,647	8,300	109,851
(24)	Ohio	25.5	18,266	10,330	121,109
(25)	Ohio	24	5,222	2,227	29,000
(26)	Ohio	53	364,403	10,068	104,000
(27)	Ohio	38	20,387	14,986	142,000
(28)	Ohio	20	46,921	10,136	72,984
(29)	Ohio	18.5	9,076	1,855	20,800
(30)	Ohio	51	116,577	10,034	106,656
(31)	Pennsylvania	19	12,623	4,788	46,376
(32)	Pennsylvania	36	5,749	8,073	91,347
(33)	Pennsylvania	20	1,556,231	10,223	108,186
(34)	Pennsylvania	31	87,411	5,088	58,430
(35)	Pennsylvania	10	5,474	1,640	13,705
(36)	Massachusetts	20	6,740	11,794	58,433

The above statistics indicate:

(1) That the length of the road and the amount of the operating revenue have no direct relation with each other from which analytical deductions can be drawn;

(2) That the size of the primary terminal has no material influence upon the amount of operating revenue; and

(3) That approximately the operating revenue varies directly with the aggregate of the intermediate town and village population. This is graphically set forth by the chart on this page.

By reference to this chart it will be noted that out of the thirty-six roads tabulated twenty-two are within the limits of the lines representing an earning per capita of intermediate town and village population of between $8 and $12, and that all but seven of these cases are within the limits of the lines representing an earning per capita of town and village population of between $7 and $13. It will furthermore be noticed that the relation between the average earnings of the thirty-six cases cited and the town and village population is approximately represented by the line indicating $10 per capita of intermediate town and village population.

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Attention is again directed to the fact that the above deductions are made from the operations of normal roads serving normal territory, and therefore they will be very misleading if applied to abnormal lines or abnormal territories. It is not intended, however, to imply that a normal electric interurban railway serving a normal territory that is productive of revenue from only Source I will earn $7, or $10, or $13 per capita of intermediate town and village population; indeed, the fact that these limits are sometimes exceeded is clearly indicated in the chart. It is clearly shown, however, that the earnings, in all probability, will vary between $7 and $13 per capita of intermediate town and village population and that the general average is approximately $10 per capita of that population.

STATISTICS OF REVENUE OF LINES PRODUCTIVE OF EARNINGS FROM SOURCES I AND II

Table II and the discussion of it have served to show the relation between population and revenue for electric interurban railways deriving earnings from Source I only. We shall now consider a combination of Source I and Source II and statistics assembled for railways having a primary terminal, one or more secondary terminals and an intermediate town and village population. The cases in Table III have also been indiscriminately selected from normal roads serving normal territories.

TABLE III—SHOWING STATISTICS OF TYPICAL LINES WITH A PRIMARY TERMINAL, ONE OR MORE SECONDARY TERMINALS AND AN INTERMEDIATE TOWN AND VILLAGE POPULATION

Case	Miles of Track	Primary Terminal Population	Secondary Terminal Population	Intermediate Town and Village Population	Gross Operating Revenue
(1)	28.5	20,367	8,696	2,723	$84,522
(2)	32	25,976	7,353	2,150	118,000
(3)	130	2,185,283	55,783	35,400	1,210,170
(4)	93	233,650	20,081	26,879	428,456
(5)	40	19,359	17,010	2,700	152,535
(6)	320	233,650	62,650	112,097	1,899,706
(7)	65	63,933	37,655	7,642	257,868
(8)	39	12,687	10,480	5,439	135,748
(9)	41	223,928	6,305	4,625	123,863
(10)	32	8,981	13,650	7,364	306,962
(11)	82	31,297	11,080	1,695	91,219
(12)	199.5	423,715	31,770	14,711	858,135
(13)	67	74,419	9,491	12,443	207,150
(14)	36.4	50,217	24,026	4,892	222,110
(15)	26	18,266	5,501	6,582	118,292
(16)	222	560,663	49,651	74,146	1,068,219
(17)	150	560,663	228,194	36,023	1,009,638
(18)	122	704,428	51,678	39,006	664,607
(19)	95	31,140	38,189	13,163	420 690
(20)	40	66,950	25,768	2,477	235,665
(21)	40	51,678	31,140	4,853	247,663

It will be remembered that the general conclusion derived from Table II was that the approximate general average of operating revenue for lines during their traffic only from Source I was $10 per capita of intermediate town and village population. Using this approximate figure as a basis for an estimate of earnings from Source I in Table III, we can by subtraction arrive at the portion of earnings attributable to Source II in Table III. The last column in Table IV, therefore, shows the per capita revenue of secondary terminal population. The average distance between terminals is also included.

The statistics in Table IV indicate:

(1) That the length of road has in this case, as in the previous case, no relative bearing (from which any conclusions can be drawn) on the amount of operating revenue from Source II;

(2) That the operating revenue from Source II is not governed by the population of the primary terminal, and

(3) That the relations existing between revenue from Source I and the intermediate town and village population, heretofore shown, do not exist between the revenue from Source II and the intermediate town and village population.

The reason why the same relationship does not exist between the intermediate town and village population and the reveune derived from Source I and Source II, respectively, is obvious. A road operating between a primary terminal and a secondary terminal, through an intermediate town and village population, will not obtain materially different results in so far as they relate to the earnings contributed by the population of the intermediate towns and villages than a road serving merely a primary terminal and an intermediate town and village population. The reason for this is that the average inhabitant of the intermediate towns and villages, if but one terminal is available to him, will direct his attention to that terminal, whereas if two terminals are available he will travel sometimes to one and sometimes to the other. Hence the sum total of the revenue derived from his patronage is approximately the same in each instance; consequently, as the revenue from Source II per capita of intermediate town and village population increases, the revenue from Source I per capita of intermediate town and village population decreases, and the approximate per capita average of $10 previously obtained is affected accordingly.

On the other hand, the table discloses the fact that the revenue from Source II per capita of secondary terminal population does not vary so widely as it seems to do from a casual examination of the table. As the earnings from Source II are essentially created by the existence of one or more secondary terminals, it is reasonable that there should exist some approximate relation between the amount of this revenue and the entire population of the secondary terminal, or secondary terminals, served. If the average distance between terminals is taken into consideration, as well as the character of the terminals, these relations may be readily brought out by a study of Table IV, and we may sum them up in the form of two general postulates:

(1) The greater the average distance between terminals the less the revenue from Source II per capita of secondary terminal population.

That this should be the case is logical from the fact that electric interurban railways paralleling steam railroads will procure for short distances, say 40 miles or less, practically all of the passenger traffic, owing to the frequency of service and the convenience of its operation over the city streets into the heart of the city. For distances greater than 40 miles, the presumed greater hazard, discomfort or loss of running time of the electric lines as compared with the steam lines results in the proportion of the traffic which the electric lines procure being gradually diminished as the distance increases.

TABLE IV—SHOWING STATISTICS OF ROADS LISTED IN TABLE III, BUT WITH REVENUES DIVIDED INTO THOSE FROM SOURCE I AND THOSE FROM SOURCE II.

Case	Miles of Track	Average Distance Between Terminals	Total Gross Revenue	Estimated Revenue Source I	Estimated Revenue Source II	Revenue from Source II per Capita of Secondary Terminal Population
(1)	28.5	28.5	$84,522	$27,230	$57,292	$6.60
(2)	32	32	118,000	21,500	86,500	12.00
(3)	130	32	1,210,170	354,000	856,170	15.00
(4)	93	60	428,456	268,790	159,666	8.00
(5)	40	24	152,535	27,000	125,535	7.35
(6)	320	50	1,899,706	1,120,970	768,736	12.30
(7)	65	65	257,868	76,420	175,448	4.70
(8)	39	39	135,748	54,390	81,358	8.00
(9)	41	40	123,863	46,250	79,613	12.30
(10)	32	32	306,962	73,640	232,320	17.00
(11)	82	22	91,219	16,950	74,269	6.70
(12)	199.5	40	858,135	147,110	711,025	22.40
(13)	67	30	207,150	124,430	82,720	8.70
(14)	36.4	15	222,110	48,920	171,190	7.12
(15)	26	26	118,292	65,820	53,532	9.70
(16)	222	50	1,068,219	741,460	326,759	6.55
(17)	150	80	1,009,638	360,230	649,408	2.85
(18)	122	100	664,607	390,006	274,601	5.30
(19)	95	50	420,690	131,630	289,060	7.60
(20)	40	40	235,665	24,770	210,895	8.20
(21)	40	40	247,663	48,530	199,133	6.40

(2) The second postulate deduced from Table IV has to do with the drawing facilities of the terminals rather

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than their distances apart, and it is to the effect that the earnings from Source II per capita of secondary terminal population depend largely upon the causes for intercommunication between the various terminals.

It is clear that two comparatively small terminals in close proximity, one a county seat and the other a manufacturing center, will have far greater intercommunication than if both terminals are county seats. Again there will be greater intercommunication per capita in the case of a very large city connected with a nearby substantially smaller city than in the case of one comparatively large terminal, sufficient unto itself, connected by an electric line with another similar large terminal.

GENERAL CONCLUSIONS CONCERNING REVENUE FROM SOURCE II

The above postulates are fundamental generalizations that are easily discernible. But it is very evident, however, that any attempt to set forth an approximate concrete relation between the revenue from Source II and the population of the secondary terminal is an extremely difficult undertaking. Nevertheless, the foregoing statistics and discussions do indicate the following general tendencies governing revenues from Source II:

(1) That where the secondary terminal is removed from the principal terminal a distance of 40 miles or less the revenue from Source II will vary between $6 and $20 per capita of that secondary terminal population, depending upon the causes for intercommunication and the efficiency of the service rendered; and

(2) That when the secondary terminal is removed from the principal terminal a distance greater than 40 miles the revenue from Source II per capita of that secondary terminal population will be diminished practically 10 per cent for each 10 miles of increased distance.

OTHER STATISTICS CONCERNING REVENUE FROM OPERATION, SHOWING SLIGHTNESS OF RELATION BETWEEN REVENUE AND CAR MILES OPERATED

The above tables and discussions have afforded a glimpse of the relation between the population served and the operating revenue of electric interurban railways. It was stated as a conclusion to Table II and Table IV that the length of the road and the amount of operating revenue bear no direct relation to each other from which any analytical deduction can be drawn. Inasmuch as it is customary, however, to use the unit of car-mile revenue in considering the revenue of railroads, it may be well to present here Table V, showing the revenue per car-mile for twenty typical electric interurban railways.

TABLE V—SHOWING REVENUE PER CAR MILE FOR TWENTY TYPICAL INTERURBAN ELECTRIC RAILWAYS.

Case	Miles of Track	Gross Revenue	Car Miles Operated	Revenue per Car Mile
(1)	41	$123,863	639,290	$0.1954
(2)	17	66,750	313,498	0.2122
(3)	20	108,186	572,977	0.1886
(4)	25	141,085	474,564	0.2975
(5)	32	107,278	341,542	0.3111
(6)	51	133,240	558,428	0.2385
(7)	38	149,304	648,728	0.2301
(8)	46	230,142	1,052,089	0.2166
(9)	23.7	70,618	191,674	0.3684
(10)	40	145,689	638,987	0.2284
(11)	320	1,899,706	5,852,994	0.3081
(12)	101	546,980	2,294,714	0.2383
(13)	62	405,890	1,307,924	0.3103
(14)	122	620,568	2,146,413	0.2889
(15)	40	234,516	818,425	0.2865
(16)	32	101,993	341,542	0.2986
(17)	222	1,068,219	3,818,028	0.2965
(18)	30	67,416	367,460	0.1985
(19)	170	999,274	3,276,608	0.3083
(20)	45	355,469	923,705	0.3826

This table, with its utter lack of uniformity in revenue per car mile, amply illustrates the futility of attempting to estimate revenue on this unit basis for electric interurban railways. The revenue per car mile will naturally be dependent upon the frequency of service, which, on the other hand, depends upon the judgment of the management and also upon the demands of local conditions. Furthermore, the question of multiple-unit operation enters into the subject of average earnings per car mile, as does also the question as to whether the traffic is balanced, that is to say, the extent of the equality of movement in opposite directions.

COMPARISON OF ELECTRIC INTERURBAN AND STEAM RAILWAY REVENUES

The average gross revenue per car mile of track on 243,229 miles of steam railroads in 1911, according to the statistics of the Interstate Commerce Commission, was $11,589, of which $2,708 was derived from passenger traffic. Similar statistics for electric interurban railways are not available, but from the records of the typical cases listed in Table V, which may be said to be representative of all roads qualifying as electric interurban railways under the definition hereinbefore given, the average gross revenue per mile of track is $5,130.

While these figures are interesting from the viewpoint of disclosing the relative earning power of steam rail-

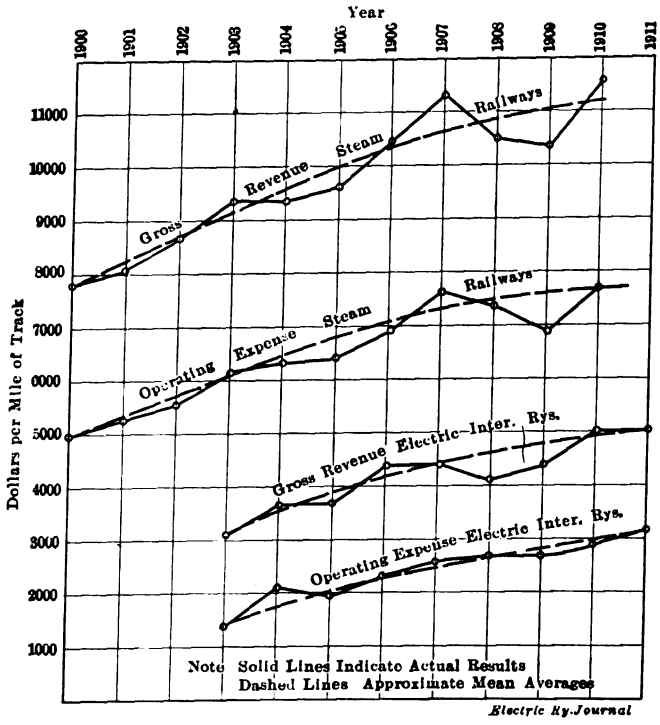

Chart Showing Relation of Tendency of Growth of Operating Revenue and Expense of Interurban Railways Compared with Steam Railways

roads and electric interurban railways, they are of little importance on account of the different conditions prevailing in the two fields. The electric interurban railways, deriving substantially all of their revenue from passenger traffic sources, are limited to sections of dense population where large passenger traffic exists. Steam roads, deriving a large percentage of their revenue from freight sources, are not limited to such restricted areas and have been located more especially for the primary purpose of developing freight traffic. Therefore, that the earnings of the electric interurban railways should be considerably higher than the passenger revenue of steam roads and considerably less than the gross revenue of steam roads is but a logical result.

The chart on this page graphically discloses the growth of the average revenue and operating expense per mile of track per year of the steam railroads as compared to that of the electric interurban railways. The statistics of the steam lines are again taken from the report of the Interstate Commerce Commission, while those of the electric interurban railway have been gathered from the operating statements of a number of typical lines.

From this chart it is obvious that the growth of revenue

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per mile of track on electric interurban railways is not keeping pace with that of steam railroads. It appears also that the operating expense per mile of track on the steam railroads has not increased as rapidly as the revenue on these lines. This has resulted in a gradual increase in the net revenue per mile of track derived from steam railroad operation. The growth of operating expense on electric interurban railways, however, has substantially kept pace with the growth of revenue per mile of track, with the result that the increase of net revenue per mile of track on electric railways has been very little and was less in 1911 than in 1910.

One of the characteristics of electric interurban railways the mileage of which has not been extended from time to time is that the available revenue was quickly developed and that at the end of this period the revenue has increased at a very low rate. This is not especially revealed by the chart on page 305, owing to the influence which the constantly increasing mileage has had on the revenue of the cases used in preparing the chart.

CONCLUSION

The generally accepted, and doubtless the best, method of determining the probable revenue of a projected line is to apply to determinable units of population of the projected line the known unit results obtained by operating roads whose type of construction and method of operation and the general characteristics of whose territory are in all respects similar to and comparable with homologous attributes of the projected road. In using already existing roads to determine the feasibility of a projected line, however, care must be exercised in determining the equality of conditions and in making corrections to compensate for differences productive of change in the revenue results. In view of previous discussion as to the relation between operating revenue and the population of the territory served, it is obvious, too, that careful consideration must be given to the distribution of the population as well as to the amount thereof.

The greatest point of interest in the contemplated establishment of an electric interurban railway is, of course, the probable revenue. The final determination of this should in general be left to those who have expert knowledge of such matters and whose judgment and discriminating discernment of the valuation of varying elements affecting revenue is of the highest character. It is possible, however, for the layman by an intelligent application of the rules governing the approximate relations existing between the revenue and the population served, as heretofore established, to determine, within reasonable limits, the probable revenue that normal interurban railways can obtain in normal territories, and in this way to determine approximately whether the projected line is fundamentally good or fundamentally bad from the point of view of the investor.

FURTHER DISCUSSION

Thus far our study of the factors underlying the successful electric interurban railways of to-day has been confined, outside of the necessary preliminary steps of definition, to an analysis of the principles that govern or affect the operating revenue of such lines. To stop at this point would be an inadequate treatment of the main subject of electric interurban railways, for in importance little if any below operating revenue come operating expense and cost of construction. These two points and the economic relations between them and the first offer wide fields from which generalized information may be obtained. Hence by means of the two articles to succeed this one, the first dealing with operating expense and cost of construction and the second with general economic relations and a hypothetical case, the promoter and the investor should be materially aided in their judgment of the merits for investment purposes of projected electric interurban railways which may be brought to them for their consideration.

COMMUNICATION

A QUESTION OF NAMES

McHenry & Murray, Engineers,
New Haven, Conn., Aug. 16, 1913.

To the Editors:

Doubtless the communication from Mr. de Muralt published in your last issue was written to provoke some discussion. The sense of humor that must unquestionably pervade all those who have read it justifies one, at least, in swimming away with the bait, and speaking of bait suggests water, and water suggests a picture that I saw in one of the recent issues of *Life*. An upturned boat was depicted about a mile from shore, in appropriate surroundings, such as high waves, seagulls, etc., and seated on the top of the boat, hanging on to the centerboard, was the skipper. The friend who had intrusted himself for a sail was exceedingly wet—at least it is assumed that he was, as he was up to his neck, hanging on the rudder, trying to reach his hat that was floating away. To the erstwhile skipper he was shouting the remark: "Say, I thought you said you knew how to sail a boat," to which came the tart reply: "Well, aren't we a mile from where we started? What do you think I have been doing—playing golf?"

Three-phase motors taking power from a single-phase contact wire bear about as much relation to the "so-called" three-phase system as the man on the centerboard in the foregoing picture does to a good skipper. It is clear that Mr. de Muralt wants to "start something," but it really cannot be done for the reason that every man who has had any real knowledge of the application of single phase to railroading knows that there is nothing to be saved by its use in so far as the power station or the locomotives *per se* are concerned. The single-phase system is justified only in virtue of the real determining economies obtained in its distribution system. Should Mr. de Muralt by any chance in the near future happen to see four radically different types of electric locomotives passing on the tracks of the New Haven Railroad, since he believes that a system should be named by the type of locomotive, would he not be compelled to classify the New Haven electrification as a "single-phase a.c.-d.c., split-phase, mercury-rectifier system"? This reference to induction motors and mercury-arc rectifiers is, of course, intended for an illustration only, as neither of these types is under consideration.

The great flexibility of the single-phase distribution system makes such an event perfectly possible, and therefore we will all agree, except possibly Mr. de Muralt, that a system derives its name from that feature in it which is at once its most valuable and distinguishing characteristic. Hence I cannot see that the editors of the Electric Railway Journal have in any way gone astray in entitling their article "Single-Phase Traction for Norfolk & Western Railroad."

Wm. S. Murray.

An ambitious motor omnibus program has been started in England under the name of the Greater Omnibus Services, Ltd., with the intention of operating motor omnibuses in most, if not all, the larger provincial towns in Great Britain. Stewart Alfred Curzon, who also represents the General Omnibus Supply, Ltd., has contracted to procure from the London General Omnibus Company a fleet of De Diva omnibuses (whether old or new is not specified) now in use by the London General Omnibus Company, and operate them outside a radius of 30 miles from Charing Cross. Applications are invited for a first issue of 135,000 ordinary shares at £1 each at par and 3000 6 per cent first debentures at £1 par, or $1,050,000 in round numbers, for the purpose of getting the plan started. The plan is not looked upon with favor by the municipal authorities in the various towns which own their tramway systems.

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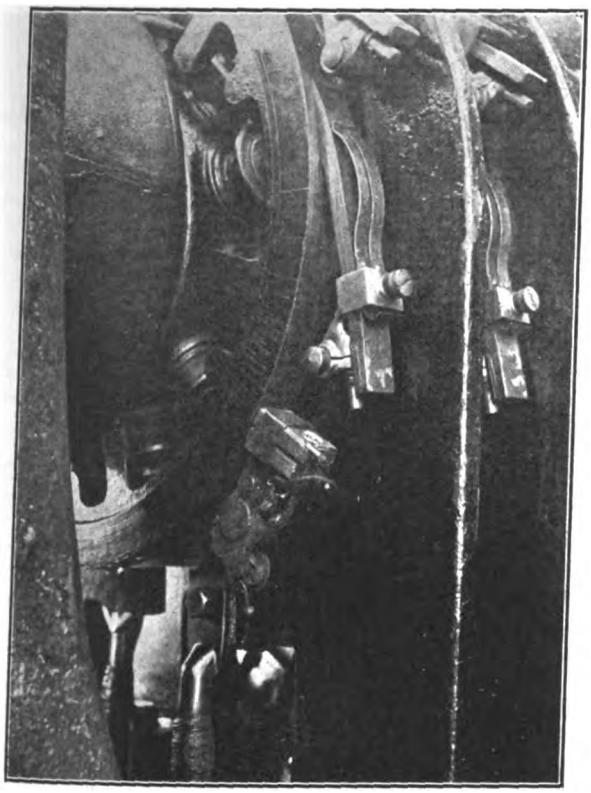
REPAIRING COLLECTOR RINGS OF ROTARIES

BY H. ROOT PALMER, GENERAL SUPERINTENDENT OF LIGHT & POWER VIRGINIA RAILWAY & POWER COMPANY

The following particulars relate to an effective plan followed by our company in repairing collector rings on six-phase rotaries.

The castings are made sufficiently long to get three rings out of each. The rings are turned up in the lathe and bored to six different sizes to correspond to the rings on the rotaries. Each successive ring, beginning with the first, is made about 1/32 in. larger in the bore. The casting is roughed out on the outside diameter, and sufficient metal is left to permit the new ring to be turned up with the old ring.

When the rings are ready to be placed, the turning tool is put in position and the old rings are turned down to the



Collector Rings of Richmond Rotary Converter

proper diameter, the inside ring being the largest. An allowance of 1/16 in. is made for shrinkage. When the rings are ready the end bearing of the rotary converter is removed and the rings are slipped over the shaft.

The rings are heated and two sets of blacksmith tongs, made specially in our own shop, are used for lifting the ring and setting in place. To prevent unsoldering the electric connection to the collector ring, cold water is used to cool the ring after it is in place. Water put on with cotton waste will do no harm. After the rings are in place the bearing is put back and the rings are turned up.

An extra brush holder with a lubricated carbon brush is installed in addition to the copper-leaf brush to keep the collector rings lubricated and also to prevent the copper-leaf brush from cutting. The castings are composed of 82.8 per cent copper, 13.8 per cent tin and 3.4 per cent zinc. The material is furnished by the company and cast at a local foundry.

Rings made in this manner have been in use since the end of 1911 without the slightest trouble or appreciable wear. This plan was worked out by J. P. Keeney, power house engineer, Norfolk, Va., and its cost is approximately one-sixth of that of new rings.

TESTS OF WOODEN POLES REINFORCED AT GROUND LINE

Some interesting tests were conducted in Pittsburgh on July 30 and 31 by the Pittsburgh Reinforcing Pole Company to determine the breakdown limits of poles which had been equipped with its Orr reinforcing collar. In this

Cracking of Reinforcement Under Excessive Loading

system of prolonging the useful life of a wooden pole, a collar and sleeve of concrete reinforced with rods and expanded metal are applied at the ground line—the part which is must subject to decay. The poles under test comprised five 40-ft. and ten 30-ft. chestnut and ten 30-ft. cedar poles which a certain company had reinforced several months before in accordance with the manufacturer's specifications.

When tested, the cedar poles broke off above the reinforcing collar at an average pull of 2000 lb., and the chestnuts at an average pull of 3000 lb. The load was applied 30 ft. above ground on the 40-ft. poles and 19 ft. above ground on the 30-ft. poles. The ultimate strength of the reinforcement was satisfactory, but in nearly every case cracks de-

Reinforcement Surviving Breakage of Pole

veloped in the concrete collars at 1500 lb. The customer expressed the opinion, however, that a steel and concrete reinforcement should be able to withstand a pull of 2000 lb. under similar conditions without developing cracks in the concrete. The poles for the second test were therefore reinforced to meet this requirement by substituting a heavier expanded metal and by adding 1 in. to the thickness of the concrete in the collars and sleeves.

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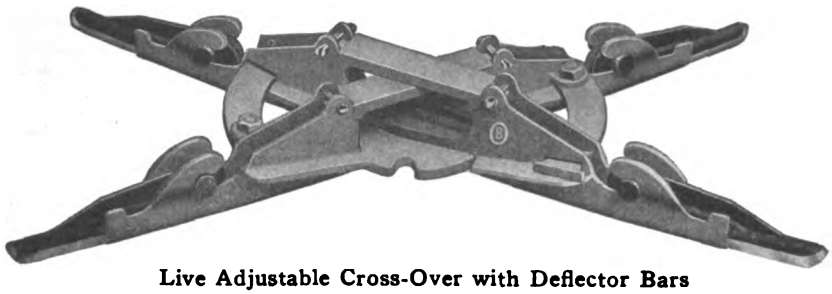
Under test, five of the strengthened 40-ft. poles withstood an average pull equivalent to 2335 lb. applied 30 ft. from the ground before developing any cracks in the collars and withstood a pull of 3040 lb. before failure. In three cases the upper part of the poles split or broke. Six 30-ft. poles stood an average load equivalent to 2444 lb. with a 19-ft. lever arm before developing cracks in the collar and 2961 lb. before failure.



Live Adjustable Cross-Over with Deflector Bars

Bronze Splicer

The average load on the base of the 40-ft. poles was 91,000 ft.-lb. at the time of failure. Eight rods were used in these and four rods in the 30-ft. poles, which withstood 57,000 ft.-lb. As both sizes had the same weight of expanded metal and approximately the same thickness of concrete in the sleeve and collar, the better results on the 40-ft. reinforcements were undoubtedly due to the extra rods. Two poles similarly reinforced were saved to be broken later. Eight other reinforced poles were broken on which reinforcing rods lighter and shorter than the standard rod were used.

The poles were new class B chestnuts, artifically weakened by reducing a section extending 15 in. below the ground to 29 in. in circumference on the 40-ft. poles and 25 in. to 25½ in. on the 30-ft. poles. The original circumference 6 ft. from the butt was between 43 in. and 47 in. on the 40-ft. poles and 33 in. to 38 in. on the 30-ft. poles.

The poles were concreted on June 6, 7 and 9 and were tested on July 30 and 31, having set about fifty-four days. The poles were set in refilled ground and not only yielded rather easily in places during the test, but in one or two instances, probably because of dampness, the concrete did not seem to have set well.

The test was made by making a direct horizontal pull 32 ft. above ground on the 40-ft. poles and 23 ft. above ground on the 30-ft. poles, and the deflection for every 100 lb. pull was registered.

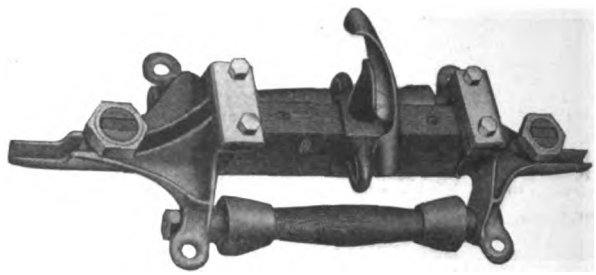
IMPROVED HIGHWAY CROSSING SIGNAL

The unique highway crossing signal developed by the Protective Signal Manufacturing Company, of Denver, Col., has been re-designed to operate with a closed circuit so that any failure in the apparatus or wiring now causes the bell to ring continuously, thus attracting attention at once to the trouble. This crossing signal, as described in the Electric Railway Journal for Dec. 21, 1912, makes use of the fact that the passage of a train or car over any stretch of track sets up a series of vibrations in the rails so that a sensitive oscillator attached to one of them will be set in motion whenever a car is moved in the vicinity. The rigidity of the roadbed is, however, sufficient to prevent anything of less weight than a car from causing any movement of the rail, and in consequence the apparatus cannot be made to give false indications. But whenever the oscillator is set in motion a bell at the crossing is rung and a light is displayed until the train passes the crossing.

RECENT DESIGNS IN OVERHEAD MATERIALS

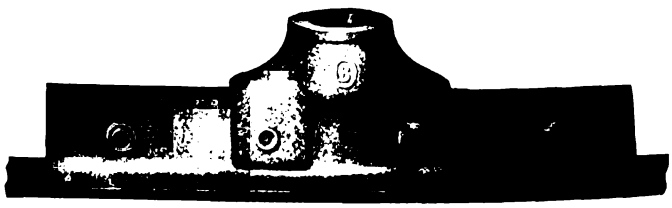
The Ohio Brass Company, Mansfield, Ohio, has added to its line of overhead materials the cross-over, splicer, section insulator and trolley clamp shown in the accompanying cuts. The cross-over is intended for use at crossings where it is desired not to insulate the wires from each other. The feature of the device is the method of holding the wires in place by means of the cam action of the renewable bronze tips. This principle has been used on O-B frogs for some time and has proved to be not only an efficient means of holding the wire, but also a time-saver for the lineman. The bronze pan and cross-runner castings interlock and are held together without the use of screws or bolts. The installation of the device is simple and is accomplished without cutting of wires.

Two forms are made. Form 1, with malleable-iron deflector bars to prevent a flying trolley harp from being wedged, is used for crossings of from 30 deg. to 60 deg., while Form 2, without deflector bars, is for crossings from 60 deg. to 90 deg., since within these latter limits there is no danger that a harp will catch. For the present these cross-overs will be furnished for No. 00 round, figure 8 and grooved wires only.



Section Insulator

The bronze splicer is an entirely new design known as type C. It is made to combine lightness, strength, clearance for trolley wheel and smooth under-run. The lips at each end of the splicer are bent around the wire to encircle and protect it throughout the entire length. There are no hollow places in the underside to cause arcing. The installation is easy as the wire is practically straight throughout the entire length of the splicer. The holding power of



Pressed-Steel Trolley Clamp

the tool-steel set screws is increased by forcing the wire into slight depressions under each screw.

The type A, form 2 section insulator is similar in every way to the well-known type A, form 1, except that it is smaller and lighter. It is recommended for No. 0 and No. 00 round, figure 8 and grooved wires, while the old heavier design is offered for the No. 000 and No. 0000 wires. The insulator is shown with the suspension yoke attached to the boss, but is furnished with the boss only when the insulator is attached to the trolley hanger.

The new trolley clamp is made with a pressed-steel

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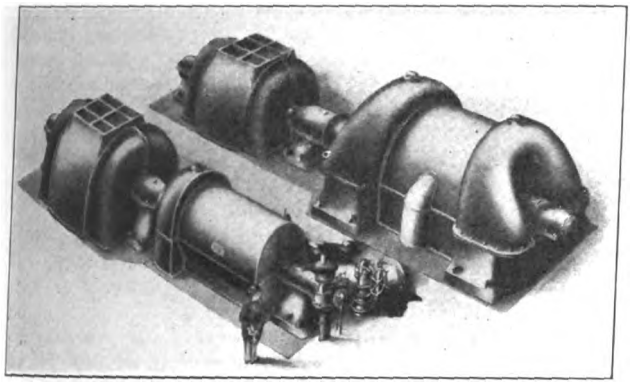
runner piece, 7¼ in. long, and cast boss. The weight of trolley wire is supported by two small lugs on the boss castings which fit into holes in the runner piece and are held firmly by the screws.

UNIQUE TURBO-GENERATORS FOR THE INTERBOROUGH

The new turbines recently ordered by the Interborough Rapid Transit Company of New York to care for its increased service are unusual not only for their size but also because of the fact that each set will be made up of two units, one operating with high-pressure steam at 1500 r.p.m. and the other receiving the exhaust from the former



Turbo-Generator Set of 30,000 kw for Interborough Rapid Transit Company

and running at 750 r.p.m. Each set will have a combined capacity of 30,000 kw, but owing to the enormous amounts of power required by the whole system the new units will be able to be operated at the most economical load during the major part of the time and therefore they were designed to give the very highest obtainable efficiency, nearly regardless of their cost—the only prior claim to this desideratum being reliability in operation.

Turbines of 30,000-kw capacity may be designed in single units, operating at 750 r.p.m. Such machines would be relatively economical and would probably show a steam consumption performance higher than has hitherto been obtained. The turbine cylinder structure, however, on account of the slow rotative speed, would be relatively large, and this, together with the temperature differences existing within the one structure, would involve in a machine of such large capacity an engineering problem of some magnitude. Similarly, both steam turbine and generator of this capacity might be designed and constructed to operate at 1500 r.p.m. In this case the structure would be less gigantic, but in order to avoid congestion of the steam in the low-pressure portions of the turbine, and to expand efficiently down to the very low limits of condenser pressure, 29-in. vacuum in this instance, blade speeds rather beyond what has hitherto been considered the limit of good practice would be involved. Either of these would be a combination type machine, comprising an impulse element for the first expansion, followed by an appropriate number of reaction elements for the low-pressure stages, the latter being arranged for double flow.

The highest degree of economy, however, is not to be obtained with an impulse element, as compared with a reaction element, provided the steam volumes, speed, etc., are appropriate for the design of the reaction turbine, but in any reaction turbine designed for high-expansion ratios the problem of having to deal with relatively minute volumes of steam at the high-pressure end and enormous volumes at the low-pressure end is serious, the volume of increase being roughly on the order of a geometrical progression. It is evident that if the high-pressure portions of a turbine may be operated at twice the rotative speed of the low-pressure portions, this problem is largely eliminated, and the capacities and speeds in this particular application, where the high-pressure is a single-flow turbine, operating at 1500 r.p.m., and the low-pressure is a double-flow turbine, operating at 750 r.p.m., render it possible to design plain reaction machines which will have an efficiency beyond anything yet constructed. The blade speeds involved are low, and either turbine element is of exceedingly simple mechanical construction, involving no new engineering problems and thoroughly fulfilling the first desideratum of absolute reliability.

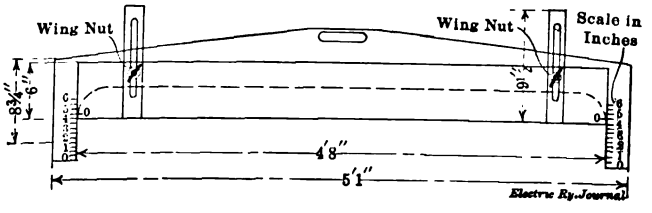
The scheme of employing two turbine elements having the steam pass serially through them is not new. A number of such units of from 1000-kw to 2000-kw capacity were built by the Westinghouse Machine Company in 1901. This construction has again come to the front in the case of the English-built Parsons turbines purchased by but not yet delivered to the Commonwealth Edison Company of Chicago. It is new, however, to employ high-pressure and low-pressure elements driving separate generators, each at a different synchronous speed.

There are other advantages in dividing large turbines into two separate elements besides those due to employing different speeds. The temperature range in either element is reduced. A sufficient number of stages may be introduced to give the very highest hydraulic efficiency without any mechanical difficulties, such as increased length between bearings, etc. Some little advantage is to be gained by separating, between the two turbine elements, the water which has been precipitated in the steam expansion. Either element is more reliable and simple, because of its smaller size. There is some slight loss of efficiency due to the employment of two generators instead of one of twice the capacity, but this is more than overbalanced by the gain in economy due to the two turbine elements operating at different speeds. For want of a better term, these units have been called "cross-compound" machines.

The Westinghouse Machine Company, which is building the new units, has guaranteed that each set will deliver energy at the terminals of the generator equivalent to 75¾ per cent of that available in the steam as worked out on the basis of the Rankine cycle.

PAVING CLEARANCE GAGE

A gage for use in determining the clearance between motor shell and paving has been used on the Syracuse lines of the New York State Railways. It consists of a wooden frame with projecting legs at each end spaced so that the bottoms of both rest on the rails. The frame has a hand



Pavement Clearance Gage for Motor Shell Clearances

grip on the upper edge for convenience in using. A sliding board, 4 ft. 8 in. x 6 in., moves up and down in guides and is clamped to the frame by means of bolts and wing nuts. The inside edges of the frame legs are graduated in inches, and marks on ends of the sliding board indicate the average height of the bottom of the board from the bottom of the feet. In operation all that is necessary is to place the feet on the rails and to push the sliding board down as far as it will go. The gage can then be raised for ease of reading the end scales. Dangerously high paving can thus be detected before it does damage to the equipment.

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News of Electric Railways

Franchise Drafted for Metropolitan Street Railway

Mayor Jost of Kansas City, Mo., on Aug. 13 submitted a complete draft of a franchise to the receivers of the Metropolitan Street Railway for their acceptance. The fundamental parts of the Jost franchise have the approval of Mayor Green of Kansas City, Kan., but slight modifications in and additions to the details where they are directly associated with intercity service have been requested. At present representatives of the company and of the city are going over the franchise section by section and clause by clause and working out all points about which there is a difference of opinion. The changes suggested and agreements reached, if such are possible, will be included in a new and final draft of the franchise.

According to Mayor Jost, under the settlement reached by the submission to Federal Judge Hook of questions concerning the amount which the Metropolitan Street Railway is to take from earnings, the interest which the city will have, and the method of acquiring such interest, all present property is valued in the contract at $30,000,000. The earnings of the property are to be available first for operating expenses and second for payment of 6 per cent on the contract value. All the balance is to be applied to the paying down of the capital account until it has been paid off to a point where it represents the actual value of the property. This, it is claimed, will be about $22,000,000.

When the actual value is reached the earnings after deductions for operating expenses and the 6 per cent on the remaining unliquidated capital shall be divided one-third to the company and two-thirds to the city. The citiy's share shall continue to be used to pay off the capital account.

As the capital account is paid down, the 6 per cent return is abated and the city becomes, to an amount represented by paid-off capital, owner of the property. When one-half of the contract value and one-half of the new additional money invested has been paid off, the city becomes absolute owner of the property, subject to existing mortgages for the other half. The city gives up its present revenues from the 8 per cent clause and the loop rentals, amounting to about $170,000 a year. The company is to pay taxes, licenses, special assessments and other public charges on the same basis as other property in the city.

Mayor Jost issued the following statement giving the principal features of the proposed franchise:

"(a) The repeal of 300 or 400 existing ordinances, making the proposed ordinance the sole repository of the company's rights and privileges.

"(b) The organization of a new Missouri corporation to buy and acquire all the Missouri property, free of mortgage or other encumbrances, thereby making the city's contract a first charge against the property with the exception of $2,600,000 of 6 per cent bonds maturing in 1922.

"(c) The organization of a Kansas corporation to acquire all the Kansas property in like manner.

"(d) The lease by the Kansas corporation to the Missouri corporation of all the Kansas property.

"(e) An assumption by the new corporation of the duty to refund the present bonded and mortgage debt and the payment of all lawful obligations, including judgments owing by the present corporations, but all this subject to the city's contract.

"(f) A directorate in the Missouri corporation of eleven persons, the number not to be increased without the consent of the city; three places on the board to be filled by Kansas City, Mo., two by Kansas City, Kan., as long as the Kansas property is operated with the Missouri property as one system; if separated, Kansas places on the board to be filled by Kansas City, Mo. The directors are to be selected by the Kansas City Court of Appeals from a list submitted by the Mayor containing five names for every one director to be selected, the Court of Appeals to have the right to reject the Mayor's list entirely and compel submission of additional lists until satisfied. The company is to issue stock to persons so selected in order to qualify them for such directors and elect them and protect them in their offices and in the exercise of their duties, failing in which the franchise then and there ends and becomes null and void without action on the part of the city. The term provided for the directors is three years, with succession possible.

"(g) The property is to be operated by two persons, one selected by the company, one by the city, with no definite term of employment, the object being to continue good men as long as possible. Either or both may be summarily removed by the Circuit Court for misconduct and neglect of duty. Generally speaking, these two men are to have all the powers usually exercised by a general manager of a street railway. A third member is provided whose only function is to settle disputes between the two where they are unable to agree, and his decision in such matters is final. He is to be agreed upon between the city and the company, or, in case of non-agreement, to be named by the state utilities board. He may be removed at any time by agreement of the parties or at the instance of any person interested, for neglect, fraud or misconduct.

"(h) The motive power is not to be changed except with the consent of the city. The city may require trolley wires to be put in conduits under ground.

"(i) The company is to pave and keep in repair the street between its tracks and 18 in. beyond each outer rail. If it fails to perform this obligation, the city may order such paving or repairs to be done and the cost thereof shall be a lien against the property and bear 8 per cent interest until paid. The company must also bear all expenses of regrading on its portion of the street.

"(j) The term of the franchise is thirty years from the date the ordinance becomes a law. (The present franchise runs until 1925.)

"(k) Certain definite work must be promptly begun and finished within three years. Certain definite work and improvements are required after three years.

"(l) The cars operated for the system must be the equal in style and pattern of the best in the United States. A definite number must be purchased and added to the present supply within a year.

"(m) The city reserves the right to object to any salary which it considers extravagant or to any wage which it considers inadequate and to have the question settled by arbitration.

"(n) The company is not obliged to build extensions in any one year exceeding 4 miles single track or 2 miles double track. The city or any of its inhabitants may build extensions to existing lines or build new lines and connect them with the company's lines, and the company shall be obliged to run cars over such extensions and operate the same as a part of the company's system.

"(o) The city to have the right to use the poles of the company to carry city signals, telegraph, telephone and electric light wires as well as city lamps.

"(p) Other companies desiring to enter the city may use any part of the company's tracks not to exceed six blocks and also the down-town loops, upon paying proper compensation. Interurban cars are to be received at the limits and carried by the company promptly to the heart of the city and returned.

"(q) The company is to sprinkle the streets occupied by any track for its entire width, the city to furnish water. The company is to sweep and keep clean that part occupied by its tracks; to clean off snow and ice street sweepings and remove them entirely from the street instead of shoveling upon that part maintained by the city. The city may require the company to haul garbage cars over its lines at night under direction of the city, on payment of proper compensation.

"(r) Extensions shall not be built unless the representatives of the company and of the city operating the property shall first certify that if built the earnings thereof will equal 6 per cent on the money invested and the expense of operation.

"(s) No part of the earnings shall be used directly or indirectly to increase the capital account. The contract or capital value shall not be increased in any case except where new money is obtained and invested.

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"(t) The company shall not sell, mortgage or encumber any of its property without the consent of the city.

"(u) The rate of fare shall be 5 cents per passenger with free universal transfers to all points on the system. The fare shall not be reduced at any time if the effect of such reduction impairs to any extent the 6 per cent return allowed on capital or materially impairs the right of the shareholders to receive one-third of the surplus at the time fixed for such participation according to the earning power of a 5-cent fare, or diminishes the city's share of earnings to such an extent as to defeat paying off one-half of the capital account and consequential city ownership by the time this contract expires.

"(v) The city may purchase at any time all of the property in Missouri or that part within Kansas City, Mo., paying an amount equal to the unliquidated part of that one-half of capital by which it would in the ordinary operation acquire the property, plus the reasonable value of the shareholders' rights of participation, which, if not agreed upon, shall be arbitrated.

"(w) New bonds issued to refund the present maturing ones, as well as mortgages for new money, may be placed against the property for the full term of this contract, and such part as remains unpaid at the expiration of this contract shall continue as a charge against any person, including the city, who comes into possession of the property.

"(x) Forfeiture proceedings may be instituted by the city for a breach of the contract in the Circuit Court. If the Circuit Court decrees a forfeiture, the property shall then and thereafter, and pending appeal and final determination of the litigation, be directed by the three city representatives on the board of directors and two named by the company. The profits which but for the forfeiture would belong to the company shall be impounded and kept to abide the final judgment on appeal. If the judgment of the Circuit Court be reversed, the company shall be restored to the direction and control of the corporation and receive the impounded profits; if, however, the judgment be affirmed on appeal, such affirmance shall have the effect to foreclose forever all rights and privileges of the company in the property and the impounded profits shall belong to the city and be by it used to pay off capital value. The three city directors shall then and thereafter continue in exclusive possession and control of the property as trustees for the city, maintaining and directing it according to the provisions of this ordinance. The forfeiture shall not relieve the city from its obligation to pay off the capital value and 6 per cent interest thereon to the holders thereof pending such payment.

"(y) The ordinance shall not become effective unless and until ratified by the people and accepted by the company, and the company must, at the time of such acceptance, obtain and file with the city a complete surrender and relinquishment by the present companies of all claims against the property or against the city."

In an interview concerning the franchise Mayor Jost spoke as follows:

"The city has no moral right to exact any condition which will take from the owners of the property a single dollar of honest investment; on the other hand, the owners have no right to any contract which will in any degree curtail the power of the city to control and secure to the public the highest grade of service. My view of the matter is that the city and the company should take up this franchise negotiation and reach an agreement that will do justice to both sides."

A difference of opinion that promises to be a stumbling block in the negotiations developed on Aug. 14, when the question of whether the system should be operated under two companies or one, with a single board of control or two, came up. Counsel for the receivers of the Metropolitan Street Railway insisted that the system can be financed to a much greater advantage if operated under one company with a single board of control. Counsel for the city admitted that it might be possible to work out a plan of that kind, but declared in favor of the organization of two corporations, one to control the Kansas lines and one to control the Missouri lines, earnings, operations, maintenance, and repair expenses being apportioned upon an equitable basis. Kansas City, Mo., desires these two corporations to be under one board of control, whereas Kansas City, Kan., insists upon two boards of control.

An important turn in the negotiations came on Aug. 15, when Mayor Jost proposed to the street car representatives to substitute for the board of control (consisting of two members and a standing arbitrator) a single street railway commissioner to be named by the company and the two cities, subject to the approval of the state utilities commissions of Kansas and Missouri. This railway commissioner, the Mayor said, should be named in the franchise when put before the people for a vote. In case the plan for a board of control of three members should be carried out, he was willing that the approval of the city's member should be vested in the Missouri Utilities Commission. The Mayor also proposed to submit the naming of the city's three directors to the approval of the commission.

Further Developments in Detroit

On August 14 John Naylon was agreed upon as the third arbitrator of the wage dispute between the Detroit United Railway and its conductors and motormen, thereby bringing to an end the efforts made during the past three weeks to find among more than fifty names a man satisfactory to both parties. The board of arbitration as now constituted consists of Mr. Naylon, Judge James Phelan for the employees, and Attorney Edward Henderson for the railway company.

At a meeting on Aug. 18 Mr. Henderson, for the company, and W. D. Mahon, representative of the employees, briefly explained to Mr. Naylon the points he will be required to pass on, and it was stated that four sections of the old agreement between the employees and the company would be arbitrated. The employees desire Section 15, relative to wages, and Section 21, relative to hours, to be changed. The men demand an increase from the present rates, 25, 28 and 30 cents per hour, according to the length of time they have been in the service, and it is reported that they will ask for a flat 35 cents per hour. They also desire a minimum workday of nine hours to be completed in eleven hours.

The company, on the other hand, has demanded abritration on Sections 6 and 19. Section 6 decrees that when mistakes are made by the conductors in figuring fare and time slips the company shall notify them of the mistakes in seven days or be debarred from taking the amount of the mistakes out of the next pay. The company wishes more time to bring up these mistakes, thereby enabling it to cut down clerical expense. Section 19 provides for free transportation to the employee.

W. D. Mahon announced that he had arranged with General Manager Brooks, of the Detroit United Railway, to open up the last paragraph of the present agreement, which provides that the agreement shall not be opened for abritration of disputed points except by consent of both parties.

Regular public hearings before the board of arbitration began Aug. 20. All the evidence that could be presented in documentary form was submitted in that shape. It is intended that new witnesses will be called during the hearings, most of them merely to explain the documentary evidence. It is believed that the presentation of evidence should take about ten days. The company will prepare sections to take the place of those objectionable to the men, and vice versa, and the board of arbitration will work the matter out.

During the delay in the selection of the third arbitrator some criticism was made to the effect that it was caused by Mr. Henderson's refusal to accept men proposed by Judge Phelan. The latter asserts, however, that both men did their best to find an acceptable man and that the objections raised on either side were consistent and well founded. In reply to the statement that all men named by him were closely identified with the railway, Mr. Henderson made public a list of the names he suggested as possible third arbitrators. Among these appear those of Henry Ford, John B. Howarth, T. J. Bosquett, Judson Bradway, Fred Guenther, Dr. J. H. Carstens, John S. Haggerty, Joseph Boyer, C. F. Backus, Edward Telfer, F. J. McDonald, H. J. Lesher, E. S. George, T. V. Dutton, J. C. McGregor, H. L. Jenness, H. L. Pierson, C. E. Baxter, W. S. Duncan and H. M. Leland. Attorney Henderson also stated that the

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company had not hampered him in any way in the selection of a man and had offered no advice unless he requested it.

Aug. 9 was the date set for the employees to vote on the strike question. Through the intervention of Mr. Mahon, however, the men decided to delay matters a little longer in the hope of an amicable settlement. On Aug. 13 Mr. Mahon announced that a third arbitrator would have to be selected within three days or the men would walk out.

A question has arisen as to vesting street railway conductors and motormen with police authority under the Lee law, which went into effect on Aug. 15. While street cars are mentioned in connection with railway trains in the law, it will probably be necessary to secure a ruling from the Attorney General concerning the real intent of the law. Police Commissioner Gillispie is reported to have said that if a ruling is issued to the effect that the law gives motormen and conductors police powers, he will carry the matter into the courts. He holds that it is much better for the train crews to carry unruly passengers until policemen can take them from the cars and see that they are prosecuted than to eject them and allow them to escape arrest.

On the evening of Aug. 12 a resolution was introduced in the Common Council placing the supervision of all the extensions to the present street railway system in the hands of the street railway commission. The action was opposed by some of the members on the ground that complete plans should be mapped out for the handling of street railway matters under the new conditions and that no hasty steps should be taken. The measure was sent to the utilities committee, where nothing will be done with it until a decision on the Verdier home rule act has been received from the Supreme Court.

An ordinance giving the Detroit United Railway authority to build an extension on Kercheval Avenue was sent to the same committee to await the completion of the proposed plans and the decision of the court.

In a letter read before the new street railway commission on Aug. 12 J. C. Hutchins, president of the Detroit United Railway, said, in reply to a communication from the commission, that "We shall be very glad to negotiate for the sale of the company's properties within the city of Detroit at any time you may wish to take these matters up." The commission thereupon directed that President Hutchins and other officers of the company be invited to attend its next meeting on Aug. 14. On that date the members of the commission met with President Hutchins and General Manager Frank W. Brooks and the subject was discussed in detail. At the request of the commission the company agreed to submit an inventory of all its property, including real estate, track, cars, machinery and equipment. Engineers employed by the commission and the company's engineers will then go over the list in order to reach a valuation of the property. Franchise values will not be considered in this appraisal, although they were discussed in a general way at the meeting.

President Hutchins said that it would require about ninety days to complete the inventory, but in order to expedite matters it will be submitted to the commission in instalments. The engineers may thus begin their work as soon as the property in any one department is listed, which work will be begun immediately by a large force of clerks.

The Modified Buffalo Agreement

Motormen, conductors, carhouse men, shopmen and other employees of the International Railway, Buffalo, N. Y., have ratified the modified agreement between their representatives and the officers of the company; the agreement, signed by both parties, will continue for three years. The text of the modified agreement will not be given out by the company or by the men, but the principal provisions of the modified agreement follow:

Reduction of the term of contract from five years to three years. Increase in wages for the shopmen from 2 to 4 cents an hour with a minimum wage of 24 cents. Increase in wages for the carhouse men from ½ cent to 2 cents an hour with minimum wage of 24 cents. Highest wage for motormen and conductors to be received on May 1, 1914, instead of May 1, 1916. Early, late and swing runs are to be operated on a basis of eleven hours as maximum and nine hours as a minimum. All runs are to be made as near ten hours' duration as possible. The day's work must be completed in twelve consecutive hours. Extra men and regular men called upon to do duty after their regular hours and to do extra work are to receive pay for at least five hours' work whether they work five hours or not. Regular men cannot be ordered to report for work after completing their regular run but may do so if they wish. Employees on the "owl" cars are to be required to work only eight hours but shall receive ten hours' pay. All engineers, conductors and brakemen on interurban runs are to receive from 2 to 4 cents an hour increase. Snow-plow men are to receive from 35 cents to 40 cents an hour for seventeen hours' work, an increase of 5 cents an hour.

Provision is also made in the new contract that any man brought up on charges for any cause shall have the right to appeal to the official making the charges, then to the superintendent, and finally to the president of the company. All pay checks are hereafter to be cashed at the carhouse in which payment to the men is made. Free transportation is to be provided for all employees without their having to wear cap or uniform. Books of passes are to be provided and each employee is to be allowed four tickets a day.

Boston Elevated Arbitration Proceedings Begun

On Aug. 18 hearings were begun in the State House in Boston before James L. Richards, representing the employees, James H. Vahey, representing the company, and James J. Storrow, the special board of arbitration chosen to adjust the differences between the Boston Elevated Railway and its union employees. Mr. Storrow, who has recovered from the operation that necessitated a previous postponement of the hearings, as noted in the Electric Railway Journal of Aug. 2, 1913, acted as chairman.

With the formal opening of the arbitration proceedings over, the first active move by the board was to make a tour of inspection of all the elevated carhouses, shops and the central power station and to ride on cars and observe the duties of trainmen. The tour was made on the suggestion of John P. Feeney, counsel for the union. Mr. Feeney said he believed the board would do its work much better if it were to see the actual conditions under which the men worked and also that it would eliminate much detail which he otherwise would have to submit through witnesses.

One of the principal matters to be decided upon has to do with an increase in wages. It is claimed by the employees that they have not shared in the general increase in wages throughout the country, but that their wages have remained almost stationary while the cost of living has increased. The company's case in answer to this will probably be presented to the board next week.

The meetings of the board of arbitration are being conducted publicly, and more than 100 employees of the company were present at the opening session. Engaged as counsel for the company are Frederic E. Snow and G. M. G. Nichol. The men are represented by John P. Feeney, Joseph B. Eastman and Fred Fay.

Ohio Public Utilities Commission Appointments

Governor Cox of Ohio has appointed Oliver H. Hughes, of Hillsboro, Judge William L. Dechant, of Middletown, and Edward W. Doty, of Cleveland, as members of the State Public Utilities Commission, which takes the place of the old public service commission under a law passed last winter. Mr. Hughes belongs to the Democratic party and served very satisfactorily on the Public Service Commission for the past several years.

Judge Dechant is also a Democrat. He has been a judge and a banker, with much experience with electric light, railway and gas companies, as well as with steam railways. He spent several years in Wisconsin, where he became familiar with the public utilities law of that State. He succeeds John C. Sullivan, of Hamilton.

Mr. Doty, a Progressive, was recommended by Mayor Baker and the Democratic organization of Cleveland. He has been a member of the Legislature and also of the last constitutional convention. He succeeds Oliver P. Gothlin, of Dayton, who will remain with the commission in charge of a bureau devoted to shippers.

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Test for Interurban Rates in Indiana.—Whether electric interurban lines in Indiana may charge more than 2 cents a mile is to be tested in the courts of the State. The Grand Jury of Porter County has recently indicted the officials of the Gary & Interurban Railway for charging 10 cents for a 3-mile ride.

Buffalo Company Applies for Stage Line.—A hearing has been set for Aug. 23 before Commissioner Hodson of the Public Service Commission of the Second District of New York upon the application of Nathan A. Bundy, superintendent Buffalo (N. Y.) Southern Railway, for a certificate of convenience and necessity for the operation of a stage route from the terminus of the Buffalo Southern Railway tracks at East Seneca to East Aurora.

City Rejects Offer of Seattle, Renton & Southern Railway.—The proposal of the management of the Seattle, Renton & Southern Railway, Seattle, Wash., to sell part of the property of the company to the city of Seattle has been disapproved by the City Council upon recommendation of the committees on utilities and finances. The report of the committees in favor of an offer from the city of $1,200,000 for the entire line, however, was adopted.

Street Improvement on Through-Route Lines in Chicago.—Acting Mayor L. E. McGann on Aug. 14 announced plans for the expenditure of the city's wheel-tax funds, amounting to about $130,000 annually, in the maintenance and repair of streets included under the city's proposed through-route transit system, connecting with county and state roads. The city receives into a general fund 15 per cent of the wheel tax collected, the remaining 85 per cent being applied in the wards in which it is collected.

Massachusetts Rapid Transit Committee of 1893 Entertained.—On Aug. 19 and 20 John R. Graham, president of the Bangor Railway & Electric Company, Bangor, Me., entertained at Portland and Augusta the rapid transit committee of the Legislature of Massachusetts of 1893, of which he was a member. The party left Boston on Aug. 19 in a special car by way of Portland to Augusta, its members staying over night there and being entertained by the citizens at a banquet. The appointment of this committee in 1893 was the beginning of the agitation of the rapid transit question in Boston that has resulted in the present subway and elevated railways and tunnel system.

Opening of Bids for Astoria and Corona Line.—Bids were opened on Aug. 19 before the Public Service Commission of the First District of New York for the construction of Section 1 of the Astoria, Woodside & Corona Rapid Transit Railroad. The two lowest bids received were from the Snare & Triest Company, $884,000, and from the Thomas J. Buckley Engineering Company, $894,000. The highest bid, $1,070,000, was made by the Degnon Construction Company. On the same day formal hearings were held on the forms of contracts for five sections of the Lexington Avenue Rapid Transit Railroad and the White Plains Road Rapid Transit Railroad, such hearings being required by law before bids may be called for.

President Shonts Narrowly Escapes Serious Injury.—Theodore P. Shonts, president of the Interborough Rapid Transit Company, New York, N. Y., had a narrow escape from death on Aug. 18, when he fell beneath a moving railway train at Le Breuil, France. A bystander pulled Mr. Shonts from beneath the wheels just in time to save him from being run over. Mr. Shonts' hands and legs were cut, but the injuries were not serious, and after they had been attended to he proceeded to Paris. At the time of the accident Mr. Shonts had alighted for a stroll on the platform at Le Breuil. In endeavoring to return to his compartment he had difficulty in opening the door. He was tugging at the handle when the train started, causing him to lose his balance and fall upon the tracks.

Toronto Valuation Slowly Progressing.—The valuation of the property of the Toronto Railway and Toronto Electric Light Company will probably not be completed before the end of August, for on account of the layout of the city there is no bulking of the work. Very much detail work is obligatory. A staff of ten men, some experts in the use of scientific instruments for measuring and calculations, others experts on clerical work, are working long hours on the valuation. Miles of rails, wires and poles have to be measured, and the numerous intersections have to be diagrammed and valued, for the intersections are all different and were made by hand. On Aug. 13 Controller Church demanded that Mayor Hocken should send to the Board of Control the interim offer for the purchase of the Toronto Railway, but the latter refused to furnish any information until the experts make their report.

Grade Crossing Protection Ordered in Los Angeles.—Adequate protection of the public from the menace of grade crossings on high-speed electric lines and steam railroads was ordered on Aug. 14, by the Board of Public Utilities of Los Angeles, Cal., when President McReynolds announced that safety appliances should forthwith be provided at 108 of the 354 crossings examined by Expert George L. Davenport, Jr. Mr. Davenport reported that 156 crossings in the city of Los Angeles demanded additional safeguards at once, but that 108 crossings were considered "dangerous" and should be protected immediately. Various means of portection were ordered, flagmen, gates, gongs or wigwag signals with gongs, as each case demanded. The Board of Public Utilities started an investigation with a view of launching a campaign for the elimination of all grade crossings within the city limits, but finding that the State Railroad Commission was making an investigation along this same line, the commission concluded that immediate action could best be obtained by ordering the installation of safety appliances. The campaign for the abolition of all grade crossings, however, will be continued.

Tribute to Mr. Stevens.—In an editorial which it published at the time it announced the resignation of R. P. Stevens as president and general manager of the Lehigh Valley Transit Company, Allentown, Pa., one of the local papers said: "In the six years that Mr. Stevens has been with the local transit system epochal changes have been made, due in large measure to the constructive genius of the man. That was what he was brought to this city for and that is what he has accomplished beyond any promises made for him upon his coming or by him during any portion of his administration. Mr. Stevens will leave Allentown with the admiration of the city for the splendid transportation system that he has provided by his genius, and with the regret that at a time when his dreams are coming true he shall not be here to enjoy them. To a large degree his work is done. The large undertakings are about complete. The consolidation of electric railway systems and power systems for greater economy in management and better service has been put into effect. Some other field now needs his services, for every business at some time or other is looking for a builder."

Union Agitation on Indiana Interurban Lines.—An attempt was recently made to organize a union, to be called the "Three Star Organization," among the interurban trainmen of the several lines radiating from Indianapolis. A number of trainmen paid the initiation fee of $5.50 but could not obtain information in regard to the nature of the organization, its real name, principal headquarters, officers, etc. In an endeavor to recover the fee, William E. Young, a motorman on the Union Traction Company of Indiana, brought suit for $10 damages on a charge of fraudulent representation. At a preliminary hearing the organizer, Carl S. Black, asserted that the headquarters of the association was in Minneapolis, Minn., that a charter had been issued in Indianapolis about July 15, and that the Three-Star Organization was affiliated with the American Federation of Labor. Owing to a lack of concrete evidence to substantiate his statements, however, it was decided to continue the case for trial September or October. At the present time the managements of the different interurban roads whose trainmen have supposedly become affiliated with this organization anticipate no serious trouble. A new move on the part of the organization of electric railway employees was brought about on July 16, when they voted to become affiliated with the Amalgamated Association of Street and Electric Railway Employees of America. Up to the present time no formal demands have been presented to the companies, but a set of grievances signed by a committee composed principally of ex-employees of the different interurban lines has been presented. This set of grievances does not give recognition to any organization, and there is no indication that any organization is presenting them.

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Financial and Corporate

Stock and Money Markets

Aug. 20, 1913.

The opening market in the New York Stock Exchange to-day was moderately active and higher. Through the day it ruled irregular with strength in spots. Advances and declines were but fractional, generally running from ⅛ to ½. Interborough-Metropolitan preferred gained 1¾ on fairly active trading. Rates in the money market to-day were: Call, 2 @ 2¼ per cent; sixty days, 3¼ @ 4 per cent; ninety days, 4½ @ 4¾ per cent; four months, 4¾ @ 5 per cent; five months, 5½ @ 5¾ per cent; six months, 5¼ @ 5½ per cent.

In spite of the fact that the Philadelphia market continued dull and uninteresting, there was a steadier undertone. Philadelphia Company was sold down on small odd lots and Philadelphia Rapid Transit advanced to 22½.

Bonds were steady in Chicago to-day. Stocks were strong, a sale of 3,335 shares of Chicago Railways, Series 2, being noted.

The Boston market was inactive and without any special feature, there being few fluctuations.

Moderate trading was displayed on the Baltimore Exchange to-day. Bonds showed greater activity than stocks.

Quotations of traction and manufacturing securities as compared with last week follow:

	Aug. 13.	Aug. 20.
American Brake Shoe & Foundry (common)	91	91
American Brake Shoe & Foundry (preferred)	131	131
American Cities Company (common)	37⅜	35
American Cities Company (preferred)	66	63½
American Light & Traction Company (common)	350	356
American Light & Traction Company (preferred)	104	104
American Railways Company	38	38¼
Aurora, Elgin & Chicago Railroad (common)	41	40½
Aurora, Elgin & Chicago Railroad (preferred)	82½	82¾
Boston Elevated Railway	91	87
Boston Suburban Electric Companies (common)	7½	7
Boston Suburban Electric Companies (preferred)	56½	55
Boston & Worcester Electric Companies (common)	*8	*8
Boston & Worcester Electric Companies (preferred)	42	42
Brooklyn Rapid Transit Company	89⅝	88⅞
Capital Traction Company, Washington	115½	115
Chicago City Railway	170	*170
Chicago Elevated Railways (common)	25	*25
Chicago Elevated Railways (preferred)	70	*70
Chicago Railways, ptcptg., ctf. 1	92	94
Chicago Railways, ptcptg., ctf. 2	26½	29½
Chicago Railways, ptcptg., ctf. 3	7	7½
Chicago Railways, ptcptg., ctf. 4	3	3
Cincinnati Street Railway	105	102½
Cleveland Railway	103¾	103½
Cleveland, Southwestern & Columbus Ry. (common)	a5½	*5½
Cleveland, Southwestern & Columbus Ry. (preferred)	a30	*30
Columbus Railway & Light Company	18	18
Columbus Railway (common)	69½	69½
Columbus Railway (preferred)	88	88
Denver & Northwestern Railway	104	104
Detroit United Railway	a80	75
General Electric Company	142½	145¼
Georgia Railway & Electric Company (common)	114½	114
Georgia Railway & Electric Company (preferred)	83	84
Interborough Metropolitan Company (common)	16⅜	16⅛
Interborough Metropolitan Company (preferred)	60⅞	61⅞
International Traction Company (common)	30	30
International Traction Company (preferred)	95	95
Kansas City Railway & Light Company (common)	18	18
Kansas City Railway & Light Company (preferred)	37	37
Lake Shore Electric Railway (common)	5	5
Lake Shore Electric Railway (1st preferred)	92	92
Lake Shore Electric Railway (2d preferred)	26	26
Manhattan Railway	130	128
Massachusetts Electric Companies (common)	16½	16
Massachusetts Electric Companies (preferred)	72	71
Milwaukee Electric Railway & Light Co. (preferred)	95	95
Norfolk Railway & Light Company	25	25
North American Company	72	71⅞
Northern Ohio Light & Traction Company (common)	a70	62¾
Northern Ohio Light & Traction Company (preferred)	a100	100
Philadelphia Company, Pittsburgh (common)	43½	42½
Philadelphia Company, Pittsburgh (preferred)	40	40
Philadelphia Rapid Transit Company	23½	22½
Portland Railway, Light & Power Company	55	55
Public Service Corporation	109	109
Third Avenue Railway, New York	36¾	36¾
Toledo Railways & Light Company	a6	*6
Twin City Rapid Transit Co., Minneapolis (common)	104	106⅛
Union Traction Company of Indiana (common)	5	5
Union Traction Company of Indiana (1st preferred)	80	80
Union Traction Company of Indiana (2d preferred)	20	20
United Rys. & Electric Company (Baltimore)	27	27¼
United Rys. Inv. Company (common)	25	23
United Rys. Inv. Company (preferred)	45	44
Virginia Railway & Power Company (common)	52½	52½
Virginia Railway & Power Company (preferred)	90½	90½
Washington Ry. & Electric Company (common)	91	89⅞
Washington Ry. & Electric Company (preferred)	88	86½
West End Street Railway, Boston (common)	71¼	72
West End Street Railway, Boston (preferred)	88	88
Westinghouse Elec. & Mfg. Company	68	71½
Westinghouse Elec. & Mfg. Company (1st preferred)	112	114

*Last sale. a Asked.

ANNUAL REPORTS

United Railways Investment Company

Below is given the statement of income and profit and loss of the United Railways Investment Company, San Francisco, Cal., for the year ended Dec. 31, 1912:

Income:		
Dividends on stocks owned	$1,984,172	
Interest on bonds owned	22,465	
Interest on bonds in sinking fund	7,857	
Interest on loans and accounts receivable	78,440	
Interest on bank balances	238	
Other interest (including collections deferred from prior years)	167,078	
Total		$2,260,250
Expenses and other charges:		
Expenses:		
Salaries	$45,998	
Legal	10,245	
Corporation taxes	5,570	
Transfer agents', registrars' and trustees' fees	3,328	
Fees of trust companies for paying coupons, etc.	1,063	
Tax on bonds held in Pennsylvania	2,500	
Directors' fees and expenses	1,381	
Stationery, printing and postage	840	
Traveling	2,939	
General	5,203	
Total expenses	$79,067	
Other charges:		
Interest on collateral trust sinking fund 5 per cent gold bonds	$907,500	
Interest on 6 per cent convertible gold bonds of 1910	73,740	
Interest on 6 per cent notes of 1908	123,000	
Interest on loans and notes payable	7,063	
Interest on dividend certificates	80,234	
Total other charges	$1,191,537	
Total		$1,270,505
Net income for the year		$989,644
Profit and loss surplus at beginning of year		3,110,230
Profit and loss credits:		
Adjustment of Philadelphia Company dividend for 1911	$121,000	
Discount on bonds purchased for sinking fund	35,666	156,666
Profit and loss surplus, Dec. 31, 1912		$4,256,542

As a source of further information to the stockholders, there was appended to the above report the income statement of the United Railroads of San Francisco, which is as follows:

Gross earnings:		
Passenger		$8,416,175
Advertising		55,500
Total		$8,471,675
Operating expenses and taxes:		
Maintenance of way and structures	$542,460	
Maintenance of equipment	468,981	
Transportation expenses	2,870,360	
General expenses	580,780	
Total operating expenses	$4,462,582	
Ratio to gross earnings, 52.68 per cent.		
Taxes	416,000	
Ratio to gross earnings, 4.9 per cent.		
Total operating expenses and taxes		4,878,582
Ratio to gross earnings, 57.59 per cent.		
Net earnings		$3,593,093
Other income:		
Sinking fund earnings	$242,324	
Interest	26,213	
Rentals	10,239	
Miscellaneous	6,543	
Total		285,322
Gross income		$3,878,415
Current income charges:		
Interest on 5 per cent promissory gold notes	$50,000	
Interest on income notes	73,740	
Interest on equipment notes	19,375	
Interest on bills and accounts payable, etc.	42,607	
Rentals and leases	78,800	
Total		264,522
Net income before bond interest charges		$3,613,893
Bond interest:		
United Railroads' bonds	$1,013,360	
Underlying bonds	793,216	
Total		1,806,577
Net income for the year		$1,807,316
From the above net income the following appropriations were made:		
For renewals, depreciation and contingencies	$183,607	
For bond sinking fund reserve	655,757	
For dividends paid on first preferred stock	350,000	

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Mason B. Starring, president, says in part:

"The industrial consumption of natural gas increased materially during the year, and, owing to the average of comparatively mild weather in the Pittsburgh district during the last half of the Philadelphia Company's fiscal year, the domestic consumption of natural gas decreased, the net result being an increase in the gross operating revenue derived from natural gas. A forecast of the company's revenue from the production of oil indicates that such revenue will be double that received from this source during the previous year.

"The recently acquired Duquesne Light Company, of which the Philadelphia Company now owns all the stock, having acquired other Pittsburgh electric properties in addition to those previously owned by the Philadelphia Company, began its unified service on Jan. 1, 1913, and paid its initial dividend of 1¾ per cent to the Philadelphia Company in March. The earnings of the Duquesne Light Company are increasing both in gross and net, and it is confidently expected that it will maintain a 7 per cent dividend rate. The condition of the street railway properties, in which the Philadelphia Company is interested, is improving, and the Pittsburgh Railways has concluded a long time contract with the Duquesne Light Company to furnish the railways company's system an adequate and reliable supply of power, thus relieving it from the burden of financing its growing power requirements.

"In accordance with the consents in writing which the stockholders filed with this company in response to my letter of Dec. 6, 1912, the following stocks owned by your company were sold to the California Railway & Power Company: $5,000,000 of first preferred stock of the United Railroads of San Francisco, $20,000,000 of preferred stock of the United Railroads of San Francisco, $8,801,400 of common stock of the United Railroads of San Francisco, $600,000 of preferred stock of the Coast Valleys Gas & Electric Company.

"Your company received therefor: $5,000,000 of preferred stock of the California Railway & Power Company and $34,160,700 of common stock of the California Railway & Power Company.

"All of the stocks sold to the California Railway & Power Company have been delivered, except 24,285 shares of the first preferred stock of the United Railroads of San Francisco, which have not yet been released from the lien of United Railways Investment Company 6 per cent notes of 1908. All of the outstanding preferred and common stocks of the California Railway & Power Company are owned by United Railways Investment Company and the Railroads & Power Development Company; the ownership of the latter company's stock by the Investment Company remains unchanged.

"The income of this new company for the first quarter of its fiscal year was sufficient to meet the full dividend requirements of its prior preference stock at the rate of 7 per cent per annum; accordingly a dividend of 1¾ per cent on said stock was paid April 1, 1913.

"By the payment in 1912 of $400,000 of the 6 per cent serial notes of 1908, and the further payment on Feb. 15, 1913, of an additional $200,000 of said notes, the amount of these notes outstanding was reduced to $1,700,000, an amount less than 50 per cent of the original issue, thereby removing the restriction 'that until the 50 per cent in amount of such notes first maturing shall have been paid, no dividend upon the stock of the Investment Company shall be declared or paid.' This is one more step toward restoring your company to a dividend basis, but the fact remains, however, that the Investment Company is still obligated to pay semi-annually $200,000 face value of the 6 per cent serial notes of 1908, and is restricted by that provision of the outstanding preferred stock dividend certificates which requires their payment 'prior to the payment of any other cash dividend on the preferred or common stock of the company.' It is hoped, however, that within the next year some satisfactory arrangement can be consummated whereby the 6 per cent serial notes of 1908 may be funded, also that means may be found to eliminate the restriction created by the preferred stock dividend certificates. Much thought and consideration is being given to the formulation of some feasible plan to overcome the foregoing inhibitions, to enable the United Railroads of San Francisco to dispose of $1,229,000 of our 6 per cent convertible gold bonds of 1910, and to so shape itself as to pay dividends on its preferred stock, the consummation of which would enable the Investment Company to pay dividends."

Geary Street Municipal Railway

William Dolge of the supervisors' finance committee of San Francisco, Cal., on Aug. 12 filed a statement showing that the Geary Street Municipal Railway has earned a net profit of $19,363.74 for seven months, from Dec. 28, 1912, to July 31, 1913.

Based upon the income of July, 1913, the financial expert estimates that the net profit for the year ending June 30, 1914, will be $101,051. Charges are included against the city railway for operating expenses, interest on the bonds, and also 18 per cent of the passenger revenue for a depreciation sinking fund.

The income, profit and loss statement for the seven months ended July 31, 1913, is as follows:

Revenues	*$181,760
Actual expenses	92,749
Gross operating profit	$89,011
Deduct depreciation sinking fund, being 18 per cent of passenger revenues	32,679
	$56,332
Deduct interest on bonds	36,968
Net profits, seven months ended July 31, 1913	$19,364

*From Dec. 28, 1912, to June 24, 1913, the road was operated, but only to a partial extent, between Kearny Street and Thirty-third Avenue. Since the last-mentioned date the road has been in full operation from the ferry to the beach.

A similar statement for only the month of July, 1913, shows the following results:

Revenues	$46,836
Actual expenses	19,967
Gross operating profit	$26,869
Deduct depreciation sinking fund, being 18 per cent of passenger revenues	8,420
	$18,449
Deduct interest on $1,969,000 bonds sold	7,383
Net profit, month ended July 31, 1913	$11,066

On the basis of the income, profit and loss statement for July, 1913, the following statement was prepared by Mr. Dolge, showing the estimated income for the year ending June 30, 1914:

Estimated revenues, average $45,900 per month	$550,800
Estimated expenses, average $21,000 per month	252,800
Gross operating profit	$298,800
Deduct depreciation sinking fund, 18 per cent of gross income	109,144
	$189,656
Deduct interest on $1,969,000 bonds sold	88,605
Estimated net profit, year ended June 30, 1914	$101,051

"The following figures," says Mr. Dolge, "show what the net profits of the city road would be were it a privately owned utility, bearing such charges as state and federal taxes, franchise taxes, licenses for cars, attorney's services, insurance and similar items. Under these circumstances the road would show a profit of $52,578 for the year ended June 30, 1914. This statement is also based on the statement of income, profit and loss for July, 1913:

Estimated revenues, average $45,000 per month		$550,800
Estimated operating expenses $21,000 per month	$252,000	
Taxes—state federal, franchise, license	43,813	
Attorney services, insurance, etc	4,660	
Total		$300,473
Estimated gross operating profit		$250,327
Deduct depreciation sinking fund, being 18 per cent of passenger revenues		109,144
		$141,183
Deduct interest on $1,969,000 bonds sold		88,605
Net profit, year ended June 30, 1914, after inclusion of all comparison charges		$52,578
Estimated net profit as above		$52,578
Add comparison charges (saved under municipal operation), taxes—state, federal, franchise, etc		43,813
Attorney's services, insurance, etc		4,660
Actual net profit year ended June 30, 1914		$101,051

"The gross receipts for the first eleven days of August were $17,712, averaging $1,610 per day. On this basis,

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instead of the basis of the July average, the gross receipts for the fiscal year ending June 30, 1914, would be $584,650 instead of $550,800, as above."

It would have been interesting if detailed figures had been submitted in regard to what compose the "expenses" in the above statements, in order that a basis of comparison might be had for determining what are the relative costs of the various operating items under private and municipal ownership of public utilities and whether other differences might be found than those in connection with taxes (state, federal, and franchise), legal fees, insurance, and the like.

Electric Properties Company Accepts Readjustment

At a recent meeting of the stockholders of the Electric Properties Company the plan for reduction and readjustment of the capital stock was approved as formulated by a committee composed of John F. Wallace, Henry R. Hayes and Albert M. Chambers, whose appointment was noted in the Electric Railway Journal of May 17, 1913. The stockholders voted to sell the assets of the Electric Properties Company to a new company, organized under the laws of Virginia, to be known as the Electric Properties Corporation, with an authorized capitalization of $4,000,000 6 per cent cumulative preferred stock and $4,000,000 common stock.

The outstanding capitalization of the new company will consist of the authorized common stock, $3,920,200 of the preferred stock and $411,533 of five-year 6 per cent redeemable notes or bonds. The latter represents all accumulative dividends upon the outstanding preferred stock for the period from Feb. 1, 1910, to April 30, 1912. The dividends upon the preferred stock of the old company, from May 1, 1912, to Sept. 1, 1913, will be paid in cash.

The preferred stock of the old company will be exchanged, par for par, for the preferred stock of the new company. The $6,000,000 of common stock of the old company will be exchanged at the rate of two shares of the new stock for three shares of the old stock.

The officers of the Electric Properties Corporation will be: President, John F. Wallace; vice-president, A. M. Chambers; secretary and treasurer, John Seager. The Electric Properties Corporation will own all the capital stock of Westinghouse, Church, Kerr & Company.

Interstate Railways

The Interstate Railways, Camden, N. J., reports earnings as follows for the fiscal year ended Jan. 31, 1913:

Credits:		
Income from dividends, interest, loans, etc.		$554,968
Debits:		
Interest on Interstate Railways Company collateral trust gold bonds, Feb. 1, 1912, to Feb. 1, 1913	$431,064	
Expenses (including taxes)	4,353	435,417
Surplus for the fiscal year ended Jan. 31, 1913		$119,550
Dividends on preferred stock paid July 1, 1912, and Jan. 1, 1913		60,000
Net surplus for the fiscal year ended Jan. 31, 1913		$59,550

Beaumont (Tex.) Traction Company.—An order signed by Judge Gordon Russell of the United States District Court was filed in the office of United States Deputy Clerk C. C. Bumpass on Aug. 9, 1913, discharging James F. Weed as receiver for the Beaumont Traction Company, authorized in the case of the Interstate Trust & Banking Company against the traction company. For some time Mr. Weed has been managing the affairs of the traction company, but he withdrew when the properties of the company were taken over by Stone & Webster.

Buffalo & Williamsville Electric Railway, Williamsville, N. Y.—Mayor Louis Wiard of Batavia expects to confer with Godfrey Morgan, Buffalo, secretary of the Buffalo & Williamsville Electric Railway, in regard to the status of the company. After the company discontinued its service between Williamsville and Batavia, it was ordered, as recently reported in the Electric Railway Journal, to resume through service between Buffalo and Batavia. When Mr. Morgan was in Batavia recently he was quoted as saying that he had taken the matter up with residents of Batavia and that a new company would be organized to take over the line into Batavia.

Dedham (Mass.) & Franklin Street Railway.—The sale of the Medfield & Medway Street Railway, which, as noted in the Electric Railway Journal of Aug. 16, 1913, is to take place at the office of Hayden, Stone & Company, Boston, on Sept. 15, is to be accompanied by the sale of the Dedham (Mass.) & Franklin Street Railway. These two roads were each held under the receivership of Eugene H. Mather.

Evanston (Ill.) County Traction Company.—The Evanston County Traction Company has recently been incorporated to take over the lines in Evanston formerly owned by the County Traction Company, the sale of which lines to a group of capitalists was noted in the Electric Railway Journal of Aug. 9, 1913. The Evanston City Council has granted a new twenty-year franchise. The city will receive 10 per cent of the gross receipts until the rehabilitation of the old line between Evanston and Chicago, which is expected to take about two years, has been completed. During the following three years no payment will be made to the city, but after that time the city will, it is stated, receive 5 per cent of 75 per cent of the gross receipts.

Highland Park & Lake Burien Railway, Seattle, Wash.—The city utilities committee of the City Council of Seattle has voted to take over the Highland Park & Lake Burien Railway as soon as the owners present a clear title to the property and an unquestioned right-of-way between Spokane Street and Iowa Street, near the West Waterway, to Lake Burien, a distance of about 9 miles, half of that within the city limits.

Louisville & Northern Railway & Lighting Company.—The Louisville & Northern Railway & Lighting Company, which is a subsidiary of the Indianapolis, Columbus & Southern Traction Company, has petitioned the Public Service Commission for authority to continue the present system of accounts rather than adopt a uniform system which has been prescribed by the commission.

Montreal (Que.) Tramways.—The board of directors of the Montreal Tramways has been increased in number from seven to nine, and the two additional places have been filled by J. P. McIntosh, of New York, and W. G. Ross, a former managing director of the Montreal Street Railway.

Nelson Street Railway, Nelson, B. C., Can.—A by-law was recently defeated in which the Council asked authority to guarantee bonds of the Nelson Street Railway to the extent of $40,000 for the purpose of taking care of the company's present indebtedness and providing for additional necessary extensions and rolling stock.

Northern Texas Electric Company, Fort Worth, Tex.—A quarterly dividend of 1¾ per cent has been declared on the common stock of the Northern Texas Electric Company, along with the regular semi-annual distribution of 3 per cent on the preferred stock, both payable Nov. 2, 1913, to holders of record Aug. 20. This dividend compares with dividends of 1½ per cent quarterly from March, 1911, to June, 1913, and of 1¼ per cent from June to December, 1910.

Omaha (Neb.) & Lincoln Railway & Light Company.—The Omaha & Lincoln Railway & Light Company, recently incorporated to take over the Nebraska Traction & Power Company, presumably in the McKinley interests, as noted in the Electric Railway Journal of July 26, 1913, has been authorized by the Nebraska Railroad Commissioners to issue $125,000 of bonds and $75,000 of stock, the latter being equally divided between common and preferred.

Pittsburgh (Pa.) Railways.—The Pittsburgh Railways has filed a twenty-million-dollar mortgage in Allegheny County. It secures that amount of general mortgage 5 per cent bonds, which are to be issued as follows: $4,000,000 to retire an outstanding issue of the Southern Traction Company bonds; $4,500,000 for rehabilitation, betterment and improvement of existing lines of the railway company; $1,450,000 will go to the Philadelphia Company to reimburse it for advances to defray the cost of changes in alteration in the down-town tracks incident to the "hump" removal and other improvements now under way, and $10,000,000 will be expended from time to time for improvements, additions and extensions, not more than 85 per cent of the cost of which is to be paid for out of the bond issue.

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Tyler City (Tex.) Light & Railway Company.—A petition has been filed in the Common Pleas Court at Dayton, Ohio, by John H. Schoenberger against John H. Barkman (who was president of the Osborn State Bank), Charles H. Warford and Clem L. Kimmel, officers and directors of the Tyler City Light & Railway Company, to recover $2,500 said to have been paid by the plaintiff for ten first mortgage 6 per cent twenty-year gold bonds of the company. This suit is the development of the failure of the Osborne State Bank. It is charged that the defendants entered into a contract with J. Russell & Company, a former Dayton brokerage house, whereby they became the fiscal agents of the company. The plaintiff claims that he was induced to purchase the bonds by alluring literature and the claim that the company possessed a fifty-year franchise for an electric railway at Tyler. It is alleged that the Tyler City company has defaulted in the payment of interest on the bonds and that they are worthless through failure of the company to comply with the terms of its franchise.

Dividends Declared

Cities Service Company, New York, N. Y., monthly, one-half of 1 per cent preferred and five-twelfths of 1 per cent common.

Columbus (Ohio) Railway, quarterly, 1¼ per cent common.

Northern Texas Electric Company, quarterly, 1¾ per cent common and 3 per cent preferred.

Terre Haute Traction & Light Company, 3 per cent preferred.

Utilities Improvement Company, New York, N. Y., monthly, one-half of 1 per cent preferred and one-sixth of 1 per cent common.

ELECTRIC RAILWAY MONTHLY EARNINGS

BANGOR RAILWAY & ELECTRIC COMPANY

Period			Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1 mo.	June	'13	$60,780	*$28,913	$31,867	$17,198	$14,669
1 "	"	'12	61,590	*28,333	33,257	16,558	16,699
12 "	"	'13	735,690	*334,820	400,870	204,868	196,002
12 "	"	'12	655,622	*298,170	357,452	178,467	178,985

CHATTANOOGA RAILWAY & LIGHT COMPANY, CHATTANOOGA, TENN.

1 mo.	June	'13	$101,635	*$60,466	$41,169	$23,204	$17,965
1 "	"	'12	89,470	*54,892	34,578	22,146	12,432
12 "	"	'13	1,161,121	*694,249	466,872	281,103	185,769
12 "	"	'12	996,075	*592,239	403,836	251,497	152,339

CUMBERLAND COUNTY POWER & LIGHT COMPANY, PORTLAND, MAINE

1 mo.	June	'13	$200,339	*$108,044	$92,295	$57,979	$34,316
1 "	"	'12	186,160	*106,067	80,093	52,894	27,199
12 "	"	'13	2,213,749	*1,225,551	988,198	675,299	312,899
12 "	"	'12	2,079,437	*1,246,664	832,773	606,635	226,138

GRAND RAPIDS (MICH.) RAILWAY

1 mo.	June	'13	$111,514	*$64,325	$47,189	$15,308	$31,881
1 "	"	'12	107,237	*59,256	47,981	14,557	33,424
12 "	"	'13	1,263,822	*732,658	531,164	177,441	353,723
12 "	"	'12	1,207,910	*672,137	535,773	176,735	359,038

LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY, LEWISTON, MAINE

1 mo.	June	'13	$64,292	*$38,019	$26,273	$15,693	$10,580
1 "	"	'12	59,237	*32,085	27,152	14,446	12,706
12 "	"	'13	651,671	*401,233	250,438	175,800	74,638
12 "	"	'12	609,367	*382,660	226,707	173,379	53,328

ST. JOSEPH RAILWAY, LIGHT, HEAT & POWER COMPANY, ST. JOSEPH, MO.

1 mo.	June	'13	$100,513	*$58,763	$41,750	$20,198	$21,552
1 "	"	'12	93,923	*56,401	37,522	19,710	17,812
12 "	"	'13	1,216,616	*686,158	530,458	238,712	291,746
12 "	"	'12	1,136,118	*686,619	449,499	234,139	215,360

NASHVILLE RAILWAY & LIGHT COMPANY, NASHVILLE, TENN.

1 mo.	June	'13	$179,176	*$109,239	$69,937	$38,501	$31,436
1 "	"	'12	167,167	*96,500	70,667	36,994	33,673
12 "	"	'13	2,142,067	*1,238,475	903,592	447,709	455,883
12 "	"	'12	2,016,204	*1,158,339	837,865	416,322	441,543

PORTLAND RAILWAY, LIGHT & POWER COMPANY, PORTLAND, ORE.

1 mo.	June	'13	$568,875	*$291,684	$277,191	$171,538	$105,653
1 "	"	'12	582,964	*277,682	305,282	171,538	105,653
2 "	"	'13	6,683,215	*3,310,139	3,373,076	1,851,786	1,521,290
2 "	"	'12	6,474,508	*3,213,098	3,261,410	1,638,632	1,622,778

*Includes taxes.

Traffic and Transportation

Terms of Insurance for Third Avenue Railway Employees

In the report of the Third Avenue Railway, New York, N. Y., for the six months ended June 30, 1913, which was abstracted in the ELECTRIC RAILWAY JOURNAL of July 19, 1913, page 116, brief reference was made to the arrangement entered into by the company through F. W. Whitridge, president, with the Travelers' Insurance Company for the issue of a policy of $1,000 on each employee of the company. Mr. Whitridge has since addressed a circular in part as follows to the employees:

"The company has made an arrangement with the Travelers' Insurance Company, Hartford, Conn., by the terms of which every employee of the Third Avenue Railway and its affiliated companies can secure a life insurance policy of $1,000 at a cost lower than such policy can be obtained by any individual, and all of the employees to whom this letter is addressed are hereby invited to take out such policy. The terms of the arrangement cover the following points:

"First: The policy will be issued without any medical examination to employees of the company, provided nearly all of them take the insurance.

"Second: This policy is in lieu of the death benefit of $250 under the present rules of the Third Avenue Benefit Association. If any member of the association does not wish to take out the policy, of course his present death benefit of $250 stands.

"Third: This being true, it is convenient and right that the cost of the insurance should be averaged so that each man will pay the same amount, and that a part of such amount should be paid by the association.

"Fourth: The amount payable each year, when the cost is so averaged, will be about $11 for each employee who is a member of the association. The amount to be contributed by the association depends upon the number of members who choose to take out the $1,000 policy. If all of the members of the association take out this policy, the association can afford to pay, for each of its members, $4 of this $11, and the insured will have to contribute only the sum of $7 per year in addition to his present dues to the association.

"Fifth: This sum of $7 per year will be paid through the company, and an order upon the company must be signed giving it authority to deduct such amount in weekly instalments of about 15 cents from the wages of the men.

"Sixth: If employees, other than members of the association, desire to take out the policy, the cost will be $12 a year, and a similar order must be given for the deduction of that amount in weekly instalments from the wages of the men.

"Seventh: This policy will remain good on these terms as long as the holder is in the employment of the company.

"Eighth: If anyone having such policy leaves the employ of the company he may continue his insurance upon paying the Travelers' Insurance Company's published rate for his age.

"Ninth: In addition to this $1,000 policy, any employee of the company may, upon the payment of an additional 75 cents per year, obtain an accident policy which will provide for the following:

Loss by severance, both hands or both feet	$1,000
Loss by severance, one hand and one foot	1,000
Loss by severance, one hand or one foot and loss of sight of one eye	1,000
Loss of two eyes	1,000
Loss by severance, one hand or one foot	500
Loss one eye	500
Loss of thumb and index finger of either hand	250

"The three benefits last mentioned will be increased in the amount of $500 in case total and permanent disability for life results from these injuries. This accident policy may also be continued by the insured in case he leaves the employ of the company, but in that case the annual rate will be $1.25.

"Tenth: The benefits of this accident policy are, of course, in addition to (a) any rights which the men have under the above life policy, (b) any sick pay they shall be entitled to receive from the association, and (c) any

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rights to recover damages which they have under the law.

"Eleventh: It is desirable that as large a number of the men as possible should accept this insurance scheme, as the Travelers' Insurance Company makes it a condition, in waiving the medical examination, that substantially all the employees should take the policy. As there is a good deal of detail to be considered in connection with the matter, this offer will remain open until Nov. 1, at which time we must know how many men take the policies."

The form of the policy which will be issued to each of the men who take out the life and accident insurance was attached to the latter. The policy so attached contained a full statement of the conditions upon which the insurance might be continued after the insured leaves the company.

Order in Regard to Smoking

The order in regard to smoking on cars adopted by the Public Service Commission of the First District of New York (Greater New York) on Aug. 1, 1913, which was noted in the Electric Railway Journal of Aug. 16, 1913, follows in full:

"A hearing having been duly had by and before the commission on June 18, 1913, and the commission being of the opinion after said hearing that the following regulations with respect to smoking and the carrying of lighted cigars, cigarettes and pipes in and upon the cars, stations, station platforms, station stairways, waiting rooms, waiting cars and shelters of the street railroads subject to the jurisdiction of this commission should be put in force, observed and enforced by the corporations operating such street railroads, now therefore it is ordered,

"(1) That all street railroad corporations operating street railroads subject to the jurisdiction of this commission be and they hereby are directed and required to prohibit smoking or the carrying of lighted cigars, cigarettes and pipes in or upon their stations, station platforms, station stairways, waiting rooms, waiting cars or shelters; also to prohibit such practices in or upon the cars or the platforms of the cars operated by them, of whatsoever type such cars may be; except that upon the open cars having running boards along the sides and having seats accessible directly from such running boards smoking and the carrying of lighted cigars, cigarettes and pipes may be permitted on not more than the four rear seats of each car, including the seat on the back platform thereof. Said corporations are also directed and required to make and enforce regulations prohibiting the practices mentioned, except as herein permitted; also to post conspicuously in their cars, stations, waiting rooms, waiting cars and shelters appropriate notices that such practices are prohibited therein, except as herein permitted; also to instruct and direct their employees to see that such regulations are enforced.

"(2) That this order shall take effect immediately and shall continue in force until changed or abrogated by further order of the commission.

"(3) That each of the street railroad corporations upon which this order is served notify the commission within ten days after service of this order upon it whether the terms of this order are accepted and will be obeyed."

President Shoup on Fares on the Pacific Electric Railway

In a statement in regard to fares over the Pacific Electric Railway between Los Angeles, Cal., and the beach cities, Paul Shoup, president of the company, recently made the following statement:

"All tickets, including commutation tickets, absolutely essential to the prosperity of the beach cities being counted, the earnngs per passenger between Los Angeles and the Santa Monica Bay cities are very little in excess of 1 cent per mile.

"No comparison with street-car fare is just because the blanket rate of 5 cents on street cars applies not only for 5 miles, but also for rides of one block, while there is no commutation rate. This blanket rate of 5 cents makes average earnings per passenger per mile in any city in the United States the size of Los Angeles greater than that between Los Angeles and the beaches by the Pacific Electric Railway.

"The Pacific Electric Railway runs during the summer season special excursions nearly every week at a 25-cent rate for the round trip to care for people who feel they cannot afford the higher rate. On a round trip to Long Beach, 42 miles, this yields hardly ½ cent a mile, or to Santa Monica about ⅔ cent a mile. The company cannot make any such mileage rate generally and continue to operate.

"The expense to the company for every item since the road was built to the beaches has increased greatly. It has raised the wages of interurban trainmen twice in four years. The interurban cars now in use cost 50 per cent more than those of five years ago, while the new steel cars will be almost double the cost of the old. This increased expenditure may be found throughout every department of the company.

"The public demand for improved and additional facilities and for safety has made it necessary for the company to add to the cost of its existing lines, not including extensions, at the rate of some $2,000,000 a year.

"Present rates are not extortionate even for the individual trip. The 50-cent round-trip rate means a fare running from 1 cent a mile to 1.4 cents a mile, while the railway fares in the United States generally range from 2 cents as a minimum up.

"On many of the electric roads on the coast and likewise on all the steam roads the mileage rate is 2 cents and sometimes more. The steam roads of Iowa, Minnesota and Missouri are claiming that the 2 cent rate is confiscatory. The Minneapolis & St. Louis Railroad has proved its case before the United States Supreme Court.

"It must not be forgotten that the Pacific Electric Railway makes low rates for thirty-ride tickets for the benefit of families so that no hardship is worked upon those who do not travel every day, but do travel frequently."

Transfer Zone Extended in Providence.—The Rhode Island Company, Providence, R. I., has received permission from the Public Utilities Commission to extend the transfer zone in East Providence. The transfers can be used within the district bounded by Market Square and Pawtucket Avenue.

Plan to Expedite Car Loading.—The Board of Supervisors of San Francisco plans to expedite street car traffic on lower Market Street by compelling passengers who enter cars at the ferry depot to purchase tickets before boarding the cars. It is hoped thus to obviate the delay caused by conductors of the cars making change.

Indiana Company Asks Increase in Passenger Rates.—The Interstate Public Service Company, Indianapolis, Ind., which controls by lease the Indianapolis, Columbus & Southern Traction Company, Columbus, Ind., has petitioned the Public Service Commission for permission to increase its passenger rates between Indianapolis and Columbus and intermediate points to the maximum, under the law, of 2 cents a mile.

Reduced Rates on New Missouri Line.—J. R. Harrigan, general manager of the Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo., has announced a voluntary reduction of rates from 2½ to 2 cents a mile. The rate from Kansas City to St. Joseph will be reduced from $1.25 to $1.05. The rate from Kansas City to Excelsior Springs will be changed from 65 cents to 55 cents. Rates to other towns on the line will be reduced in proportion.

Reduced Rates for School Children in Troy, N. Y.—The United Traction Company, Albany, N. Y., has announced that reduced rates on its cars in Troy for school children will become effective when the school term opens in September. The rates, to be announced later, will be practically half of the present rates. They will be operative only on school days and during school hours. The system under which the school children will be able to purchase the commutation tickets will also be announced later.

Progress of Re-routing in Philadelphia.—The Philadelphia (Pa.) Rapid Transit Company has issued its Co-operative Bulletin No. 22, including steps Nos. 4 and 5, describing its re-routing plans to take effect during August. The principal object of its re-routing system, it is explained, is to alternate the direction of traffic on parallel streets so as to overcome inconvenience where two adjacent streets

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are used for traffic bound in the same direction, and the streets available for travel in the opposite direction are several squares apart.

Complaint Against International Railway Satisfied.—A complaint was recently made to the Public Service Commission of the First District of New York by the Cazenovia Business Men's Association and others against the International Railway, Buffalo, N. Y., regarding passenger cars and service rendered the public on the Abbott-South Park line. A letter has been received by the commission from the complainant, however, to the effect that lately the service has been improved to such an extent as to meet with the association's entire approval.

Ohio Company to Prosecute Conductors Detected Stealing.—So much trouble with certain conductors has lately been encountered by the Northern Ohio Traction & Light Company, Akron, Ohio, because of a tendency to hold out money collected for fares that it has been decided to prosecute all who are detected in the crime. The usual custom has been to dismiss such men from the service, but the officers of the company feel that they only repeat the offense on some other road, and that for the sake of general security prosecution is a better step.

Accident Pamphlet at Atlantic City.—The Atlantic City & Shore Railroad has recently distributed to its employees in all departments a booklet entitled "Accidents: How to Prevent Them," written by David Gibson. The book is of pocket size with twelve pages and graphically describes ways to prevent accidents and the irreparable loss and injury which an accident causes to a sufferer or his family, or both. Later the company may distribute these pamphlets among the public in order to let them know the efforts the company is making to obtain better care on the part of the trainmen.

British Columbia Electric Railway Folder.—The British Columbia Electric Railway, Vancouver, B. C., has issued a traffic folder, "Tips for Tourists," in which is contained various information of value to visitors in Vancouver. The folder is on white paper, printed in black with red captions and special notes, and in the center there is a double-page plan of the company's lines in Vancouver and the suburbs, together with a table showing the distinguishing works of the principal lines. A bird's-eye view of Stanley Park is also given, as well as numerous half-tone engravings made from photographs showing various places of interest around the city and various resorts for amusement and recreation.

Street Car Exhibit at Pittsburgh Exposition.—An elaborate display of street railway cars and equipment is to be made at the Pittsburgh Exposition this year by the Pittsburgh Railways. It is promised that the show will be one that will be appreciated by even the smallest schoolchild, as it will show the evolution of the street railway from a forgotten period to the present time. The exhibition is to be a most pretentious one and will take up a large space in Machinery Hall. A feature will be moving pictures that will give comparisons of street-car service in Pittsburgh and other cities. Actual scenes of the handling of crowds during the rush hours are to be shown. There will also be pictures of accidents and their causes, how people should get on and off cars, and the like.

Free Rides Ended on St. Louis Municipal Line.—After carrying passengers free for ten years, the city of St. Louis has decided to charge fares on the Water Works Railways, an 8-mile line extending from Baden to the Chain of Rocks or the municipal water works. Tickets will be sold at the rate of eight for 25 cents, and 5 cents will be charged for a single ride. City employees engaged in work at the water works will receive free transportation. In the fiscal year ended March 31, 1913, the passengers carried totaled 352,489, including city employees. The last annual report of the water commissioner shows that the cost per passenger is slightly in excess of 3 cents. It is believed that the plan will result in a revenue to the city of from $500 to $600 per month during a considerable portion of the year.

Decision Concerning Interurban Service from Akron.—According to a decision handed down by the Public Service Commission of Ohio, Aug. 5, 1913, the Northern Ohio Traction & Light Company, Akron, Ohio, will be permitted to operate trains of two or more interurban cars on the portions of its lines composing its interurban railway system and so much of its lines in any municipality as is necessary to be used in the transportation of interurban cars in interurban railway service, in charge of one motorman for each train of two or more cars and one conductor for each car in such a train. This permission is based upon the provision that each of such cars when so operated in trains of two or more cars must be equipped with automatic air brakes and must be under the control of the one motorman.

Relief from Reduced Rates Prayed For.—At a hearing before Federal Judge Neterer on Aug. 12, counsel for the Puget Sound Electric Railway declared that the reduction in rates on the company's interurban line between Seattle and Tacoma, made effective by the State Railway Commission three years ago and since sustained by the Public Service Commission, has brought the profits of the railway so low that property valued at more than $4,000,000 does not yield a return of 2 per cent. Counsel for the State asserted that the Superior and Supreme Courts of the State, had found the new rates to be reasonable and lawful, and they opposed the action of the interurban company in seeking to get a permanent injunction in the federal court. Judge Neterer announced that his decision would be held under advisement until the papers in the case and authorities had been examined.

Repeal of Speed Ordinance in Cleveland.—In their effort to secure a readjustment of schedules under the city's plan of operation, the street railway men of Cleveland, Ohio, discovered recently that the old speed ordinance, limiting the speed of cars in the down-town business district to 10 miles an hour and in the residence district to 15 miles an hour, had been repealed shortly after Peter Witt was appointed street railway commissioner. Now there is no limit to the speed the cars may make in any part of the city. According to Commissioner Witt the ordinance was repealed because claimants in accident suits always alleged that cars were exceeding their speed limit and too much opportunity for fraud was thus offered. As a result of the repeal, the street railway employees will not be able to secure extensions in the running time of cars by means of the ordinance, as they expected.

Accident on Wisconsin Line.—Two passengers were killed and more than fifteen others were injured in a rear-end collision on the Milwaukee Northern Railway on the evening of Aug. 10. The following statement is attributed to George Lewis, claim agent of the company: "The accident was unavoidable, caused by a combination of circumstances. Motorman Williams has been with the company for many years and is one of the most reliable men in our employ. He apparently misjudged the distance to the local car. He also says he expected the car to move. He applied the brakes, but did not put them on full force until only a short distance from the other car, when he saw that an accident was unavoidable. He says the brakes worked well, but that the momentum was too great to stop. I believe that had the local car been of heavy construction like the interurban there would have been no fatalities."

Plans for Handling State Fair Crowds in Des Moines.—Plans are being made by the Des Moines (Ia.) City Railway for handling the increased traffic during the coming state fair. Several changes will be made in the routing of cars through the down-town district to accommodate the fair grounds traffic. Only a few of the lines will maintain their present routes and the running schedules will be shortened. There will be sixteen trains and twenty single cars in continuous operation to the fair grounds, in addition to ten cars to be operated continually to the White City, making a total of from sixty-two to sixty-five cars. More cars will be held in reserve for use if needed. For the benefit of the employees on the fair grounds lines, the company has arranged for the erection of a big dining tent at East Thirtieth and Walnut Streets. Dinner and supper will be furnished by the company to the employees free of charge.

Record Excursion on Aurora, Elgin & Chicago Railway.—The Aurora, Elgin & Chicago Railroad, Wheaton, Ill., has experienced some record-breaking picnic parties this year. On a recent occasion "The Fair," a large Chicago department store, held its annual picnic at Glenwood Park, 40 miles out of Chicago. In order to handle this round-trip excursion, it required sixty-eight cars, operated in four,

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five and six car trains, leaving the Chicago terminal every half-hour from 8.15 a. m. until 12 m., the return trip being made from 4.15 p. m. until 8 p. m. It is estimated that approximately 4000 people were handled at a chartered-car rate. On another recent date this company handled two excursion parties, one including approximately 2500 people, requiring forty special cars, and the other requiring twenty-two special cars. One party made the round trip to the Fox River Park, near Aurora, Ill., and the other to Glenwood Park, near Wheaton, Ill.

Third Arbitrator Chosen for Investigation at Springfield, Mass.—Henry V. Cunningham, an attorney of Boston, Mass., has been selected as third arbitrator in the investigation of working conditions to be conducted upon the Springfield Street Railway and the Worcester (Mass.) Consolidated Street Railway. The companies will be represented by Bentley W. Warren, Boston, and the employees by William P. Hayes, Springfield. The board will consider the relation of the "nine-hours-in-eleven" law to the working agreement between the companies and their employees. Messrs. Warren and Hayes agreed upon the third arbitrator after about ten days' consideration. Mr. Cunningham is well known in Massachusetts public life, and has been connected with the ballot law commission for about twenty years. He is personal counsel for Cardinal O'Connell and has served upon arbitration boards prior to the present association. The board will meet at once to arrange for hearings.

President Hanchett Entertains Employees at Home.—Benjamin S. Hanchett, president of the Grand Rapids (Mich.) Street Railway on Aug. 12 entertained the employees of this company at his home in Lakewood on the occasion of their eleventh annual outing. The festivities were started early in the afternoon by a concert given by a band composed of employees. This was followed by a baseball game, a series of races and contests, for which prizes were given, a vaudeville performance and a display of daylight fireworks. Aviator Jannus also made a short exhibition flight in his hydro-aeroplane. A generous barbecue supper was informally provided for the picnickers, after which elaborate night fireworks were set off. The final feature of the day was a dance held in the new ballroom of the Hanchett residence, with music furnished by a Filipino orchestra. Louis J. De Lamarter, secretary of the street railway company, assisted by a well-organized staff, was responsible for the excellent management of the picnic. The following day the night men of the street railway company and their families enjoyed the same program, while the day men double-headed their work.

Air Brakes Ordered on Freight Cars in Connecticut.—The Public Utilities Commission has issued an order to the street railway companies of Connecticut restricting their operating freight cars in trains of two or more cars, exclusive of the motor car, on and after Jan. 1, 1914, without having all of the cars making up such train equipped with an air-brake system which can be operated from the motor car, and which will automatically apply the brakes should any part of the train become detached or should a break occur in the pipe line. There are excepted from the provisions of this order, however, emergency cases, such as hauling disabled cars, taking cars to the repair or paint shop, and in the use of cars for the removal of snow from the streets over which the company operates. In the case of cars used in the removal of snow, all such cars when used in trains of three or more, exclusive of the motor car, shall be equipped with automatic air brakes. The fact was brought out in a hearing before the commission on June 18, 1913, that the Connecticut Company has an order or rule in force whereby all stone cars and trailers, or other cars used in freight work, when operated in trains of two or more cars, shall be equipped with chains, the same to be kept hooked up when the cars are in service, as a safeguard in case the couplings should fail; also that all motor cars shall be equipped with hooks or rings to permit the use of the chains between the motor car or cars and trailers to supplement the couplers. In all cases where automatic air brakes are not used, under the exceptions to this order, the commission recommends that the several companies coming coming under the purview of the order adopt the rule of the Connecticut Company.

Personal Mention

Mr. C. S. Mitchell, who has been auditor of the Beaver Valley Traction Company, New Brighton, Pa., has had his title changed to comptroller.

Mr. H. W. Cameron, who was secretary and treasurer of the Pittsburgh, Harmony, Butler & New Castle Railway, Pittsburgh, Pa., has been appointed auditor of the company.

Mr. R. C. Jones, who has been treasurer and assistant general manager of the San Antonio (Tex.) Traction Company, has been elected secretary and treasurer of the company. He succeeds Mr. O. O. Woodman as secretary.

Mr. S. H. Waddell, who has been claim and purchasing agent of the Pittsburgh, Harmony, Butler & New Castle Railway, Pittsburgh, Pa., has been appointed secretary and treasurer of the company in addition to purchasing agent.

Mr. J. W. Adams has resigned as superintendent of transportation of the Pine Bluff (Ark.) Company and has been succeeded in that position by Mr. W. Woodruff, formerly car receiver for the company, who in turn has been succeeded by Mr. Earl Smith, former construction timekeeper.

Mr. R. P. Stevens, who has just resigned as president and general manager of the Lehigh Valley Transit Company, Allentown, Pa., has been elected president of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, and of its subsidiary companies, the appointment to take effect Oct. 1. An illustrated biography of Mr. Stevens was printed in the Electric Railway Journal of Aug. 16, 1913.

Mr. William H. Hitchcock, who has been general superintendent of the Trenton & Mercer County Traction Corporation, Trenton, N. J., since January, 1913, has been appointed general manager of the company. Mr. Hitchcock began his railway career as a conductor with the Metropolitan Street Railway, Washington, D. C., in 1896. He was promoted to station clerk in 1900 when a number of the smaller properties in Washington were consolidated as the Washington Traction & Electric Company. The latter company was later absorbed by the Washington Railway & Electric Company. Mr. Hitchock was subsequently promoted and served as street inspector, general instructor and division superintendent. He resigned from the Washington Railway & Electric Company in the early part of 1910 to become superintendent of transportation with the Wilmington & Philadelphia Traction Company and the Southern Pennsylvania Traction Company, Wilmington, Del., and continued with these companies until his appointment as general superintendent of the Trenton & Mercer County Traction Corporation in January, 1913.

William H. Hitchcock

Mr. W. G. Ross was elected a director at the recent annual meeting of the Montreal (Que.) Tramways. Mr. Ross was formerly managing director of this company, but resigned in 1910 to devote his attention to his other interests. At this time he is president of the Amalgamated Asbestos Corporation, Ltd., and also chairman of the harbor commission of Montreal, which has charge of improvements to cost several million dollars.

Mr. George W. Manning has been appointed superintendent of railway service of the Utah Light & Railway Company, Salt Lake City, Utah. Mr. Manning has been in the employ of the Utah Light & Railway Company and its predecessors continuously since 1891. He began his service in Salt Lake City as motorman and later was promoted to be timekeeper, starter and inspector. Mr. Manning was appointed assistant superintendent of railway service of the company in 1907.

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Mr. Hoyt Catlin has been appointed general manager of the Waycross Street & Suburban Railway, Waycross, Ga. For five years Mr. Catlin has been conducting a series of special experiments in the art of paper making and the distillation of wood and other vegetable matter. While pursuing this work he was superintendent of the Universal Distillation Company, Waycross. In addition to the above-mentioned pursuits, he has been for over three years, with the exception of some eleven months, assistant to the superintendent of the Ware County Light & Power Company, Waycross. Previous experience in central-station, substation and new-business work was gained by Mr. Catlin with the Northern Connecticut Light & Power Company, Windsor Locks, Conn.

Mr. W. E. Terry has been appointed general auditor, assistant secretary and assistant treasurer and purchasing agent of the Appalachian Power Company, Bluefield, W. Va. Mr. Terry entered railway service in 1902 as voucher clerk for the Birmingham (Ala.) Railway, Light & Power Company and remained with that company until 1905, when he resigned to become secretary and treasurer of the Meridian Light & Railway Company, Meridian, Miss. In 1907 he left Meridian to become associated with Stone & Webster as assistant treasurer. Mr. Terry was connected with that organization until 1910, having charge of the Savannah (Ga.) office during 1907. Later he was transferred to the Key West Electric Company, also a Stone & Webster property. In 1910 Mr. Terry went into business for himself as a public accountant, and in February, 1912, he entered the service of H. M. Byllesby & Company. He was with the Consumers' Power Company, Mankato, Minn., and later in Stillwater, Minn., before his appointment with the Appalachian Power Company.

Mr. H. J. Crowley, general manager of the American Railways, Philadelphia, Pa., and vice-president of the Lynchburg Traction & Light Company, Lynchburg, Va., has been elected president of the latter company to succeed Mr. R. D. Apperson, who continues as chairman of the board of directors of the company and of the Roanoke Railway & Electric Company, Roanoke, Va., and the Roanoke Traction & Light Company, Roanoke, Va. Mr. Crowley was born in Unionville, Conn. After completing a four years' apprenticeship with the Pratt & Whitney Company, Hartford, Conn., he entered the locomotive shops of the New York, New Haven & Hartford Railroad. His first electrical experience was with the Schuyler Electric Light Company, constructing electric light plants in New England, Pennsylvania and Ohio. In 1888 he entered the employ of the Thomson-Houston Electric Company and was associated with the late Charles T. Van Depoele in early electric railway developments. Later he was appointed chief of experts of the Thomson-Houston Company. From 1890 to 1893 he was railway manager of the company's Southern office, with headquarters at Atlanta. During this period he was in charge of a number of early railway installations, including Atlanta, Augusta, Savannah, Birmingham, Mobile, Chattanooga and Memphis. From 1893 to 1899 he was manager of the General Electric Company's railway department in Philadelphia. When the American Railways Company was organized in 1899 Mr. Crowley was appointed general manager. This company owns and operates the Scranton Railway and the Altoona & Logan Valley Electric Railway of Pennsylvania, the Bridgeton & Millville Traction Company and the Bridgeton Electric Company, Bridgeton, N. J., the electric railway, electric lighting and gas companies of Lynchburg, Va., the electric railway and electric lighting plants at Roanoke, Va., the electric railway and electric lighting plants in Huntington, W. Va., Ashland, Ky., and Ironton, Ohio, the People's Railway, Dayton, Ohio, the Springfield (Ohio) Railway and the Chicago & Joliet Electric Company, Joliet, Ill.

H. J. Crowley

Mr. Norman McD. Crawford has resigned as president of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, and its subsidiary companies to devote his time to other enterprises in which he is interested. Mr. Crawford was for several years vice-president of the Ohio Electric Railway, Cincinnati, Ohio, and previously, for a long time, was general manager of the Hartford (Conn.) Street Railway. As a contractor he built the Glastonbury line of the Hartford Street Railway in 1891 and was afterward retained by the company as engineer. In 1894 he was made general manager of the company, which position he held until the Hartford Street Railway was taken over by the Connecticut Company, acting for the New York, New Haven & Hartford Railroad. In December, 1908, Mr. Crawford was elected president of the Mahoning & Shenango Railway & Light Company. Mr. Crawford spent six months in Europe in 1906, investigating street railway conditions there for the committee on public ownership and operation of the National Civic Federation.

Mr. R. D. Apperson has resigned as president of the Lynchburg Traction & Light Company, Lynchburg, Va., but continues as chairman of the board of directors of the company and of the Roanoke Railway & Electric Company, Roanoke, Va., and the Roanoke Traction & Light Company, Roanoke, Va. Mr. Apperson was born in 1863. He entered the office of the Pullman Palace Car Company in 1875. In 1886 he became connected with the Little Rock & Citizens' Street Railway, Little Rock, Ark., remaining with that company until 1890, when the property was sold. He then went to Staunton, Va., and in five months an electric railway was built in the interest of his New York and Arkansas associates, who insisted on Mr. Apperson assuming the management of the property. While thus engaged he carried on a contracting business and later built and operated an electric light and gas plant in Staunton for the same interests. In 1899 Mr. Apperson and his associates purchased the property of the Petersburg Gas & Light Company, Petersburg, Va., and the Lynchburg Gas Company. Two years later they purchased the property of the Lynchburg Electric Railway & Light Company and the Lynchburg & Riverton Street Railway, and these properties and that of the gas company were consolidated as the Lynchburg Traction & Light Company. In 1903 the Apperson interests purchased the property of the Roanoke Railway & Electric Company. In January, 1910, the American Railways acquired the property of both the Lynchburg Traction & Light Company and the Roanoke Railway & Electric Company, Mr. Apperson continuing as president and general manager of both of the companies and becoming a director of the American Railways.

OBITUARY

Michael J. Leary, general freight and passenger agent of the Connecticut Company, New Haven, Conn., died of typhoid fever in the New Haven hospital on Aug. 18, at the age of forty-eight. Mr. Leary had charge of freight and passenger work over the whole system. He was appointed to that office ten years ago, being promoted from the office of general freight agent of the Valley division. Mr. Leary is survived by his widow and three children.

Charles A. Caul, general roadmaster Chicago (Ill.) Railways, died Aug. 11, 1913, after an illness of five weeks, at the age of fifty-six. In 1888 Mr. Caul entered the service of the North Chicago Street Railway as an assistant foreman on track work. Later he was transferred to the operating department, where he worked as a gripman on the old cable cars until 1889. At this time he was placed in charge of the track department with the title of general roadmaster. In 1899, when the North Chicago Railway was taken over by the Chicago Union Traction Company, he was retained in charge of the track department, in which position he served until 1908, when he was made general roadmaster of the Chicago Railways Company. During the rehabilitation period following the acceptance of the 1907 ordinance, he had under his charge as many as 3000 or 4000 men in the extremely busy period. As an evidence of the respect in which he was held by the Chicago Railways Company, all of the offices were closed on the afternoon of his funeral and all construction work was suspended.

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Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Bridgeport & Southern Railroad, Bridgeport, Ill.**—Incorporated in Illinois to build an interurban railway from Bridgeport to Mount Carmel. Capital stock, $25,000. Incorporators: John P. Klein, A. A. Pantelis, O. H. Weidmer, Thomas S. Hogan and George B. Erb, all of Chicago.

***Springfield & Pana Railway, Springfield, Ill.**—Application for a charter has been made by this company to build an interurban railway between Springfield and Pana. Capital stock, $25,000. Incorporators: John E. Melick, C. M. Williams and Charles P. McClaughlin, Springfield; A. C. Sprague, N. Smith and C. C. Melick, Hampton, N. J.

FRANCHISES

San Diego, Cal.—The San Diego Electric Railway has applied to the Council for a franchise over Twelfth Street and Park Boulevard through Balboa Park in San Diego.

Lewiston, Idaho.—F. L. Sturm, representing the Lewiston-Clarkston Valley Railway has asked the Council for an extension of time to Feb. 1, 1914, on its franchise in Lewiston. This line will connect Lewiston, Idaho, with Clarkston and Asotin, Wash. [E. R. J., June 14, '13.]

Bradentown, Ind.—C. A. Mattison, Indianapolis, and associates have asked the Council for a franchise to build an electric railway over certain streets in Bradentown. This is part of a plan to build a line to connect Bradentown, Manatee and Cortez.

Elmira, N. Y.—The Elmira Water, Light & Railroad Company has asked the Public Service Commission, Second District, for the approval of its franchise in South Broadway and for an extension of its lines in Elmira.

Rochester, N. Y.—The New York State Railways has asked the Common Council for two franchises for extensions of its lines in Rochester.

Bryan, Ohio.—The Toledo & Indiana Electric Railway has asked the Council for a franchise to extend its line in Bryan.

Portland, Ore.—The Portland & Oregon City Railway has asked the Council for a street railway franchise in Portland.

Dallas, Tex.—The Southern Traction Company has received a franchise for the right-of-way to permit the joining of the Corsicana and Waxahachie interurban lines to enter Dallas through the river beds and connect with the North Texas Traction Company at about Fifth Street and Oak Cliff in Dallas.

El Paso, Tex.—The Rio Grande Valley Traction Company has asked for a franchise in El Paso.

Oak Cliff, Tex.—The Southern Traction Company has asked the Council for a franchise in Oak Cliff.

TRACK AND ROADWAY

Little Rock Railway & Electric Company, Little Rock, Ark.—This company has definitely decided not to accept the proposition recently submitted by Mayor Charles Taylor for the construction of an electric line across the free bridge, and it has submitted a counter proposition which is to have consideration from the special committee of the Council having the matter in charge.

Fresno, Hanford & Summit Lake Railroad, Fresno, Cal.—It is stated that Kimball & Somers, Oakland, have agreed to supply this company with enough funds to build 20 miles of interurban line out of Fresno, and the plan under which they are willing to operate has been approved by the State Railroad Commission. The company already has rights-of-way from Fresno to Lone Star and at that point the railway branches, rights-of-way having been secured to Sanger, to the east, and to Fowler, Selma and Kingsburg, to the west and south.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—This company has placed in operation its line to Pittsburg, a distance of 8 miles beyond Bay Point, its present terminus in Contra Costa County.

***Arcadia, Fla.**—E. Prouty and George F. Hall, Arcadia, are promoting plans to build a gasoline interurban railway to connect Arcadia, Hall City, Christian Colony, Lake Okeechobee and intermediate points.

Jacksonville & St. Augustine Public Service Corporation, St. Augustine, Fla.—Work will be begun by this company by Oct. 1 on its line between Jacksonville, St. Augustine, Diego and Pablo Beach. Thomas R. Osmond, St. Augustine, general manager. [E. R. J., July 19, '13.]

St. Johns Electric Company, St. Augustine, Fla.—During the next few weeks this company plans to build extensions on several branches of its lines in St. Augustine.

***Sterling, Ill.**—It is stated that arrangements have been completed for financing the construction of an interurban electric railway from Sterling to Savanna and that a company will be organized shortly and a preliminary survey of the route made. William Osborne, 527 South State Street, Chicago, is interested.

Arkansas Valley Interurban Railway, Wichita, Kan.—It is reported that this company plans to extend its lines to the north in Wichita in the near future.

***Jenkins, Ky.**—It is stated that the Consolidated Coal Company is preparing plans to build an 8-mile electric railway between Jenkins, McRoberts, Dunham and Burdine.

Louisville & Interurban Railroad, Louisville, Ky.—Plans are being considered by this company for an extension of its suburban line from Orell several miles west to Kosmosdale.

Shreveport (La.) Traction Company.—Work has been begun by this company upon plans for many improvements of its lines in Shreveport.

Calais (Maine) Street Railway.—It is reported that this company plans to build a ½-mile extension from the corner of King and Union Streets in St. Stephen, N. B., to the fair grounds.

Winnipeg (Man.) Electric Railway.—This company is making progress on the new line to Fort Garry. The company has already over 3 miles of track laid and the wire strung and the grading has been done on another 3 miles.

Concord, Maynard & Hudson Street Railway, Maynard, Mass.—During the next three weeks this company plans to build two concrete bridges. One structure will be erected at Acton, Mass., and the other in Concord, Mass.

Worcester (Mass.) Consolidated Street Railway.—Plans are being made to have this company build an extension through Brook Street to the town line on Greeley Street in Clinton.

Detroit (Mich.) United Railway.—Plans are being made by this company to secure right-of-way to double-track its line between Royal Oak, Flint, Rochester and Oxford.

***Flint, Mich.**—Vincent R. Coon, Detroit, and associates are considering plans to build a 14-mile electric railway from Flint to Fenton via Long Lake.

Commonwealth Power, Railway & Light Company, Grand Rapids, Mich.—It is reported that this company will expend about $100,000 for the improvements on the Grand Rapids, Holland & Chicago Railway, which it controls.

***Holland, Mich.**—The West Michigan Park Association is preparing plans for the construction of an electric railway on the north shore of Black Lake to Ottawa Beach.

Kalamazoo-Grand Rapids Electric Railway, Kalamazoo, Mich.—Over 30 miles of track have been laid by this company and the grading for the entire line will be completed by Sept. 1 for its 50-mile line between Kalamazoo and Grand Rapids.

Minnesota Central Railway, Minneapolis, Minn.—This company states that it has begun the construction of its 66-mile electric line from Minneapolis to St. Cloud, via Robbinsdale and Champlin. E. G. Potter, Minneapolis. [E. R. J., Aug. 16, '13.]

***Springfield, Mo.**—Plans are being made to begin surveys at once for the proposed electric railway to connect Hollister, Powersite and Branson. This line will connect with the St. Louis & San Francisco Railroad at Ozark. W. J. Campbell, St. Louis, is interested.

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Brooklyn (N. Y.) Rapid Transit Company.—Plans for the reconstruction of the Sea Beach line of the Brooklyn Rapid Transit System as a four-track depressed line from its connection with the Fourth Avenue subway, about Sixty-fifth Street, Brooklyn, to a point immediately south of Eighty-sixth Street, near Coney Island, have been filed with the Public Service Commission by the New York Municipal Railway Corporation, an auxiliary of the Brooklyn Rapid Transit Company.

***Great Neck, N. Y.**—J. T. McGovern, A. Wolf, John C. Baker and Melvin D. Chapman are promoting plans to build a 1-mile electric line between the steamboat landing and North Hempstead Turnpike in Flushing.

Frontier Electric Railway, Niagara Falls, N. Y.—Arrangements are being made for the beginning of work on the double-track line of this company between Niagara Falls and Buffalo. All obstacles that have been confronting the company have been overcome. Under the company's franchise with the city of North Tonawanda, the line must be well under way by July 1, 1914. No contracts for rails, power poles, rolling stock or other equipment has yet been placed. James S. Simmons, vice-president. [E. R. J., July 26, '13.]

Piedmont & Northern Railway, Charlotte, N. C.—Plans are being made by this company to relocate one of its lines in Greenville, also to build on Academy Street from Washington Street to McBee Avenue, in order to make certain other improvements at an expenditure of about $150,000.

***King, N. C.**—Right-of-way has been secured to build an electric railway to connect King, Vade Mecum Springs and Stuart, Va. W. D. Wilcox is interested.

Marion & Suburban Railway, Marion, Ohio.—George Whysall, receiver of this company, will ask the court to authorize an issue of receiver's certificates to equip and operate the line, which has not been completed. An issue of $250,000 bonds was made to build the railway, but only a small part of the securities was disposed of.

Youngstown & Sharon Railway & Light Company, Youngstown, Ohio.—This company announces that plans are being made to extend its lines on North Water Street, in Youngstown, as far as Clark Avenue, thence east on that thoroughfare to Sharpsville Street, there to connect with the Sharon-Sharpsville line. The company also proposes to extend its lines east on Silver Street and south through the eastern portion of Sharon and Farrell and connecting at the intersection of the roadway and Spearman Avenue with the Sharon-Wheatland lines.

Ardmore (Okla.) Traction Company.—Plans are being made by this company to begin at once to improve and extend some of its lines in Ardmore.

Portland, Eugene & Eastern Railway, Portland, Ore.—Plans are being made by this company to extend its Alpine branch 7 miles, and the Bellefontaine branch 10 miles, this year. The company is electrifying its Fourth Street line in Portland.

Lehigh Valley Transit Company, Allentown, Pa.—Two heavy grades, a railroad grade crossing and from eight to ten minutes in running time of the interurban service between Allentown and Philadelphia will be eliminated by the completion, about Oct. 1, of the ½-mile reinforced concrete bridge of the Lehigh Valley Transit Company connecting Allentown and South Allentown. The renewal of the rail from Soudertown to Sellersville and the installation of stone ballast between these two points has been completed.

***California, Pa.**—A company will be organized to build an electric line from California to several mining towns along the Monongahela River, including Granville, Centerville, Vesta No. 5, Frederickstown and Millsboro, in Washington and Greene Counties. E. C. McCullough, Uniontown, is the engineer, and C. L. Snowden, Brownsville, is said to be interested in the project. Rights-of-way have already been secured for the greater part of the distance.

Conestoga Traction Company, Lancaster, Pa.—During the next few months this company plans to build several short extensions from Lancaster to Rohrerstown, a distance of about 2 miles. Material has been ordered.

Beaver Valley Traction Company, New Brighton, Pa.—This company has just completed laying about 1800 ft. of new track and it expects to build about 1500 ft. of new track during the next few weeks.

Pittsburgh, Harmony, Butler & New Castle Railway, Pittsburgh, Pa.—Work will soon be begun by this company on its line between Beaver Falls and Ellwood City. This new line will cross the Beaver River from Ellwood to Koppel and connect with the Beaver Traction Company's lines at Morado.

***Shippensburg, Pa.**—Preliminary surveys have been made and right-of-way secured to build a 16-mile electric railway between Shippensburg, Newburg, McKinney and Roxbury. Application for a charter will soon be made and it is ultimately intended to extend this line to McConnellsburg.

Somerset (Pa.) Railway.—Surveys have been completed and preliminary arrangements have been made for the electric line to connect Somerset, Rockwood and Johnstown. C. C. Winslow, Somerset, chief engineer. [E. R. J., Aug. 10, '12.]

Hull (Que.) Electric Company.—During the next few weeks this company expects to replace 5 miles of 56-lb. steel rails with 65-lb. rails on its lines in Hull.

Northern Texas Traction Company, Fort Worth, Tex.—This company is asked to extend its lines in Fort Worth to the South Ryan addition.

Ogden (Utah) Rapid Transit Company.—Definite plans have been adopted by this company to build the extension from Twenty-fifth Street along Jefferson Avenue in Ogden.

SHOPS AND BUILDINGS

Sioux Falls (S. D.) Traction Company.—This company is now erecting its new carhouse, office, shop and waiting room building in Sioux Falls. The structure will be 88 ft. x 150 ft., with a capacity for twenty-four cars.

Galveston-Houston Electric Railway, Galveston, Tex.—It is stated that plans are being considered by this company to build a new passenger station in Galveston in the near future.

POWER HOUSES AND SUBSTATIONS

Los Angeles Gas & Electric Corporation, Los Angeles, Cal.—This company will install in its power plant the following apparatus: One 300-kw motor-generator set consisting of one 250-125-volt, three-wire d.c. generator direct connected to one 2400-volt, three-phase, 60-cycle, 870-r.p.m. induction motor. The apparatus has been ordered from the Westinghouse Electric & Manufacturing Company.

St. Johns Electric Railway, St. Augustine, Fla.—This company plans to build superheaters on all of its boilers.

Somerset Traction Company, Skowhegan, Maine.—During the next month this company will award contracts to build a new substation.

Boston (Mass.) Elevated Railway.—This company will add to its power plant equipment two 2000-kw, 600-volt d.c., six-phase, 25-cycle commutating-pole, self-starting rotary converters and six 375-kva, 13,200-volt, 25-cycle air-blast transformers, together with one switchboard for control of same. All this apparatus is being built and will be installed by the Westinghouse Electric & Manufacturing Company.

Southern Power Company, Charlotte, N. C.—This company has placed in operation its new steam plant at Mount Holly.

Columbus, Delaware & Marion Railway, Marion, Ohio.—An order has been placed by this company for a 750-kw turbine to be installed at its power plant at Marion by the General Electric Company.

Pittsburgh, Harmony, Butler & New Castle Railway, Pittsburgh, Pa.—It is reported that this company has secured an option on the organ works at Morado, where it plans to build a new power plant.

Utah Light & Railway Company, Salt Lake City, Utah.—Work will soon be begun by this company on a new substation at Bountiful which will supply power for its new interurban line between Salt Lake City and Bountiful. The structure will contain a 500-kw motor-generator set and auxiliary equipment, but is being built large enough to contain additional apparatus in case the company decides to extend its lines further north.

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Manufactures and Supplies

ROLLING STOCK

Grafton (W. Va.) Traction Company is in the market for several cars.

County Traction Company, Chicago, Ill., is in the market for thirty cars.

Santa Barbara & Suburban Railway, Santa Barbara, Cal., is in the market for two cars.

Illinois Traction System, Peoria, Ill., has ordered one parlor car from the St. Louis Car Company.

Milwaukee (Wis.) Western Electric Railway is contemplating the purchase of a considerable amount of new rolling stock in the near future.

TRADE NOTES

Electric Service Supplies Company, Philadelphia, Pa., has received orders for automotoneers from the Dallas (Tex.) Consolidated Electric Railway and the Des Moines (Ia.) City Railway.

Burton W. Mudge Company, Chicago, Ill., announces that Robert M. Smith, for the past year Eastern sales manager of the company, has been appointed general sales manager, with offices in Chicago.

Curtain Supply Company, Chicago, Ill., has received an order for its No. 48 ring-fixture curtains with Rex all-metal rollers to be installed in twenty-five new cars of the Boston Elevated Railway now being built by the American Car & Foundry Company.

General Electric Company, Schenectady, N. Y., has received an order from the East St. Louis & Suburban Railway to equip the ten interurban cars now being built by the American Car Company with ten four-motor GE-216 equipments, with K-35 control.

Ackley Brake & Supply Company, New York, N. Y., announces that T. Narushewitz, chief engineer of the Moscow (Russia) Municipal Railways, will attend the fall convention of the American Electric Railway Association at Atlantic City as guest of this company.

Allis-Chalmers Manufacturing Company, Milwaukee, Wis., will remove a part of its Chicago works to Milwaukee in an endeavor to concentrate its manufacturing plants in that city. By this change nearly 1000 of its employees will be transferred to its Milwaukee plant.

American Engine & Electric Company, Bound Brook, N. J., announces that it has taken over the business of the American Engine Company and will have increased facilities for the manufacture of the American-Ball high-speed steam engines, which have been built by the latter company for the past seventeen years.

Tillsonburg Electric Car Company, Tillsonburg, Ont., has been organized with the following officers: C. G. Davis, president; V. A. Sinclair, vice-president; J. T. Baillie, manager; F. Chandler, superintendent, and William Russ, secretary-treasurer. The company's plant is now nearly complete and operations will be begun in the near future.

Philadelphia Holding Company, Philadelphia, Pa., has received a recent order for its radial trucks from the Selma Street & Suburban Railway for 27-ft. 2-in. one-man cars, weighing approximately 11,000 lb. and having a 13-ft. 6-in. wheelbase; one from the Mahoning & Shenango Railway & Light Company for 24-ft. car bodies, weighing 16,000 lb. and having a 13-ft. 6-in. wheelbase, and another from the Montreal Tramways for 24-ft. car bodies having a 14-ft. wheelbase.

Warner International & Overseas Engineering Company, Ltd., London, Eng., has placed in service one of its non-parallel single trucks, with air-brake equipment, on the Toronto (Ont.) Railway. This truck, on which is mounted a new car body, has proved very satisfactory in every way, particularly so as regards its easy running. This is the first time the Warner equipment has been used in Canada, although it is standard on a great many railways in other countries.

T. C. White Company, St. Louis, Mo., has just placed on the market a new design of porcelain strain insulator. This new type is intended for use on high-voltage lines. It is almost square in shape, and thus the distance between the grooves through which the cables pass is greater than in any other shape and the leakage surface is correspondingly effective. In this new insulator the unglazed surface, so common at one end of ordinary porcelain insulators, has been eliminated.

American Car & Foundry Export Company, St. Louis, Mo., has been incorporated in Delaware, with a capitalization of $500,000, as a subsidiary of the American Car & Foundry Company. The foreign export business of the American Car & Foundry Company, at present managed by a large commission house, will pass entirely into the hands of this new subsidiary company, which will have offices in London, Berlin, Paris and in several South American cities. The incorporators are J. M. E. Ames, William M. Hager and Charles S. Gawthrop.

ADVERTISING LITERATURE

Railway Track-Work Company, Philadelphia, Pa., has issued a folder illustrating its reciprocating track grinder.

T. C. White Company, St. Louis, Mo., has issued a folder illustrating the different styles of its improved porcelain strain insulator.

H. W. Johns-Manville Company, New York, N. Y., has issued a folder describing its J-M metallic flexible sand spout for street cars.

Railway Improvement Company, New York, N. Y., has issued Catalog No. 3, which contains letters from interurban railways showing the economy resulting from the use of its coasting time recorders.

Bonney Vise & Tool Works, Allentown, Pa., have issued Catalog No. 16, describing and illustrating its different types of wrenches and vises. It also contains price lists of these tools, according to size.

American Safety Fender Company, Seattle, Wash., has issued a folder entitled "Fender Efficiency," containing a record of pick-ups made by the Nelson automatic air-controlled street car fender in Portland, Ore.

Chicago Pneumatic Tool Company, Chicago, Ill., has issued Bulletins Nos. 34-B and E-29, describing and illustrating respectively its "Chicago Pneumatic" power-driven compressors and its Duntley and Universal electric grinders.

Electric Service Supplies Company, Philadelphia, Pa., has issued a folder describing the different processes of manufacture of the Keystone steel gear cases and illustrating the method of spot welding embodied in the manufacture of these cases, as well as showing their lightness and the ease with which they can be repaired.

NEW PUBLICATION

Street Railway Reports, Volume 8. Matthew Bender & Company. Cloth, 393 pages. Price, $5.

An annotated edition of "Street Railway Reports," Volume 8, which contains reports of all electric railway and street railway decisions of both federal and state courts in the United States, has recently been published by Matthew Bender & Company. The major portion of the book is devoted to full reports of cases of interest in the electric railway world, and about one-quarter of the letterpress contains cases given only in brief syllabus form. The book is well supplied with annotations giving pertinent references at appropriate points, and at the front is placed an index to these special notes, not only for this particular volume, but for the entire eight. The best feature of the book for the busy railroad official, however, is the complete index, containing the various subjects arising under electric railway litigation and the cases reported on these points in the whole series. This outline is well classified to cover such points as "abutting owners," "advertising in cars," "arrest of passengers," "municipal regulation of brakes," "contributory negligence," "contracts creating a monopoly," "ejection of passengers," "duties of employees," "duties of pedestrians," "transfers" and all other points that may come up in the daily operation of an electric interurban or street railway. The book as a whole is excellent in its arrangement, exhaustive in the ground covered, clear-cut in the general editorial work, and the claim agent and company lawyer should find it of great assistance in looking up the latest decisions on all points.

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ILLEGIBLE CAR NOTICES

The general advertiser who posts an announcement in a car is very sure to use a type display that will be legible from the greater part of the car. He knows that if his message is to go home, his words must be few but full of meaning. Would it not be well for electric railways, when they too have something to advertise, to follow the example of the experienced advertiser? Not long ago one railway issued a "courtesy" poster which ambled around and took several hundred words to explain that the men were instructed to be courteous to passengers and that all disputes regarding transfers, smoking, etc., should be reported to the management for adjustment. Yet the substance of this notice could have been put into a few words in much larger type, and then the company's story would have had a much better chance to be read and remembered. Aside from its unreadable typography, the poster was rarely in the same location in different cars, and in some cases it was attached almost along the center line of the ceiling. Under these circumstances, it is not likely that any large part of the public is properly acquainted with this railway company's laudable intentions to promote a better understanding with its patrons.

THROUGH SERVICE FOR AMUSEMENT RESORTS

During the present summer several roads have discontinued the operation of through cars for traffic to and from amusement resorts situated on branches from the main line, furnishing instead shuttle service or its practical equivalent over the branch line and handling the major part of the passengers by means of a somewhat augmented main-line service. The plan has much to commend it from a strictly operating standpoint, for the profitable operation of a temporary service to some unusual destination is always subject to the reverses due to inclement weather as well as to the lack of opportunity for estimating the amount of traffic in advance of the time at which it is presented for transportation. In addition, the empty haul of the return trip is a prolific source of diminished revenue. Nevertheless, the plan is as dangerous an economy as that of the boy who mounted stairs two at a time to save shoe leather and then split his trousers. Hardly anything is productive of more adverse comment by the public than the necessity for transferring to some branch line when the number of people transferred is apparently large enough to warrant the operation of special through cars. On the other hand, the installation of the latter class of service cannot fail to make friends for the company, and even though it may not be as profitable as the other method of handling amusement resort crowds, it affords indirect advantages which should not be overlooked in planning for the handling of this class of traffic.

APARTMENTS IN RAILWAY SERVICE BUILDINGS

A notable feature of German electric practice is to incorporate living quarters for family use in substations, passenger stations and the general utility buildings at operating carhouses. This policy offers the advantage of having the local superintendent, agent or other employee on the spot for practically twenty-four hours a day. At a carhouse, for example, the same superintendent is in charge from the earliest preparations for the heavy morning service until the return of the last evening trippers. This long period of service can be performed by him without fatigue because he loses no time in going to and from work and has ample opportunity for a siesta between peak hours. Residence at a passenger station is equally desirable in the case of ticket agents, as this would insure the practically continuous presence of some one to receive service and emergency messages, and it would also avoid undue confusion at stations where it is customary for the agent to open the ticket window ten minutes before train time. Substations also offer opportunities for the installation of living rooms. The average interurban substation is usually operated by one man, who is as lonely as Robinson Crusoe on his island. Most substations are operated by young unmarried men, but where the equipment is large enough to require the services of an older man with a family the addition of apartments is worthy of some consideration. In general, the extra cost is not much, as service buildings of the character named are already supplied with plumbing, lighting and heating equipment. Furthermore, the provision of free living quarters is certainly an attraction from the employee's standpoint, because he saves an appreciable fraction of his wages and also secures better accommodations that he could afford to pay for elsewhere. Abroad it has been found that the sense of ownership which an employee acquires under these conditions is an important factor in keeping him contented with his employment.

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FUNCTIONS OF PUBLIC SERVICE COMMISSIONS

An interesting discussion of commission regulation was presented Aug. 20 before a branch of the National Electric Light Association by William J. Norton and was published in abstract last week. Although relating directly to electric lighting companies, Mr. Norton traces the revolution which has occurred in public utility business matters through the establishment of commission rule, and this subject is, of course, of as much interest to one kind of public utility as to another.

Theoretically, it is difficult to conceive of any change more radical from a business standpoint than that resulting from the adoption of the commission principle. For years lighting companies had not been prohibited under existing laws from establishing variable rates for service rendered at different hours and in different quantities, although usually a maximum permissible rate was stipulated. They had power to develop their own rates. In a similar way the street railways had practically full liberty of action in regard to their operation and corporate organization, except that they were able by their charters to make only a certain maximum charge for transportation. All the investments in both kinds of enterprises had been undertaken upon this basis and upon the principle that it was proper from both a legal and an accounting standpoint to capitalize the earning capacity of the properties. It was also generally believed that all expenses caused by obsolescence and some of those required for depreciation were more than counterbalanced by the supposed appreciation constantly going on in the value of the property, due to its growth and to that of the city in which it was located. The modern theory of public service regulation is still in a somewhat nebulous shape, but in general its advocates unite upon the principle that such utilities should not be permitted to earn more than certain amounts, depending primarily upon the hazards of the business and upon the value of the property used in the prosecution of the enterprise. Such a plan presumably requires that when the profits of the enterprise are such that they exceed for any considerable length of time the maximum rate permitted upon the investment the charges for service will be reduced.

There seems to be no reasonable objection to a plan of this kind in the case of a new enterprise provided all points are clearly understood in advance and then remain in force. It is a simple business proposition which can be accepted or rejected at will, according as the rate of return under such a plan compares with the profits to be obtained from investments in other lines of industry. It is an entirely different matter, however, to apply such principles to an existing company whose business has been developed lawfully according to the older method. The reason for this is that the company's investment and all of its contracts and other business arrangements have been based upon the previous status of affairs, and if that is to be radically changed some time should be allowed to permit the company to adjust its affairs to fit the new conditions. The length of time may be as long a period as twenty-five years. This period of adjustment would allow a company to spread over a considerable number of payments any necessary amortization of intangible assets which the commission considered it was no longer advisable for the company to keep in its capital account, and if increases in its charges for service had to be made to accomplish this change, they would have to be only reasonable in amount and thus would not seriously disturb the relations between the company and its customers.

PAY ROLLS AS RECORDS

The practically universal custom of considering repair shop pay rolls to be a part of the permanent records for use by general officials is, we believe, a practice not warranted by anything except conservatism. It is, of course, manifest that shop pay rolls must go through the hands of the proper shop officials for approval and through the office of the paymaster for distribution. There appears, however, to be no real need for the pay rolls in detailed form to be sent regularly as a matter of routine to the office of the auditor or even to that of the manager or president. Records of the unit cost of production are what such officials really need, and the mere statement of fact that a certain repairman draws $70 for a month's work is absolutely unenlightening to anyone in the main office who is not acquainted with the kind or amount of work which that man is doing.

As a matter of fact, records of shop pay rolls in the hands of those who are not acquainted with the detailed operations of the shop where they originate may become a source of serious trouble. One of the most difficult things for some office men to comprehend is that large pay checks to individuals can easily be features of real advantage to the company. Yet it is quite common to find serious and long-continued objections taken in the offices of railways with shops operating on a piece-work basis if a machinist should draw a monthly pay of $150 instead of the usual more modest figure. It may be that the man is turning out three times as much work as his fellows who draw half as much pay, but this fact is not shown in a record composed of a list of names and pay checks, and unless the reason is thoroughly understood, such a mere record is apt to be misleading.

This point is really the main cause of the objections which always are expressed when the introduction of a piece-work or premium system is proposed. The workmen claim, often with justice, that piece-work prices are not kept stable and when a man by unusual effort or skill succeeds in earning a large monthly pay this fact will be used as a means to reduce prices or at least will start an inquiry toward that end. The same thing applies to "stretching" work in shops where piece work has actually been established, and, indeed, some notorious examples show higher unit costs under a piece-work system than in other shops on the straight day-work basis doing exactly similar work. The reason is obvious.

Of course, it is a very simple matter for the manager or any one else in authority to secure a copy of the detailed sheet when he wishes it and thus to keep in touch with the situation at the shop. But the general principle should be followed that if the engineering department is held responsible for results and is obtaining these results economically, wide latitude in its methods and in its pay checks to individuals should be allowed to it.

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WORK FOR THE SALT LAKE CONVENTION

In an editorial in the last issue of the *Motorman and Conductor* every local of the Amalgamated Association of Street & Electric Railway Employees is urged to send a full delegation to the annual convention at Salt Lake City in September. The convention, it is remarked, will be a barometer by which the growth, size and "aggressive and defensive force" of the organization will be judged by railway managements.

A full delegation from all locals at the thirteenth annual convention would mean an attendance of 500—enough to impress anyone so far as mere quantity or bulk can be impressive. Equally deserving of attention are the recent assertions of officials as to the extent of Amalgamated membership and the proportion of roads which are now unionized in whole or in part. Discount these statements as we may—and that they should be heavily discounted is beyond doubt—there is left this much of truth, that the Amalgamated now includes a large proportion of the electric railway employees of the United States, has steadily extended its influence of late to include such important communities as Buffalo and Cincinnati, and now has more than 170 written agreements with electric railways. The association has had a number of setbacks in the past year in various sections of the country from Florida to Wisconsin, but if railway managers wish to know what is really happening, as distinguished from what they would like to have true, it needs to be realized that the Amalgamated has made and is making steady progress in numbers and influence among the rank and file of electric railway workers, including shop and mechanical men as well as platform employees. With very rare exceptions this growth has not been accompanied by an improved standing among railway managers. Their attitude is almost uniformly antagonistic, not to say hostile.

There would be little or no profit in going into an examination of the causes of this condition of affairs if it did not afford an opportunity to point out the steps that must be taken by the Amalgamated in order to make itself not only impressive but respected and to establish a confidence which does not now exist. Only by doing this can the resistance now made to the association be lessened and the good of all parties concerned be furthered. For the most radical of both of these parties must admit this much, that the more responsible, law-abiding, honest and well-managed the association is, the better it will be both for the union and the employers. The latter will not be impressed or frightened by the gathering of 500 men at Salt Lake City. They would be impressed and gratified by sincere declarations against lawlessness, condemning the breach of contracts, demanding the observance of awards and upholding discipline, and some evidence that a higher order of national and local officials and board members will be chosen to conduct the affairs of the association. Having reached the point in its career when it can be reasonably proud of its bigness, the Amalgamated may with profit consider means of becoming great and respected.

That it is not respected at the present time is certain. Few experienced railway men regard the 174 contracts of which boast is made as being worth the foolscap on which they are written, and it is doubtful if a dozen of these contracts were signed by railway managements except under some degree or form of coercion. They were obtained by the employees at the cost of immense losses, and but for the disbelief in the Amalgamated's good faith there might be many more than 174 out of the possible 1200 or 1500 contracts to be made with American electric railways.

The reasons for the distrust referred to are not at all obscure. Within easy recollection railway men have seen an Amalgamated agreement to arbitrate thrown overboard in Cincinnati; an agreement as to hours signed in Massachusetts and prompt steps taken to subvert it by legislation; in Chicago they have heard the result of an arbitration abusively condemned by the Amalgamated's president; in Detroit within a few weeks they have heard the declaration that if an arbitration "does not go their way they [the union men] will strike." Railway managers have come to expect violence and lawlessness as the unfailing accompaniments of any strike under Amalgamated auspices, and nearly everywhere it is the rule that Amalgamated grievance committees by upholding and defending men unquestionably at fault have subverted discipline and as far as they could do so made the life of operating officials a burden.

It is because they know these things and many others of similar import that the Amalgamated is opposed by railway managements. No demonstration of strength will lessen this opposition. Such a demonstration is more likely to reinforce determination never to deal, when it is possible to avoid it, with an organization that cannot be trusted and which is dangerous—not desirable—in proportion to its size. Dealings with labor unions are a matter of course in the steam railway field, and there is little resistance to this rule, mainly because the steam railway men form not only large but permanent and responsible bodies with which it is possible to do business. The closer the electric railway men approximate this condition, the better it will be for them.

To be fair, as it is the wish of the ELECTRIC RAILWAY JOURNAL to be, it must be admitted that the electric railway organizers have troubles of their own, due to the shifting character of electric railway employment. But this very condition makes it all the more necessary that the Amalgamated as an institution should stand for honesty and square dealing, whatever may be the demands of immediate expediency or however loud may be the clamor of irresponsible and loosely organized men. The kind of labor leadership that consists simply of going along with the crowd is scarcely worthy of the name. To be more specific, an international officer recently acquiesced in the rejection of an arbitration agreement and another in the rejection of an award because the prospects were good for extorting more favorable terms. These officials would have done more for their cause by insisting that the given word of their followers should be kept even if this had to be done at the risk of local dissatisfaction.

Evidently there is something more important than self-congratulation for the Amalgamated delegates to do at the Salt Lake convention. They may well look to Amalgamated faults and weaknesses and begin a reform of its methods and standards if they aspire to occupy in the electric railway business a position comparable to that enjoyed by the steam railway brotherhoods.

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Way Construction of the Connecticut Company

This Article Describes the Division of Duties Between the Construction and the Way Departments of the Connecticut Company in Handling the Track Work of the Latter, the Methods of Carrying Out a Job, Construction Standards, Etc.

The New York, New Haven & Hartford Railroad Company owns and operates electric properties of a total single-track mileage of 1350 miles, these being electric street and suburban lines in the States of Connecticut and Rhode Island, the western portion of Massachusetts, southern Vermont and the suburban district of Westchester County, New York.

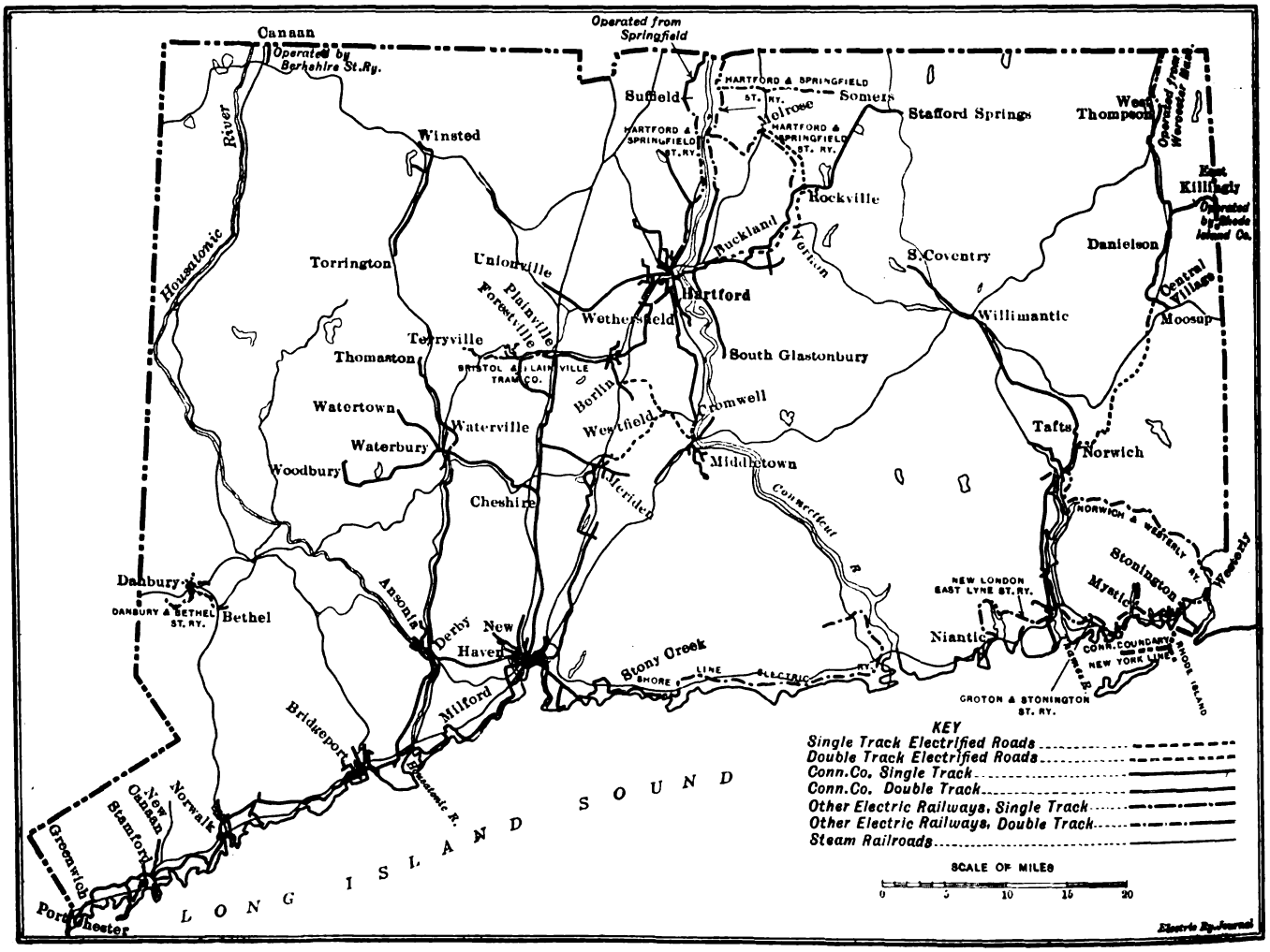
The several classes of electric railways in Connecticut may be divided as follows:

(1) The city and suburban lines of the Connecticut Company, over which no steam cars are operated.

(5) Direct-current electrified lines between Westfield and Berlin and between Rockville and Melrose, operated exclusively by the New Haven company.

(6) Alternating-current single-phase railways of the New Haven company, comprising the main line from New York to Stamford, the extension to New Haven now under way and the interurban line between New Canaan and Stamford.

The New Haven company cares for the track of all lines over which any of its cars are operated. New work of the Connecticut Company relating to the right-of-way, includ-



Connecticut Way—Electric Railways of Connecticut, Showing Lines Owned or Operated by Different Interests

(2) Trackage rights from the New Haven company for the operation of a trolley passenger service from Hartford over steam freight and passenger track between Middletown and Cromwell, between Buckland and Vernon and similarly from Norwich between Taft's Station and Central Village.

(3) Trackage rights from the New Haven company between Middletown and Westfield and between Vernon and Rockville for operation of electric passenger service by the Connecticut Company in addition to the electric passenger and steam freight service of the New Haven company.

(4) The Connecticut Company's passenger service and New Haven company's steam freight service over the latter's tracks between Westfield and Meriden.

ing carhouses, etc., is divided between the construction and way maintenance departments of the Connecticut Company. There is no distinct line of cleavage between the two departments, but in general it may be said that the way department cares for all maintenance and handles new track construction when the work is in the nature of additions to existing lines, such as double-tracking, while all larger new work is undertaken by the construction department. The following paragraphs will describe the organization and work of each department.

THE CONSTRUCTION DEPARTMENT

The construction department does trolley and transmission work for both the New Haven and Connecticut companies, carries out experiments and researches in catenary

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and other line constructions, is responsible for standard line specifications in conjunction with the supervisor of electrical power and lays out high-tension transmission lines. The designs for transmission work come from the office of the supervisor of electrical power, but the construction details are handled by the construction department.

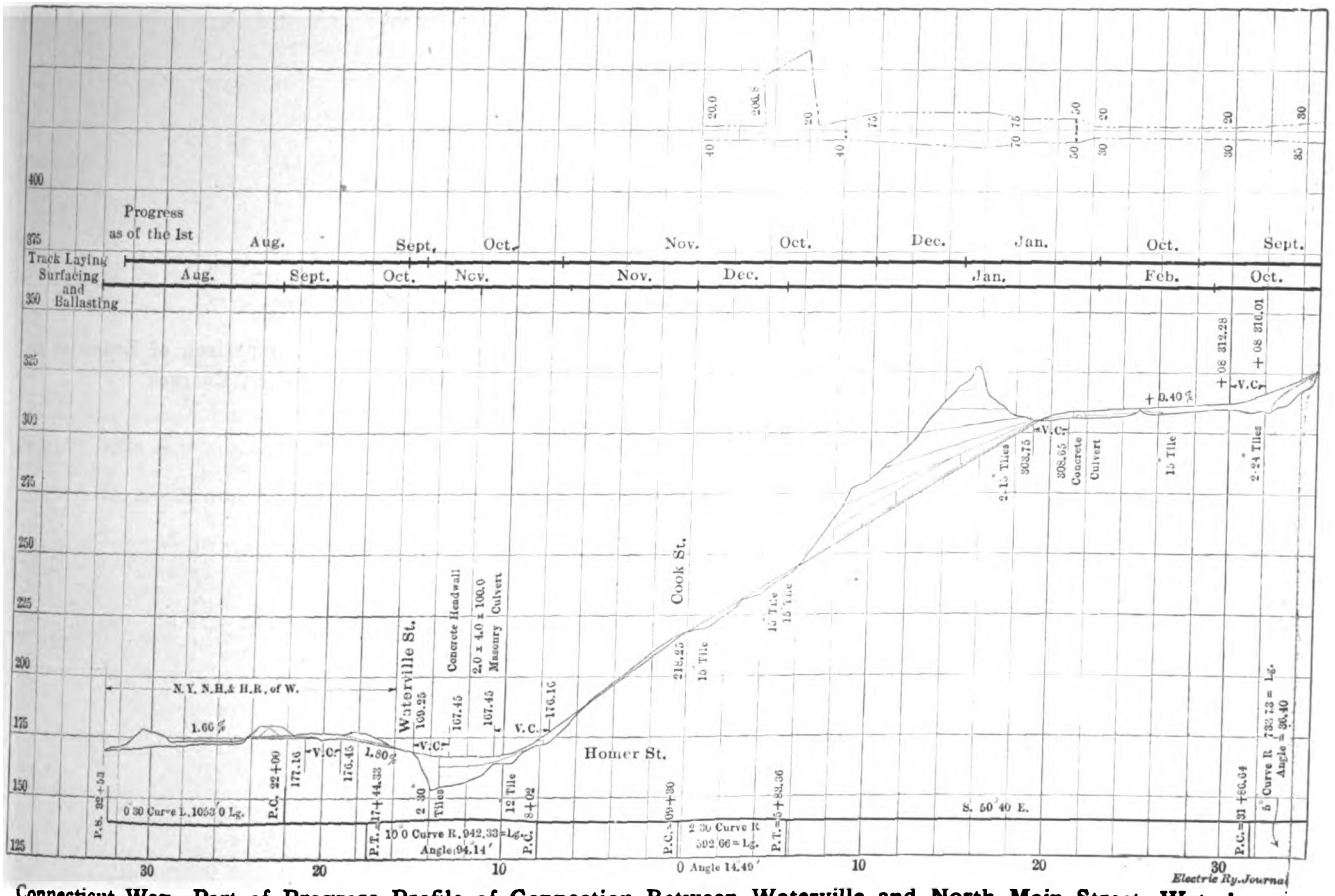
Another important field of the construction department is the design and construction of carhouses and shops. After the management has advised the construction department that a carhouse of stated capacity is desired for a given territory, location studies are made, and, later, the design and construction proceed after conferences with the Connecticut Company's operating department and with the insurance department of the New Haven company.

For instance, the following mode of operation was actually applied to the authorization of a given job, known as the Waterbury-North Main Street extension. After the project had received preliminary approval, the construction department filled out a standard authorization request as the first step toward actual construction. This sheet gave: (1) the amount of expenditure required, $258,800; (2) the nature of the proposed work; (3) a statement of its necessity and probable saving, and (4) the course that the authorization was to follow from the construction engineer to the vice-president. The request was accompanied by a detail of the estimated expenditures for each part of the work, all arranged according to account numbers which followed very closely the Interstate Commerce Commission's classification. This detail sheet was divided into four heads as reproduced in part on the accompanying Form 1.

Upon executive approval of the authorization request the auditor assigned to it an appropriation number by which it was identified thereafter. From the commencement of the work by the contractor, weekly progress reports of the form reproduced (in part) in Form 2 were forwarded to the construction department. This report was signed by the engineer who supervised the job. As the work proceeded, the estimates of cost were revised in accordance with the knowledge gained during the progress of the job, the information being recorded in Form 3.

The comprehensive report which was furnished every month by the auditor's office is also reproduced in Form 4. This posts the detailed expenditures on the various parts of the job under consideration and shows the balance available. Necessarily the auditor's figures are several weeks behind those of the construction department, but they are very useful in catching any improper charges which might be made against the appropriation number under review. When the job was completed the engineer in charge furnished a final report in which he gave the original estimate, the expenditures to date and full explanation of any overages or shortages that appeared.

Much of the work is of a character which cannot be accurately estimated. For instance, after a line has been authorized, the alignment may have to be seriously modified because of changes demanded by property owners or by municipalities. On the other hand, the weekly and monthly reports described do permit a running comparison of esti-



Connecticut Way—Part of Progress Profile of Connection Between Waterville and North Main Street, Waterbury

mated and actual costs. If the expenses appear to vary materially from the estimate, a detailed report bringing out the fact and the reasons therefor is forwarded to the vice-president through the same routine as an entirely new job. If an increase in cost is involved, a supplementary improvement form is forwarded to the executive offices. As all appropriations are taken from a reserve fund, it is not necessary to go into the market for a definite amount of money whenever a given job is authorized. When an expenditure has been approved it is available for use as needed by drafts directly upon the treasury. Consequently, a little additional expenditure which would improve conditions materially can be obtained more quickly than if it was necessary to issue bonds for amounts as needed.

Two drawings on pages 329 and 331 show the graphic progress records used on this and similar contracts. The originals are far more effective than the reproductions, owing to the use of the New Haven Company's standard

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progress report colors, as indicated, for different months. The monthly progress report shows the percentage of grading, track, signals, etc., completed. The work done each month is made to stand out not only by the use of colors but also by tapering off the junctions between the different periods. The progress profile and plan is of particular interest, since it shows so clearly the location and advancement of each class of work.

As a rule, all of the engineering is done by the construction department itself, but the actual construction is carried out either by outside contractors or partly by contractors and partly by the company's forces. Work that is likely in any way to involve interference with operation is usually handled by the company's men.

THE CONNECTICUT COMPANY, WATERBURY-NORTH MAIN STREET EXTENSION

A. Total estimated cost of work, (1) incidental expenses, (2) balance of cost:	
651—Engineering	$13,907.00
652—Right-of-way	22,510.00
654—Grading	71,465.00
.....	.....
672—Distribution system	49,360.00
690—Legal expenses	2,320.00
	$258,800.00
B. Chargeable to operating expenses:	
1—Superintendent way and structure	$305.00
.....	.....
3—Ties	1,880.00
4—Rail	3,660.00
23-C—Bonding	615.00
	$13,550.00
C. Estimated time to complete	6 months
D. Method of distribution:	
To operating expenses, as above	$13,550.00
C. & D., recollectible, Chase Rolling Mill Company	21,000.00
To additions and betterments account new construction	224,250.00
	$258,800.00

Connecticut Way—Form 1—Preliminary Estimate

THE WAY DEPARTMENT

The way department, headed by the civil engineer of the Connecticut Company, has four divisions in charge of local roadmasters as follows:

(1) Trolley properties belonging to the New Haven railroad and located in New York State, but including lines in Connecticut extending from the New York State line as far as Norwalk.

WEEKLY PROGRESS REPORT FOR WEEK ENDING FRIDAY, DECEMBER 27, 1912. ELECTRICAL CONSTRUCTION DIVISION.

Authorization No.	Nature and Location	Per Cent Work Done to Date	Per Cent Work Done During Week	Explanation and Remarks
1761	Waterbury - North Main Street.			C. W. Blakeslee & Sons, contractors.
	Grading, 54 per cent.	96.5	0.5	Average daily force: 1 superintendent, 1 timekeeper, 6 foremen, 7 engineers, 3 firemen, 75 laborers, 1 cranesman, 2 drillers, 3 helpers, 1 blacksmith, 1 helper, 1 watchman, 1 water boy, 2 carpenters, 3 double teams, 2 single teams, Plant: 4 boilers, 2 steam drills, 2 well drills, 4 donkey engines, 1 steam shovel, 4 derricks, 26 dump cars.
	Bridges, 3 per cent.	92.0	2.0	
	Track work, 17 per cent.	79.0	3.0	
	Overhead, 15 per cent.	82.0	1.0	
	Special work, 8 per cent.	90.0	3.0	
	Signals, 1 per cent.	0.0	0.0	
	Fencing, 2 per cent.	0.0	0.0	
	Total, 100 per cent	87.80	1.23	Work: Cuts from station 7+50, station 17+00. Steam shovel and donkey engines at work at station 17+34, for wasting material opposite station 5+00 and station 18+00.

Hartford, Dec. 27, 1912. O. W. Head, assistant engineer.

Connecticut Way—Form 2—Weekly Progress Report

(2) The trolley lines in Bridgeport, Derby, Waterbury, New Britain and part of Meriden, constituting chiefly the properties formerly operated by the Connecticut Railway & Lighting Company, with the roadmaster at Bridgeport.

(3) The lines in New Haven and the rest of those in Meriden, with the roadmaster at New Haven.

(4) The lines in Hartford and adjacent towns, as fully described in the ELECTRIC RAILWAY JOURNAL for Oct. 19, 1912, with the roadmaster at Hartford.

THE CONNECTICUT COMPANY, ESTIMATE NO. 9 OF WORK DONE, WATERBURY-NORTH MAIN STREET EXTENSION, WATERBURY, MONTH OF DECEMBER, 1912

C. W. Blakeslee & Sons, Contractors. Jan. 1, 1913. Appropriation No. 1761

Nature of Work	Unit	Total to Date	Previous Estimates	Present Estimate	Price	Total
Earth excavation	Cu. yd.	23,502	23,176	326	$0.36	$117.36
Foundation excavation	Cu. yd.	935	895	40	1.50	60.00
Solid rock	Cu. yd.	29,558	24,831	4,727	1.40	6,617.80
Loose rock	Cu. yd.	3,035	2,981	54	0.65	35.10
Concrete	Cu. yd.	483.4	446	37.4	6.00	224.40
.....	.....	.....	.....	.....	.....	.....
Pipe, 15-in.	Lin. ft.	404	372	32	1.50	48.00
Track ballast, delivered	Cu. yd.	3,641	3,146	495	0.55	272.25
Teaming material	Ton-mi.	195	135	60	0.75	45.00
						$8,032.41
Less 10 per cent retained						803.24
Amount payable this month						$7,229.17

Distribution	100 per Cent	10 per Cent	90 per Cent
Charge appropriation No. 1761, account No. 654	$6,970.26	$697.02	$6,273.24
Charge appropriation No. 1761, account No. 655	272.25	27.23	245.02
Charge appropriation No. 1761, account No. 661	457.50	45.75	411.75
Charge appropriation No. 1761, account No. 665	332.40	33.24	299.16
	$8,032.41	$803.24	$7,229.17

Correct, O. W. Head, Asst. Engr.
Approved, Charles Rufus Harte, Asst. Engr.

Connecticut Way—Form 3—Comparison of Estimates and Actual Distribution Charges

THE CONNECTICUT COMPANY, WATERBURY-NORTH MAIN STREET EXTENSION, WATERBURY, CONN.

Appropriation No. 1761. New Haven, Conn., Dec. 31, 1912.

Account	Estimate	Expended to November 30, 1912	Expended During Month December, 1912	Expended to Date, December 31, 1912	Balance Available
Road:					
651—Engineering and superintendence	$13,917	$8,279	$581	$8,860	$5,057
652—Right-of-way	22,510	23,610	—298	23,312	—801
654—Grading	71,465	52,934	12,934	65,868	5,597
655—Ballast	5,860	3,235	1,813	5,048	812
656—Ties	9,142	3,993	1,410	5,407	3,739
657—Rails, fastenings and joints	23,660	16,366	2,913	19,279	4,381
658—Special work	15,750	13,037	—6	13,031	2,719
660—Paving	7,546	1,791	174	1,965	5,581
661—Track laying and surfacing	14,500	5,125	1,370	6,494	8,005
662—Roadway tools	.....	135	.....	135	—135
665—Bridges, trestles and culverts	8,510	3,752	161	3,913	4,597
666—Crossings, fences, cattle guards and signs	4,560	.....	299	299	4,261
667—Interlocking and other signal apparatus	2,500	.....	.....	.....	2,500
668—Telegraph and telephone lines	.....	3	.....	3	—3
669—Poles and fixtures	7,200	4,189	312	4,501	2,699
672—Distributing system	49,360	28,036	2,712	30,748	18,612
681—Substation equipment	.....	358	.....	358	—358
Sundries	.....	206	.....	206	—206
General Expenditures:					
690—Law expenses	2,320	.....	.....	.....	2,320
692—Injuries and damages	.....	.....	.....	3	—3
Totals	$258,800	$165,052	$24,379	$189,431	$69,369

Connecticut Way—Form 4—Detail Distribution of Charges

This arrangement leaves some territory in eastern Connecticut under a general foreman who reports indirectly through the local manager at Norwich. There are also foremen at Middletown and on the Torrington and Win-

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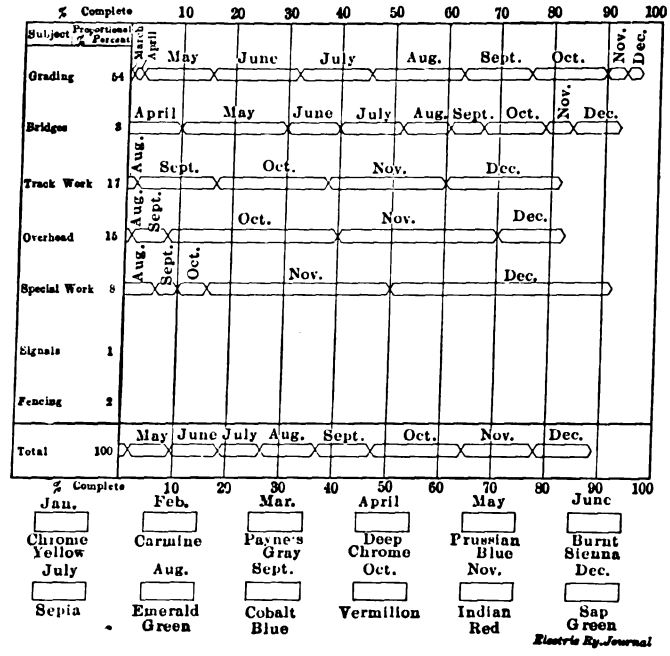
chester lines who report through their local superintendents.

The plans for track reconstruction during each season are formulated at the office of the civil engineer after conference with the local managements. If, for example, the management at Hartford desires certain reconstruction, the cost of the work is estimated at the office of the civil engineer. He then asks for the money, sends out specifications and bids and checks all contracting jobs. The details of the job, however, are supervised jointly by the local manager and roadmaster. Ordinary maintenance is left almost entirely to the judgment of the roadmaster, except that he must not exceed his appropriation. The office of the civil engineer prepares schedules showing the weekly labor and material allowances, and the local managements are

Connecticut Way—Steam and Street Railway Crossing, New Britain



Connecticut Way—Progress Diagram of Chase Rolling Mill Line (Original in Colors Indicated)

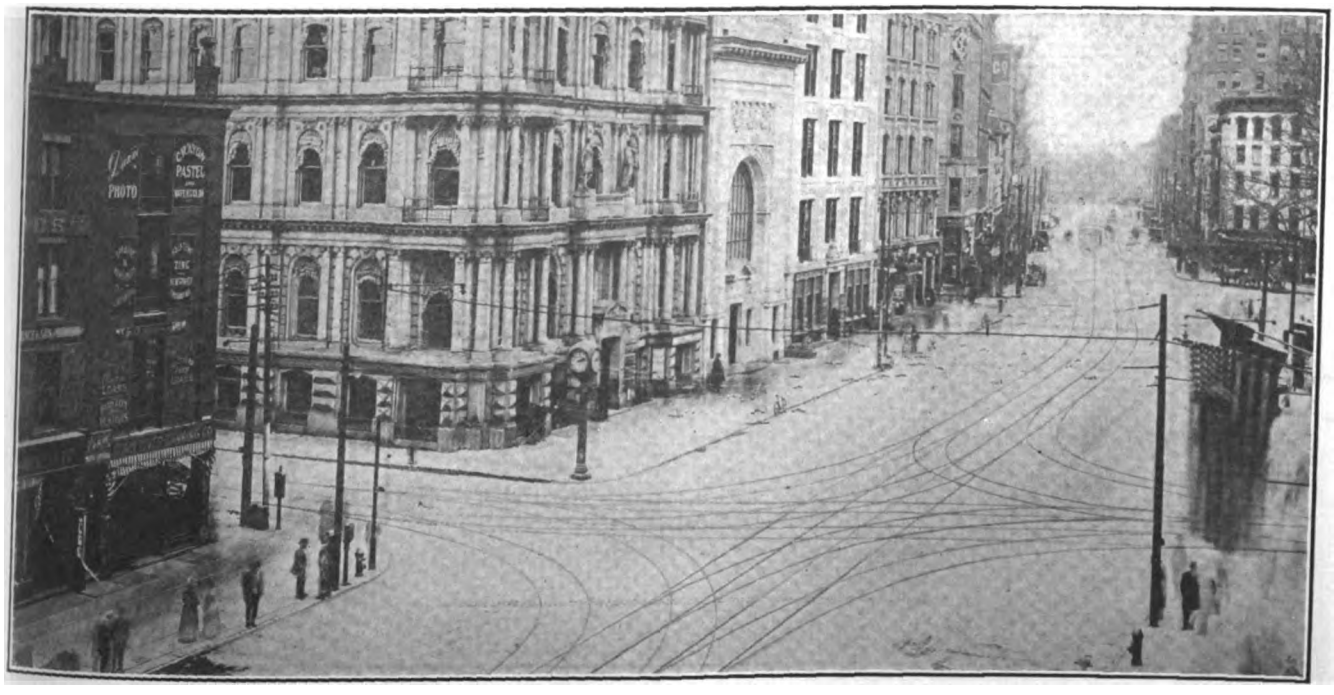
expected to work within the limits shown by these tables.

TRACK STANDARDS

The three standard rails used by the Connecticut Company are 5-in., 80-lb. A. S. C. E. for suburban and interurban work, 7-in., 95-lb. Pennsylvania *272* T-section for most city work and 9-in., *125*-lb. Pennsylvania *273* Boston profile grooved rail in a few cases where grooved rails are used. These sections have been the company's standards since 1906. They are gradually replacing T-sections of 40 lb. upward and girder and grooved rails from 70 lb. upward.

The standard joint for the 95-lb. T-rail is the 24-in. Continuous joint with four bolts spaced 1 15/16 in.—5 in. from ends of rails, although the rails are drilled at 1 15/16 in.—5 in. 6 in. from ends to provide for use of ordinary joints with six bolts if desired. A 32-in. twelve-bolt joint, section 273-A, Pennsylvania Steel Company, is used in connection with the 9-in., 125-lb. groove girder rail. In this case the drilling calls for an upper row spaced 2½ in.—5 in.—5 in. and a lower row spaced 3½ in.—5 in.—5 in.

The six sections on the next page show various combinations of rails and paving which have been made to meet local requirements. The feature common to most of these constructions is the use of a sub-foundation of 5 in. or 6 in. of concrete below the base of the rails. Little stone is used for ballasting city track except at Hartford, which has a spongy, clay soil. The asphalt block construction at



Connecticut Way—View of Completed Special Steel Center Construction at Pearl and Main Streets, Hartford

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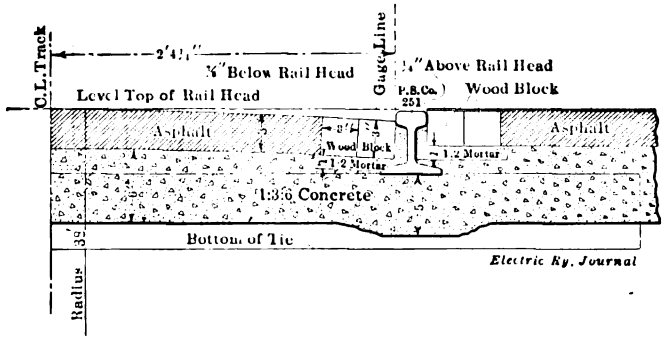
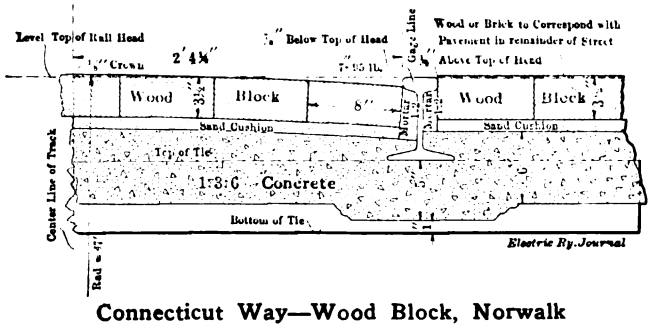
Rye and the sheet asphalt at New Britain were used with an old 7-in., 70 lb. rail which was electrically welded, but the work in the other towns named was done with new rails.

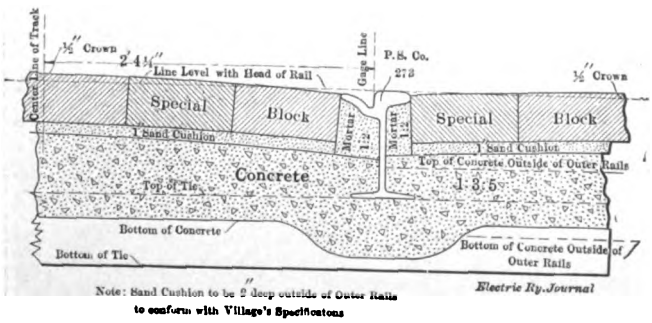
The three drawings of recent sections are of particular interest. The first, of wood block in New Haven, is similar to the construction in Norwalk but deserves particular notice since it indicates the construction for the year 1913 as approved by City Engineer F. L. Ford. The second of the new sections is a combination of wood block and Roman road paving in South Norwalk, showing the use of wood block between the rails of the track where the city is paving with Roman road which is brought up to the rails outside the tracks. The third section, which is used in Hartford, shows a 5-in., 80-lb. T-rail in a street paved with 3-in.



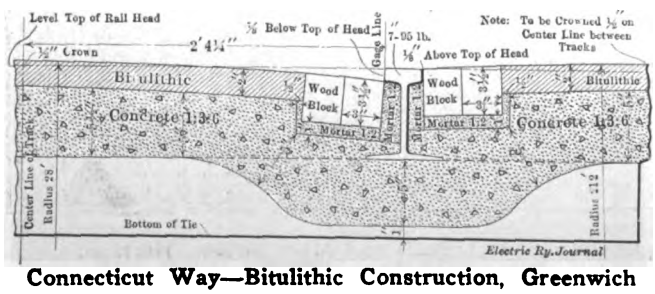
Connecticut Way—Asphalt and Wood Block Pavement, Morgan Street, Hartford



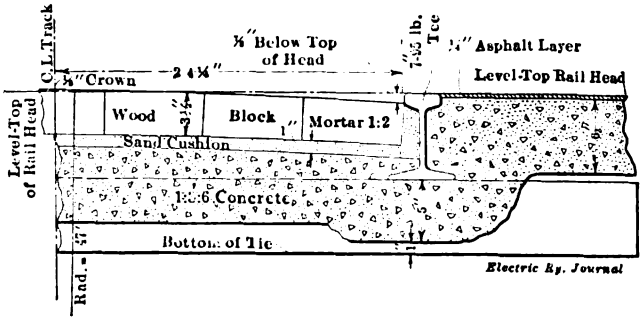
Connecticut Way—Wood Block, Norwalk



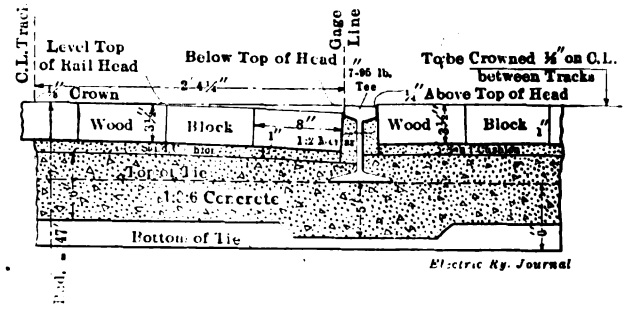
Connecticut Way—Special Block Construction, Mamaroneck



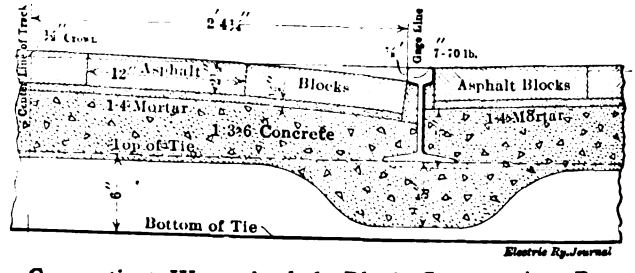
Connecticut Way—Bitulithic Construction, Greenwich



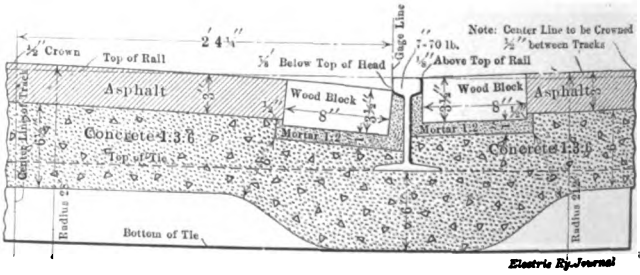
Connecticut Way—Wood Block, New Haven



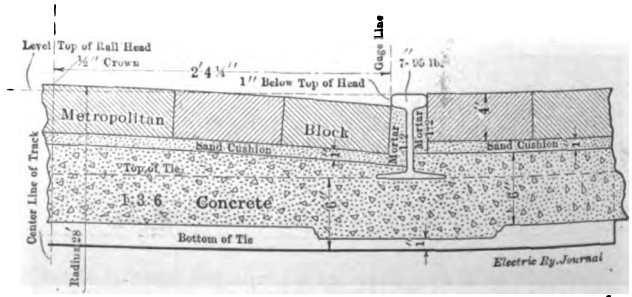
Connecticut Way—Roman Road Pavement, Railroad Avenue, South Norwalk



Connecticut Way—Asphalt Block Construction, Rye



Connecticut Way—Asphalt and Wood Block Construction, New Britain



Connecticut Way—Metropolitan Block Pavement, Stamford

asphalt. In the last construction it will be observed that 3-in. rather than 3½-in. wood blocks were used so as to clear the bottom flange at the rail.

All of the ties are 8 ft. x 6 ft. x 8 in. in size, spaced 2-ft. centers. Chestnut (55 cents each for the first quality) and white-oak ties are commonly used, but are not treated except on the River Bridge at Hartford. In macadamized streets the company lays 6 in. to 7 in. of macadam, in accordance with the practice on the rest of the roadway. In a few cases where the rails were only 5 in. high the highway commissioner and others interested per-

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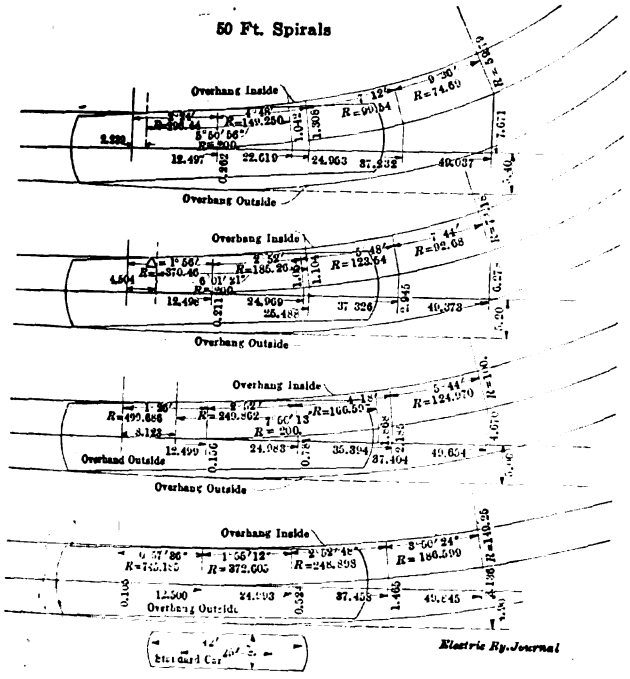
mitted a depth of macadam equivalent to the height of the rail.

The standard interurban track is an 80-lb A.S.C.E. rail and ordinary six-bolt joints with holes spaced 1 15/16 in.—5 in.-6 in. from ends of rails. On tangents the rails are

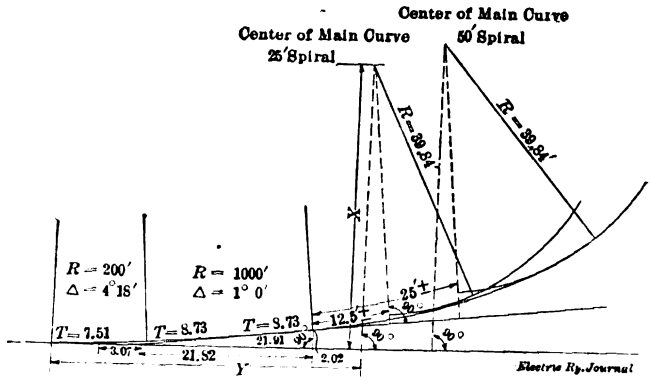


Connecticut Way—Standard Spirals and Easements with 200-Ft. Radius Switches Cut Into the Spirals

laid in 33-ft. lengths with eighteen ties per rail. The ballast is of trap rock or gravel, the minimum being 6 in. under the tie at the center of the fill. A 3-in. crown is given to the sub-grade. Embankments more than 16 ft. high are 16 ft. wide at sub-grade. Cuts in rock are 16 ft. wide at sub-grade and 20 ft. wide when cut in earth. Rock slopes are ¼ to 1, and earth slopes, while varying with the nature of the material, are sometimes as much as 1 to 1.

SPECIAL WORK

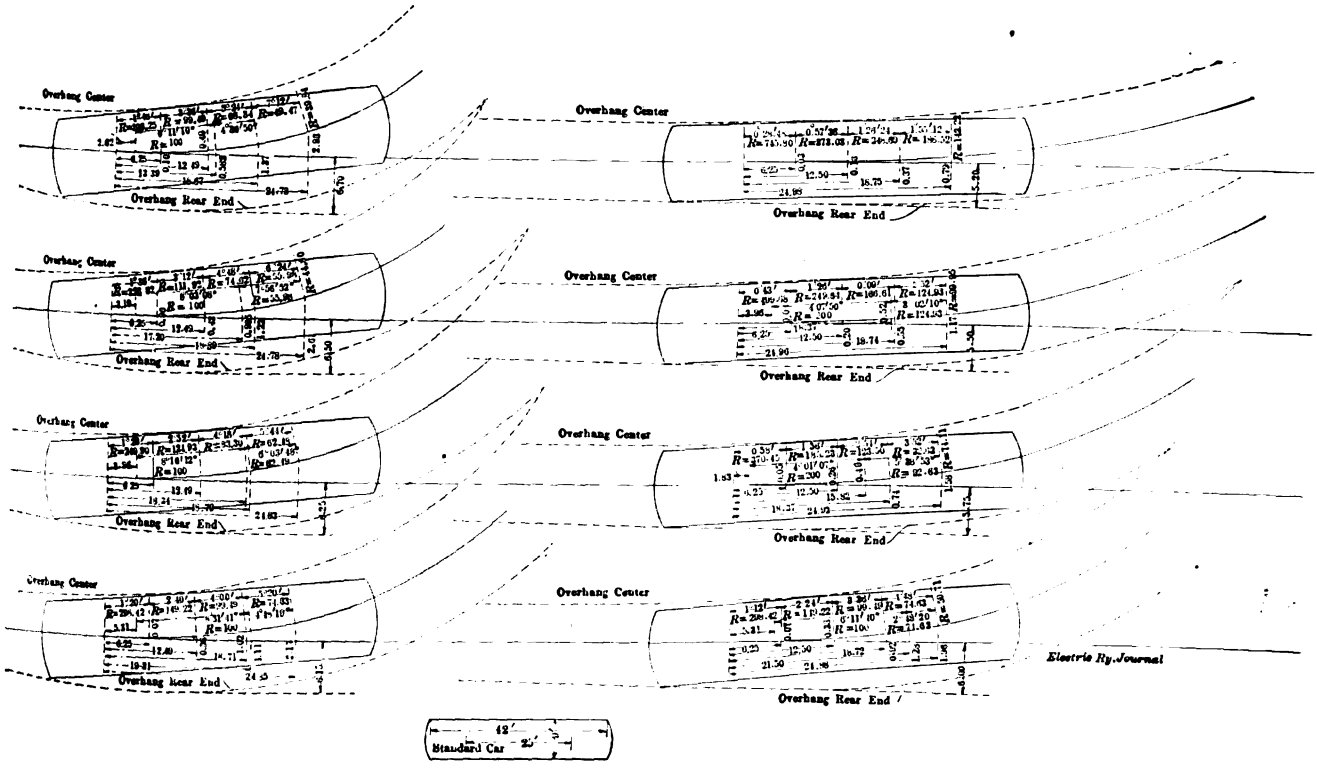
Practically all special work is hard-center construction, solid manganese being used to a limited extent for steam railroad crossings while built-up work serves at storage



R	25-FT. SPIRAL		50-FT. SPIRAL		R
	X	Y	X	Y	
39.84	43.82	41.00	47.87	52.60	39.95
44.80	48.65	40.57	52.42	52.31	44.91
50.00	53.74	40.11	57.25	51.96	50.10
53.75	57.42	39.77	60.77	51.70	53.84
59.71	63.28	39.23	66.42	51.25	59.79
74.11	77.48	37.93	80.28	50.06	74.18
99.95	103.09	35.57	105.45	47.81	100.00
149.22	152.01	31.03	154.00	43.36	149.25
198.95	201.47	26.46	203.25	38.80	198.98

Connecticut Way—Standard Branch-off Clearance Curves

carhouses. Two accompanying illustrations show an important Manard steel center layout furnished in 1909 by the Pennsylvania Steel Company for the City Hall loop at Hartford. Another illustration shows a type 24 Barbour-Stockwell crossing, containing solid manganese in the steam run, which was installed at New Britain in 1910 on the main line of the New Haven railroad between Hartford and Waterbury.



Connecticut Way—Standard 25-Ft. Spirals and Easements

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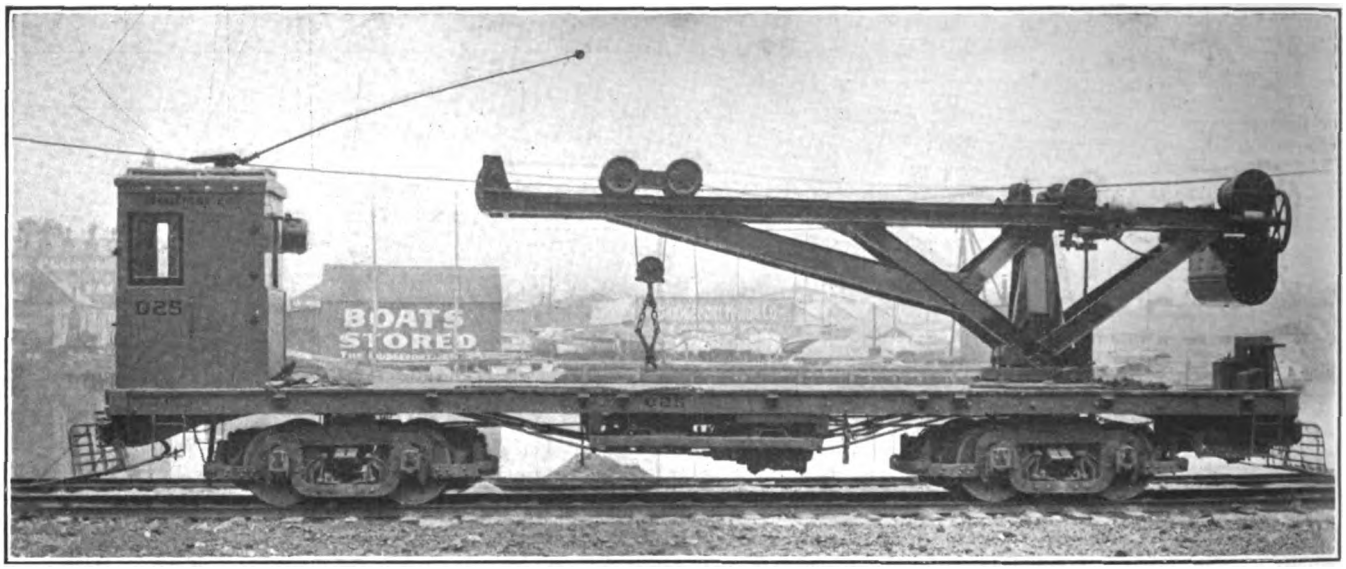
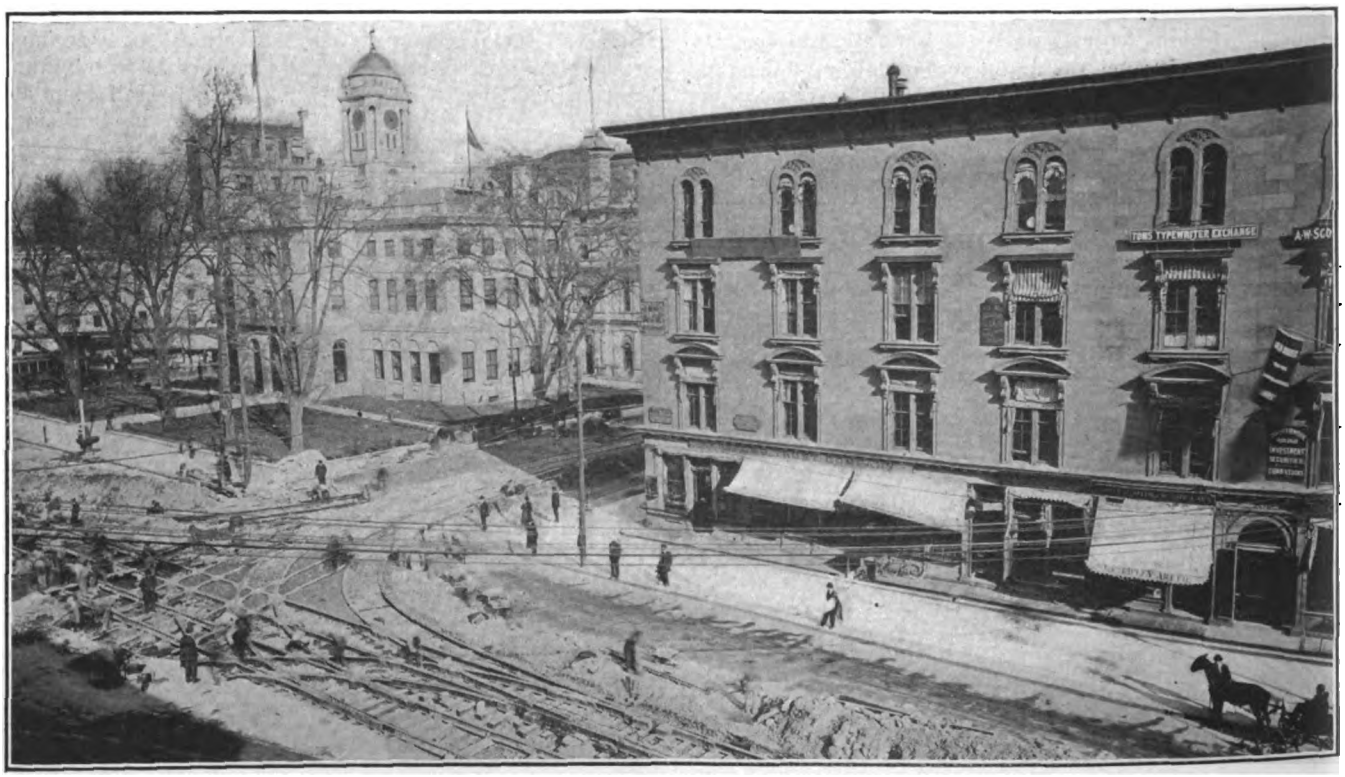
Systems of standard spirals and easements, standard branch-off clearance curves and switch radii have been developed as reproduced in accompanying drawings and tables. A switch radius of 200 ft. is standard on all turnouts and on the inside curve of all double-track branch-offs. The turnouts have no guard rails. A switch radius of 100 ft. is used in special layouts, depending upon the radius of the outside curve, and in cross-overs of emergency character. The standard branch-off clearance curves



Connecticut Way—Bridgeport Derrick Car with Depressed Platform for Control Apparatus at Derrick End



Connecticut Way—Special Work with Special Steel Center Main Streets as Part of Loop Construction Being Installed at the Corner of Pearl and Around Hartford City Hall

are laid out to give 6-in. clearance for a car 9 ft. wide, 42 ft. long over all and 25 ft. truck centers with the tracks placed 10-ft. centers.

A sketch of every piece of special work operated by the Connecticut Company is kept in a book of locations at the office of the civil engineer. Each special-work location has a distinguishing number so that in furnishing material the manufacturers are required to mark all work with the number of the location for which it is intended and to show that number on all accompanying detail plans. Later, these plans are folded and filed in envelopes numbered with the location numeral and filed in numerical order. All plans of any one location are placed in the same envelope.

SUPPLIES, RAIL WELDING, BONDING, CARS, ETC.

The general storekeeping department has standardized many track appliances for both the steam and electric roads. On requisition from the division roadmaster the local storekeepers secure from the general storekeeper any track tools and other small supplies desired, but requests for the service of rail grinders, rail benders, portable cross-overs and the like must be made directly to the civil engineer. The principal portable crossover used by the company is of the Pennsylvania type with adjustable lead rails for use on tracks varying from 9-ft. to 10-ft. centers. The Wharton cross-over of similar type is also used.

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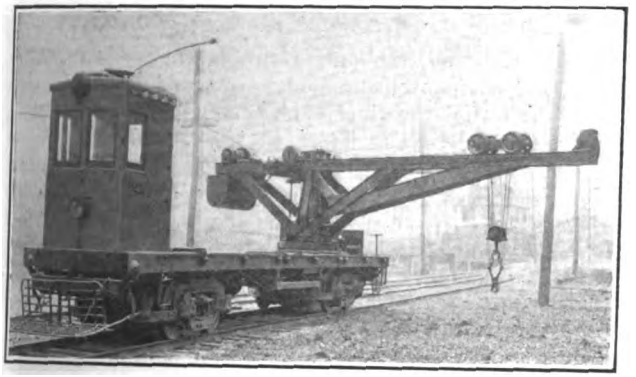
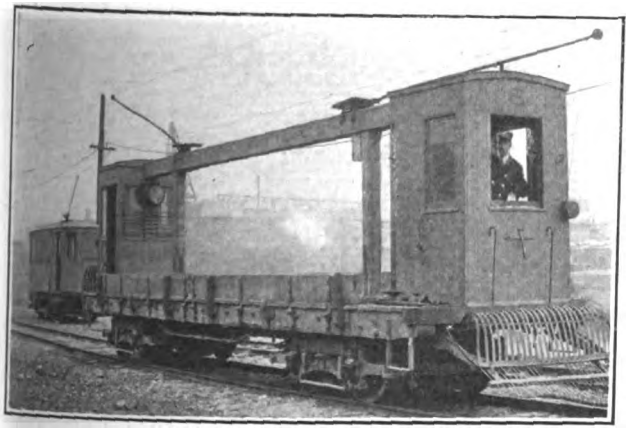
Since 1908, the Connecticut Company has placed four contracts with the Lorain Steel Company for the electric welding of old rails. Up to June 1, 1913, 19,679 joints had been completed. A Cleveland bond-brazing machine furnished by the Electric Railway Improvement Company is also in service. Recently the company purchased a track-grinder from the Railway Track Work Company of Philadelphia to take care of worn joints before cupping and to grind joints in new work.



Connecticut Way—Derrick Car with Motorman's Cab at One End

Whiting crane cars of 6-ton capacity each for handling special work, etc., are used at New Haven, Hartford, Bridgeport and Waterbury. The Bridgeport car, representing the latest type furnished for that place and Waterbury in 1911, is illustrated on page 334. The principal dimensions of the crane cars are as follows: Length over all, 42 ft. 10 in.; maximum height, 13 ft. 1½ in.; minimum height, 12 ft. 1½ in., and width, 8 ft. The New Haven car, furnished in 1909, weighs 64,320 lb. The track yards at New Haven, Bridgeport and Waterbury are each equipped with a stiff-legged derrick with a 50-ft. boom for unloading rails from steam cars, either to pile the rails or transfer them directly to the supply cars.



Connecticut Way—Bridgeport Motor Flat Car, Showing Box Car for Distributing Supplies to Track Gangs

NOTE

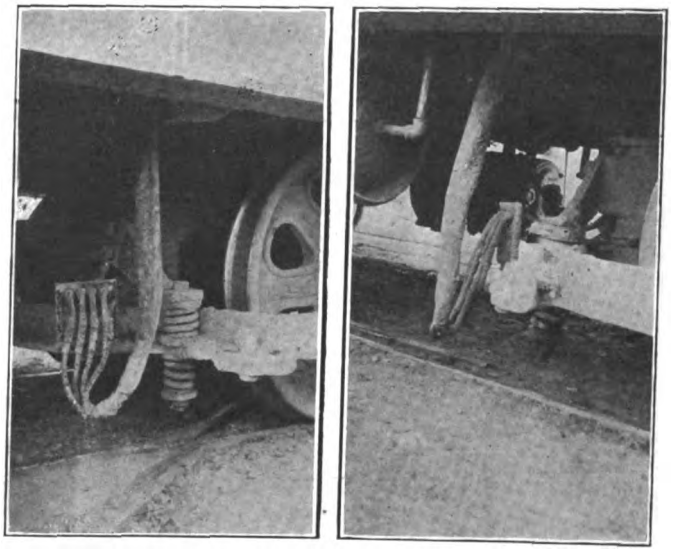
A later article will describe the bridge construction and maintenance practice of the Connecticut Company.

The thirty-seventh annual report of the Department of Public Works of the City of Chicago for the year 1912 contains, under the report of the Bureau of Streets, a statement of the various permits issued to electric railways for construction work or alterations in connection with the streets and a full description of the work done on the pavements and the various materials used. The report covers the work of the Chicago Railways, the Chicago City Railway and the Calumet & South Chicago Railway.

MOTOR LEAD CONNECTIONS AT SAN ANTONIO, TEX.

A novel method of connecting lead wires to motors has been devised by H. Fink, Jr., master mechanic San Antonio Traction Company, and tested by two years of actual service. The motor leads are brought out on the suspension side of the motor and passed through holes in an angle-iron bracket riveted to the truck end frame. This bracket serves as a fixed support to the leads and keeps them from chafing on any of the truck parts. To eliminate any possibility of wear to the lead wires where they pass through the holes in the angle-iron bracket, rubber bushings are provided of a size to give a snug fit on the leads. The motor leads are drawn through this bracket about 6 in. and are provided at the ends with connectors for attaching the cable leads.

From the point where leads are brought out from the cable box in the car body they are incased in 3-in. cotton cable cover and a sufficient length of this cable is provided to allow for the maximum sweep of the truck. All connections are made on the cable side of the bracket, with the exception of the field lead. This enters the bottom motor casing and is provided with a connector on each side of the bracket to make it unnecessary to remove the lead from the bracket when the bottom casing of the motor is taken down.



Motor Lead Connections in San Antonio

Experience has shown that considerable care must be exercised in the length of cable cover which is employed. The leads from the car body should not be wrapped to any greater length than the distance between the car body and the lowest point reached in any truck position. If the covering is carried beyond the low point, thus forming a pocket, water will collect and cause rotting and short-circuits between the leads.

It is stated that the new scheme effects a reduction in motor-lead trouble of 75 per cent. Motor-lead connections on the axle side of the motor have not been found satisfactory by this company, probably because the wheelbase of all trucks is only 4 ft. 6 in. This leaves a very small space between the truck centers and motor, a part of it being required by the pull rod and air-brake levers.

The electric railway system of Calgary, Alberta, was hired by the Hudson Bay Company for the afternoon of Aug. 18, the day the company's new Calgary store was opened by G. H. Bulyea, Lieutenant-Governor of Alberta. Arrangements were made whereby the sixty-five cars of the municipal system were at the disposal of the Hudson Bay Company for four hours on that day and the residents of Calgary were invited to ride free between the hours of 2 p.m. and 6 p.m.

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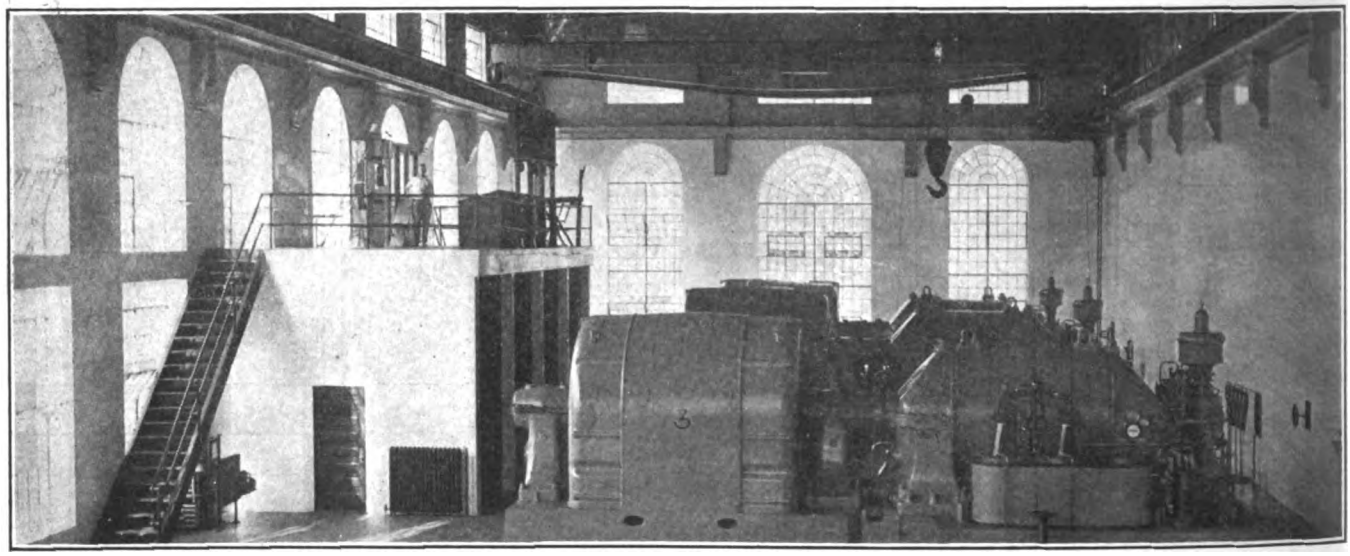
New Power Station of Northern Ohio Traction & Light Company

A Plant of Large Capacity Has Been Constructed Recently to Replace a Number of the Company's Smaller Stations in the Northern Section of the State of Ohio

Chief among the numerous improvements now being made by the Northern Ohio Traction & Light Company, of Akron, Ohio, is the system for the generation and distribution of electrical energy. This includes a steam station, known as the Gorge power station, with a present rating of 20,000 kw and an ultimate rating of 50,000 kw, a hydraulic station of 2000-kw rating, eight substations and the necessary transmission lines.

The company owns and operates approximately 216 miles of single track, consisting of the city lines in Akron and Canton and the interurban lines from Akron north to Cleveland, south to Canton, Massillon, Urichsville, Canal Dover, etc., east to Kent and Ravenna, and southwest to Barberton and Wadsworth. In addition, it supplies electricity for all services in the city of Akron and numerous towns and villages on the railway lines. The latter business has developed more rapidly during the past few years than the company's facilities for handling it, and in several instances proffered business has necessarily been refused. The gross receipts of the company during 1912 exceeded those of 1911 by 11.2 per cent.



Northern Ohio Power—View of East End of Turbine Room Showing Turbines and Operating Gallery Over Oil-Switch Compartments

The Gorge power station, supplemented by the hydraulic station, will replace stations at Akron, Silver Lake Junction and Bedford and furnish all energy required north of Canton. The existing stations at Canton, generating alternating current at 25 cycles, will, however, continue to supply the city lines in Canton and the interurban lines south of Canton.

The station is located in the valley of the Cuyahoga River, just below the Cuyahoga Falls, Ohio. As the low-water flow of the Cuyahoga River was not sufficient for condensing purposes, it was necessary to build a dam so that a suitable pond for cooling water would be provided, and as the fall of the Cuyahoga River is quite rapid at this point, it was found possible, by utilizing the head from this dam in connection with a fall below the dam, to secure a head of about 100 ft. one-half mile below the dam.

The coal for the station will be delivered over the Pennsylvania Railroad, the only railroad which runs near the site. The company has a siding from this road which runs along the top of the river bank at an elevation about 90 ft. above the boiler-room floor. A trestle with coal bunkers underneath is now nearing completion on which loaded cars will be shifted by the company's motor car. From the bunkers the coal will pass through valves into the crusher car and through this crusher car into individual bunkers for each boiler.

The power station proper consists of the boiler room, 56 ft. wide by 330 ft. long, and the turbine room, 63 ft. wide by 227 ft. long, separated by a division wall, the turbine room being on the river side. The turbine room was located on this side because this decreased the length of the condensing water tunnels and also simplified the delivery of coal to the boiler room. In addition, there are two small wings in one of which are the blowers for the forced draft and in the other the lightning arresters.

The main floor of the boiler room, which is flush with the basement of the turbine room, is placed at elevation 918.5, which is about 40 ft. above the bed of the stream and about 90 ft. below the top of the bluff, where coal is to be delivered. The dam, which is about half a mile below this station, has its spillway at elevation 910, so that low water would only be 8 ft. 6 in. below the turbine room basement. These elevations are referred to sea level. During the recent floods in Ohio the water rose to elevation 918.2. Flashboards may be provided on the spillway so that the low-water elevation will be 912.

BOILER-ROOM EQUIPMENT

The boiler room contains sixteen 604-hp Babcock & Wilcox boilers and superheaters, eight of which are in service at this time. These boilers are arranged in a single row, the stack being placed in the center of the boiler room, with eight boilers on one side and eight on the other. All boilers are equipped with Taylor stokers. Sturtevant fans, driven by Sturtevant engines, which are located in the blower room, just south of the boiler room, furnish the

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forced draft for these stokers. Engines were chosen to drive the fans instead of motors so that it would be possible to regulate the speed of the fans directly from the steam pressure.

The ashes are dumped into ash pockets underneath the grates and thence into a small car running on a track in the basement. For the present the ashes are wheeled out by hand, but an elevator will soon be installed at the end of the boiler room so that the small cars can be lifted from the basement level to a trestle of sufficient height and thence be dumped into wagons or standard railroad cars for removal.

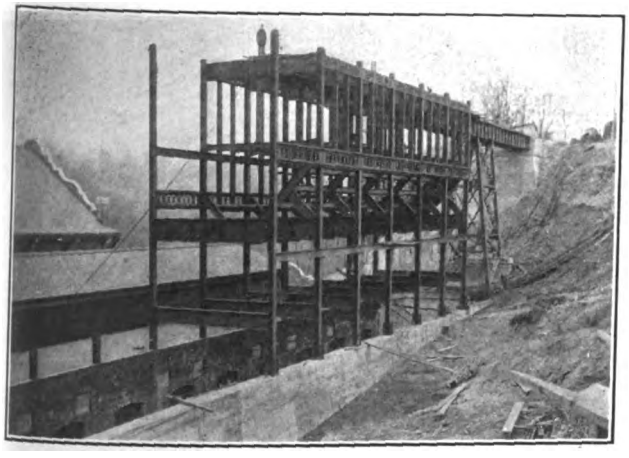
Steam at a pressure of 200 lb. will be used with a superheat from 75 deg. to 90 deg. Each boiler will be equipped with recording instruments in order that a complete comparative record of coal consumption and steam furnished may be kept.

The stack was built by the Alphons Custodis Chimney Construction Company and is 275 ft. high and 16 ft. in diameter inside at the top. The stack is unusually high because the station is about 90 ft. below the surrounding country. There are two openings for the breeching, each 20 ft. high and 7.5 ft. wide. This breeching was manufactured by the Babcock & Wilcox Company, and the novelty in its construction was the use of ¼-in. American ingot iron plates.

PIPING

The main steam header has been so arranged that the boilers may be divided into four groups, one or more of which may be out of service at any time. All nozzles were welded on by an electric arc. Van Stone flanges were used throughout on all high-pressure piping 4 in. and above in diameter.

The main steam piping consists of a 12-in. header in the boiler room, connected to each boiler by 8-in. compound bends. This header is connected to the three turbines by 12-in. leads, each of which is provided with a suitable separator at the lowest point and an angle valve adjacent to the throttle valve. This arrangement allows the separator to drain the header at all times, whether the turbine is in service or not. There is an 8-in. auxiliary header in the turbine room basement, connected to this 12-in. header at



Northern Ohio Power—Steel Structure for Coal Bunkers on Bluff in Back of Station

three points, from which all connections are taken to auxiliaries.

The blow-off main is taken outside the building at each end and the blow-off water conducted through a tile drain to the pond.

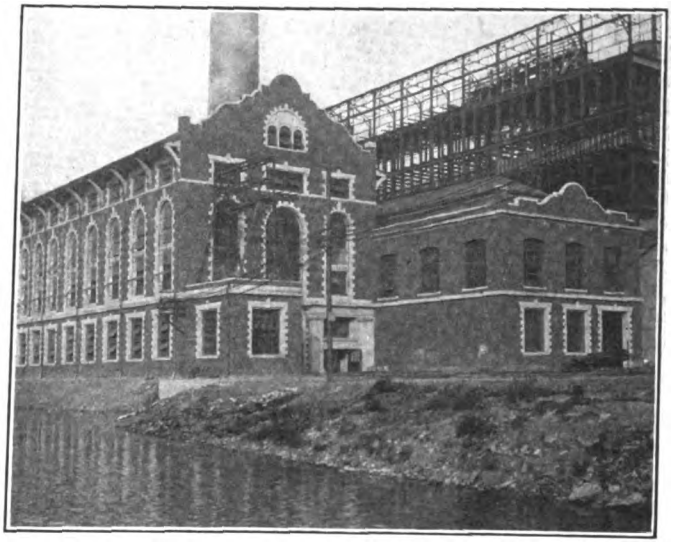
A 50,000-gal. steel tank which is set on the bluff just above the station, with a head of about 100 ft., supplies the general service water, the cooling water for transformers, the water lines for cooling ashes, and the fire lines.

Air piping has been carried throughout the building, as compressed air will be used in cleaning the generators, rotaries, etc., in the turbine room, and for operating turbine-tube cleaners in the boiler room.

The oil piping for the transformers is so arranged that the oil from any transformer may be removed through this pipe to barrels which are set in the pit at one end of the pipe line; or, in case of fire, this oil can be run to a pit outside of the building.

TURBINE ROOM EQUIPMENT

The present installation of generating equipment consists of three Westinghouse 6300-kw, 2300-volt, 60-cycle, three-phase turbo-generators, 1800 r.p.m., directly connected to



Northern Ohio Power—Front View of Gorge Station Showing Initial Transmission Tower at End of Turbine Room

three Westinghouse horizontal double-flow steam turbines. The contractors have guaranteed a steam consumption not to exceed 14.8 lb. per kw-hr. at 100 per cent of rating and 15.4 lb. at 150 per cent. Space has been provided for two additional similar or larger units in the future.

Two 150-kw steam-driven exciters have been installed and an additional motor-driven unit will soon be provided. These exciters are placed on the turbine room floor between main units and directly in front of the main switchboard. The exhaust from the turbines discharges into Westinghouse Le Blanc condensers, which are in the basement, immediately underneath the turbines. The circulating and air pumps for these condensers are on a single shaft and are driven by a 228-hp Westinghouse steam turbine. As there was a possibility that at some time the level of the pond would be drawn below the spillway of the dam, Alberger single-stage booster pumps were provided in the turbine room basement, near the condensers, driven by 75-hp, 2300-volt, three-phase Westinghouse motors.

Three boiler-feed pumps driven by Kerr steam turbines have been provided in the basement of the turbine room. The pumps normally take their water from three Hoppes feed-water heaters which are placed on a platform midway between the turbine room floor and the basement floor. The feed-water heaters are filled from the hot-well or discharge tunnel by means of two pumps directly connected to Westinghouse motors. Two service pumps directly connected to Westinghouse motors, each having a rating of 150-gal. per minute, are also located in the basement. These pumps are used filling the service tank on the bluff.

ELECTRICAL EQUIPMENT

The electrical operation of the station is controlled from a gallery about 40 ft. long on the river side of the turbine room between main units No. 2 and No. 3. A benchboard on this gallery contains fourteen panels. Three of these are used for the control of the main units, two for the exciters, three for outgoing high-tension lines, three for

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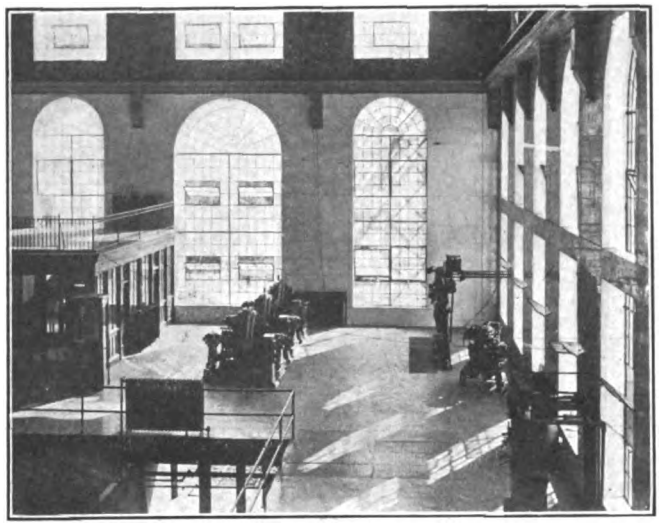
2300-volt lines to substation No. 3, one for 2300-volt lines to the booster pump motors, and two are blank for future connections. Indicating and recording instruments are on vertical panels above the benchboard.

The structure for the busbars and oil switches is on the main floor under the front of this gallery. The ends of this structure are inclosed, forming a room in which the high-tension circuit-breakers are installed. The main cables



Northern Ohio Power—View of West End of Turbine Room Showing Engineer's Office and Local Substation

from the generators are carried under the turbine room floor to the 2300-volt busbar. From this bus cables lead to three 3000-kw transformers. Additional transformers will be installed soon. The transformers are located in the turbine room basement directly beneath the switchboard gallery and step up to 22,000 volts for the outgoing high-tension lines which feed the substations mentioned before. The high-tension cables pass through ducts in the turbine room floor to the lightning arrester room. In this room are installed three sets of electrolytic lightning arresters. Directly above this room is an initial transmission tower which is the starting point for all lines.

Substation No. 3 is located in the northwest corner of the turbine room and consists of three 500-kw Westinghouse six-phase, 60-cycle rotaries and three step-down transformers, which are fed directly from the 2300-volt main busbar. The switchboard for this substation contains the necessary panels for the rotaries and outgoing feeders. Sixty-cycle rotaries were finally selected for this service to avoid frequency changes in view of the fact that remarkable progress has been made during the past few years in their design. Additional panels for switches and circuit-breakers for lighting and auxiliary motors were placed on the turbine room floor near the substation board.

STATION OPERATION

The station is now being operated by two shifts. The organization consists of one chief engineer and four assistant engineers. One engineer is expected to be on duty in the turbine basement and one on the main turbine room floor at all times. In addition there is an operator on the main switchboard and one on the switchboard for Substation No. 3.

The boiler room is under one boiler room foreman, and each shift consists of one water tender, one fireman and four coal handlers at the present time until the completion of the coal bunkers. Additional laborers are now employed removing ashes and wheeling coal into the boiler room, but when the ash-handling system is completed it will require very little attention and one or two ash handlers on each shift should be able to take care of all the ashes. When the coal bunkers are completed two men will be required to shift and unload coal and operate the coal crushers. In addition, one clerk or timekeeper and one porter have been employed and from two to six boiler cleaners or laborers will be required.

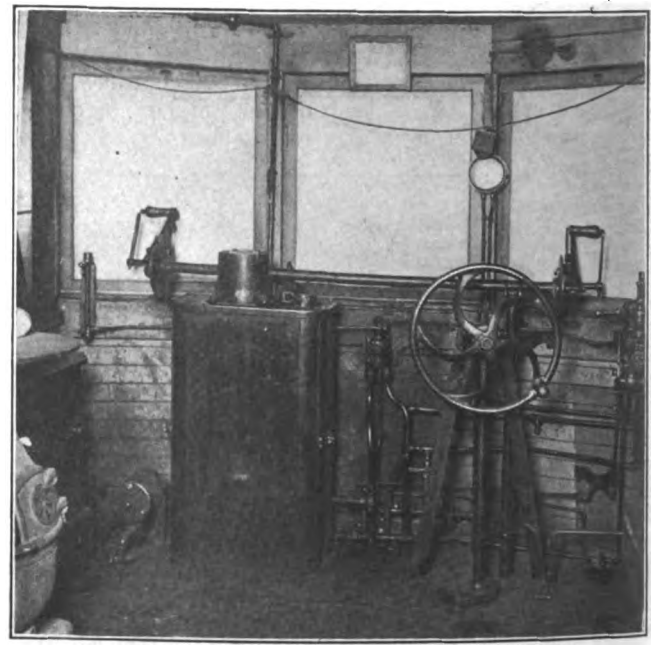
J. T. Ross, of Cleveland, was consulting engineer on the work, and J. C. Lathrop had immediate charge of the civil and mechanical engineering features.

A NOVEL ARRANGEMENT OF MOTOR CONTROL

The Cedar Rapids & Iowa City Railway & Light Company has several express cars which are frequently used for switching service. In order to permit motormen to observe signals given by a switchman from the rear during such movements the cars have been equipped so that the controller can be operated from either side of the cab. The arrangement, which has been developed by Charles Munson, electrical engineer of the company, consists in a bevel gear mounted in a cast-iron casing in place of the controller handle and operated by means of a horizontal shaft extending across the car. The shaft is made of gas pipe and has a handle at each end equipped with a "dead man's button," so that a man seated at either side of the cab and leaning out of the cab window has a handle within easy reach. The reverse lever is arranged in the same manner with a horizontal rod attached to the reverse lever through a pair of bell cranks.

The cars are equipped with automatic air brakes for road service as well as straight air brake for use in switching. The straight air control valve is connected by rods to hand levers on each side of the cab and within easy reach of the motorman, the automatic air being controlled through an engineer's brake valve in the customary position on the right-hand side of the cab.

The control equipment is of the Westinghouse K-14 type,



Standard Controller Arranged for Switching Service

and a four-pole switch is provided in the motor circuit which enables the motorman to throw all four motors into series for starting an extremely heavy load.

The Monza-Lecco Railway, Italy, which is 42 miles long and joins the Valtellina Railway, is now being electrified for three-phase, fifteen-cycle, 3200-volt operation. The completion of this line will give an all-electric route, 155 miles long, from Milan, Italy, to the Swiss border at Tirano, where the road will connect with the electrically operated Bernina Railway.

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INDIANAPOLIS & CINCINNATI TRACTION COMPANY'S OPERATING RULES WITH CAB SIGNALS

On June 8, 1912, a complete description of the new signal equipment of the Indianapolis & Cincinnati Traction Company appeared in the ELECTRIC RAILWAY JOURNAL. At that time the installation included only a portion of the Shelbyville division affording protection between the city limits of Indianapolis and Shelbyville. The initial installation has since been extended so that the complete division between Indianapolis and Greensburg, a total distance of 38 miles, is now in operation. Each block extends from siding to siding, an average distance of about 2 miles.

The installation between Shelbyville and Greensburg was completed about March 1, at which time a movement of all trains over this division was protected by the Simmen system of signaling. As this was the first installation of its kind, a set of operating rules was prepared as a result of experience on the first section of this type of signaling. These rules have since been adopted by the company and approved by the Indiana Railroad Commission. Since these rules governing the operation of trains under the Simmen system of signaling are the first of their kind, considerable interest should be attached to their publication. Charles L. Henry, president and general manager of the Indianapolis & Cincinnati Traction Company, prepared them, and, as will be noted, they are brief yet cover all the points which may arise in the operation of trains. An abstract follows:

In the operation of all trains, both scheduled and extra, on the Shelbyville division, from the Junction to Greensburg, the section upon which the Simmen system of railway signaling and train dispatching is installed, dispatchers, motormen and conductors will be governed by the following special instructions:

1. (a) Regular scheduled meeting points are fixed on the time table and may also be fixed by train orders either for regular or extra trains. On approaching such meeting points the motorman must be on sharp lookout. If he does not get a green light at the distant rail, he must slow down prepared to stop; and if at the home rail he still does not get a green light, he will report to the dispatcher, as hereinafter directed. If, on approaching such meeting point, he gets a green light at the distant rail, he will stop with the shoe on the home rail, and if he then has a green light, he will remain with the shoe on the rail until the dispatcher momentarily gives him a red light followed afterward by a green light. This will indicate to him that the dispatcher desires to make a new meeting point, and the train will then proceed. The new meeting point will be indicated to the motorman later by failure to get a green signal at the distant rail and again at the home rail at some other siding, and upon such failure the motorman will be governed the same as if it were the regular scheduled or train order meeting point.

(b) In such case the opposing train will be notified that its rights have been restricted by failure to get a green light at any distant rail and home rail. When thus notified the motorman will understand that a new meeting point is fixed at that siding, and he will be governed accordingly, the same as for any other meeting point.

2. A relay switch is placed in the car near the relay. This switch may be turned in any one of three positions: (a) Turned to the right for eastbound movement; (b) turned to the left for westbound movement; (c) turned to central position disconnects the relay entirely.

Before reaching the Junction with an eastbound train the conductor and motorman will unlock and turn the relay switch to the right for an eastbound movement, at once relocking the switch in that position. Before leaving the third-rail in the Greensburg station the conductor and motorman will unlock the relay switch, turn it to the left for westbound movement; relocking it at once in that position. In taking a car out of the Shelbyville shops the relay switch must be unlocked and set either for an eastbound movement or a westbound movement, as the case may be, before starting, and then relocked in that position. In case a train, eastbound or westbound, is required for any reason to back up, before backing up, the motorman and conductor will change the relay switch so as to provide for the movement either east or west, as the case may be.

3. Motorman will not move without green light. All rights to move a train as given by the book of rules or by bulletins are of no avail unless the motorman gets a green light. Only a specific order from the dispatcher will authorize a motorman to move his train without a green light. (a) When at siding for a "meet," motorman will call dispatcher and report whether in siding or not and whether opposing train has appeared. (b) If in siding and opposing train is there, dispatcher will call "No orders" and give motorman a green light. (c) If the opposing train is to take the siding, then as soon as it is in the siding, the motorman of the other train which first arrived will report to the dispatcher and he will answer "No orders" and give motorman a green light. (d) Neither train must pass by home rail without green light. In backing out of siding, train will always back up far enough for the shoe to rest on the home rail. In heading out of a siding, it will go forward far enough to close the switch, then back up until the shoe rests on the home rail.

4. Disappearance of the green light in the cab at any point when the shoe is not in contact with a third rail may be attributed only to some trouble in the car wiring, battery or lamps, and should be disregarded by motorman until he reaches the next third rail. If at that rail he does not get a green light, he will at the nearest telephone connection call the dispatcher and report the situation.

5. Motorman will always disconnect car battery (by turning the cutout switch) when he passes the Junction going west. Also always connect up the battery, going east, before reaching the home rail at the Junction, so as to get proper signal at that rail. Whenever leaving a car at either carhouse or at Greensburg, Connersville or Indianapolis, at the end of a run or when it is exchanged for another car, the battery must be disconnected.

6. In case of any defect in operation, motorman will immediately report to dispatcher and in no case proceed otherwise than with green light unless under regular train order from dispatcher. (a) In such case dispatcher will note on his record the fact, in order to keep account of "failures," no note being taken of the same at subsequent sidings, until there has been opportunity for repair. (b) Dispatcher will also at the time make notation of any and every failure in any part of the signal system. This is important in order that we may perfect the system as well as keep an accurate record of its efficiency.

7. Do not let a car stand with the shoe on a third rail except for a short interval of time, as by so doing you will injure the relays. This especially applies while a train is stopped at Greensburg or the Junction but is applicable to all places.

8. At the Shelbyville station a relay switch has been placed in the registry box. This switch must always be thrown in and out by the motorman or conductor of an eastbound or westbound train so as to complete the record at the dispatcher's office by showing the train at that point. This switch is also intended to give the motorman or conductor a red or green signal, whether to proceed or not, the same as when the shoe touches a third rail. For this purpose two sets of lights have been placed at the Shelbyville station, one for eastbound trains and the other for westbound trains. When the relay switch is thrown in and out, unless a green light is received for the direction in which the train is to move, it must not proceed. If a red light is received, the dispatcher must be called for orders.

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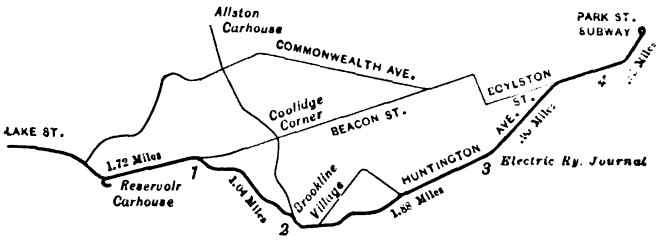
HOW SERVICE REQUIREMENTS ARE ASCERTAINED IN BOSTON

BY EDWARD DANA, ASSISTANT SUPERINTENDENT OF SURFACE LINES BOSTON ELEVATED RAILWAY

Probably no two patrons of a street railway have like ideas as to the adequacy or inadequacy of the service provided to meet their varying needs. Some are radical, oth-



Boston Traffic Count—Method of Dividing Route into Sections

ers conservative, in their estimate of what the company should do in carying them from the point of departure to the location they desire to reach. Incidentally it might be added that few of these persons in their own pursuits would long attempt to supply a commodity the demand for which is so erratic that at times a great deal more is served than can be used, while at other times it is impossible to furnish a satisfying amount. It may be of interest to outline the methods of the Boston Elevated Railway in ascertaining what service is required at different hours upon its many arteries of travel.

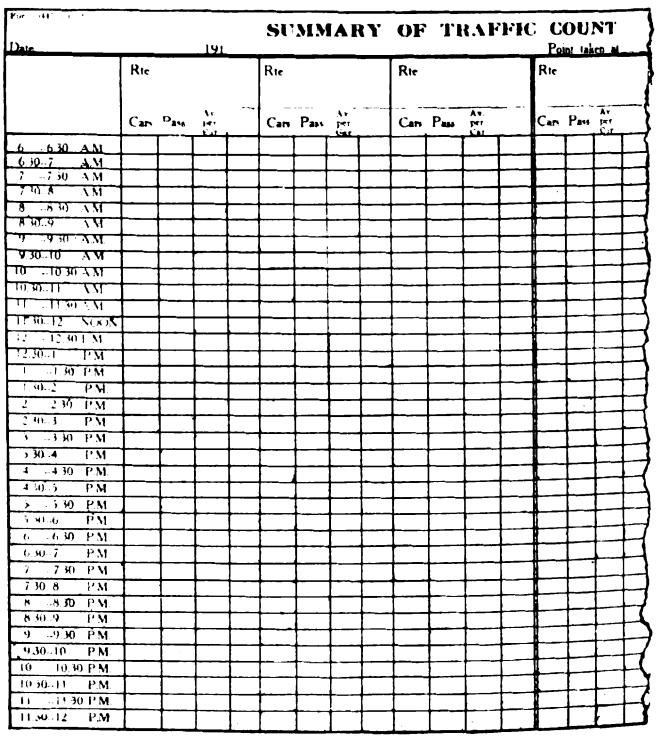
Changes in service are made to suit either permanent or temporary needs. The latter are provided for through information from street inspectors or extraneous sources almost entirely and the changes made are purely dependent upon the exigencies of the day or hour. Permanent changes are those which are embodied into timetables intended for use for a longer or shorter period, except such changes as are made of the timetables themselves to meet varying conditions of weather, affairs of more than normal magnitude on the lines, etc.

Information in regard to permanent so-called conditions of traffic is obtained from three sources, each of which is useful, but the last is of the greatest ultimate value.

Street inspectors supply one source. Their observation, report and comment upon the needs of the service are quite pertinent and highly desirable. The accuracy and consequent value of their statements, however, are frequently marred by the fact that they usually move over a considerable area, have many other matters demanding their attention and are apt not to secure the correct relationship between time and conditions. Quite often a condition of serious overcrowding exists through irregular operation by which the first car becomes much overcrowded and is followed directly by others of the same line comparatively light-laden. As likely as not this overcrowding makes an impression upon the mind of the inspector, and this impression is sometimes accentuated by comments from outsiders. He reports heavy riding and the need for more service before he has seriously endeavored to discover the cause for the apparently inadequate accommodation. To add service under such conditions is but to pay a high price for inefficient street supervision. Nevertheless such reports are of some value, and the Boston Elevated Railway secures reports of such conditions from its inspectors and provides special blanks for their use.

Conductors, by means of trip reports filled out after finishing their work, supply a second source of information. Their reports give a record of the passengers carried on each trip. While many inaccuracies exist due to the varying degree of ability of the men and the care with which they perform their work, these sheets form a permanent and fairly complete record of the service not secured through the first source. Necessarily, however, these reports show only the total passengers carried by half trips. While such information is of some relative value from day to day and week to week, it is more in the nature of a reminder to study the service more carefully at certain times than a basis for actual addition to or subtraction from the service. The reason why such information is spoken of as a reminder is that while the total number of passengers for a half trip may be excessively large, two conditions might exist which could not be determined from such a record. For instance, one case might show a comparatively small number of passengers carried, but if most or all of these were through passengers, the car on at least some portions of its route would have been excessively crowded. On the other hand, the trip might have secured several interchange freights and the register would have a high reading, although the car at no one time would have carried more than a normal load. It will be seen, therefore, that a company that goes no further than to base its service upon register readings is satisfied with rule-of-thumb methods and is willing to waste many dollars of hard-earned revenue in ill-adjusted service.

The third source mentioned is by means of systematic traffic checking on the street. By a comparatively small annual outlay permanent records can be secured which offer endless opportunities for study, scientific analysis and ammunition for defense against unjust criticism of the service. Moreover, it is modern efficiency to meet representations by accurate and convincing figures at once rather than to take the matter in hand with the understanding that it will be investigated to learn whether or not conditions are as represented.


SUMMARY OF TRAFFIC COUNT

Date ... 191 ... Point taken at

	Rte			Rte			Rte			Rte		
	Cars	Pass	Av. per Car	Cars	Pass	Av. per Car	Cars	Pass	Av. per Car	Cars	Pass	Av. per Car
6 — 6.30 AM												
6.30–7 AM												
7 — 7.30 AM												
7.30–8 AM												
8 — 8.30 AM												
8.30–9 AM												
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10.30–11 PM												
11 — 11.30 PM												
11.30–12 PM												

Boston Traffic Count—Portion of Blank Used for Summary

It was found desirable on the 472 miles of surface track in Boston to designate seventy-six traffic points, thereby dividing the trackage into districts. These traffic points are determined by knowledge of the local conditions of riding, many being at points of maximum load and at headway junction points. A schedule of traffic-count periods has been drawn up for each division. It was found advisable to allot such work by divisions in order that the company

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might the more readily train for the work men who were thoroughly conversant with the trips and lines passing through the division to be counted. Moreover, such a method provides the division superintendent with the information at the earliest moment before it is forwarded to the department of surface lines. It likewise entails less traveling time on the part of the checkers and consequently allows the maximum checking time without unduly severe working hours.

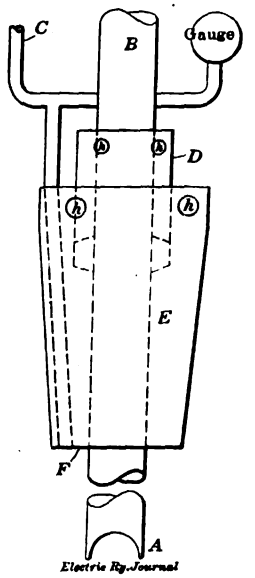
Every traffic point on the system of the Boston Elevated Railway is checked every fifteen days, which is equivalent to five points checked daily. The car number, arriving time and passengers are recorded and every half hour the number of passengers is totaled and averaged by the checkers. A summary is then prepared and gives at a glance a knowledge of the conditions existing at one or several points on a line. If some undesirable condition shows up on the summary, attention can then be directed to the detailed count.

Many times, where complaints have been made about the service, the summary gives the company all the information which is necessary to substantiate its position. The chart attached shows the traffic points upon a line 6½ miles long originating in a sparsely settled district and terminating at the Park Street subway staton. It will be seen that a complete analysis of the traffic is possible as well as information as to the headway and the point where time is lost.

When it is considered that in Boston there are 125 all-day routes, increased in rush hours to 337, that daily the car mileage amounts to more than 125,000, and that 1,475,000 people are carried on 15,551 trips, it can readily be seen what an endless task is presented properly to adjust the service to the needs.

A SIPHON FOR EMPTYING OIL BARRELS.

For use on the Western Ohio Railroad a novel device has been developed for the purpose of transferring oil and other liquids from barrels to storage tanks. In brief, the device consists of a siphon head which is screwed into the bunghole of an oil barrel and through which a piece of pipe is extended to the bottom of the barrel. A small hole in the siphon head is connected to a compressed-air supply, and the air pressure thus established in the barrel forces the oil out through the discharge pipe, transmitting it, in fact, to considerable distances if necessary.



Siphon Head for Oil Barrels

The storage house of the company at Wapakoneta, in which the oils are kept, is somewhat isolated, and the compressed-air system used in the shop is not extended to it. In consequence, a portable tank has been arranged for supplying compressed air at the storehouse. This tank is an ordinary main reservoir, 16 in. in diameter by 48 in. long, such as is used on an interurban car. It is mounted on a two-wheel truck and after being charged with air in the shop is wheeled from there to the oil house. When charged at a pressure of 60 lb. per square inch it affords sufficient air to transfer the contents of a 50-gal. barrel to any desired receptacle.

The discharge pipe is made up of a piece of ½-in. standard gas pipe, which is turned in a lathe to give it a smooth surface capable of making a close fit in a stuffing box. The siphon head through which the discharge pipe is extended is made of cast iron. It is about 3 in. long, threaded on the outside with sixteen threads per inch and cut on a taper of 2½ in. per foot, as this taper appears to be the general standard used for the sides of bungholes in oil barrels. A stuffing box is inserted in a threaded recess at one end of the siphon head to hold packing around the discharge pipe.

The siphon head is drilled with a ¼-in. hole, and into this is inserted a ⅛-in. air-supply pipe on which are mounted a pressure gage and an air cock for the purpose of releasing the pressure in case of accident to the barrel or to the discharge line.

In operation, the siphon head is screwed into the bunghole of the barrel until it is air-tight, and the ½-in. discharge pipe is shoved down through the siphon head until it reaches the bottom of the barrel. Air is then turned on to the air-supply pipe marked *C* on the accompanying illustration, the pressure being read on the gage. This air pressure is transmitted to the barrel through the hole in the siphon head marked *F* and the oil is forced up through the pipe, emerging at the point marked *B*, from which it is delivered into any desired receptacle.

The holes shown in the upper part of *E*, the siphon head, and *D*, the stuffing-box nut, are bored to provide a means for screwing the two castings into place, as a pin inserted into one of the holes takes the place of a wrench and aids in assembling the apparatus at points far away from the shop.

The object of the pressure gage is to enable the operator properly to adjust the air pressure and to prevent the barrel from being subjected to a pressure of more than 10 lb. or 12 lb. per square inch. This pressure has been found to be sufficient to transfer the most viscid oils to the storage tanks, which are set at an elevation of about 7 ft. above the top of the barrel.

The device has been found to be very satisfactory and decidedly convenient. It is easy to assemble, and about five minutes' work is sufficient to make complete preparations to transfer liquids, as it is necessary only to drive in the bung and screw the head into place in the bunghole. The bottom end of the discharge pipe is notched out as shown in the illustration, and this permits draining the barrel practically complete.

With the device it has been found that about ten or fifteen minutes is required to transfer 50 gal. of such oils as turpentine, signal oil, boiled linseed oil or compressor oil. Oils of greater viscosity than those, such as car oil or cylinder oil, require a proportionaely longer time.

WELFARE WORK AT MANILA

With the aim of gaining the good-will of the public and of its employees, the Manila (Philippines) Electric Railroad & Light Company has been conducting a series of concerts on the Luneta, or city park grounds, every Saturday night during the hot season. The concerts have proved highly popular with the public, and on April 19 nearly 20,000 people were present. On this special occasion the Luneta was brightly illuminated and a pyrotechnic display was held in honor of the Toyo Kisen Kaisha's liner, the *Shinyo Maru*, which lay at anchor opposite the Luneta. The fireworks opened with a royal bomb salute to the United States army and navy and closed with a salute in honor of Governor-General Forbes.

The Manila Electric Railroad & Light Company has made conspicuous efforts in other lines, realizing that the promotion of the happiness and co-operation of its men is a valuable factor which cannot be ignored. It has encouraged sports among them by preparing a large baseball park near the carhouses. Careful attention is also bestowed on the health of sick or injured employees, who are allowed free medical attendance, including all hospital charges, without being struck off the pay roll.

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FARE COLLECTING AND RECORDING IN BUFFALO

In the issue of the ELECTRIC RAILWAY JOURNAL for March 11, 1911, the then new Dayton fare recorder system was described. The International Railway Company has more than 700 of these in use at present, and a number have been in operation long enough to demonstrate that it is practicable to handle the collection of fares in a manner similar to that employed in selling goods in a store, while the bookkeeping and checking in the auditor's office are much simplified.

In Buffalo the recorders give the following data: date, line number, trips, cash, 5-cent fares, transfers, 3-cent fares, passes, total passengers, total registered, inspector's number, time of starting each trip, conductor's number and car number. These records are printed on a strip of paper 12 in. wide, which is torn off from time to time. Two records are taken from the recorder, one by the conductor when he leaves the car, the other by the station clerk when the car is turned in the carhouse at night. The conductor does not have access to the second sheet, which records the total fares collected by all conductors operating the car for the day. On the records are given not only the items mentioned trip by trip, but also the totals at the top of each sheet.

The clerical work required of conductors is very much reduced by this system. In addition to operating the recorder, each has a trip sheet to fill out giving the car number, the place of arrival and starting by station number and the time of arrival at and departure from each station. Both actual and schedule times of starting are given. In addition to this very simple record there is merely set down the serial number of the transfer first issued on each trip. For each round trip each conductor is provided with an envelope in which he places the transfers, passes and tickets received and notes on the outside the number of each. He carries his cash with him until the end of the day, when it is turned in and counted by the receiver at the carhouse. Each conductor is required to carry $5 of his own money for change. He is bonded for $50 at his own expense, or can in place of this deposit $25 in cash.

An important feature of this system as used by the International Railway Company is the provision for checking the various records. The sets of sheets from each recorder are checked for totals, and as the machine does all of the arithmetic there is no reason why the figures should not tally. The auditor also checks against the register readings the contents of the envelopes turned in. If the counters find that the contents of the envelopes do not check with the register record the conductors are charged full cash fares for all shortages. A number of such mistakes are found, but the fact that such careful checking is possible makes the conductors watchful. In the near-side cars the conductors are relieved of all duties connected with the boarding and alighting of passengers, hence they have not the usual excuses for making mistakes.

The auditing department, in addition to checking the records, makes out very complete tables of operation. The usual mileage records are made out from the timetables furnished by the transportation department and from deviation sheets turned in by the carhouse clerk. The deviation sheets shows accidental departures from schedule after a car leaves a carhouse. Deviations are reported to the carhouse clerks for entry on the deviation sheets. One of the carhouse men notes the time at which each car leaves the carhouse and turns in a copy of this record daily to the auditor.

By means of a Burroughs adding machine the total data for each car are tabulated from the recorder records, a special form being used for this purpose. From these, a standard statement sheet, comparing the most important statistics for the corresponding period of the preceding year, is made out weekly and monthly. These statements of receipts give the data desired by the officers and directors, including for each line the recepits, the car hours, the receipts per car hour, the actual car miles, the receipts per car mile and the actual speed. All of this work is comparatively simple by the system outlined above. It is evident that the use of the Dayton recording system in the near-side cars has turned the conductor into a clerk. If this plan becomes general, a new name for this functionary will be required. The substitution of mechanical recording devices for written records by car conductors certainly eliminates the chief cause of inadvertent error. The only mistake which can be made is the result of careless operation of the recorder lever. Of course, no mechanical system will make men accurate, but, as the conductor's work is done at the front of the car in plain sight of all of the passengers, he is under close inspection and is not apt to be careless.

GASOLINE EMERGENCY WAGON OF THE SYRACUSE RAPID TRANSIT COMPANY

A gasoline emergency wagon which was put into service late last summer by the Syracuse Rapid Transit Company has demonstrated its usefulness on many occasions. During the past ten or eleven months it has made a large mileage and it responds to six calls, more or less, per day. It is housed in a part of the Townsend Street substation near the center of the city, and an expert operator is always on duty ready to respond to a call. It is tested every hour by starting the engine.

Gasoline Emergency Wagon, Syracuse Rapid Transit Railway

The truck has a heavy steel underframe, the chassis being designed for a 5-ton load, although the springs and body are of but 3 tons capacity. The specifications called for a truck which should be suitable for emergency line and wrecking work, assisting in the handling of derailed cars and vehicles stalled upon the railway company's tracks. The body is provided with two longitudinal seats 6 ft. long, 16 in. wide and 16 in. high. Underneath the seats are lockers for tools, with doors opening downward on the outside. The roof is removable and is of strength sufficient to support the weight of two men. It is at a height of about 11 ft. above the ground. Access to the body is by a flight of steps in the rear.

This truck has been found useful in numerous ways. It responds to all fire calls and to calls for help for derailed cars, etc. Being geared for the moderate speed of 15 m.p.h., it can exert an enormous drawbar pull. This speed, however, is sufficient to enable it to reach scenes of trouble quickly. In fact, this speed is as high as would be practicable for use in crowded city streets.

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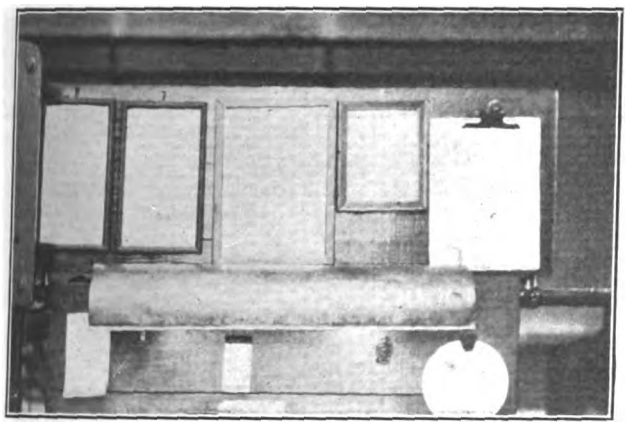
POWER PLANT CONVENIENCES AT PROVIDENCE

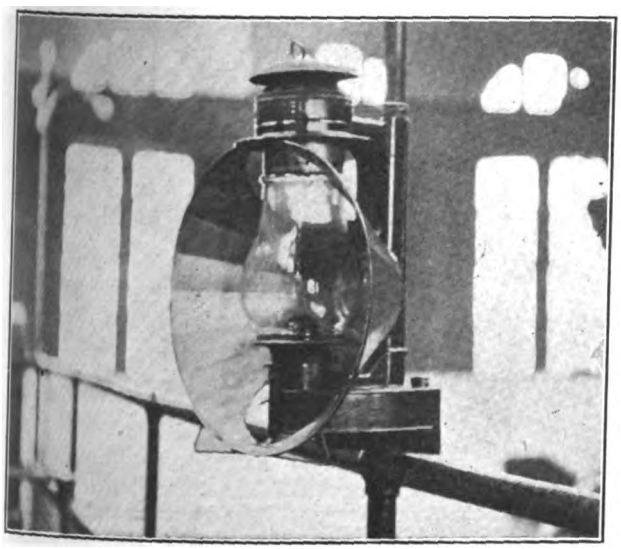
In the operation of a large power plant from day to day labor-saving methods often play an important part. Such simple matters as the prevention of eye strain at the desk where switchboard readings are written on the log sheet, the use of transparencies for signaling machine manipulation, and the provision for emergency lighting even of a



Power Conveniences—Illumination of Log Table

comparatively crude type count in the easier operation of the station. The following paragraphs give an outline of a few of these devices in use at the Manchester Street station of the Rhode Island Company at Providence, R. I. The apparatus is of the home-made type and simple in its construction, but it is of demonstrated usefulness in the handling of the station.

The first illustration shows an effective means of lighting the log table in the switchboard gallery so that the fifteen-minute instrumental readings may be put down without the eye strain which so often accompanies this work, especially when it is done under glaring lamps. The feature of this lighting arrangement is a semi-cylindrical copper reflector 7 in. in diameter and 30 in. long, lined with tin on the inside and containing two 110-volt, 16-cp incandescent lamps, placed with their axes horizontal so as to throw the light

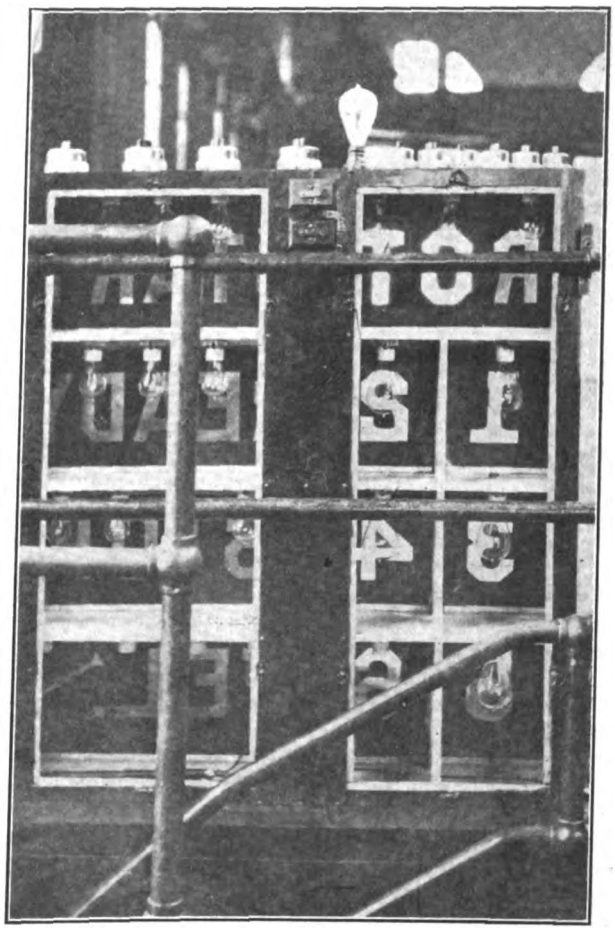


Power Conveniences—Kerosene Lamp for Emergency Use

most effectively upon the table. The lower edge of the reflector is carried about 12½ in. above the table surface, and its dull outside surface is thoroughly satisfactory to the eye in a location where more or less light is transmitted to it from lamps on the nearby switchboard. The reflector is fastened to a bulletin board at the rear of the desk by a screwed metal strap running from end to end, the whole device being hung on the pipe railing bordering the gallery.

Even in the largest plant, the operators do not care to take chances with total darkness, and the second cut shows how the old-time kerosene lamp is kept at hand on the switchboard gallery of a 25,000-kw station as a precautionary measure. This station has no storage battery of sufficient size to light it temporarily in emergencies, but in case the generators are disabled, leaving the switchboard without light, the operator simply turns to old-fashioned methods. The location of the oil lamp with a duplicate at another point on the gallery rail in front of a conical reflector insures that a strong beam of light will be thrown just where it is most needed on the panels and instruments.

At the top of the stairway in this plant is located an annunciator cabinet, shown in the third view. This cabinet is divided into compartments which contain incandescent lamps and fronted by transparencies which are easily read



Power Conveniences—Rear View of Annunciator Cabinet

from the operating floor some 40 ft. below. The lamps in each compartment are controlled by switches shown on the top of the cabinet, and the indications tell the floor operators just when to start up or stop any of several rotary converters or when to go to the telephone. Thus, if the operator on the switchboard wants the floor attendant to start up rotary No. 1, he throws the corresponding snap switches on the top of the compartment, lighting the lamps that illuminate the transparencies "Rot.," "1," "Start," and in spite of the noise caused by a large steam turbine in the same room the signal is quietly but effectively transmitted. Bell signals are also connected to call the atention of floor operators to the transparencies. Ten switches are required for this device. The compartments are about 10 in. deep, and the cabinet is 4 ft. square, the lamps being of 8-cp and 32-cp rating. Usually one of the larger size is employed in the narrower compartments, from three to five of the smaller lamps being connected in each division on the left-hand side of the annunciator.

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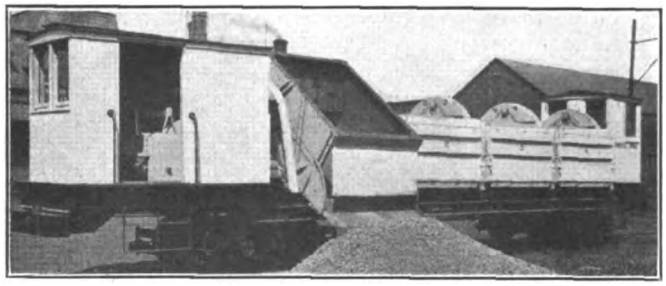
MULTIPLE DUMP CARS FOR THE CONNECTICUT COMPANY

The Connecticut Company has lately received from the Wason Manufacturing Company five multiple dump cars of the type shown in the accompanying illustration. These cars are designed to draw gravel or trap rock from the stone crusher to the various points where the railroad may need this material, or to draw the material for State road work.



Dump Car with One Section Lowered

A feature of the construction of these cars is the use of metal, except that the cabs are of wood. The trucks are of the Wason No. 30 arch-bar motor type with 5-in. x 9-in. journals. The total weight of a car with load and operating equipment, including air brakes, is approximately 105,000 lb.

The dump cars are 48 ft. 8 in. over the buffers, 27 ft. 5½ in. truck centers and 8 ft. 3 in. wide. A car underframe carries four independent dumping bodies, each one of a capacity of 162 cu. ft., or a total capacity of 24 cu. yd. The cars are so arranged that the operator in the cab can dump each body separately in either direction from the cab by using a GE crane motor. A cab is located on each end of the car, but only one of these cabs contains the dump control apparatus.

The sideboards are so arranged that they open and close automatically with the raising or lowering of the dumping body, and when opening they make an extended shelf or apron so that the trap rock or other material dumped will be left far enough away from the track to avoid interference with car steps. This arrangement is a very important feature in the mechanism of the car. The hoisting devices are arranged to cut out automatically so that when the body is raised high enough to dump the motors stop working; also, when the body comes back in place the motors are automatically cut out and stop, thereby making it impossible for an inexperienced man to harm either the motor or mechanism. These cars will undoubtedly be of great service in reducing the cost of handling trap rock, etc., as only two men are required to operate the car and control the dumping.

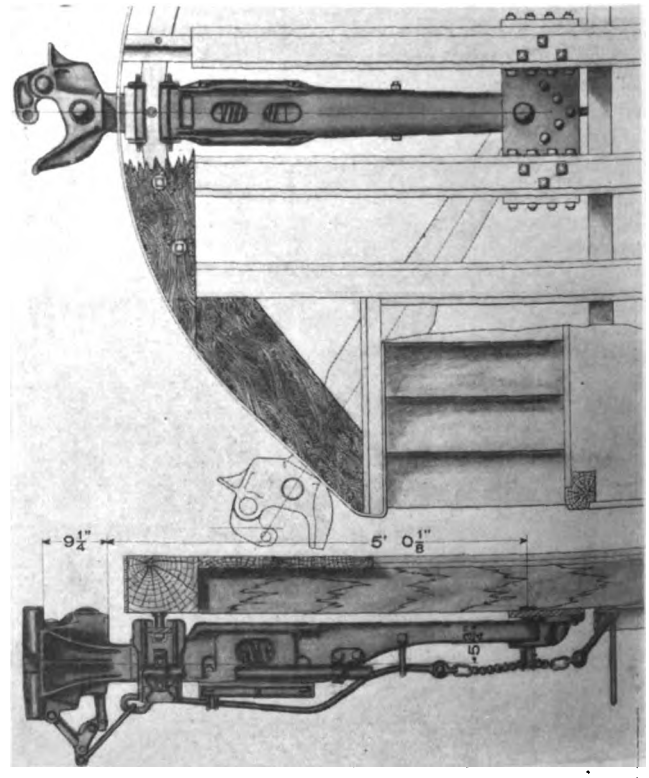
The year book of the Japanese Ministry of Finance contains figures showing the growth of electric railways in that country for 1911 as compared with 1910. The number of companies increased from thirty-four to forty, the paid-up capital from £9,438,000 to £9,687,900, the length of lines in operation from 363.6 to 431.5 miles, the length of lines under construction from 180.44 miles to 221.05 miles, the number of passengers from 325,066,000 to 395,666,000, and the net earnings from £811,900 to £898,700. The total number of motor cars operated to the end of the year 1911 was 2459. It is not anticipated that the increase in the mileage of electric railways during the coming years will equal the ratio shown in the past years, as much of the work done in 1911 was stimulated by a pending increase in the tariff on electric railway supplies. The government has taken up the subject of electrification of steam railroads, and it is proposed to experiment between Tokyo and Yokohama.

RADIAL COUPLER AND DRAFT RIGGING FOR ELECTRIC CARS

The new "National" radial coupler and draft rigging shown in the accompanying illustration has been developed by the National Malleable Castings Company, Cleveland, Ohio, in response to a demand for the application of automatic couplers to electric traction equipment. It consists of an automatic coupler of the approved Master Car Builders' type, pivoted by means of a radius bar to the car body. The pivotal point is located adjacent to the truck center, and the coupler is permitted a large degree of unrestricted lateral displacement, thus allowing coupled cars to pass around very sharp curves without throwing any strain on the car structure.

Either the company's well-known Sharon or Vulcan automatic couplers can be used with this device, and both of them have the required lock set, lock-to-lock and knuckle throwing features, couple automatically by impact, operate without the necessity of anyone going between the cars and also interchange with standard steam railroad equipment. Both of these couplers when used with the new device are equipped with lateral wings or buffing lugs, which, when two couplers are interlocked, engage and prevent the couplers from buckling under buffing stresses. Substantial springs located in the radius bar connection absorb all the normal shocks which are apt to occur in train operation, both in buffing and pulling.

It is stated by the manufacturer that the new radial coupler has been in successful service for several years on a few of the large electric traction lines. In one particular application in which the Sharon coupler is used sufficient



Views of Radial Coupler and Draft Rigging

lateral displacement is provided so that coupled cars each 50 ft. long can pass without strain around curves of 33-ft. radius.

The knuckle of 16-in. depth used on these couplers will be found ample to provide for changes in height of track. Provision is also made in the contour lines for the vertical angling which is necessary in passing from one grade to another.

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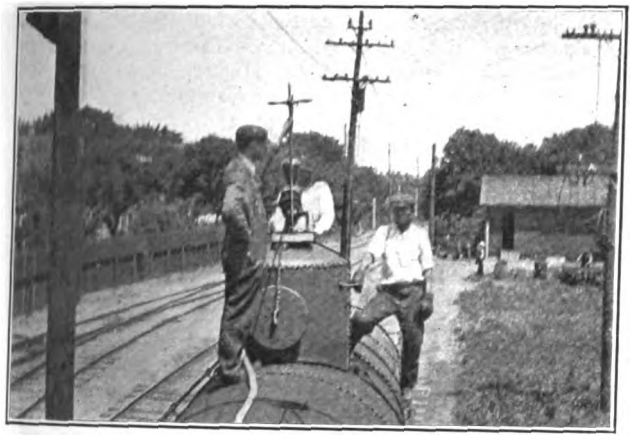
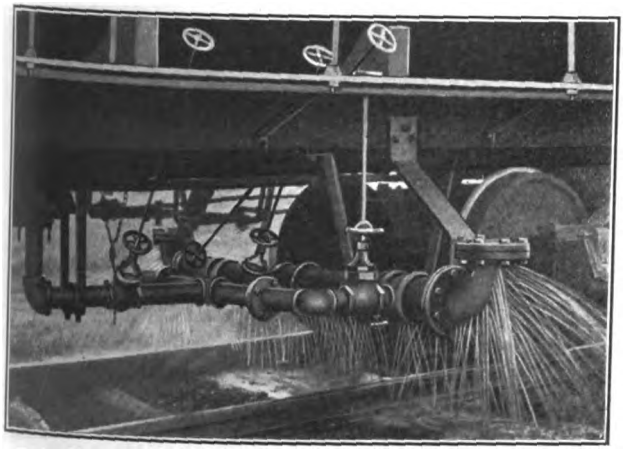
WEED KILLER IN ROCHESTER

The New York State Railways, Rochester, N. Y., has recently applied Atlas A weed killer and track preservative, which is manufactured by the Atlas Preservative Company, on its Sodus Bay line, which runs between Rochester and Sodus Point, a distance of 39 miles. The chemical was shipped in a large tank car direct from the factory to the line on which it was to be used. The car was coupled to a spray car with a capacity of 5000 gal. and using a 5-in. spray pipe with three rows of 3/16-in. holes running ten to the foot, the rows being about 1 in. apart. This car, as shown in one of the accompanying illustrations, contains a structure work over the center of the tank on which two barrels are placed for measuring the liquid, which is forced into them from the first car by means of a hand pump, as shown in the other illustration. In this 5000-gal. tank 243 gal. of the chemical is placed, the rest of the tank being filled with water, which is agitated and mixed with the chemical by means of air pressure introduced through an air-pipe inserted into the tank from above. This amount of chemical is enough to spray 3 miles of track. In all, 2810 gal. of the Atlas "A" were used to spray thoroughly the 39 miles of track of the Sodus Bay line.



View of Tank Car, Showing Hand Pump

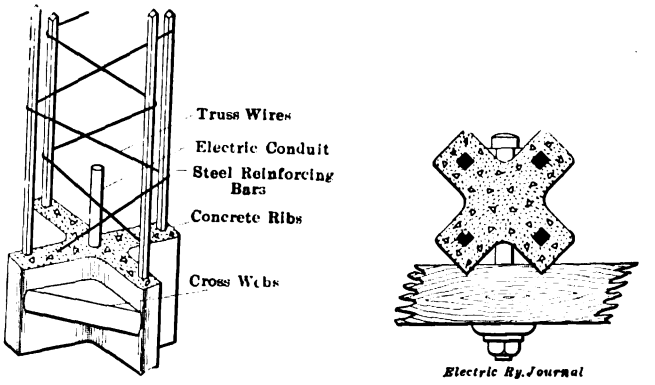
This application killed practically all the vegetation permanently with the exception of some of the roots of the hardier weeds which go down several inches in the ground, and these after several weeks are just beginning to sprout again. This operation will be repeated very soon, after which the company claims that all vegetation will be entirely extinct. By this method the railway company feels that it can keep its lines free from weeds at considerably less expense than it has been able to do with the methods previously employed.



Weed Killer in Operation

REINFORCED CONCRETE POLE OF STAR SECTION

W. H. Lienesch, a consulting engineer of Chicago, is preparing to make for general sale a reinforced-concrete pole of the star-shaped section shown in the accompanying drawing. It is asserted that the new design weighs but two-thirds as much as square-type reinforced-concrete poles for the same service; thus it is not necessary to pour it under the disadvantageous conditions of field work. Another important difference is that cross webs are used as steps, thus eliminating the cost and maintenance of metal spikes. The new pole is designed to utilize a minimum amount of concrete, which is compressed into metal molds so constructed that the steel reinforcement is absolutely held in its proper position until the initial set has occurred. The concrete is merely a protection for the fabricated steel reinforcement, which is figured to develop the entire strength of the pole. Other features claimed for these poles are freedom from exposed metal parts, superior flexibility and greater stability against wired pressure owing to the bearing of the "saw-buck" section against the earth.



Star-Shaped Concrete Pole, Showing Character of Reinforcement and Provision for Conduit

The following table is the maker's comparison of this pole with square reinforced and round wooden poles.

COMPARATIVE POLE DATA.

Length, Ft.	Shipping Weight, lb.			Cost Set Up		
	Square	Star	Cedar	Square	Star	Cedar
25	2400	1500	350	$9.71	$5.00	$4.10
30	3150	1900	450	11.63	7.00	8.25
35	3900	2450	600	14.45	8.50	11.15
40	5400	3150	950	20.05	11.00	15.00
45	6450	4000	1200	24.78	14.00	22.20
50	7500	5000	1500	29.50	17.50	26.70
Ave.	4800	3000	842	18.35	10.50	14.56

In the foregoing table the word "square" refers to ordinary concrete poles with a square cross-section reinforced with vertical steel bars and poured into the top of vertical wooden forms erected in place; the word "star" refers to star-shaped poles, using special mixed concrete and vertical reinforcing bars, and the estimates, while including freight and setting up, are exclusive of any royalty; the word "wood" refers to a good grade of cedar poles dressed, graved, ruffed, bored, hauled and set.

The figures on wood poles were copied from treatises on concrete poles published in 1910 by the Universal Portland Cement Company. They represent the total cost, including all profits. In general, for any given length, the star-shaped pole is 1 in. to 2 in. less in diameter at the top and 2 in. to 3 in. less at the bottom than are the wood and square poles respectively.

Notices have been placed in all cars on the city and interurban lines of the International Railway, Buffalo, N. Y., offering a reward of $25 in gold for information leading to the arrest and conviction of persons maliciously removing electric light bulbs or otherwise interfering with the equipment of a car.

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News of Electric Railways

Short Strike on Indianapolis Interurban Lines

After the failure of the Three Star Organization to unionize the interurban trainmen on the lines operating out of Indianapolis, the committee of the Three Stars voted to affiliate with the Amalgamated Association of Street & Electric Railway Employees. This action, taken Aug. 16, was concurrent with the arrival of Rezin Orr, international treasurer of the Amalgamated Association. J. J. Thorpe, first vice-president of the Amalgamated, arrived in Indianapolis from Pittsburgh on Aug. 19, bringing the charter of the local organization. A meeting was held the same night and officers of the local union were elected. On Aug. 21 forty-six trainmen of the Terre Haute, Indianapolis & Eastern Traction Company sent in resignations to Messrs. Orr and Black, withdrawing from the Three Stars and refusing to be assigned by that organization to any other union, reserving the right to themselves to take such future action as they might see fit. The trainmen stated that the organization had failed to keep its promise and that its action of Aug. 16 demonstrated that it was incapable of carrying out its announced purposes. Resignations of other trainmen were turned in to the organization on the day following.

On Aug. 22 Mr. Orr announced that a general strike would be called at 4 a. m. on Aug. 23 because the companies had "ignored" the demands of the "union." On Saturday morning practically all the main interurban trunk lines operated their trains on regular schedules without interruption, and the service continued during the day. On the Martinsville, Crawfordsville, Rushville and Shelbyville lines only partial service was in effect, a few men having gone on strike and others being intimidated by the labor men. In all not more than from fifty to sixty men out of a total of 600 failed to report.

A special meeting of the board of safety of the city of Indianapolis was called, and instructions were sent to the superintendent of police to the effect that no one "must be permitted to interfere with the running of the street cars in the city limits"; that it was the duty of the police to see that the cars were run for the accommodation of the public as long as there were men willing to operate them; that as many special police as might be necessary should be employed, and that the board would back the superintendent in enforcing order. Superintendent Hyland at once instructed the police force to arrest all persons preventing or undertaking to prevent the running of cars or doing anything to prevent the regular operation of cars and transportation of passengers.

On Saturday evening Mr. Orr stated that if the companies would treat with individual committees from their roads he would not ask that they deal with the Amalgamated Association as an organization. The companies take the position that they have never received any intimation of any grievance from any of their employees. The very efficient police protection at the Traction Terminal Station and on the interurban cars prevented any attempted disturbance by the organizers or sympathizers. On Aug. 24 normal service was resumed on all but one of the interurban lines, and over 90 per cent of the trains due to leave the Traction Terminal Station pulled out on schedule. By Sunday evening many of the men who had failed to report were seeking to man their cars.

Charles L. Henry, president of the Indianapolis & Cincinnati Traction Company, posted notices on Aug. 25 to striking motormen and conductors that they must return to their work by 5 o'clock the following morning if they expected to continue in the employ of the company. He said his decision was final, declaring that his men had no grievances against the company and that none had been presented to him. He said the regular schedule would be resumed at the earliest possible date whether his men wanted to work or not, but that he preferred they should have their places again if they would accept them.

All cars in and out of Seymour, Ind., were running without interference on Aug. 25. There had been no disturbance at Seymour up to Aug. 25 on account of the strike.

Arbitration of Terms of Service in Detroit

The demands of the motormen and conductors of the Detroit (Mich.) United Railway were presented to the board of arbitration on Aug. 19 by W. D. Mahon. Following the reading of the document, Judge Phelan, a member of the board, offered a resolution to have the officials summoned before the board to answer certain questions he desired to ask. Attorney Edwin Henderson, another member, assured Judge Phelan that no resolution was necessary and that J. C. Hutchins, president, and F. W. Brooks, general manager of the company, would answer any questions that might be asked of them. The principal demands of the men are as follows:

"The workday for all motormen and conductors in city service shall be nine hours, to be completed in eleven consecutive hours in any one day of twenty-four hours. The time between the early and late runs to be divided as nearly equally as possible. One relief for meals or swinging from one run to another shall be paid for at straight time. No run of any kind shall pay less than eight hours' time.

"On interurban and suburban lines the workday of motormen and conductors shall be upon straight time, the workday to be as nearly nine hours as the division of time will permit. The time between early and late runs shall be divided as nearly equally as possible and no run shall pay less than eight hours' time.

"All crews in city, suburban and interurban service shall start and get off at the same carhouse or station. All motormen and conductors in city, suburban or interurban service shall be paid for all time in excess of ten minutes that is required for them to go from their reporting place to the place where reliefs are made, and where men are called upon to do any work they shall be paid for ten minutes after they have been instructed to report and twenty minutes shall be added to each man's run on the different timetables to cover actual time consumed.

"The wages for all motormen and conductors shall be for the first year in service 30 cents per hour, and for one year and thereafter in the service 35 cents per hour. No single trip shall be considered less than one hour."

On Aug. 20 the statement of the company was submitted to the board by Mr. Brooks. It contained no concession in regard to wages and provided that nine to ten hours with one-half trip leeway, to be completed in thirteen hours, should constitute a day's work on the week-day schedule. The company stated that it would reduce the number of swing runs wherever it was possible to do so, but did not agree to the proposition made by the men.

Mr. Brooks stated that many of the runs on which the men were compelled to work long hours are swing runs and do not come under the provision calling for the completion of the day in twelve hours.

Mr. Mahon contended that they are regular runs and that the men's period of work should be considered. He admitted, however, that the public must be considered in any readjustment that is undertaken. He thought that the runs could be adjusted so that the men could finish their day within the time fixed in their demands. Mr. Mahon presented figures to the board on Aug. 21 showing the high cost of living for workingmen in Detroit and the comparative wages paid them. He said that an extremely modest living would cost $1,146.87 per family per year and that the conductors and motormen should receive at least $1,300 annually. Mr. Mahon admitted that he had not made an investigation of the cost of operation of the company.

Judge Phelan insisted that any award should date back to the time when the men agreed to submit the question of wages to arbitration.

Mr. Brooks presented a communication from the company on the forenoon of Aug. 22 in which it was stated that conditions and wages are just as favorable in Detroit as in any other city in the United States; that the present demands of the employees are prohibitive and beyond the ability of the company to pay; that the Detroit city government has reduced the company's income by compelling it to sell seven tickets for a quarter, and that enormous

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sums must be spent for improvements and extensions. Other businesses may raise or lower their prices to meet the changing cost of doing business, but the company has been compelled to reduce the price of service while its expenses have been increased.

A number of division superintendents were questioned relative to the company's claim that free transportation to employees has been abused. These men testified that a number of the men had torn sheets of tickets from their transportation books and kept them for use after they went out of the company's service. Judge Phelan thought that the names of these men should be presented, but Mr. Brooks objected to this. He said that he did not wish the names of the men to appear in the newspapers. The court as a whole did not insist upon the names being made public. William D. Bonthron, an expert accountant, testified that the company had issued to motormen and conductors during the first six months of the year transportation amounting to $53,316 and that for the entire year the free transportation would be at least double that amount. Mr. Brooks said that the company was considering the withdrawal of free transportation from firemen and policemen. Mr. Mahon asserted that the men considered free transportation part of their compensation and that if the tickets issued to employees are withdrawn the men will be compelled to ask for 45 cents an hour instead of 35 cents.

At the opening of the session on Aug. 25 Chairman Naylor refused to entertain a motion made by Judge Phelan to require the company to furnish the board with a classified list of the persons who ride free on its lines. Almost the entire session was spent in hearing testimony and arguments relative to the company's desire to limit free transportation.

At the hearing on Aug. 26 Mr. Bonthron outlined the results of his investigations of the probable effect of the increase in wages demanded and the reduction in fare, as secured from the books of the company while operating under conditions which prevailed prior to Aug. 15. He said that, taking the figures of 1913 as a basis, the reduction in fares would cause a deficit of $1,185,757. The gross earnings, he estimated, will be only $8,278,166, as against $10,202,621 for the year ended June 30, 1913. Taking the figures of 1913 without any reference to the reduced fare, Mr. Bonthron estimated that the increase asked by the men would cause a deficit of $674,688. The combined effect of the decrease in fare and increase in wages, he said, would leave the company $2,598,143 behind the preceding year.

Mr. Mahon objected to any testimony bearing upon the cost of extensions on the ground that no contracts had been made between the city and the company for the construction of extensions. Mr. Brooks asserted that the company had a right to build extensions. Judge Phelan interrupted to request that Mr. Brooks produce a copy of any contract that had been made to that effect on the following day and was told this would be done. As a matter of fact the Common Council was at that time passing such legislation.

General Superintendent Bullen presented a lengthy statement dealing with the difficulties of traffic in the factory districts and said the company wants to serve the factories, but that the factories do not adjust their hours to the railway company's desires nor to the wishes of their employees. Several witnesses testified that the schedules were formulated to give the men the best possible working conditions and that the swing runs were changed wherever it was found possible to do so.

Fender Tests in Vancouver

Tests of street car fenders and wheel guards were held in Vancouver, B. C., on Aug. 15 and 19 by the British Columbia Electric Railway, in the presence of company officials, representatives of the fender manufacturers and William Rae, provincial tramway inspector. Tests were carried out, in general, according to the methods prescribed by the Public Service Commission of New York, which were published in this journal Aug. 22, 1908. These methods were used in the tests at Schenectady, Wilmerding and Pittsburgh in 1908.

The following types of fenders were subject to the full number of tests: Watson fender, Watson wheel guard, Pogue fender, Hudson-Bowring wheel guard and the Nelson fender. The Pogue fender was invented by a local man.

For all the tests calling for prostrate positions, 50-lb. and 100-lb. dummies stuffed with sawdust and sand were used, while for the upright tests a jointed wooden dummy was employed. The speeds of the cars were 6 and 15 m.p.h., as specified, except for the upright position, in which case the lower speed was considered sufficient. Tests were made both over macadam and cobble pavement.

The results of the tests are now being tabulated in the office of the provincial tramway inspector.

Patrick Calhoun to Retire as President at San Francisco

M. B. Starring, president of the United Railways Investment Company, which through its stock ownership of the California Railway & Power Company, controls the United Railroads of San Francisco, makes the following statement in regard to the retirement of Patrick Calhoun as president of the latter corporation:

"The statement to the effect that Jesse W. Lilienthal will, at an early date, become president of the United Railroads of San Francisco is correct. Mr. Lilienthal is a man of unimpeachable integrity and high standing. It is my understanding that he will surround himself with a board of directors composed of some of the strongest and most influential local men. The management of this property in California and by Californians should redound greatly to the benefit of the city of San Francisco and the owners of the property. The public may expect fair treatment from Mr. Lilienthal and the very best service from the railroads under his management that is practicable in existing conditions. The retiring president has borne the brunt of many personal attacks and brought the railroads through a long and severe struggle, but the press of his private affairs having in the past required prolonged absences from San Francisco and the fact that such absences will inevitably continue and probably increase in duration fully explain his retirement."

James Dalrymple on Visit Here

James Dalrymple, general manager of the Glasgow (Scotland) Corporation Tramways, has arrived in this country to tour the principal cities of the United States and Canada and study electric railway practice. He left Glasgow on Aug. 9 and, after a few days in New York, left that city Aug. 20 and visited Buffalo, Toronto and Cleveland on his way to Chicago, where he arrived Aug. 28. His tentative schedule after leaving Chicago calls for visits to Milwaukee, Minneapolis, Winnipeg, Vancouver, Seattle, San Francisco, Los Angeles, Denver, St. Louis and Washington. Mr. Dalrymple is accompanied by Thomas Nesbit, master of works of Glasgow, who was instructed by the Glasgow Corporation to inspect the river bridges with a view to obtaining ideas for use in connection with the plan to construct a bridge over the Clyde. Interviewed in New York, Mr. Dalrymple said:

"I am especially interested in the experiments New York is carrying on with the double-deck street cars. They are primarily a British institution, although they are found here and there on the Continent. They have proved successful abroad in the large cities and it is possible to handle in a satisfactory way many people on one car.

"No public utility can be operated under a spoils system. To my mind, good service and continuity of service, so far as public servants are concerned, are synonymous. In Glasgow, if a man is making good at the head of a city department, he is kept there no matter how frequently the administration changes. John Young, my predecessor at the head of the Glasgow Tramways, had been in the municipal service thirty years and connected with the tramway management ten years. I have been in the employ of the city thirty-three years. The city corporation can fix the wage rate and the hours of labor of the men under me, but it has nothing to say about whom I shall employ. I am on the same status as the head of a mercantile establishment."

In an interview with Mr. Dalrymple which appeared in the New York *World* he was quoted as discussing the question of fares, referring to the zone system of Glasgow and the flat rate prevalent in the United States. He was reported as unwilling to say that the New York lines could

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carry passengers profitably for less than the current 5-cent charge. He explained that a careful examination of running expenses and general conditions would be necessary before this could be determined. He was then quoted as follows:

"In comparing the expenses of the New York companies and our own, a great difference will be found in the cost of labor. Motormen and conductors on our tramways get on an average from $8 to $9 a week, less than half what they receive here. This does not mean that we are paying our men poor wages. Our schedule compares very favorably with that paid throughout Scotland for unskilled and even skilled labor. The cost of living is much lower for them there than it would be here, and they are perfectly satisfied. Two years ago we had a strike, but the men were glad to come back without the city making any concessions to them. Aside from this labor cost, the expenses of the two cities would probably be the same as far as materials are concerned. We pay just as much for construction. Nor are we free from taxes. The city treats us just exactly as if we were a private corporation and our property is assessed and taxed accordingly. We pay into the municipal treasury $250,000 annually. Our investment represents an outlay of $17,500,000."

Additional Subway Construction Contracts in New York

The Public Service Commission for the First District of New York on Aug. 19 opened bids for the construction of Section No. 1 of Routes Nos. 36 and 37, known as the Woodside, Astoria and Corona rapid transit railroad. The Snare & Triest Company, New York, submitted the lowest of ten bids, its bid aggregating $884,859. The Astoria, Woodside and Corona line, now partly under construction in Queens Borough, begins at the Queens Plaza of the Queensboro Bridge and runs respectively through Second Avenue to Ditmars Avenue, Astoria, and through Queens Boulevard and Roosevelt Avenue to Sycamore Avenue, Corona. Both are to be elevated railroads and are to be operated jointly by the Interborough Rapid Transit Company and the New York Municipal Railway Corporation. Section No. 1 covers the junction point of the two lines and the joint station near the Queensboro Bridge. Contracts for the Astoria line, Section No. 2, and the Corona line, Section No. 3, were let several months ago and construction work is now in progress. The contractors for the Astoria line are Cooper & Evans, New York, and for the Corona line the E. E. Smith Contracting Company, New York. It is expected that the contract with the Snare & Triest Company for the construction of Section No. 1 will be executed within a short time.

The commission has disapproved a plan submitted by W. S. Menden, chief engineer of the New York Municipal Railway Corporation, for proposed changes in the Eighty-sixth Street station of the Fourth Avenue subway, Brooklyn. This subway, now under construction, is to be operated by the Brooklyn company and the station at Eighty-sixth Street will be the terminal station of the line. The station is to be centered on Eighty-sixth Street and will give direct access from the center of a train to the trolley tracks on the surface through stairways which will be built at that point.

In connection with the construction of the Broadway subway in Manhattan the commission has issued an invitation to building wreckers for bids, to be received Sept. 2, for the demolition of the southerly half of the Astor House at the northwest corner of Broadway and Vesey Street.

Protest Against Fare Ordinance in Portland

In protesting against the ordinance now before the City Council of Portland, Ore., to fix the fare over the lines of the Portland Railway, Light & Power Company at six tickets for 25 cents, good at all hours, Franklin T. Griffith, president of the company, said:

"The Portland Railway, Light & Power Company is always ready to meet the city on any issue of vital importance to the public. I have the interest of Portland just as much at heart as any citizen, even though I am president of a public service corporation. It is unfair that the city should attempt to regulate the fares when so little is known about the company's business. A force of from thirty-five to forty men is appraising the company's properties, and until the work of these men is completed I myself will not know just what the company owns. We invite inspection, however, at all times. The popular impression is that a public service corporation is always trying to hide. This is not the case with the Portland Railway, Light & Power Company. The books of the company are always open to the city officials and public. My only request is that the city withhold action on the proposed ordinance until a correct appraisement of the company's properties is made. These figures will be submitted to the State Railroad Commission and to the members of this Council and can be easily checked."

Mr. Griffith stated that engineers of the company are making plans for a rearrangement of all seats on street cars. Some of the seats, according to Mr. Griffith, will be placed across the cars instead of lengthwise, as is the practice at present.

Vote on San Francisco Municipal Railway Bond Issue

The electors of San Francisco, Cal., voted on Aug. 26 to adopt the $3,000,000 bond issue for the extension of the municipal electric railway system. The vote was light. It was 51,649 for the issue and 13,720 against. A vote of two-thirds was required to carry.

It is proposed to construct a double-track street railway on Van Ness Avenue from Market Street to North Point Street, a distance of 2.07 miles. Cars can be operated on this line at a half-minute headway, making the maximum carrying capacity 12,000 passengers per hour. The road will be built with the track centers 14 ft. 6 in. apart and trolley wires will be supported on reinforced concrete poles in the center of the street. These poles will be so constructed that electric lamps for lighting the street can be mounted on each pole.

For ordinary operation it has been estimated this railway should be equipped with twelve cars and that the maximum carrying capacity will be 3000 per hour. If it is desired to operate it independently of the United Railroads at its maximum carrying capacity of 12,000 per hour, sixty-two cars will be required, and it will also be necessary to construct a loop from Van Ness Avenue and Fell Street to Franklin Street, thence to Oak Street and thence returning to Van Ness Avenue in order that passengers may be loaded and unloaded and the direction in which cars are traveling may be reversed without interfering with the headway.

Should it be decided to operate the road in conjunction with the United Railroads, it will be necessary that connections be made with the United Railroads at Market Street in order that eastbound cars on Market Street can be deflected to Van Ness Avenue and southbound cars on Van Ness Avenue to the westbound tracks of the United Railroads on Market Street. If the Fillmore Street tunnel is constructed, additional connections between the United Railroads' tracks and the municipal railway will not be necessary, but if the Fillmore Street tunnel is not constructed some turnouts will have to be installed so that eastbound cars of the United Railroads can be deflected into Van Ness Avenue and southbound cars on Van Ness Avenue can be deflected to the westbound United Railroads' tracks.

The estimated cost of the 2.07 miles of the Van Ness Avenue line follows:

	Ordinary Operation	Extraordinary Operation	Joint Operation
Construction Oak to North Point Street	$341,200	$341,200	$341,200
Additional electric work	.....	20,700	20,700
Terminal loop Fell, Franklin and Oak Streets	.....	16,000	.....
Special track work, Market Street and Van Ness Avenue	.....	.....	4,700
Cars and carhouse (twelve cars)	138,000	.....	138,000
Cars and carhouse (sixty-two cars)	.....	713,000	.....
Total	$479,200	$1,090,900	$504,600
Special track work:			
Sutter Street	.....	.....	4,800
O'Farrell Street	.....	.....	2,200
Ellis Street	.....	.....	2,700
Eddy Street	.....	.....	2,200
Turk Street	.....	.....	2,700
McAllister Street	.....	.....	4,800
Hayes Street	.....	.....	4,800
	$479,200	$1,090,900	$528,800

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The Boston Arbitration Hearings

Hearings were continued during the week ended Aug. 30 at Boston by the board of arbitrators designated to settle the differences between the Boston Elevated Railway Company and its employees, the time being entirely occupied by witnesses called by counsel for the men. On account of the large attendance, the hearings have been transferred to Ford Hall, where ample accommodations are available. Following the visits of the board to various carhouses and shops of the company, testimony was presented by J. B. Eastman purporting to show that the cost of living had increased 54 per cent in Boston since 1897, and that it is impossible for a man to support a family of five in reasonable comfort on wages of $850 per year. He quoted extracts from the report of the Massachusetts Commission on the Cost of Living and other governmental bodies purporting to show that a family budget of $1,154.40 is necessary for proper living conditions. On cross-examination, Mr. Eastman admitted that few of the data quoted by him applied strictly to conditions in Boston, they having been assembled for Massachusetts as a whole or for the North Atlantic States. He had made no inquiries as to how long certain quoted high prices of foodstuffs and fuel prevailed, and in many cases he took only a single price for a given month's conditions. Counsel for the company brought out the fact that there has been no material increase in rents in suites of the type renting for $18 to $20 per month in the past decade. Notably in South Boston, tenants are better housed than in 1901. Many old houses have been renovated. An excellent flat of five rooms and bath, with hot and cold water fixtures, in a building for three families only, separated 10 ft. on each side from the nearest house, can now be rented for from $17 to $18 per month, whereas fifteen years ago the same accommodations would have cost $20 as a minimum.

Among the officials of the company called for examination by the employees' counsel were C. S. Sergeant, vice-president; Alfred J. Guyon, head of the employment department; Cyrus S. Ching, chief instructor; George R. Tripp, superintendent of transportation; J. Henry Neal, general auditor, and George H. Benjamin, trainmaster of rapid transit lines. The following data were presented regarding hourly wage scales for different classes of employees:

WEEKDAY WAGES ON RAPID TRANSIT LINES IN CENTS PER HOUR

	Year					
	First	Second	Third-Fifth	Sixth-Tenth	Eleventh-Fifteenth	Sixteenth and Onward
Brakemen	21.2	21.7	22.4	23	23.7	24.5
Guards	23.9	24.5	25.2	25.8	26.5	27.3
Motormen	26.2	27.8	29.6	30.3	30.9	31.7
Gatemen	16.7	17.3	17.9	18.6	19.3	20

SUNDAY WAGES ON RAPID TRANSIT LINES IN CENTS PER HOUR

Brakemen	22.4	23	23.7	24.4	25.1	25.9
Guards	25.3	25.9	26.6	27.2	28	28.9
Motormen	27.7	29.5	31.3	32	32.7	33.6
Gatemen	17.7	18.3	19	19.7	20.4	21.3

WEEKDAY WAGES ON SURFACE LINES IN CENTS PER HOUR

Conductors and motormen	25.6	26.2	26.8	27.5	28.2	28.9

SUNDAY WAGES ON SURFACE LINES IN CENTS PER HOUR

Conductors and motormen	27.1	27.7	28.4	29.1	29.8	30.6

It was brought out that surface line motormen and conductors received $2 per day in the days of horse traction, and that an increase to $2.25 was granted when electric motive power was substituted. The first-year regular man now receives $2.30 per day. During the period of instruction in the company school new employees are paid a flat rate of $1 per day, and when a man goes upon the extra list he is guaranteed a minimum weekly wage of $12. The maximum daily wage is $2.60 for a nine-hour period.

The details of employment, physical and other examinations and an outline of the instruction furnished to applicants for positions in the car service were presented during the hearings. Upon request of counsel for the men, the company submitted figures showing that for the year ended July 1, 1911, 6729 men applied for "blue-uniform" work, and of these 1974 were rejected before passing the eyesight tests and physical examination. In the year ended Aug. 16, 1913, 4905 men applied for work and 2650 passed the above preliminary examinations. About 5 per cent of the applicants for medical scrutiny are rejected by the company doctor on their first examination. In the written examinations taken by the average motorman there are 132 questions. A sixty-day probation period is required, and about 23 per cent of the men are dropped from the ranks at the end of this. The company has issued five instruction bulletins to help its employees obtain better results in the operation of semi-convertible cars of different types, in the handling of air brakes and multiple-unit control. There are now 2522 surface line conductors, 2421 motormen, fifty-seven inspectors, eighty-five starters, twenty-five special police, four crossing tenders, eighteen station masters, thirteen collectors, thirty-five gatemen, nine watchmen and five carhouse division inspectors in the service, making a total of 5194 blue-uniformed men on the surface car system, including the gatemen. On the average, a man may become a regular conductor in two years or a motorman in three years. About 75 per cent of the men leaving the service have been in it less than one year; perhaps 15 per cent of those leaving are two-year men, and by resignation and discharge about 720 men leave the service per annum. On the surface lines are 4943 motormen and conductors, of whom 4099 have yet to attain the maximum wage. The graduated scale of wages was adopted in 1903.

On the surface lines 2454 conductors and motormen have been in the service three years or less, while 3009 have been in service five years or less. There are 659 listed in the six-year to ten-year class, 431 in the eleven-year to fifteen-year class, and 844 who have been in the service fifteen years or more. Of 2532 men entering the service in the year ended July, 1911, 487 are now in the company's ranks, and of 1069 entering in the year ended Aug. 16, 1913, 801 are now in the service. Considerable detailed evidence was submitted to show the shortening of running times on surface car routes since 1901, and the company summarized this by stating that in 1898 the average running time on all round trips was 77.4 minutes compared with 50.4 minutes at present, and that the allowed time, including layover, was 93.5 minutes in the former case and is 60.7 minutes at present. The schedule speed is 10.36 m.p.h. compared with 8.5 m.p.h., or, including layovers, 8.59 m.p.h. against 7.1 m.p.h. Counsel for the men contended that increased speeds, larger cars, increased density of traffic on streets, the larger use of automobiles and the installation of signals have tended to add to the responsibilities of the motorman in the past few years. The company maintained that the introduction of electric track switches, prepayment type cars and mechanically operated doors has actually made the work of the motorman and conductor easier in many respects.

A feature of the hearings was an attempt of Mayor Fitzgerald of Boston to enter the corporation counsel of the city in the proceedings, but the board of arbitrators decided that it had no authority to hear arguments by any party outside the parties to the agreement under which the proceedings are being held. The Mayor issued a statement later in which he said that as Boston has investments amounting to $23,000,000 in subways and looks to the company to provide sinking funds and interest on the bonds and to share in bridge and street repairs and the removal of snow and ice, the financial condition of the road is a matter of much concern to the city. The company expressed no opposition to the appearance of counsel for the city, but the protest of the representatives of the employees' organization was allowed.

Keokuk Plant Dedicated

On Aug. 26 the Keokuk hydroelectric plant, installed by the Mississippi River Power Company, Keokuk, Ia., was officially dedicated. On Aug. 25 Governor Dunne of Illinois, on his way to the conference of Governors at Colorado Springs, Col., attended by his full military staff, celebrated the dedication of the water power on the Illinois side. On the following day Governor George W. Clark of Iowa, with his retinue, dedicated the hydroelectric plant on the Iowa side. The gates in the more than fifty arches were closed and the water above the structure soon submerged the historic and troublesome Des Moines rapids. At the same time the government triple lock in the Keokuk Canal was drawn and "Cooper Lake" was christened after Hugh L. Cooper, who largely conceived and carried out the project.

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Receivers Reject Offer of the City of Seattle.—The offer of the city of Seattle, Wash., to take the entire property of the Seattle, Renton & Southern Railway for $1,200,000, which is $200,000 less than the offer made by the company, has been rejected by Scott Calhoun and Joseph Parkin, receivers for the company. In a communication which the receivers addressed to the City Council their offer to sell that portion of the line and all its physical assets within the city limits for $1,200,000, and that portion outside the city for $200,000 additional, is renewed.

Violation of Labor Law Charged.—An inspector of the State Labor Bureau of New York applied to Magistrate Voorhees in the Adams Street court, Brooklyn, on Aug. 23 for summonses against the officials of the Brooklyn Rapid Transit Company on the charge that it had violated the labor law by permitting conductors and motormen to work for longer periods than fixed by the statute governing the hours of labor. The inspector is reported to have said that the prosecution was friendly and that the officers of the company had facilitated his work of investigation. The summonses issued to the officers of the company were made returnable on Sept. 15.

Renewal of Short-Term Notes in California.—The California Railroad Commission has issued an order permitting the renewal of notes issued by public utility corporations for not more than a twelve months' period without formal application for such renewal to the commission, but such notes may not be refunded by stocks, bonds, notes or evidences of indebtedness without the consent of the commission. In case the combined terms of the original notes and the renewing notes shall not exceed twelve months, the renewal may be made without application to the commission, but a full statement of the transaction must be filed with the commission immediately.

Receipts Under New Fare in Detroit.—In the issue for Aug. 22, 1913, *Electric Railway Service*, which is published in the interest of the Detroit (Mich.) United Railway, said in regard to the receipts of the company from the sale of seven tickets for 25 cents: "Like most of the guesses newspapers make regarding the Detroit United Railway, the guesses by the press as to the receipts of the company from the sale of the new seven-for-a-quarter tickets last Friday, the first day of the sale, were very bad. One of the guesses was $90,000. As a matter of fact the sale of these tickets for Aug. 15 and 16 totaled only $37,878.75—less than an average of $19,000 a day."

Hearing on Proposed Public Utility Bill for Minnesota.—The special committee on public utilities of the Senate of Minnesota, after a four-hour session on Aug. 18, adjourned until Sept. 17 for further hearings. Frank N. Stacy, former deputy public examiner, took about half of the time arguing in favor of state control, and Stiles P. Jones, secretary of the Voters' League of Minneapolis, the other half, speaking against it. Chairman J. M. Hackney said after the meeting that as the committee is instructed to bring in a bill the members desire to hear what different people think ought to go into the bill, rather than addresses for and against state control. Only five of the seven committee members were present at the hearing.

Changes in Pacific Electric Railway Organization.—J. McMillan, general manager of the Pacific Electric Railway, Los Angeles, Cal., has announced the appointment of F. L. Annable, formerly superintendent of the northern division, as general superintendent of the system. A. C. Bradley, formerly superintendent of the San Bernardino division, succeeds Mr. Annable as superintendent of the northern division. The San Bernardino and Riverside divisions are consolidated as the eastern division, and M. P. Groftholdt, formerly superintendent at Riverside, has been appointed superintendent. Edwin Clark, assistant superintendent of the northern division, has been transferred to the western division. H. E. Rodenhouse succeeds Mr. Clark on the northern division.

Progress with Kansas City Negotiations.—The conferences between the receivers of the Metropolitan Street Railway, Kansas City, Mo., and the officers of the city in connection with suggested modifications of the franchise draft submitted by Mayor Jost of Kansas City, Mo., are being continued and the ordinance is being gone over section by section. So far a number of questions of policy have arisen, but none of the points which have been brought up is regarded as insurmountable. Perhaps the question that has caused the greatest concern so far relates to whether the management of the property shall be vested in a single head. It would be a mere guess to attempt to predict when the negotiations are likely to be concluded. It is, however, regarded as more than likely that each point will be disposed of in turn or that arrangements will be made for the satisfactory future adjustment of such points as cannot be disposed of at this time. The agreement will then be amended to meet whatever new conditions it may be decided are to be part of the franchise pact.

Blanket Franchise Sought in Portland.—Proposing to terminate all leases and contracts under which street cars are operated over bridges owned by the city of Portland, Ore., the Portland Railway, Light & Power Company, has applied to the City Commission for a blanket franchise covering all bridges. The old contract and lease system has caused much trouble and even some litigation on account of its clumsy and indefinite form. The proposed grant is now in the hands of City Attorney La Roche, who is checking the provisions to see that the city's interests are properly safeguarded. Following this the franchise will be advertised for twenty days and will then go before the commission for action. The length of the new franchise is twenty-five years. Under it the company will pay the city at the rate of 3 cents for each car operated over a bridge. At present the company is using the bridges under an agreement to pay this amount pending a franchise settlement. Owing to the fact that the franchise as presented to the city cannot be granted before the middle of September at the earliest, a revocable permit will probably be granted for the use of the Broadway bridge.

Franchise Decision Reversed in Brooklyn.—The Appellate Division of the Supreme Court of New York on July 26, 1913, reversed the decision of Justice Kelby, who dismissed the application for a write of mandamus to compel the city authorities to permit the Brooklyn, Queens County & Suburban Railroad to build an electric railway along Troy Avenue from Bergen Street to the city line. The company holds a franchise granted in 1892 and including eight extensions, of which the Troy Avenue line is one. Section XII of the railroad law provides that franchises are void unless at least 10 per cent of the construction work is completed within five years; and although the seven other extensions have been built, no work had been done on the Troy Avenue line. The attorneys for the Brooklyn Rapid Transit Company contended that all of the eight extensions are really one, and that the completion of 10 per cent of the eight lines within the time limit held the franchise. The lower court, however, dismissed the writ of mandamus on the theory that the franchise had expired covering the street in question, but the Appellate Division has directed that the writ issue against the city authorities to permit the construction of the line.

Reconstruction Plans for Sea Beach Railway.—Plans for the reconstruction of the Sea Beach Railway have been filed with the Public Service Commission for the First District by the New York Municipal Railway Corporation (Brooklyn Rapid Transit Company). Under the dual system contracts the Sea Beach line, which runs to Coney Island, is to be reconstructed by the company and connected with the Fourth Avenue subway in Brooklyn at about Sixty-fifth Street, so that trains from Manhattan may run through to Coney Island by way of the Fourth Avenue subway and the Sea Beach line. The plans call for the reconstruction of this line as a four-track depressed railroad from the connection with the Fourth Avenue subway to a point immediately south of Eighty-sixth Street. Timothy S. Williams, president of the corporation, in submitting the plans, asked permission of the commission, in order to save time, to let the construction contract immediately without competitive bidding to Major George W. McNulty, who is ready to begin work at once. With the commission's consent, the company proposes to make a contract with McNulty on the unit price basis for the completion of the work within seventeen months, with a bonus for finishing it within that time and a penalty if the time is exceeded. The company points out that it will take at least three months to prepare detailed plans, advertise for bids and award the contract,

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which would probably defer the beginning of work until next spring, whereas if work is commenced this fall it can be finished about the time that the extension of the Fourth Avenue subway to Sixty-fifth Street is ready for operation.

PROGRAMS OF ASSOCIATION MEETINGS

Central Electric Railway Traffic Association

The members of the Central Electric Traffic Association will meet on Sept. 16 at the Beckel House, Dayton, Ohio.

Central Electric Railway Association

The members of the Central Electric Railway Association will meet on Nov. 20 at the Hotel Severin, Indianapolis, Ind.

Conference of Presidents of Electrical Associations

The Association Island Corporation is extending an invitation for a conference of the presidents of the electrical associations, societies and clubs in the United States to be held Sept. 3 to 6 at Association Island, Henderson Harbor, N. Y. The letter from J. Robert Crouse, Nela Park, Cleveland, Ohio, explaining the character of the meeting contains a program of addresses which includes the following subjects and speakers:

"Distribution of Electric Energy, Present and Future," by Samuel Insull, president of the Commonwealth Edison Company, Chicago, Ill.

"Future Technical Development in the Electrical Business," by Charles P. Steinmetz, General Electric Company, Schenectady, N. Y.

"State Commission on Control," by John H. Roemer, chairman of the Railroad Commission of Wisconsin, and Martin S. Decker, chairman of the Public Service Commission, Second District, of New York. It is expected that the chairmen of the Massachusetts Commission and New York Commission, First District, will also speak.

It is also expected that addresses will be made by J. B. McCall, president of the National Electric Light Association; A. W. Berresford, vice-president of the American Institute of Electrical Engineers; George H. Harries, president of the American Electric Railway Association; Preston Millar, president of the Illuminating Engineering Society; S. O. Richardson, Jr., president of the Manufacturers' Club; Franklin Overbagh, secretary of the Electrical Supply Jobbers' Association; Ernest McCleary, representing Ernest Freeman, president of the National Electrical Contractors' Association, and F. E. Watts, Jupiter of the Jovian Order.

Federation of Trade Press Associations

The tentative program for the eighth annual convention of the Federation of Trade Press Associations in the United States, which is to be held at the Hotel Astor, New York, N. Y., Sept. 18, 19 and 20, 1913, has been issued in pamphlet form. The general subject of the keynote meeting on the morning of Sept. 18 is "Business Promotion Through Trade Press Efficiency." On the afternoon of Sept. 18 there will be an editorial symposium and a circulation symposium, at both of which papers and subjects on editorial and circulation work will be presented and discussed. On the morning of Sept. 19 there will be an advertising symposium at which papers will be presented by educators, publishers, advertisers, advertising managers and advertising agents. Later the same morning there will be a "big business" meeting at which the inside stories of some of the big trade paper publishing successes will be told. On the afternoon of Sept. 19 there will be a mass meeting with inspirational addresses by representative business and professional men on subjects of live interest to editors, publishers and advertisers. On the evening of Sept. 19 the annual banquet will be held at the Hotel Astor. On the morning of Sept. 20 there will be a publishers' symposium at which aggressive policies, standards and the ideals of the trade press publishing business will be discussed. The convention will be concluded with the election of officers, etc. Copies of the program may be obtained from William H. Ukers, chairman of the committee on arrangements, 79 Wall Street, New York.

Financial and Corporate

Stock and Money Market

Aug. 27, 1913.

Trading on the New York Stock Exchange to-day was extremely sluggish and the market continued unsettled until the end, although some issues recovered fractionally from the lowest prices. The special movement included a gain of three-quarters of 1 ponit in Brooklyn Rapid Transit. At the close Interborough issues lost all of their earlier substantial gains. Third Avenue also sold off at the close. Rates in the money market to-day were: Call, 2¼ @ 2½ per cent; sixty days, 3½ @ 4 per cent; ninety days, 4¼ @ 4½ per cent; four months, 4½ @ 4¾ per cent; five months and six months, 5 per cent.

In the Philadelphia market heaviness was displayed to-day. The bond transactions totaled about $20,000.

In the Chicago market the tendency of the general list was toward lower levels. Dealings were moderate.

In the Boston market to-day there was a greater degree of activity at the expense of values. Declines were established in many issues. The tone was heavy.

The Baltimore market to-day was featureless. The only significant sale was 830 shares of the United Railways & Electric Company. The bond transactions totaled $40,000.

Quotations of traction and manufacturing securities as compared with last week follow:

	Aug. 20	Aug. 27
American Brake Shoe & Foundry (common)	91	91
American Brake Shoe & Foundry (preferred)	131	132⅛
American Cities Company (common)	35	36½
American Cities Company (preferred)	63½	64½
American Light & Traction Company (common)	356	347
American Light & Traction Company (preferred)	104	104
American Railways Company	38¼	38¼
Aurora, Elgin & Chicago Railroad (common)	40½	40½
Aurora, Elgin & Chicago Railroad (preferred)	82¼	82
Boston Elevated Railway	87	88
Boston Suburban Electric Companies (common)	7	7½
Boston Suburban Electric Companies (preferred)	55	55
Boston & Worcester Electric Companies (common)	*8	*8
Boston & Worcester Electric Companies (preferred)	42	42
Brooklyn Rapid Transit Company	88⅞	89
Capital Traction Company, Washington	115	115
Chicago City Railway	*170	*170
Chicago Elevated Railways (common)	*25	*25
Chicago Elevated Railways (preferred)	*70	*70
Chicago Railways, ptcptg., ctf. 1	94	94
Chicago Railways, ptcptg., ctf. 2	29½	30⅞
Chicago Railwyas, ptcptg., ctf. 3	7½	8
Chicago Railways, ptcptg., ctf. 4	3	3
Cincinnati Street Railway	102½	102½
Cleveland Railway	103½	103½
Cleveland, Southwestern & Columbus Ry. (common)	*5½	*5½
Cleveland, Southwestern & Columbus Ry. (preferred)	*30	*30
Columbus Railway & Light Company	18	18
Columbus Railway (common)	69½	69½
Columbus Railway (preferred)	88	88
Denver & Northwestern Railway	104	*104
Detroit United Railway	75	a80
General Electric Company	145¼	145¼
Georgia Railway & Electric Company (common)	114	114½
Georgia Railway & Electric Company (preferred)	84	83
Interborough Metropolitan Company (common)	16⅛	16¼
Interborough Metropolitan Company (preferred)	61⅞	62½
International Traction Company (common)	30	*30
International Traction Company (preferred)	95	*95
Kansas City Railway & Light Company (common)	18	*18
Kansas City Railway & Light Company (preferred)	37	*37
Lake Shore Electric Railway (common)	5	*5
Lake Shore Electric Railway (1st preferred)	92	*92
Lake Shore Electric Railway (2d preferred)	26	*26
Manhattan Railway	128	128
Massachusetts Electric Companies (common)	16	14
Massachusetts Electric Companies (preferred)	71	*71½
Milwaukee Electric Railway & Light Co. (preferred)	95	95
Norfolk Railway & Light Company	25	25
North American Company	71⅛	71¼
Northern Ohio Light & Traction Company (common)	62¾	60¾
Northern Ohio Light & Traction Company (preferred)	100	a100
Philadelphia Company, Pittsburgh (common)	42½	43⅛
Philadelphia Company, Pittsburgh (preferred)	40	40
Philadelphia Rapid Transit Company	22½	23
Portland Railway, Light & Power Company	55	55
Public Service Corporation	109	109
Third Avenue Railway, New York	36¾	37¾
Toledo Railways & Light Company	*6	*6
Twin City Rapid Transit Co., Minneapolis (common)	106⅛	105⅜
Union Traction Company of Indiana (common)	5	*5
Union Traction Company of Indiana (1st preferred)	80	*80
Union Traction Company of Indiana (2d preferred)	20	*20
United Rys. & Electric Company (Baltimore)	27¼	27⅛
United Rys. Inv. Company (common)	23	21
United Rys. Inv. Company (preferred)	44	39½
Virginia Railway & Power Company (common)	52½	52
Virginia Railway & Power Company (preferred)	90½	91
Washington Ry. & Electric Company (common)	89⅞	89½
Washington Ry. & Electric Company (preferred)	86½	88
West End Street Railway, Boston (common)	72	72
West End Street Railway, Boston (preferred)	88	88
Westinghouse Elec. & Mfg. Company	71½	72½
Westinghouse Elec. & Mfg. Company (1st preferred)	114	114

*Last sale. a Asked.

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ANNUAL REPORTS

Montreal Tramways

The statement of income, profit and loss of the Montreal (Que.) Tramways for the year ended June 30, 1913, is as follows:

Gross earnings		$6,754,227
Operating expenses		4,032,664
Net earnings		$2,721,563
Deductions:		
City percentage on earnings	$489,080	
Interest on bonds and loans	721,152	
Interest on debenture stock	800,000	
Taxes	73,000	
Total deductions		2,083,232
Net income		$638,331
Dividends		156,382
Surplus		$481,949
Less:		
Proportion of discount on bonds sold	$63,714	
Transferred to contingent account	200,000	
Transferred to capital reserve	23,670	
Total		287,384
Transferred to general surplus		$194,565

E. A. Robert, president of the company, says in part:

"In view of this being the first complete year's operation of the company, the figures submitted cannot be compared with the figures of the last statement, which covered a period of nine months only, but the increase in gross earnings and the ratio of operating expenses to earnings are satisfactory.

"The sum of $200,000 has been appropriated from surplus for a contingent account in addition to $300,000 appropriated from earnings for the same purpose, making a credit to this account during the year of $500,000, which, added to the amount carried forward last year of $127,648, makes a total credit of $627,648, against which has been charged the sum of $442,892, leaving a balance of $184,756.

"During the year there has been expended on capital account the sum of $976,008.

"According to the policy adopted by the company of insuring its properties against fire, a large sum of money has been spent in changes and additions, which has resulted in a substantial reduction in premium rates, as well as improving the properties.

"During the year the company has issued $2,890,000 of its 5 per cent thirty-year gold bonds, and from the sale of these bonds there remains a balance of $1,637,954.75 for extensions and improvements.

"On the authority of a by-law passed by the shareholders 9993 shares of common stock have been issued and allotted to the shareholders at par.

"The bonds, debentures and common stock of the company have been listed on the Montreal Stock Exchange. Application has also been made to have the company's bonds listed on the London and New York stock exchanges.

"During the year an interim dividend of 5 per cent was paid, and a dividend of 2½ per cent was declared for the quarter ended June 30, 1913, payable on Aug. 1.

"The following exclusive franchises have been granted to the company: Parish of St. Laurent, twenty-five years; town of Mount Royal, twenty-five years; town of Pointe aux Trembles, forty years; town of Montreal East, forty years.

"The company has continued its liberal policy toward its employees in respect to wages, having increased them during the year.

"In addition to the large sum spent on maintenance and upkeep there has been expended on extraordinary renewals of track and rolling stock the sum of $442,892."

At the annual meeting of the Montreal Tramways on Aug. 5, 1913, the number of directors, pursuant to an amendment to the by-laws previously authorized, was increased from seven to nine. The old directors were re-elected, and two new directors were elected, W. G. Ross, formerly managing director of the Montreal Street Railway, and P. J. McIntosh, New York. Mr. Ross is president of the Asbestos Company of Canada. Mr. McIntosh is a director of the Halifax Tramways Company and private secretary to William Rockefeller. Officers were elected as follows: President, E. A. Robert; first vice-president, J. W. McConnell; second vice-president, F. Howard Wilson; secretary-treasurer, Patrick Dubee; assistant secretary-treasurer, A. E. Shaw, and general manager, J. E. Hutchinson.

The board of directors is now constituted as follows: E. A. Robert, J. W. McConnell, Hon. J. M. Wilson, F. H. Wilson, W. C. Finley, J. M. McIntyre, G. G. Foster, K.C., W. G. Ross and P. J. McIntosh.

Youngstown & Ohio River Railroad

The comparative income, profit and loss statements of the Youngstown & Ohio River Railroad, Leetonia, Ohio, for the calendar years 1911 and 1912, are as follows:

	1911	1912
Gross earnings	$234,459	$239,527
Operating expenses	122,134	127,770
Earnings less operating expenses	$112,325	$111,757
Taxes and rentals	16,230	17,768
Net earnings	$96,094	$93,989
Interest on bonds	50,000	50,000
Net divisible income	$46,094	$43,989
Dividends—preferred stock	35,000	45,000
Surplus	$11,094	*$1,011
Ratio operating expenses to earnings, per cent	52	53

*Deficit.

The analysis of earnings and other operating statistics for these same years are given herewith:

Analysis of Earnings		
Passenger	$166,835	$168,078
Freight	47,928	48,156
Power	17,927	21,126
Miscellaneous	1,769	2,167
Total	$234,459	$239,527
Miles of main track	36	36
Gross earnings per track mile	$6,514	$6,654
Net earnings per track mile	3,120	3,105
Car Mileage		
Passenger	508,913	500,111
Freight	186,077	172,941
Total car mileage	694,990	673,052
Gross Income per Car Mile		
Total	$0.3356	$0.3559
Passenger	0.3665	0.3826
Freight	0.2575	0.2785
Passengers carried	816,278	816,732
Average fare per passenger	$0.204	$0.197

Will Christy, president, says in part:

"Additions and betterments have been made and paid for during the year as follows: Additions to motive power and rolling stock, $8,319; tie plates, $1,033; new freight sidings, $628, or a total of $9,980.

"Additions made to motive power and rolling stock during the year consisted of two second-hand locomotives, twelve dump cars, four flat cars, one gondola and one box car.

"The surplus of the company as shown by the condensed balance sheet of Dec. 31, 1913, is $16,746."

Springfield & Xenia Railway

The following is a comparative statement of the earnings and operating statistics of the Springfield & Xenia Railway, Springfield, Ohio, for the two years ended Dec. 31, 1911 and 1912:

	1911	1912
Gross earnings	$72,984	$74,376
Operating expenses and taxes	52,162	53,486
Net earnings from operation	$20,822	$20,890
Car miles operated	243,846	243,758
Passengers carried	453,041	454,939
Gross earnings per main track mile	$4,007	$4,132
Gross income per car mile	0.2993	0.3052
Operating expenses and taxes per car mile	0.2139	0.2194
Net income per car mile	0.0854	0.0858
Gross revenue per pay passenger	0.1611	0.1635
Passenger revenue per pay passenger	0.1430	0.1461

Warren Bicknell, president of the company, says in part:

"During the past year two sets of new Baldwin trucks were purchased; a new turn-out was installed in Springfield; all the cars were overhauled and repainted; approximately 3000 new ties were installed in the track and the entire physical property of the company was maintained.

"The expenditures charged to the betterment account during the year aggregated but $697.

"The preferred stock of the company is 5 per cent cumu-

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lative and from the date of its original issue to Dec. 31, 1912, is entitled to preferential dividends aggregating 31¾ per cent. From Oct. 5, 1908, up to Dec. 31, 1913, the company has paid dividends to the amount of 29 per cent, or on Jan. 1, 1913, the unpaid preferential accumulations upon the preferred stock aggregated 2¾ per cent. The profit and loss surplus, as shown on the balance sheet as of Dec. 31, 1912, is $27,938.

Northern Electric Railway Financing.

E. R. Lilienthal, president of the Northern Electric Railway, Chico, Cal., made a recent trip to New York to discuss plans for the permanent financing of his company. Discussing the matter, the San Francisco *Chronicle* says:

"All details are lacking, but the permanent financing of this system will certainly represent an investment close to $20,000,000 for present construction and whatever additional money future plans of construction render necessary. The company is capitalized for $25,000,000, of which $10,000,000 is preferred and $15,000,000 common, all outstanding. There is an authorized bonded indebtedness of $25,000,000, of which $5,275,000 is outstanding, $3,784,000 reserved for prior liens and $15,941,000 reserved for future construction. The system has not earned its full charges, although the present rate of improvement will enable it to meet from operation all essential costs in the next fiscal year. The deficit has been met in part and guaranteed in part by the group of capitalists that projected and built the system. In addition large amounts have gone into construction and improvement that have never been permanently funded. No one believes that the present bonded debt of the system represents more than half its cash cost, so that there has been accumulated a large floating obligation that has to be funded."

In an interview Mr. Lilienthal said:

"I have ordered the completion of the Vacaville-Suisun branch, and expect to have it in operation early in September, adding another important link to the system."

Concerning the report that the Santa Fé contemplated the purchase of the Northern Electric Railway, he said:

"I would not be arranging for permanent financing if the Northern Electric were about to be sold to another road."

Financing Plans for Buffalo & Lake Erie Traction Company

Although the new corporation which will take over the Buffalo & Lake Erie Traction Company under foreclosure of its general and refunding mortgage and will also acquire other properties, as outlined in the ELECTRIC RAILWAY JOURNAL of July 26, 1913, page 156, has not yet been formally named, substantially all of the financing which will be done in the reorganization has been decided upon.

Bonds of the underlying companies of the Buffalo & Lake Erie Traction Company will not be disturbed but will be placed in a stronger position. The Buffalo & Lake Erie Traction Company has outstanding $7,066,000 of general and refunding bonds, of which $6,000,000 are in the hands of the public and $1,066,000 in the hands of the bankers for the corporation. Under the plan of reorganization the bankers will take over $448,300 par value of the capital stock of the new company and in return will deliver to the committee for cancellation $1,066,000 of the general and refunding bonds and $359,000 of unsecured notes of the old company. In addition they will deliver cash to pay $185,000 of matured coupons up to Nov. 1, 1912, on the general and refunding bonds, $125,000 for reorganization expenses and working capital for the new company, and $75,000 for current operating accounts of the old company.

The bankers will also subscribe at par in cash to $935,000 of the 7 per cent preferred stock of the Canadian-American Power Company, of which $500,000 will be used by the power company for working capital and $435,000 for the acquisition from the bankers of all the capital stock of the Niagara Falls Electrical Transmission Company. They will sell to the new corporation the $3,000,000 of stock of the Canadian-American Power Company, receiving in exchange $3,000,000 par value of stock of the new company.

For 81 per cent of preferred and 81 per cent of the common stock of the Buffalo, Lockport & Rochester Railway, the bankers will receive $866,700 par value of stock of the new company. Holders of the $6,000,000 of general and refunding bonds of the Buffalo & Lake Erie Traction Company will receive $6,000,000 of Series "B" bonds of the new company. These bonds will bear interest at the rate of 2 per cent for 1915, 4 per cent for 1916 and 5 per cent for 1917 and thereafter.

With this financing completed, the new company will have no debt beyond its funded debt of $6,000,000 and will have $5,250,000 of capital stock outstanding. By this reorganization the capitalization of the Buffalo & Lake Erie Traction Company will be reduced $7,154,100, or the amount of its common and preferred stocks now outstanding. Estimates of earnings of the new corporation, made by Ford, Bacon & Davis for 1914, 1915, 1916 and 1917, indicate that it will earn, from the date of its organization, the interest on its $6,000,000 of bonds and a full dividend of 6 per cent on its outstanding $5,250,000 of capital stock, and for the four years in addition will accumulate over $1,000,000 of surplus, which will be available for betterments and improvements.

In addition to the series "B" bonds the new company will be authorized to issue series "A" bonds to an amount not to exceed $10,000,000, at either 5 per cent or 6 per cent interest, for the purpose of making additions and betterments to the property and to refund the underlying mortgage bonds. They will be a lien on the entire property, and in addition will have as security all the common and the preferred stock of the Canadian-American Power Company and the Buffalo, Lockport & Rochester Railway owned by the new company which it is proposed to organize as the successor corporation.

American Cities Company, New York, N. Y.—A special meeting of the stockholders of the United Gas & Electric Corporation has been called for Sept. 24 to authorize an increase in the company's capital for the purpose of acquiring the stock control of the American Cities. It is proposed to create a new class of stock, second preferred, and to issue $12,500,000 of this, increasing the corporation's capital from $45,000,000 to $57,500,000. The new stock is to bear interest at 2 per cent for 1914, the rate of interest being increased annually by 1 per cent until a rate of 6 per cent is reached, at which it will be continued. It is stated that the purchase of American Cities stock is to be made by the exchange of stock on a par basis, seventy-five shares of the new second preferred stock and twenty-five shares of the common stock of the United Gas & Electric Corporation being exchanged for each 100 shares of the common stock of the American Cities company.

American Public Utilities Company, Grand Rapids, Mich.—At the recent annual meeting of the American Public Utilities Company it was decided to increase the board of directors from seven to sixteen. The position of chairman of the board of directors was created to be filled at a later date. A resolution was adopted to the effect that instead of an increase in the common stock dividend the money should be conserved for the company's use. Immediately following the meeting of the stockholders, the board of directors met and appointed the following named executive committee: Joseph R. Brewer, chairman; C. B. Kelsey, George D. Whitworth, Joseph S. Hart, Blaine Gavett, C. A. Boalt and Charles McPherson. H. L. Nason, of the firm of H. L. Nason & Company, Boston, was elected a director.

Dry Dock, East Broadway & Battery Railroad, New York, N. Y.—Upon the application of the Dry Dock, East Broadway & Battery Railroad, a hearing was set for Aug. 26 before the Public Service Commission of the First District of New York for permission to issue a refunding mortgage for $4,300,000 and to issue thereunder bonds as follows: $1,500,000 series "A" bonds, $560,000 series "B" bonds and $2,240,000 series "C." The "A" bonds are to bear interest at 5 per cent and to be a prior lien. The series "B" and "C" bonds are to bear interest at 4 per cent and to be succeeding liens. It is stated in the petition that this refunding will effect a reduction of $1,654,594 in the debts of the company, due to a reduction of certain claims, among them a claim of the Third Avenue Railway of $1,822,963, scaled down to $1,500,000.

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Evansville (Ind.) Railways.—The Evansville Railways has filed a petition with the Public Service Commission of Indiana asking permission to issue $273,000 of five-year 6 per cent notes, maturing April 1, 1918, and to sell, hypothecate or otherwise dispose of them at not less than 75 cents on the dollar; also to sell, hypothecate or otherwise dispose of shares of its common stock, not to exceed in amount 50 per cent of the notes, at not less than $20 per share. The company sets out in its petition that it has floating debts which it wishes to pay, and that it proposes to use the $273,000 to pay off these debts, amounting to $204,732.

Goldsboro (N. C.) Traction Company.—Judge Connor in the United States District Court at Raleigh, N. C., on Aug. 19 ordered the foreclosure sale of the property of the Goldsboro Traction Company in the suit brought by the Merchants' Trust & Deposit Company, as trustee, which was noted in the Electric Railway Journal of July 12, 1913.

Grand Valley Railway, Brantford, Ont.—J. L. Addison, on behalf of himself and other holders of the securities of the Grand Valley Railway, has entered action at Osgoode Hall, Toronto, against A. J. Pattison, W. S. Dinnick, John Firstbrook, E. T. Fox, J. S. King and W. R. Turnbull, Toronto, and M. A. Verner, Pittsburgh, for an accounting by the directors in respect to their disposition of the company's assets.

Hudson & Manhattan Railroad, New York, N. Y.—A routine step in the reorganization plan of the finances of the Hudson & Manhattan Railroad was taken on Aug. 25 in the filing of the two new mortgages totaling $98,574,000, under the plan of organization recently adopted by the stockholders. The mortgages are those on which are based the $65,000,000 authorized issue of first mortgage 5 per cent bonds and the $33,574,000 issue of adjustment income 5 per cent bonds. The trustees are the Central Trust Company and the Guaranty Trust Company.

Interborough-Metropolitan Company, New York, N. Y.—The annual meeting of the stockholders of the Interborough-Metropolitan Company will be held on Sept. 16, 1913, to determine whether the number of directors shall be reduced from twenty-one to fifteen; to elect directors to serve for a term of three years, and to transact such other business as may properly come before the meeting.

Kansas City Railway & Light Company, Kansas City, Mo.—The committee representing holders of the 6 per cent notes of the Kansas City Railway & Light Company, due Sept. 1, 1912, deposited under the agreement dated Aug. 15, 1913, announces that it has arranged for payment by that company on Sept. 2, at the office of the New York Trust Company, of interest on these notes from March 1 to Sept. 1, 1913, at the rate of 7 per cent. Notes and certificates of deposit must be presented for indorsement.

Morris County Traction Company, Morristown, N. J.—The Morris County Traction Company recently filed a new mortgage to the Safe Deposit & Trust Company, Pittsburgh, as trustee, to secure an authorized issue of $5,000,000 of bonds due 1948, which issue was mentioned in the Electric Railway Journal of March 1, 1913.

New England Investment & Security Company, Springfield, Mass.—The regular monthly meeting of the trustees of the New England Investment & Security Company was held in Boston on Aug. 27. E. N. Sanderson, H. H. Porter and E. C. Foster were elected trustees, and E. N. Sanderson was elected vice-president of the board. Mr. Sanderson takes the place of Laurence Minot, who resigned several months ago, and Messrs. Porter and Foster take the places of Bentley W. Warren, Boston, and Charles E. Ware, Fitchburg. The board is now composed of H. L. Higginson, A. Willard Damon, J. T. Harmer, president; Augustus G. Bullock, E. N. Sanderson, vice-president; H. H. Porter and E. C. Foster.

New York Consolidated Railroad, Brooklyn, N. Y.—The Public Service Commission for the First District will hold a hearing on Sept. 3 on the joint petition of the New York Consolidated Railroad and the South Brooklyn Railway for the approval of an agreement between them dated Aug. 1, 1913. By this agreement portions of the Sea Beach line owned by the New York Consolidated Railroad are to be leased to the South Brooklyn Railway, but such portions are not a part of the Sea Beach line which is to be used under the dual system contracts, and the proposed agreement also gives the South Brooklyn Company trackage rights over this part of the line. For the first five years the annual rental is to be $100 and thereafter $15,000 in addition to taxes.

New York, New Haven & Hartford Railroad, New Haven, Conn.—A petition has been filed by the New York, New Haven & Hartford Railroad with the Massachusetts Public Service Commission for authority to issue $67,552,400 of convertible bonds, as voted by the stockholders on Aug. 22. Sept. 9, at 10.30 a. m., was the date provisionally designated by the commission for the first hearing on the petition and it has been definitely fixed upon the receipt of the amended petition in a broader and final form.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—Permission has been granted to the Oakland, Antioch & Eastern Railway to issue $1,000,000 of 5 per cent bonds to pay for construction of the line from Bay Point to Sacramento. The bonds are to be pledged at 60 and sold at not less than 80. In explanation of the recent assessment of $5 a share levied upon the stockholders of the company, which was noted in the Electric Railway Journal of Aug. 16, 1913, W. Arnstein, president of the company, sets forth the following reasons in a communication to the stockholders: First, the greater cost of terminal properties in Oakland and in Sacramento due to particularly advantageous locations being acquired; second, a large increase in equipment and operating facilities over the original estimate, due to the large amount of intermediate business accruing to the road through the rapid development in the territory traversed; third, the installation of an automatic block signal system, the wisdom of which, although it entailed a large expenditure not provided for at the beginning, cannot be questioned, especially in view of the recent serious electric railway accidents; fourth, the additional size of the ferry boats to take care of the increase in traffic and the additional size of the slips necessitated by the larger boats and by the desire of the company to dock its ships at its own wharf so as to be able to transfer freight to its cars in the same manner as the Southern Pacific does at Long Wharf, Oakland; fifth, the concreting in the tunnel; sixth, the building of a line on standard steam specifications in order to be able to handle any transcontinental business, either passenger or freight, in standard equipment, and, seventh, the purchase of a bridge site and the preliminary work done, the War Department permit having been granted after the estimates of costs of completion had been made.

Oklahoma Railway, Oklahoma City, Okla.—The stockholders of the Oklahoma Railway will vote on Sept. 12 on increasing the bonded debt by $1,200,000 or any part thereof for the refunding of the present floating debt and for the construction and acquisition of other properties. At present the company is laying tracks on an 8.2-mile extension building under the name of the Norman Interurban Railway. Plans also call for the building during 1914 of a 16-mile extension from the northern terminus at Edmond to Guthrie.

Pacific Gas & Electric Company, San Francisco, Cal.—Further particulars have been received in regard to the proposed issue, subject to the authorization by the stockholders, of collateral notes of the Pacific Gas & Electric Company, $4,500,000 of which have been sold to a syndicate headed by Harris, Forbes & Company and N. W. Halsey & Company, as noted in the Electric Railway Journal of Aug. 9, 1913. President Drum, in a circular dated July 26, states that the stockholders will vote on Sept. 10 on authorizing an issue of 6 per cent gold bonds of a maximum value of $7,000,000 to mature June 26, 1914, and to be secured by pledge of collateral of $5,000,000 general lien 6 per cent bonds and $5,000,000 general and refunding 5 per cent bonds, both of which issues have heretofore been authorized by the stockholders. On Aug. 4 the company applied to the California Railroad Commission for authority to issue the $5,000,000 of convertible general lien bonds in place of the $5,000,000 of convertible debentures previously authorized. These two issues of collateral will be deposited from time to time with the

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Bankers' Trust Company, New York, trustee, under the gold note agreement when and as the company receives the proceeds of the loan. The proceeds of these $4,500,000 of notes are to be used to take up demand notes for advances already made by the bankers and yet to be made, pending authorization of the gold notes by the stockholders, and to pay other current indebtedness of the company for the prosecution of necessary construction work and the extension of the company's business. The remainder of the authorized issue, $2,500,000, will be reserved to meet possible future notes. This method of financing, it is stated, has been adopted by the Pacific Gas & Electric Company as the result of scarcity of capital and the difficulty at this time of obtaining a good market for the bonds which are pledged to secure these notes. It is anticipated that before the maturity of the notes it will be possible for the company to market its bonds upon more favorable terms.

Pittsburgh (Pa.) Railways.—In the ELECTRIC RAILWAY JOURNAL of Aug. 23, 1913, reference was made to a new mortgage for $20,000,000 filed by the Pittsburgh Railways. This is one step in the new scheme of financing brought about by certain adjustments between the Pittsburgh Railways and the Philadelphia Company, the controlling interest, whereby the subsidiary will henceforth do its own financing. Last year, after the organization of the Duquesne Light Company, the Philadelphia Company was able, by reason of an exchange of stocks and other adjustments, to increase its surplus by $5,959,429. Because of this increase in surplus and also by a recognition of part of an increase in book values of stocks of certain gas companies in which extensive improvements and additions had been made out of earnings, it also was in position to adjust its accounts with the Pittsburgh Railways. The principal transaction involved in this adjustment was the sale to the railway company of stocks of street railway and traction companies included in the operating system of the railway company, which were carried on the books of the Philadelphia Company at $8,265,000, and also the turning over to the railway company of the bills payable of that company and certain underlying street railways amounting in book value to $10,610,052. For these stocks and bills payable the Philadelphia Company received from the railway company $10,000,000 par value 6 per cent non-cumulative debentures, the interest upon which is payable as and when earned. By these transactions the railway company was relieved from a large indebtedness to the Philadelphia Company, its sole stockholder, and also from the payment of large sums of money annually as interest upon such indebtedness.

Public Service Corporation of New Jersey, Newark, N. J.—On July 7 the Paterson & State Line Traction Company, a sub-company of the Public Service Corporation of New Jersey, filed a certificate of increase in the authorized capital stock from $100,000 to $300,000.

San Francisco-Oakland Terminal Railways, Oakland, Cal.—The trustees in charge of the refinancing of the San Francisco-Oakland Terminal Railways have requested an extension of time on the company's notes for a period of one year. The holders of the minority stock, about 20,000 shares, of the Oakland Traction, the San Francisco, Oakland & San José Consolidated Railway and the San Francisco-Oakland Terminal Railways were recently requested by Henry Wadsworth, Judge E. Nusbaumer and R. Whitehead, the committee representing them, to send 10 cents per share to meet the expense of preliminary examination. This committee finds after a careful examination of the statements rendered to the San Francisco-Oakland Terminal Railways by accountants that apparently injustice has been done to the minority stockholders. They desire to recommend therefore that chartered accountants be employed to make a thorough investigation of the financial conditions and expenditures of the company for the past three years. In view of the representations made by the trustees for the Smith interests, however, it has been decided to defer bringing any suit.

Southern Pacific Company, San Francisco, Cal.—A decision has been rendered by the California Railroad Commission granting the application of the Southern Pacific Company for permission to issue the remaining $5,120,000 of equipment trust certificates previously authorized, at a discount of 6 per cent on the basis of the average maturities of the face amount of said certificates.

Third Avenue Railway, New York, N. Y.—On Sept. 3 the Public Service Commission for the First District of New York will hold a hearing before Commissioner Milo R. Maltbie on the application of the Belt Line Railway Corporation and the Third Avenue Railway for permission to increase the capital stock of the Belt Line company from $600,000 to $750,000, to issue capital stock of the company to defray the cost of acquiring storage battery cars and to authorize the acquisition by the Third Avenue Railway of such capital stock. The Belt Line company now has $481,000 capital stock and $1,750,000 bonds outstanding, all of which is held by the Third Avenue Railway. The Belt Line company has been operating storage battery cars for some time and it now proposes to purchase thirty-nine additional cars of the same type at a cost of about $129,000.

Union Elevated Railroad, Chicago, Ill.—A jury in Judge Bowles' court recently decided in favor of the Union Elevated Railroad in a suit brought against it by the late Potter Palmer in 1900, demanding $500,000 damages for alleged injuries to the Palmer House through the construction of the loop. In a similar suit brought by Mrs. Palmer for $250,000 damages, a jury in Judge Stough's Court disagreed on May 20, 1913.

Union Traction Company of Indiana, Anderson, Ind.—Four one-thousand-dollar and two five-hundred-dollar first mortgage 6 per cent bonds of 1897 of the Citizens' Street Railway, of Muncie, Ind., have been called by the Union Traction Company of Indiana for payment at 105 and interest, at the Guaranty Trust & Safe Deposit Company, Philadelphia, on Sept. 1, 1913.

United Properties Company, Oakland, Cal.—It is reported that the trustees of the United Properties Company have given R. G. Hanford an option to purchase the electric lines controlled by the San Francisco-Oakland Terminal Railways, good until Jan. 1, 1914, to enable them to open negotiations in London for the sale of the properties.

ELECTRIC RAILWAY MONTHLY EARNINGS

AMERICAN RAILWAYS, PHILADELPHIA, PA.

Period			Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m.,	July,	'13	$490,472	.....	.....	.....	.....
1 "	"	'12	450,606	.....	.....	.....	.....

ATLANTIC SHORE RAILWAY, SANFORD, MAINE

1m.,	June,	'13	$34,420	$28,109	$6,311	$642	$5,669
1 "	"	'12	30,591	22,735	7,857	582	7,275

EAST ST. LOUIS & SUBURBAN COMPANY, EAST ST. LOUIS, MO.

1m.,	June,	'13	$206,491	*$127,300	$79,191	$47,537	$31,654
1 "	"	'12	194,426	*111,369	83,057	48,279	34,778
12 "	"	'13	2,565,154	*1,427,091	1,138,063	584,432	553,631
12 "	"	'12	2,336,283	*1,298,591	1,037,692	563,410	474,282

JOPLIN & PITTSBURG RAILWAY, PITTSBURG, KAN.

1m.,	July,	'13	$51,651	*$31,271	$20,380	$12,542	$7,838
1 "	"	'12	48,625	*27,070	21,555	12,542	9,013
12 "	"	'13	563,311	*332,852	230,459	150,500	79,959
12 "	"	'12	508,833	*300,274	208,559	154,993	53,566

LEHIGH VALLEY TRANSIT COMPANY, ALLENTOWN, PA.

1m.,	July,	'13	$162,401	$64,121	$98,281	$46,665	$51,616
1 "	"	'12	137,837	58,403	79,433	42,464	36,969
12 "	"	'13	1,686,525	715,578	970,948	538,791	432,156
12 "	"	'12	1,439,649	633,216	806,432	488,126	318,306

MONONGAHELA VALLEY TRACTION COMPANY, FAIRMONT, W. VA.

1m.,	July,	'13	$80,997	$29,103	$51,895	$24,527	$27,367
1 "	"	12	79,822	31,818	48,004	25,333	22,671
7 "	"	'13	523,064	180,758	342,305	169,187	173,118
7 "	"	'12	466,845	190,960	275,886	138,439	137,447

PHILADELPHIA (PA.) RAPID TRANSIT COMPANY

1m.,	July,	'13	$1,996,613	$1,192,531	$804,082	$797,691	$6,391
1 "	"	'12	1,918,941	1,156,227	762,713	758,181	4,532

PORTLAND (MAINE) RAILROAD

1m.,	June,	'13	$93,150	*$62,817	$30,333	$11,214	$19,119
1 "	"	'12	89,365	*60,012	29,353	10,206	19,147
12 "	"	'13	1,007,479	*711,240	296,239	125,003	171,236
12 "	"	'12	973,898	*704,665	269,233	116,749	152,484

UNION RAILWAY, GAS & ELECTRIC COMPANY, ROCKFORD, ILL.

1m.,	June,	'13	$354,373	*$189,459	$164,914	$97,091	$67,823
1 "	"	'12	272,714	*162,152	110,562	69,302	41,260
12 "	"	'13	4,545,575	*2,563,964	1,981,611	1,140,932	840,679
12 "	"	'12	3,422,973	*1,984,431	1,438,542	789,944	648,598

*Includes taxes.

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Traffic and Transportation

Accidents on Interstate Electric Railways

The Interstate Commerce Commission, Washington, D. C., has issued a summary for the three months ended Dec. 31, 1912, of the casualties to persons on steam and electric railways under its jurisdiction. The total number of casualties of all classes reported amounted to 2967 for persons killed and 51,323 for persons injured. This statement includes 250 passengers killed and 4334 passengers injured, 2611 employees killed and 18,720 employees injured. The casualties were sustained by employees while at work, by passengers getting on or off cars, by persons at highway crossings, by persons doing business at stations, etc., as well as by trespassers and others. In addition to the above, 106 persons were killed and 28,260 persons injured in casualties reported as "industrial accidents," which term covers accidents not involved in train operation, but occurring to railway employees, other than trainmen, on railway premises. The report for interstate electric railways by themselves shows that the list of those killed during the three months was 111, or 3.7 per cent of the total, and the list of injured 1387, or 2.7 per cent, which compare with 3.4 per cent and 2.6 per cent, respectively, during the preceding three months.

From the statement of the commission, which is appended, the columns have been eliminated which show casualties to employees not on duty and to trespassers. Of the former class none was killed and six were injured, while thirty-one trespassers were killed and thirty-six injured. The summary, with these eliminations, is as follows:

Causes.	Number of Accidents.	Passengers Killed.	Passengers Injured.	Employees on Duty Killed.	Employees on Duty Injured.	Other Persons Not Trespassing Killed.	Other Persons Not Trespassing Injured.	Total Persons Killed.	Total Persons Injured.
Collisions	61	2	347	3	39	..	..	5	386
Derailments	18	..	26	2	3	..	..	2	29
Accidents to trains, cars, or engines, except collisions, derailments and boiler explosions	2	..	14	..	1	..	..	..	15
Bursting of, or defects in, locomotive boilers, or boiler attachments	..	..	..	..	..	..	..	..	..
Total train accidents	81	2	387	5	43	..	..	7	430
Accidents to roadway or bridges not causing derailment, such as fires, floods, landslides, explosions, etc	1	..	..	..	..	..	..	..	..
Coupling or uncoupling cars (exclusive of accidents with air or steam hose)	.	..	..	..	6	..	..	..	6
While doing other work about trains (not in shops or engine houses) or while attending switches	..	..	..	1	35	..	..	1	35
Coming in contact, while riding on cars, with overhead bridges, tunnels, or any signal apparatus or fixed structure above or at side of track	..	..	5	1	4	..	..	1	9
Falling from cars or engines	..	2	18	3	15	..	..	5	37
Getting on or off cars or engines	..	4	321	1	15	..	1	5	348
Other accidents on or around trains not here named	..	..	65	..	9	..	13	..	87
Being struck or run over by engines or cars at stations or yards	..	..	2	..	2	4	4	5	13
Being struck or run over by engines or cars at highway grade crossings	..	..	..	..	..	37	111	38	112
Being struck or run over by engines or cars at other places	..	..	4	2	2	15	66	44	92
Other causes	..	..	34	..	1	..	2	2	38
Total, other than train accidents	1	6	449	8	89	56	197	101	777
Grand total, exclusive of industrial accidents	..	8	836	13	132	56	197	108	1,207
Industrial accidents to employees	..	..	..	3	180	..	..	3	180
Grand total	..	8	836	16	312	56	197	111	1,387

The bulletin published by the commission also contains the following statement of the collisions and derailments on the interstate electric railways during October, November and December, 1912:

Classes	Number	Damage to Road and Equipment and Cost of Clearing Wrecks	Number of Persons Killed	Number of Persons Injured
Collisions, rear	29	$5,336	1	263
Collisions, butting	15	11,920	3	93
Collisions, trains separating	..	..	..	..
Collisions, miscellaneous	17	8,486	1	30
Total	61	$25,742	5	386
Derailments due to defects of roadway	4	$682	..	19
Derailments due to defects of equipment	5	5,938	..	1
Derailments due to negligence of trainmen, signalmen, etc	3	1,010	..	4
Derailments due to unforeseen obstruction of track, etc	3	3,555	1	4
Derailments due to malicious obstruction of track, etc	1	..	1	..
Derailments due to miscellaneous causes	2	586	..	1
Total	18	$11,771	2	29
Total collisions and derailments	79	$37,513	7	415
Total for same quarter of—				
1911	65	33,395	10	376
1910	67	49,677	41	455
1909	66	19,316	5	222

Commutation Tickets on South Carolina Road.—The Greenville, Spartanburg & Anderson Railway, Greenville, S. C., has placed on sale commutation tickets prepared on the basis of 1 cent a mile. The fixed minimum fare is 5 cents.

Inquiry Into Operating Methods of Pacific Electric Railway.—The Railroad Commission of California rendered a decision subsequent to an investigation into the methods of operation and equipment of the Pacific Electric Railway, Los Angeles, requiring the company to submit for the commission's approval a complete plan concerning the instruction and examination of its employees, and the number and protection of its railroad crossings.

Cleveland Employees Protest to Federation of Labor.—Officials of the local branch of the union of employees of the Cleveland (Ohio) Railway have taken their grievances against the schedules arranged by Peter Witt, street railway commissioner, to the Cleveland Federation of Labor, and they have been placed in the hands of the grievance committee for investigation. The employees claim that they are not getting their lay-over periods at the end of their runs and that sometimes they find it impossible to make the runs on time.

Traffic Delayed Pending Damage Payment.—The Detroit (Mich.) United Railway had one of its lines tied up recently by a constable who seized a car to satisfy a judgment of $138 damages. The damages against the company had been only recently assessed, but the claimant became uneasy because the payment was not made immediately after the decision was rendered. The constable refused to permit the car to move until the payment for damages was brought to him from the general office. In the interval the operation of the entire line was delayed.

Courtesy Movement in Columbus, Ohio.—In order to bring about a better understanding between the Columbus Railway & Light Company, Columbus, Ohio, and the public, the company has begun a system of instruction for employees that will create a desire for efficiency and right treatment of others. As a first step in this direction bronze watch fobs attached to a neat leather strap will be given to all motormen, conductors and carhouse men. On the face of the medallion will be the words "Safety First," and on the obverse side "Be Patient, Courteous and Attentive."

Hearing on Boston Transfers.—The Public Service Commission of Massachusetts gave a hearing to the Boston Elevated Railway on Aug. 21 upon the abuse of transfer facilities in connection with the operation of certain surface lines connecting with the Cambridge subway. The company pointed out that existing transfer arrangements enable passengers on various lines entering Kendall Square to take surface cars into the heart of Boston and return to the starting point on payment of a single fare, the abuse

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being most common during the lunch hour. The company desires to curtail some of the transfer facilities, and the board took the case under advisement.

Safety First Meetings at New Albany.—Following the quarterly meeting of employees of the Louisville & Southern Indiana Traction Company, the Louisville & Northern Railway & Lighting Company, the United Gas & Electric Company and other public service properties centering at New Albany, Ind., it was announced that the meetings would hereafter be put in charge of the men themselves instead of being addressed only by officers of the companies. The quarterly sessions, which have been held for several years, are for the discussion of "safety first" principles and have been successful. The recent meeting was held on Aug. 22 at the Carnegie library, New Albany. One session was at 11 a. m., giving the night men a chance to attend, and the other at 3 p. m. Chester P. Wilson, Indianapolis, president of the Interstate Public Utilities Company; Alexander Shane, and Charles B. Scott, manager of the bureau of safety of the Middle West Utilities Company, Chicago, were the speakers.

Petition for Smoking Cars in New York.—The following petition, addressed to Edward E. McCall, chairman of the Public Service Commission of the First District of New York, is being distributed in Greater New York: "We, the undersigned citizens of the State of New York, are in favor of the operation of smoking cars or cars having smoking compartments on all surface and elevated lines of transportation in the city of New York, on the ground that thereby a great majority of the public will be afforded a privilege to which, by reason of their overwhelming number, they have a right. We respectfuliy request your honorable body to take this petition under consideration and to issue such order in compliance with our request as will satisfy what we believe to be a public demand." At the top of each petition is the following notice: "Do not sign this petition unless you are a voter in this city and are uninfluenced by any other consideration than your honest desire to be convenienced in the matter of smoking."

Tickets Withdrawn from Sale in Seattle.—Tickets have been withdrawn from sale on local lines of the Seattle (Wash.) Electric Company in conformity with the decision of Judge Rudkin of the federal court of western Washington. The ordinance under which the city had directed the company to sell tickets, in the opinion of the court, is in conflict with the state law. Judge Rudkin said: "Such conflict of authority is not to be tolerated. For this reason I am satisfied that the act of the municipality in enacting the ordinance in question was *ultra vires*, and that the ordinance itself is null and void. The injunction must therefore issue as prayed." Waving the question whether damages of $15 000, claimed by the railway, have been proved by competent evidence, the court says they are not recoverable, either at law or in equity. Pending the filing of a petition for rehearing by the corporation counsel's department and final decision from the Supreme Court, to which the municipality will appeal, Judge Rudkin granted an injunction to the railway.

Tacoma-Seattle Fare Case.—A further step was taken in the controversy between the Puget Sound Electric Railway and the State Railway Commission of Washington recently, when James B. Howe and John A. Shackleford, counsel for Stone & Webster, appeared before Judge Neterer of the federal court and declared that the reduction in rates on the line between Tacoma and Seattle has decreased the profits of the company until the return on the investment does not exceed 2 per cent. The reduction in rates was made effective some time ago by the State Railway Commission and was later sustained by the Public Service Commission, and the action for relief from the commission's order has been carried through the State Supreme Court and the Superior Court of Thurston County. Counsel for the State pleaded that the matter had already been passed upon by the Superior and Supreme Courts of the State and that those tribunals had found the new rates reasonable and lawful. They opposed the action of the company in seeking to secure a permanent injunction against the enforcement of the order in the federal court. Judge Neterer announced that he would take the matter under advisement.

Personal Mention

Mr. W. A. Cattell has been appointed consulting engineer of the San Francisco-Oakland Terminal Railways, Oakland, Cal.

Miss E. Maxwell has been appointed secretary-treasurer of the St. Thomas (Ont.) Street Railway by the City Council.

Mr. George F. Cooper has succeeded Mr. J. E. Tappan as auditor of the Knoxville Railway & Light Company, Knoxville, Tenn.

Mr. Samuel Z. Smith has succeeded Mr. J. M. Siegfried as treasurer of the Warren & Jamestown Street Railway, Warren, Pa.

Mr. James Myers has succeeded Mr. George Gudue as engineer of the power station of the Burlington (Vt.) Traction Company.

Mr. E. R. Lilienthal will be elected president of the United Railroads, San Francisco, Cal., to succeed Mr. Patrick Calhoun.

Mr. R. O. Thomen has been elected treasurer of the Union Light & Power Company, Junction City, Kan., to succeed Mr. S. W. Pierce.

Mr. W. E. Terry has succeeded Mr. J. Macaleese as auditor and purchasing agent of the Appalachian Power Company, Bluefield, W. Va.

Mr. P. L. Gallagher has succeeded Mr. James Cannon as master mechanic of the South Bethlehem & Saucon Street Railway, South Bethlehem, Pa.

Mr. A. Strohm has succeeded Mr. Roy Edinger as superintendent of power and equipment of the Warren & Jamestown Street Railway, Warren, Pa.

Mr. Frank Morrison has been elected chief engineer of the power station of the Union Traction Company, Coffeyville; Kan., to succeed Mr. O. E. Polk.

Mr. W. L. McKee has been elected vice-president of the Trinidad Electric Transmission, Railway & Gas Company, Trindad, Col., to succeed Mr. J. F. Wessel.

Mr. Richard A. Taussig has been elected secretary and treasurer of the Jersey Central Traction Company, Keyport, N. J., to succeed Mr. William Moyer.

Mr. Jacob Rieder has been appointed superintendent and purchasing agent of the Capitol Street Railway line, Bismarck, N. D., to succeed D. M. Slattery.

Mr. George P. Lawrence, recently appointed a member of the Public Service Commission of Massachusetts by Governor Foss, has resigned, dating from Sept. 1.

Mr. G. S. Storrs has resigned as auditor of the Syracuse & Suburban Railroad, Syracuse, N. Y., to become auditor of the Maryland Electric Railways, Annapolis, Md.

Mr. F. L. Annable, who has been superintendent of the Northern division of the Pacific Electric Railway, Los Angeles, Cal., has been appointed general superintendent of the company.

Mr. Frederick J. Shepard, Jr., has been appointed superintendent of the Chester & Derry Railroad Association, Chester, N. H., to succeed Mr. Charles Bartlett, who continues as vice-president of the company.

Mr. D. D. McEwen has been appointed roadmaster of the London (Ont.) Street Railway. Mr. McEwen went to Canada from Scotland in 1911. He was with the engineering staff of the Caledonian Railway, Glasgow, Scotland, for seven years.

Mr. E. P. Grove, who has been connected with the Central London Railway, London, Eng., as chief engineer, has been appointed resident engineer at Melbourne, Australia, for Mertz & McClellan, to superintend the important electric railway installation to be carried out there.

Mr. Carl O. Y. Montelius, assistant chief engineer, and Mr. Hugo M. Rahmberg, electrical engineer, electrification department Swedish State Railways, Stockholm, are in this country inspecting heavy electric traction and high-tension transmission systems. They expect to stay in the United States for two months, during which time they will visit the principal developments as far as the Pacific Coast,

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Mr. E. E. McCall, chairman of the Public Service Commission for the First District of New York, has been named by the Democratic designating committee for Mayor of Greater New York. Mr. McCall was nominated by Governor Sulzer on Feb. 3, 1913, to succeed Mr. William R. Willcox as chairman of the commission. Previous to that he was a justice of the Supreme Court of New York. Mr. McCall was born in Albany on Jan. 6, 1863.

Mr. M. R. Fewell has been appointed assistant general passenger agent of the Texas Traction Company and the Denison & Sherman Railway with headquarters at Dallas, Tex. On June 28, 1907, Mr. Fewell was appointed assistant general passenger agent of the companies with headquarters at Denison, Tex. Prior to his connection with the Texas Traction Company and the Denison & Sherman Railway Mr. Fewell was in the insurance business at Denison, Tex.

Mr. S. W. Cheney has been appointed assistant engineer of Kelsey, Brewer & Company, with headquarters at Grand Rapids, Mich. Mr. Cheney leaves the position of engineer and general superintendent of the La Crosse Gas & Electric Company, La Crosse, Wis., which he has filled for the past four months. He had been identified with public utilities since his graduation in 1904 from the University of Wisconsin. He was also connected with the Railroad Commission of Wisconsin.

Mr. A. B. Coryell has resigned as general superintendent, purchasing agent and chief engineer of the Waycross Street & Suburban Railway, Waycross, Ga. Mr. Coryell has been connected with the railway and lighting business for more than twenty years. Before coming to Waycross he was general manager of the Dayton Construction Company and the Greenville Railway & Light Company, Greenville, Tex. Previous to that time he was general manager and purchasing agent for the Huntsville Railway, Light & Power Company, Huntsville, Ala.

Mr. G. A. de Haseth has been appointed chief engineer of the Puget Sound Electric Railway, the Tacoma Railway & Power Company and the Pacific Traction Company, of Tacoma, Wash., Stone & Webster properties, succeeding Mr. W. M. Bosworth. Mr. de Haseth is a graduate of the University of Maine and began engineering work with the Boston & Maine Railroad in 1807. He became connected with the Stone & Webster properties in Seattle in 1901, but left Seattle to take employment with the Stone & Webster Engineering Corporation on construction work in the South in 1911. His appointment became effective on July 21.

Mr. L. E. Lippitt, formerly bookkeeper and voucher clerk for the New York State Railways, Utica-Syracuse Lines, has been appointed auditor of the Syracuse & Suburban Railroad, Syracuse, N. Y., to succeed Mr. G. S. Storrs, whose appointment to the Maryland Electric Railways, Annapolis, Md., is referred to elsewhere in this column. Mr. Lippitt entered the employ of the Oneida Construction Company in October, 1906, as cost clerk in the engineering department at Utica, N. Y., and in June, 1907, became connected with the accounting department of what is now the New York State Railways, Utica-Syracuse Lines. After holding various positions with the Utica-Syracuse Lines he was made voucher clerk, his appointment dating from January, 1911. In November, 1912, he was appointed bookkeeper of the New York State Railways at Utica and continued in that position until the time of his appointment as auditor of the Syracuse & Suburban Railroad.

Mr. Nicholas F. Brady, eldest son of the late Anthony N. Brady, has been elected a member and chairman of the board of directors of the Brooklyn (N. Y.) Rapid Transit Company to succeed his father. Mr. Brady was born in Albany on Oct. 25, 1878. He attended the public schools, and after graduating from Albany Academy entered the academic course at Yale. Immediately after his graduation with the class of 1905 he entered the employ of the New York Edison Company. Shortly after he began work with the company Mr. Brady manifested an interest in welfare work, and under his direction various technical courses have been established, a commercial school with instruction in accounting for employees has been instituted, an employees' savings and loan association founded, and a well-fitted club house presented to the employees of the company. Two years ago, when he was a member of the public policy committee of the National Electric Light Association, he helped to draw up the report on the relations between capital and labor. He is a director of the Brooklyn Rapid Transit Company, Consolidated Gas, Electric Light & Power Company of Baltimore, Consolidated Telegraph & Electrical Subway Company, Edison Electric Illuminating Company of Brooklyn, Edison Light & Power Installation Company, Louisville Lighting Company, Manhattan Refrigerating Company, Metropolitan Engineering Company, United Electric Light & Power Company and a number of other public service corporations and is president of the New York Edison Company.

Mr. C. H. Sanderson, who for several years has been engineer of switchboard and power station design for the Westinghouse Electric & Manufacturing Company at East Pittsburgh, Pa., has resigned to become chief engineer of the Havana Electric Railway, Light & Power Company, Havana, Cuba. Mr. Sanderson is a graduate of Ohio State University and has been connected with the Westinghouse Electric & Manufacturing Company since 1900. A portion of this time was spent in the factory and drafting room, from which he was transferred to the engineering department and subsequently to his present position. Mr. Sanderson has been engaged on some of the largest switchboard and power station apparatus that the company has furnished. A farewell dinner was tendered to Mr. Sanderson at the Fort Pitt Hotel on Aug. 20 by about 100 of his associates in the Westinghouse Company.

C. H. Sanderson

OBITUARY

William L. Dechant, Middletown, Ohio, a member of the Ohio Public Utilities Commission, died at Battle Creek, Mich., on Aug. 25. He was fifty-seven years old.

Albert E. Hewitt, superintendent of the railway lines of the Rutland Railway, Light & Power Company, Rutland, Vt., is dead. Mr. Hewitt was born in Proctor twenty-nine years ago. About sixteen years ago he took up his residence in Rutland. He was a student in the Rutland grade and high schools and on June 3, 1905, entered the employ of the auditor's office of the Rutland Railroad. On Sept. 1, 1905, he resigned because of ill health and spent some time in the Adirondacks. Mr. Hewitt was employed on the street railway at Rutland as motorman and conductor for a year or two, and in 1907 succeeded Mr. W. H. Horton as superintendent of the railway lines of the Rutland Railway, Light & Power Company.

E. J. Lawless, long a prominent railway supply man, died suddenly Aug. 27. Mr. Lawless commenced his railway career in 1877 with the Sutter Street Cable Railway, San Francisco, where he was successively a foreman of construction, assistant secretary and assistant superintendent. His knowledge of the construction and operation of cable railways in San Francisco led to his appointment in 1885 as superintendent of the Kansas City (Mo.) Cable Railway and later of the Metropolitan Cable Railway of that city. In 1888 he retired from railway work and engaged in the manufacture of cement, but in 1891 returned to the railway field as manager of the Paterson (N. J.) Railway, where he remained some three years. He then became Eastern agent of the American Car Company, St. Louis, and then successively was connected with the John Stephenson Company and the Danville Car Company, remaining with each until its purchase by The J. G. Brill Company. Recently Mr. Lawless was connected with the Walker & Bennett Manufacturing Company, and previous to that was with the Railway Motor Car Corporation, Philadelphia, manufacturer of gasoline motor cars. Mr. Lawless' death was caused by kidney trouble.

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Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Dominion Traction & Lighting Company, Portland, Maine.**—Chartered in Maine to construct, acquire and operate railways and other public utilities. Capital stock, $5,000,000. Officers: A. A. Richards, president, and C. G. Trott, Portland, treasurer. The operations of the Dominion Traction & Lighting Company, Ltd., Toronto, Ont., were referred to in the ELECTRIC RAILWAY JOURNAL for Aug. 16, 1913, page 280.

***West Stayton Power & Railway Company, Stayton, Ore.**—Application for a charter has been made by this company in Oregon to build an electric railway between Stayton and Salem. Capital stock, $100,000. Incorporators: S. N. Arnold, E. O. Stadter and Grant Thomas.

Shippensburg, Newburg & Western Railway, Shippensburg, Pa.—Chartered in Pennsylvania to build an electric railway between Shippensburg, Newburg, Cold Spring, Roxbury and McConnellsburg. [E. R. J., Aug. 23, '13.]

North Anderson Street Railway, Anderson, S. C.—Chartered in South Carolina to build an electric railway between Anderson and North Anderson. Capital stock, $15,000. Incorporators: John W. Linley, G. N. C. Boleman, J. D. Hammett, J. H. Anderson and J. D. Brown. [E. R. J., July 26, '13.]

***Tennessee & Kentucky Railroad, Nashville, Tenn.**—Application for a charter has been made by this company in Tennessee to build an interurban electric railway between Nashville and Springfield, Tenn., and Adairville and Russellville, Ky. Capital stock, $10,000. Incorporators: J. P. Helms, Alfred G. Merritt, Jr., H. L. Sperry, Paul D. Denton, B. F. Cornelius, R. W. Bratton, J. C. Collins, Clyde Shropshire, J. L. Weakley, J. W. Tilford and A. C. Ferris.

***Ogden, Lewiston & Northern Railroad, Logan, Utah.**—Application for a charter has been made by this company in Utah to build an 80-mile interurban railway from Ogden over the Idaho state line through Fairview to Preston. Frederick W. Crockett, Logan, Utah, president, and A. W. Hart, Preston, Idaho, agent.

FRANCHISES

Little Rock, Ark.—The Little Rock, Pine Bluff & Eastern Traction Company has asked the Council for a franchise in Little Rock.

Redondo Beach, Cal.—The Pacific Electric Railway has received a twenty-year franchise from the Council in Redondo Beach over Wharf No. 1. The company has received permission from the Board of Supervisors to double-track its Santa Ana line between Stanton and Buaro.

Mount Vernon, Ill.—The Mount Vernon Traction Company has received a franchise from the Council to extend its lines in Mount Vernon.

Brockton, Mass.—The Bay State Street Railway has asked for a franchise to double-track its line on Howard Street in Brockton.

Corunna, Mich.—The Michigan United Traction has asked for a franchise in Corunna.

Lorain, Ohio.—The Lake Shore Electric Railway has asked the Council for a franchise in Lorain.

Lorain, Ohio.—The Lorain Street Railway has asked the Council for a franchise in Lorain on Broadway and East Twenty-eighth Street to the proposed new subway.

***Dunmore, Pa.**—The Dunmore, Ariel & Honesdale Street Railway has received a perpetual franchise from the Council in Dunmore. Gerald MacDonald, Scranton, is interested.

Beaumont, Tex.—The City Council has granted the request of the Stone & Webster Syndicate, which represents the Jefferson County Traction Company, to build switches and cut-offs on Pearl Street, Bonham Street, Orleans Street and on Broadway in Beaumont.

El Paso, Tex.—The Rio Grande Traction Company has received a franchise from the Council over certain streets in El Paso.

El Paso, Tex.—The El Paso Electric Railway has received a franchise from the Council to build three extensions in El Paso.

Marshall, Tex.—The Marshall Traction Company has received a new franchise from the Council in Marshall in consideration of arrangements for a public park in Marshall.

San Antonio, Tex.—The San Antonio Traction Company has asked the Council for a new franchise for a double-track line on Commerce Street in San Antonio.

Charlestown, W. Va.—The Kanawha Valley Traction Company has asked the Council for a franchise in Charlestown from Duffy Street along Washington Street to Chesapeake Avenue and also on Park Avenue from Central Avenue to Jackson Street.

TRACK AND ROADWAY

Pine Bluff & Sulphur Springs Interurban Railway, Pine Bluff, Ark.—Contracts have been let by this company for the clearing of the right-of-way for its line between Pine Bluff and Sulphur Springs, and it is expected that construction will be begun at once. The company has arranged for the rails and ties and a portion of the route has already been graded. A. G. Russell, president. [E. R. J., May 24, '13.]

Pacific Electric Railway, Los Angeles, Cal.—Nearly $500,000 will be expended by this company this fall and winter on improvements of its lines in Pasadena. Work will be begun about Sept. 1 laying new tracks on Fair Oaks Avenue from Columbia Street to Washington Street. As soon as this is completed work will be begun laying heavier double tracks on Lake Avenue from California Street to the south city limits and on Oak Knoll Avenue in Pasadena, and also double-tracking North Lake Avenue between Colorado Street and Washington Street.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—This company has received permission from the Railroad Commission to purchase from the Northern Electric Company one-half interest in certain tracks in Sacramento for the sum of $11,403.

Peninsula Railway, San José, Cal.—Announcement has been made by this company that it will lay 6-in. T-rails on its lines into and through Los Gatos. The rails are to be imbedded in a 6-in. base of concrete.

Big Four Electric Railway, Tulare, Cal.—This company has received permission from the State Railroad Commission to begin the construction of its line within the next few days to connect Tulare, Visalia, Poplar and Porterville. Application for franchises over city streets and local terminals will be made at the next meeting of the Council. [E. R. J., Aug. 16, '13.]

Chicago, Peoria & Quincy Traction Company, Quincy, Ill.—Surveys have been begun by this company near Quincy on its line to connect Quincy and Peoria. A. S. Hadley, Chicago, engineer. [E. R. J., June 28, '13.]

Laporte, Logansport & Southern Railroad, Laporte, Ind.—About one-half of the right-of-way has been secured by this company for its line between Laporte and Logansport. It is expected to begin work on this branch shortly. Ora Boseman, president. [E. R. J., July 19, '13.]

***Iowa City & Southwestern Interurban Railway, Iowa City, Ia.**—Plans are being made to build an electric railway between Iowa City and Keota, a distance of 36 miles. Albert Tanner, Davenport, and F. J. Kipp, Milwaukee, are interested.

Kentucky Utilities Company, Lexington, Ky.—Plans are being considered by this company for the construction of a line from Somerset, Ky., to Burnside, Ky., 6 miles.

Smithland, Ky.—Engineers have been put in the field at Smithland for the survey of a proposed electric railway from Smithland through Livingston County. J. B. Trail, Smithland, is interested. [E. R. J., Aug. 16, '13.]

***Duluth, Minn.**—J. J. Frey and associates are considering plans to build an electric railway from Duluth to New Duluth. Application for franchises will soon be made.

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St. Louis, Lakewood & Grant Park Railway, St. Louis, Mo.—During the next six months this company will award contracts to build about 2 miles of new track.

Red Lodge, Mont.—Preliminary surveys have been made for the construction of an electric railway to connect Red Lodge, Bearcreek and Washoe. At Washoe it will connect with the Montana, Wyoming & Southern Railroad. Final plans for the financing of the line are being made. H. A. Glasmacher, Seattle, is interested. [E. R. J., Aug. 9, '13.]

Omaha & Council Bluffs Street Railway, Omaha, Neb.—A 1½-mile extension will be built by this company to the southwestern part of Omaha.

Conception Bay Electric Company, Brigus, Newfoundland.—G. H. Field, who was noted in the Electric Railway Journal of July 19, 1913, as being one of the incorporators of the Conception Bay Electric Company, which was chartered primarily to furnish power for lighting, states that, aside from supporting the movement for electric lighting, he has no connection with the company. Mr. Field states that the charter includes the power to construct a railway but that it is unlikely that such a proposition will materialize. [E. R. J., July 19, '13.]

Brooklyn Rapid Transit Company, Brooklyn, N. Y.—The Public Service Commission, First District, has approved a contract between the Brooklyn Rapid Transit Company and Cooper & Evans, amounting to $245,870, for construction of Section No. 1, of the Lutheran Cemetery and the Myrtle Avenue elevated lines in Brooklyn.

New York State Railways, Rochester, N. Y.—Work has been begun by this company on improvements in Syracuse. About 1 mile of double track will be built on the East Syracuse line and the tracks on the University stadium extension will be raised to grade between West Genesee Street and Park Avenue on a concrete foundation and a new pavement laid.

Lake Erie & Youngstown Railroad, Youngstown, Ohio.—This company has filed a mortgage with the Citizens' Savings & Trust Company of Cleveland, Ohio, to secure the issue of $4,500,000 bonds. Construction is to be begun within a short time. Gasoline cars may be operated.

Lake Erie & Northern Railway, Brantford, Ont.—This company has received permission from the Dominion Board of Railway Commissioners to change the route between Brantford and Port Dover. Instead of going via Boston the line will now pass through Wilsonville.

Toronto & Eastern Railway, Toronto, Ont.—Grading has been completed by this company between Pickering and Bowmanville. West from Pickering to Toronto the exact line has not yet been definitely settled, and it is probable that the northerly route may be abandoned in favor of the Cherrywood district.

Schuylkill Railway, Girardville, Pa.—The Public Service Commission has recommended that this company reconstruct certain bridges near Shenandoah in the near future.

Rhode Island Company, Providence, R. I.—Work will be begun by this company on the extension of double tracks on Plainfield Street from Odd Fellows' Square to the entrance of Newtaconkanut Park in Olneyville.

Charleston & Summerville Interurban Railway, Charleston, S. C.—Plans are being made by this company to begin the construction of its line about Oct. 1 in order to meet the requirements of its franchise. This 22-mile line will connect Charleston and Summerville. J. L. David, president. [E. R. J., June 8, '13.]

Augusta & Edgefield Electric Railroad, Edgefield, S. C.—Surveys will be begun by this company about Oct. 1 for its 60-mile line to connect Augusta, Ga., and Greenwood, S. C., via North Augusta, Collins, Edgefield, Pleasant Lawn and Kirksey. C. W. Requarth, Charlotte, N. C., chief engineer. [E. R. J., Aug. 9, '13.]

Knoxville Railway & Light Company, Knoxville, Tenn.—This company is now using a viaduct spanning the tracks of the Southern Railway and connecting Knoxville and Park City. The work was done at the joint expense of the railway company, the Southern Railway and the two municipalities. It is of reinforced concrete construction. It is of chief importance in connection with service to the grounds of the National Conservation Exposition, located in Park City. The exposition is held in October, and the construction of the viaduct enabled a double track line to be built to that point, taking the place of the single track heretofore used.

Nashville Railway & Light Company, Nashville, Tenn.—This company plans to expend $125,000 for the reconstruction and extensions of some of its lines in Nashville. In addition to work already in progress the company will extend its Buena Vista line, the St. Cecilia line and the Fatherland Street line in Nashville.

***Tennessee & Kentucky Railroad, Nashville, Tenn.**—This company, the incorporation of which is noticed in this issue, plans to begin surveys and secure right-of-way at once for its line to connect Springfield, Nashville, Adairville, Goodlettsville, Ridgetop, Hygeia, Greenbroier and Russellville. It is stated that financial backing has been secured and it is planned to begin work in the immediate future. J. P. Helms is interested.

Bryan & Central Texas Interurban Railroad, Bryan, Tex.—About 11 miles of track has been constructed by this company from Bryan as far as Stone City, and grading is now being done for 20 miles of track south of Stone City to Wilcox.

Cleburne (Tex.) Street Railway.—Improvements are being made by this company along all of its lines in Cleburne.

Southern Traction Company, Dallas, Tex.—This company announces that it will place in operation its lines from Dallas to Waco and from Dallas to Corsicana about Sept. 1. Rails have been laid and the delivery of the electrical equipment will soon be made. The line between Ferris and Waxahachie will not be completed until after the two main lines leading to Waco and Corsicana have been completed.

Rio Grande Valley Traction Company, El Paso, Tex.—This company has completed its 12-mile line between El Paso and Ysleta and will soon place it in operation.

Northern Texas Traction Company, Fort Worth, Tex.—This company has been asked to extend its Summit Avenue line a distance of 1 mile beyond the present terminus in Fort Worth.

Salt Lake & Utah Railroad, Salt Lake City, Utah.—Grading has been completed, 50 miles of rails have been laid and plans are being made by this company to place the section of its line between Salt Lake City and Provo in operation by Oct. 1. This line will eventually connect Salt Lake City, Provo, American Fork, Pleasant Grove, Springfield, Spanish Fork and Payson. W. C. Orem, Salt Lake City, president. [E. R. J., July 5, '13.]

Lynchburg Traction & Light Company, Lynchburg, Va.—Work will soon be begun by this company on the improvement of its line to Fairview Heights and also on the construction of a cross-town line on Buchanan Street from Eleventh Street to Fifteenth Street in Lynchburg.

Puget Sound Traction, Light & Power Company, Seattle, Wash.—Construction has been begun by this company on its ¾-mile line to connect with the King County industrial district near Georgetown. This track will be paid for by the county.

Chippewa Valley Railway, Light & Power Company, Eau Claire, Wis.—During the next six weeks this company plans to award contracts to build 3 miles of new interurban roadbed and track with 4-in., 56-lb. to 60-lb. rails, either new or first-class relayers.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis.—Work will be begun at once by this company on its new crosstown line from Twenty-seventh Street and Burleigh Street to the south city limits in Milwaukee.

Superior (Wis.) Interurban Traction Company.—This company will be asked to consider plans to double-track and improve its line to the East End in Superior.

SHOPS AND BUILDINGS

Northern Electric Railway, Chico, Cal.—This company and the Central California Traction Company are considering plans to secure the Hanrahan Building as a possible depot to be used by these two companies, which have lines operating into Sacramento.

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Los Angeles (Cal.) Railway.—A new carhouse will be built by this company at Washington and Pacific Avenues in Los Angeles to care for the increased traffic in the south and west sections. The structure will be of steel and concrete construction and will cost about $300,000.

Lewiston, Augusta & Waterville Street Railway, Lewiston, Maine.—Plans are being considered by this company to build a new passenger station in Haymarket Square on Main Street in Lewiston.

Manhattan & Queens Traction Corporation, Long Island City, N. Y.—Plans are being made by this company to build new carhouses at the corner of Thomson Street, Honeywell Street, Buckley Street and Nott Avenue, Long Island City.

South Carolina Power, Light & Railway Company, Spartanburg, S. C.—Plans are being made by this company to build a new machine shop, carpenter shop and paint shop and to enlarge its carhouse in East Spartanburg. The machine shop will be 40 ft. x 80 ft. and of sheet-iron construction. The addition to the carhouse will have a capacity for twenty-five cars. A water tank of 15,000-gal. capacity has been erected at a height of 30 ft. on the grounds. The improvements are estimated to cost $50,000.

Southern Traction Company, Dallas, Tex.—Locations have been made by this company to build new passenger stations on its new line between Waco and Dallas. Locations will soon be made for stations for the line between Corsicana and Dallas.

POWER HOUSES AND SUBSTATIONS.

Pacific Electric Railway, Los Angeles, Cal.—This company will install in its substations four 1000-kw two-bearing motor-generator sets. The order has been placed with the General Electric Company.

Maryland Electric Railways, Annapolis, Md.—This company has placed an order with the Westinghouse Electric & Manufacturing Company for four 300-kw, 1200-volt d.c., three-phase, 25-cycle, 750-r.p.m. self-starting rotary converters and four 300-kw, 13,200-volt high-tension, three-phase transformers and two switchboards for its power plant in Annapolis.

Marquette City & Presque Isle Railway, Marquette City, Mich.—This company is increasing the capacity of its power plant by the installation of one 200-kw, 600-volt, d.c., two-phase, 60-cycle self-starting rotary converter with two 110-kva, 6600-volt, 60-cycle, oil-insulated, self-cooled transformers and switchboard. The Westinghouse Electric & Manufacturing Company will furnish the apparatus.

Interborough Rapid Transit Company, New York, N. Y.—This company has placed an order with the Westinghouse Electric & Manufacturing Company for two 300-kw, 250-volt, 900-r.p.m. compound-wound d.c. generators connected to and driven by two steam turbines through reduction gears.

New York & Queens County Railway, Long Island City, N. Y.—This company plans to enlarge its substation on Lawrence Street south of Broadway in Flushing. The addition will be one story and of brick construction. The cost is estimated to be about $6,000.

Columbus Railway & Light Company, Columbus, Ohio.—This company will add to its substation equipment a 200-kw motor-generator set. The apparatus has been ordered from the General Electric Company.

Lehigh Valley Transit Company, Allentown, Pa.—This company has recently closed a contract to supply electricity to the Philadelphia Suburban Gas & Electric Company, a subsidiary of the American Gas Company, the territory supplied being North Wales, Pa., Lansdale, West Point and surrounding suburbs.

Citizens' Traction Company, Oil City, Pa.—This company will place in operation in its power station an 1875-kva Curtis turbine with switchboard and accessories. The machine is being built by the General Electric Company.

Tacoma Railway & Power Company, Tacoma, Wash.—Options have been obtained by this company upon property situated at the corner of Twelfth Street and Sprague Street on which it plans to build a new power house, storage sheds and offices for headquarters in the place of the existing structure on A Street in Tacoma.

Manufactures and Supplies

ROLLING STOCK

City Railway, Dayton, Ohio, is in the market for twenty cars.

Chicago (Ill.) City Railway has ordered one snow plow from the Wason Manufacturing Company.

Bryan & Central Texas Interurban Railroad, Bryan, Tex., expects to purchase two gasoline-electric motor cars.

Drake Railway Automotrice Company, Chicago, Ill., has ordered one car from the McGuire-Cummings Manufacturing Company.

New York Central & Hudson River Railroad, New York, N. Y., has recently issued specifications for twenty-five new passenger cars.

Southern Pacific Company, San Francisco, Cal., is in the market for eleven 21-ft. cars and five 28-ft. 6-in. cars and has requested carbuilders to bid on same.

Jefferson Traction Company, Punxsutawney, Pa., has ordered two single-truck closed cars mounted on Brill 21-E trucks from The J. G. Brill Company.

Monongahela Valley Traction Company, Fairmont, W. Va., has ordered two 20-ft. semi-convertible car bodies from the G. C. Kuhlman Car Company.

Brooklyn (N. Y.) Rapid Transit Company is in the market for either two or four electric locomotives which will be practically duplicates of the last order placed.

Westside Electric Street Railway, Charleroi, Pa., has ordered two 48-ft. steel center-entrance interurban cars from the Niles Car & Manufacturing Company. Electric equipment will be furnished by the Westinghouse Electric & Manufacturing Company.

Norfolk & Western Railway, Norfolk, Va., has awarded a contract to the Westinghouse Electric & Manufacturing Company for twenty-six 130-ton electric locomotives for use on the section of its line which is to be electrified between Bluefield and Vivian, W. Va.

Bureau of Foreign and Domestic Commerce, Washington, D. C., makes the following announcements in the Aug. 23 and Aug. 26, 1913, issues respectively of its *Daily Consular and Trade Reports:* File No. 11,528: "An American consul requests that catalogs and literature containing full particulars respecting the latest type of street cars, including pay-as-you-enter cars, be forwarded to him as soon as possible. The city in which he is located has taken over the tramway system, and extensive additions and improvements are being made. It is quite likely that if full information concerning the newer type of cars can be laid before the Board of Aldermen the new supply of rolling stock will be ordered from the United States." File No. 11,548: "A report from an American consul states that a street railway in his district is owned jointly by two cities. Recently eight all-steel cars were ordered, but they are being delivered slowly. On Jan. 1, 1914, the present system will be discontinued, each city operating its system singly. As the rolling stock is now inadequate, it is probable that one of the cities will be in the market for about ten or twelve large cars, of the pay-as-you-enter style, and American manufacturers should take steps to get in touch with the officials as soon as possible."

TRADE NOTES

Edson O. Sessions, Chicago, Ill., consulting engineer, has opened a new office in the Marquette Building, Chicago.

Western Electric Company, Chicago, Ill., has appointed A. R. Loughborough, formerly city sales manager of its San Francisco office, manager of its Salt Lake City sales force to succeed M. S. Orrick, who became manager at San Francisco.

Curtain Supply Company, Chicago, Ill., has received an order to equip the five new cars which are being built by the G. C. Kuhlman Car Company for the Johnstown Passenger Railway with curtains, using ring No. 48 fixtures and Rex all-metal rollers.

A. L. Whipple, New York, N. Y., has resigned as vice-president of the Standard Heat & Ventilation Company, with office in Chicago, and has returned to New York,

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where he expects to re-enter the railway supply business on his own account at an early date.

Barney & Smith Car Company, Dayton, Ohio, is remodeling its wooden car erection shops for the purpose of building in any of them either all-steel or all-wood passenger cars. These adjustments will considerably increase the output capacity of the company.

Ackley Brake & Supply Company, New York, N. Y., has equipped fifteen new pay-as-you-enter cars of the Panama Railway with Ackley adjustable brakes. This company has also recently filled large orders for brakes from Brazil, Chile, Uruguay and Russia.

Cooper Heater Company, Carlisle, Pa., is shipping a carload of heaters, forty-five of which are for the New York State Railways and five for the Johnstown Traction Company, to the G. C. Kuhlman Car Company, Collinwood, Ohio, to be placed in the new cars which the Kuhlman Company is building. These heaters are of the latest design of forced-ventilation, hot-air type.

Heywood Brothers & Wakefield Company, Wakefield, Mass., has offered to its stockholders the right of subscription to $1,000,000 new common stock at par. The subscription privilege covers both preferred and common stock. There is $4,000,000 of preferred and $2,000,000 of common stock now outstanding. Proceeds of the new stock will be used to wipe out a small floating debt and provide additional manufacturing and storage facilities at the company's several plants, which are needed to accommodate its rapidly increasing business. A banking syndicate, comprising Kidder, Peabody & Company and Stone & Webster, has underwritten the issue.

American Car & Foundry Export Company, St. Louis, Mo., which was recently organized in order to manage the foreign export business of the American Car & Foundry Company, as stated in the Electric Railway Journal Aug. 23, 1913, has announced the election of the following officers and directors: Frederick Eaton, chairman of the board; W. H. Woodin, president; Charles S. Gawthrop, and G. L. Rodgers, vice-presidents; S. S. Delano, treasurer, and William M. Hager, secretary. The directors are Frederick Eaton, W. H. Woodin, William M. Hager, Charles S. Gawthrop, J. M. Ames, E. G. Carey and C. D. Eaton. Mr. Rodgers will be in charge of the company's London office.

Clark Electric & Manufacturing Company, New York, N. Y., has received an order from the Utah Power & Light Company for suspension choke coils, contact grounding devices and other miscellaneous power house equipment. A considerable number of suspension-type, live-disconnecting switches have been ordered for the Carolina Power & Light Company, through the Electric Bond & Share Company, New York. Clamps for use with suspension insulators will be shipped in the near future to the United States government lines in the Panama Canal Zone. The Clark protective clamping set for use at railroad right-of-way or where electric lines cross over or under telegraph lines has been approved by the Chicago Telephone Company. Several of these sets have also been ordered for shipment to Japan.

ADVERTISING LITERATURE

Asbestos Protected Metal Company, Beaver Falls, Pa., has issued Bulletin No. 53, which describes and illustrates the application of its "Asbestosteel" type of construction, used in connection with concrete for the construction of roofs and curtain walls.

Kennicott Company, Chicago Heights, Ill., is distributing an attractive booklet entitled "The Kennicott Company," written by Elbert Hubbard, who describes in popular biographical form the progress of Cass L. Kennicott in inventing water-softening apparatus and traces the growth of the Kennicott iron and steel manufacturing plant.

The J. G. Brill Company, Philadelphia, Pa., prints in the August, 1913, issue of the *Brill Magazine* an illustrated biography of Ralph Peters, president of the Long Island Railroad. Among the feature articles are the following:" Conditions Which Govern the Type of Car Service in Spokane, Wash.," "The Brooklyn Center-Entrance Car," "The Evolution of the California Type," "Duplication of Body Design in Double and Single-Truck Cars," and "A Locomotive-Construction-Line Car."

Bertron, Griscom & Company, New York, N. Y., have issued an attractive ninety-six-page book giving a concise statement of the various public utility companies controlled or directly supervised by them. The book is neatly bound in red leather and contains next to the title page a map of the United States with the cities marked in red where the controlled or supervised companies are located. This is followed by a tabulation of the capitalization of the operating companies as of Dec. 31, 1912, and their earnings for the twelve months ended March 31, 1913. The remainder of the book is taken up with a further discussion concerning each company, preceded by a black and red diagram showing the location of its lines. Under each company's name the following information is given: the date of incorporation, the extent of the business of the company, franchises, population served, capitalization, earnings, dividends, comparative data, as construction, etc., officers, directors, the date of the annual meeting and the location of the offices.

NEW PUBLICATION

Wirtschaftliche Betrachtungen über Stadt- und Vorortbahnen. By Gustav Schimpff, with an introduction by G. Kemman. Berlin: Julius Springer. 216 pages. Price, 6.60 marks.

In this book Professor Schimpff, who is in charge of the railway engineering department of the Royal School of Technology at Aachen, has presented a study of rapid transit planning for an ideal city of 4,000,000 inhabitants, the writer assuming that the city is free to grow in every direction. Professor Schimpff divides the city into districts for business, residences, manufactories, public institutions, parks and cemeteries, estimating the comparative areas required in each case. The plan of the proposed ideal city would be radial, each section consisting of a zone equi-distant from the center in every direction. Upon this basis the author estimates the division of traffic among the various modes of non-surface and surface transit, such as the density of travel between the different classes of zones, the variation of traffic density according to the time of day and the average length of ride in each case.

The discussion of line layout is devoted entirely to rapid transit non-surface lines. A radial system is suggested, but instead of having the lines converge at one place Professor Schimpff suggests that they intersect various other routes at right angles and terminate at the opposite end of the town because the character and amount of traffic would be the same on both radii. While he recommends that the stations should be placed about one-half mile apart, he believes that buses and cars would be favored if the rapid transit routes were more than 325 ft. to 650 ft. from the main business streets. A belt line to connect all the trunk line terminals entering the city is not justified owing to the small proportion which such traffic bears to the total city and suburban travel. In fact, it is suggested that the terminals of trunk lines ought to be removed to the outer zones where ample facilities for entrance to different parts of the city would be afforded by the rapid transit lines. The writer then makes a detailed study of costs of construction, rolling stock, energy requirements, station location schedules, average length of ride between zones of specified character, fares, possibility of baggage and mail handling, etc. In conclusion Professor Schimpff considers ownership and franchise conditions. He points out that if the rapid transit system is owned entirely by private capital the undertaking must pay its way, but a proper return on the investment is impossible if subway construction is demanded for the less congested districts. However, if the city becomes a partner in the enterprise in some form, the capital can be raised under more favorable conditions, and the cost of easements, etc., can be materially reduced. A recapitulation is then given of the forms of agreements now in vogue in cities where electric rapid transit systems have been installed. In the appendixes cost figures are given of every part of a non-surface railway undertaking; various systems of zone fare also are suggested, these ranging from a fair return on the investment to a condition where only the operating costs are to be met.

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LOCATIONS FOR DESTINATION SIGNS

So much attention has been devoted to the location and illumination of front destination signs that the requirements of that large portion of the public generally classified as absent-minded seem to have been overlooked. There is not a doubt but that the transparencies visible both from the inside and the outside of the car are very greatly appreciated by the riding public, and, where the use of these is not possible, a separate inside sign is almost as much of a convenience as the one outside. Indeed, one within the rear vestibule which can readily be seen by passengers who run to catch a car on principle before ascertaining its route will save much of the conductor's time as well as unreasonable but quite inevitable ill-feeling on the part of a certain percentage of the line's patrons. The advantage of signs in the rear vestibules or at the entrance doors seems in fact to have been generally neglected by electric railways, although their satisfactory reception on such lines as have made use of them is a good indication of their value.

THE A. E. R. A. CONVENTION PROGRAM

In spite of the length of the program for the American Electric Railway Association convention at Atlantic City, it has been possible to arrange the times of the sessions of the different bodies so as to follow the usual plan. This consists of morning sessions only for all the affiliated associations, except on Monday, and afternoon sessions for the American Association, beginning on Tuesday. The list of speakers and chairmen of committees, as contained in the program published in this issue, is a guarantee of the success of the convention, and the topics to be considered are those which concern every railway company. The most radical departure made in the program of any of the associations is in that of the Engineering Association. Here it will be found that a change in the method of handling the report of the committee on standards has been adopted. This committee has heretofore presented its findings *in toto*, thus necessitating that, unless it had the last place in the entire program, it was required to make recommendations to the association upon reports of committees which had not been presented. In consequence the scheme adopted this year, in which the committee on standards will make a series of separate reports, each being presented immediately following the committee report to which it applies, will prove a welcome change in procedure.

A QUESTION OF NOMENCLATURE

We agree with Mr. Babcock, whose letter appears elsewhere in this issue, that the problem of deciding upon a proper name for the electric railway system to be used in the Norfolk & Western Railroad electrification could well be taken up by the standards committee of the American Institute of Electrical Engineers. All will admit that if the term "single phase" is applied to the system, such a term does not convey the same impression as it would have done to most persons a month or more ago. Then it would have implied the use of single-phase current both on the trolley wire and in the motors. Shall we continue to use the simple term "single phase" in referring to a road with a single-phase trolley wire and polyphase motors or shall we use a longer and composite name like "single-phase polyphase"? If but a single term is to be generally employed, "single phase" seems the only logical one, as we stated last week, but if there are any advantages in having the name more explicit, the standards committee is an appropriate body to make the selection.

PURCHASED POWER IN CENTRAL NEW YORK

Niagara power has been used for the city cars in Syracuse for a number of years. Although 160 miles from the falls, excellent service has been maintained with but a small steam plant used by the railway company for the reduction of the peaks in the load line. Until recently, however, the interurban railways connecting Rochester, Syracuse, Auburn and neighboring towns have been supplied from local steam plants. Hydroelectric power has at last prevailed because it is cheaper, and for several months these railways have been supplied with power by the Niagara, Lockport & Ontario Power Company, which purchases a block of 60,000 hp from the Ontario Power Company, of Niagara Falls, and distributes it through central and western New York. This recent contract furnishes additional evidence of the growing appreciation of the laws of economical power supply. The railways get energy at a figure at least as low as they could generate it, and they obtain in addition the security of a reserve power supply. The power company secures a good customer and through the acquired steam plants has a local

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reserve and a power-factor-correcting equipment. Moreover, the power generation and transmission are handled by specialists in that line, and the energies of the railway officials formerly responsible for the steam plants are released for attention to transportation problems.

ADDITIONAL MATERIAL FOR COURTESY CARDS

In one of the well-known special columns of a New York daily which is, so to speak, conducting a campaign in favor of courtesy on the part of street railway employees there is recorded the fact that a certain conductor assisted with unusual gentleness a blind and very stout old lady from his car. In addition it seems that the conductor escorted her to the sidewalk—a very kindly, if not thoughtful, act with which it would even be difficult to find fault on the obvious ground that it was a violation of rules. Yet, at the risk of being misanthropic, it might be well to point out that the old lady displayed a perfect example of the lack of foresight supposedly characteristic of her sex in riding alone during the rush hours, and also that of the fifty or more passengers on the car who were delayed by this exhibition of courtesy a great majority probably felt that an unwarranted liberty was being taken with their time. Judging from the enthusiasm with which publicity was accorded to the incident, the popular conception of courtesy from platform men does not include consideration of the operating rules designed solely for the public benefit. And in connection with the courtesy cards now so much in vogue it might be well under conditions of city traffic to add to the text contained in them advice to the effect that politeness which involves the necessity for a conductor to leave his car or which causes delay to other passengers is neither permissible nor, in the end, desirable.

WIDER FIELDS FOR THE MOVING PICTURE

Moving pictures have already been exploited by electric railways to teach the public about accident prevention, but anyone who has studied their great development in other fields will concede that electric railways are as yet hardly awake to what this marvel of the age can do for them to serve entirely different ends. Perhaps the most profitable prospect is in the field of traffic promotion. Is there any better way of advertising a scenic route than by a moving picture of the route itself as made from a train in motion? Such panoramas have been prepared to advertise foreign pleasure resorts with the result that the pictures have attracted the patronage of people who would never have been reached by tourist literature. Recently a film was made of the interurban division of the Quebec Railway, Light & Power Company, which runs from Quebec past Montmorency Falls to the famous shrine of St. Anne de Beaupré, and ere long this beautiful portion of the St. Lawrence valley will be shown at lectures in New York and elsewhere. A really beautiful scenic film could be circulated by an interurban railway among a very large number of moving picture theaters in cities, while, on the other hand, a city railway could attract visitors from the smaller towns by circulating views of the busy streets, finer residential quarters and industries of its community.

A decidedly different application of the moving picture is that which was described by D. C. Boy, assistant chief of the educational bureau, Central Railway of Georgia, at the May 15 meeting of the Southern & Southwestern Railway Club, Atlanta. Mr. Boy discussed the utility of the moving picture in teaching a trade to apprentices. The principle is to have the several operations of a given process carried out by an expert before a moving picture camera, whereupon the apprentice can watch the film again and again until he is able to perform each movement correctly. In short, the film is used to teach a trade in the same tireless way as a phonograph is used to drill the language student in pronunciation. Of course, the novelty of the method also arouses more interest than tutorship by men who lack patience and tact. Mr. Boy stated that since May, 1912, moving pictures of locomotive firing had been shown to more than 1500 apprentices of his company. He added that the same methods were now followed by the Southern Pacific and Illinois Central Railroads, which carry the outfit on special cars.

COMPULSORY ARBITRATION FOR STRIKES

We have no doubt that if the cost to the country of the strikes which have occurred during the past twelve months should be calculated the sum total would show that such industrial conflicts are a national calamity equal in aggregate loss inflicted to that caused by the destruction of property by fire. The damage arises in three ways. First, there is a direct loss in wages to the employees on strike or thrown out of work by the strike. Second, there is the direct loss to employers, made up in part by loss of profits, in part by the interest on idle or partly idle equipment, and in part perhaps by the cost of protecting their property from assault. Finally, there is that large indirect expense to which many outsiders are subjected because of decreased business efficiency or other causes brought about by the interrupted supply to them of the service or products affected by the strike. In view of these facts, any effort made to remove the cause of this drain upon the resources of the country is laudable. But to be successful any plan must be inherently just and must recognize the rights of both parties to the dispute, because if based on wrong principles it will simply aggravate the trouble. For these reasons we believe that the plan often called "compulsory arbitration," but really the plan compelling the adoption by both parties of the findings of a board of arbitration, is a most mischievous one, assuming, for the sake of argument, that a way could be found under our state constitutions of enforcing such findings. Compulsory arbitration itself, or the power of a board to examine into an industrial dispute but with no power to enforce its verdict, is another matter entirely.

Those in favor of the method of settling industrial disputes by requiring the disputants to accept the decision of a board of arbitration often refer to the alleged success of the plan in New Zealand, but the latest reports from that country indicate that it is regarded as a failure there, not only by the employers but by the employees themselves. For a considerable time after it was established, some twenty years ago, the trend of the decisions in the cases in dispute

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was in general in favor of labor. In consequence a season of industrial peace followed, because the penalties could be enforced against the employers, and they had to submit; but the arduous conditions to which capital was subjected discouraged further investment there. Now, however, it seems that even the labor element has lost faith in the plan. Thus, we learn from the *Daily Telegraph* of Sydney for July 18 that at a general labor conference held in New Zealand during the early part of July Mr. Treager, for many years head of the Labor Department of New Zealand, acknowledged that the act not only had not prevented strikes but that "no power, no locking together of any organization by any form of procedure, could prevent half a dozen or a dozen men from throwing down their tools if they found it necessary to do so."

The fact is that compulsion as regards the findings of an arbitration board means a compulsion upon employers only and that such must be the case because the employers are the only ones against whom a penalty of this kind can practically be enforced. It is true that theoretically penalties can be assessed against employees also, but in practice it has been found in both Australia and New Zealand that jail sentences against a man, and especially against a large body of men, for not working are out of the question. Hence it is significant that at the conference mentioned the resolution was adopted by a more than two-to-one majority that "The United Federation of Labor [New Zealand] will employ the strike weapon, local, general or national, whenever the circumstances demand such action."

TEACHING PUBLIC UTILITY VALUATION

The suggestion which John A. Atkinson, chairman of the Missouri Public Service Commission, has expressed an intention of making to the curators of the University of Missouri is indicative of the prominent position that the subject of physical valuation and appraisement of public utilities has assumed in the corporate world to-day. It is proposed, in brief, that a special chair should be established in the university to give instruction to young men on this question, not as it concerns gas companies or railroads or electric railways, but as it applies to public utilities of every character. The underlying motive is to have a course opened in connection with the economics and engineering departments, graduates from which may be taken into the employment of the Public Service Commission.

This plan, however, while emphasizing the weight of the valuation subject, might better be considered a crystallization of existing practices than a distinctly novel idea. For several years the leading schools of commerce and business administration have been instilling in the minds of students the principles of valuation and appraisement. Sometimes they may have appeared in a corporation finance course, in a public utility accounting class or in a course dealing with transportation and rate making; but, whatever the surroundings, education of late has seen many professorial dissertations on original cost, cost of reproduction, cost of reproduction less depreciation, capitalized earnings and other theoretical aspects of valuation and the factors underlying rate making. Such courses in the main have been elected by students who already possessed degrees in economics or engineering and have served to broaden their theoretical knowledge. Now, however, a change is suggested. Just as the subject of business organization under the advancements made by efficiency engineers was sorted out from economics and made to stand by itself, just as the study of politics and public affairs has been evolved from a medley of economics, history and current topics, just so the question of valuation is now to emerge from various commercial, accounting and financial courses as a separate subject.

In view of the present-day tendency for specialized utility on the part of university curricula and the importance given to valuation by the Interstate Commerce Commission and various state commissions, this idea of a distinct course is theoretically good, but one must not lose sight of its practical limitations. The simple truth is that the subject of valuation is too inclusive and complex to be easily taught or easily comprehended. In the ultimate analysis the successful teaching of valuation and appraisement requires a man who has given many years to its actual practice, and such men will find little inducement in the teaching sphere. Then, too, the average college student is not mentally equipped to receive, nor could be obtain even from a most competent teacher in the average college course, more than a scattered and superficial knowledge of the theoretical side of the subject. No one would be so absurd as even to imagine that the ability to value "public utilities of every character" could be thus acquired. In the electric railway field, for example, with various city, suburban, interurban and underground lines, so many problems of diverse character and varied magnitude are encountered that the field seems practically inexhaustible even from the expert's viewpoint. If the proposed course is to include a study of all utilities, the best that the special chair of valuation can do for the young student is to acquaint him with the terms used, with a trifle of the general theory connected with valuation and appraisal and perhaps with a modicum of practice, so that when he secures a position with a public service commission he will possess a few of the elementary tools with which to begin work. Yet, if the proposed course succeeds merely in laying a firm foundation, the move will not have been in vain. The chief danger, however, to be guarded against, even with such a foundation, is that the immature student will look upon his thimbleful of definitions and theory as thoroughly fitting him for valuation work, which will only add to the chaos already existing in the field.

We asssume that Mr. Atkinson has, in his way, recognized the importance and difficulty of the subject of valuation and the desirability of starting early an education along that line to be perfected by later and extensive practice. This impresses us as being a more wholesome idea than that apparently entertained by the Governor of New York State, who appointed to the Public Service Commission two men whose only stated qualifications were competency at the engine throttle and affability in village politics. The training of men for public utility valuation and commission work may be attended by difficulties and limitations, but we at least concur with Mr. Atkinson as to the desirability of their being trained.

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PROPOSED TRAILER OPERATION IN MONTREAL

In our issue of Aug. 2 reference was made to some drawbacks which justify the question: "Is trailer operation profitable?" These drawbacks, as then pointed out, were the increased number of stops, the unequal loading of motor car and trailer, the delay in transmitting signals, and the time required for making up trains. At least one of these objections certainly is applicable to every experiment in train operation which has been made hitherto by American street railways. It is already apparent, however, that the necessity for trailer service has created several improvements in this field, and others are under way. Unfortunately, there is little to learn from foreign practice despite the fact that trailers in Europe are as old as the electric railway itself. Usually, the trail cars and the coupling connections are of the crudest kind, and no one shows any concern over the likelihood that the trains are slower than the none-too-rapid single cars. Zurich and Vienna are among the few cities where the design of trailers as such has received some thought. As for the United States, the most important advance to date has been the well-known low-step, center-entrance trailer of the Pittsburgh Railways.

In view of the foregoing remarks it is of interest to turn to the proposed trailer operation of the Montreal Tramways. This railway has just ordered twenty-five motor and twenty-five trail cars for service on St. Catherine Street, the trunk line of Montreal. Plenty of old cars were available, but after a study of trailer operation in the United States the management was convinced that such operation would not be a real success in Montreal unless the objections which have been previously cited were met by appropriate traffic conditions and equipment. The outlook for two-car service on St. Catherine Street is indeed favorable because this avenue has a heavy all-day travel with a normal headway of one and one-half minutes. Thus the trailer can be attached early in the morning and not detached again until late at night; furthermore, these changes can be conducted at a carhouse and not in some public thoroughfare. This condition of a long heavy-traffic period avoids, therefore, the annoyance occasioned when trains are made up just before the morning and evening rush hours. An automatic coupler and a three-way connector will be provided for all braking, lighting, heating and automatic door signal lines, and these connections may be made in very little time. It is not likely that train operation will appreciably increase the number of stops in the greater part of St. Catherine Street owing to the many transfer crossings and to the fact that the larger cars on this street actually do stop or slow down at almost every intersection.

The remaining objection to two-car operation, unequal loading, is really the principal one; this will be eliminated by a design which is the practical equivalent of an articulated center-entrance car. The passengers, instead of boarding the rear platforms of both the motor car and trailer, will use the rear platform of the first car and the front platform of the second. It is plain, therefore, that boarding passengers will tend to be equally distributed because the entrances are side by side and not a car length or even half a car length apart. Each entrance platform will also have an exit aisle in addition to a front exit via the motorman's platform. As Montreal cars are operated single-ended, congestion will be reduced by the medium of a very wide aisle at the entrances and by the installation of the more attractive cross seats at the farther ends. Delays in signal transmission are to be forestalled partly by the entrance scheme, which leaves the passengers no chance for hesitation, and partly by electric door contacts, which will close the circuit of a pilot lamp in front of the motorman as soon as every door is shut. It is noteworthy that the motor equipment will have practically the same normal output as that used on the latest Montreal motor cars except for the addition of better ventilating means. The only extra cost to be expected is a higher charge for motor maintenance, and this increment will be negligible in comparison with the greater earnings which are to be expected because of the increased number of cars which can be placed upon the street.

THE ENGINEER AS AN EXECUTIVE

In these days, when engineering is the foundation of so many industrial enterprises, there are many reasons why a qualified engineer should have the executive direction of their affairs. To fill such a position properly, however, he must possess a knowledge of many matters not entirely within the bounds of his professional training. Not only must he be able to direct men, but he should be what is sometimes called a man of affairs. This means that he should have a good knowledge of the principles of law as well as of accounting and should also be conversant with the operating technique of the particular business in which he may be engaged.

We believe that this fact is more generally realized at present than a few years ago and that because of this fact most of the engineering schools are now providing instruction in commercial law and in business methods. In some cases, as with the recently announced course of the Massachusetts Institute of Technology, a special course is to be established for business and commerce, somewhat similar to the course conducted at Harvard but approached from the engineering side. But even the man who intends to follow engineering strictly should also take advantage of any opportunity which he has for gaining an acquaintance with the legal and accounting principles used in his own engineering specialty.

An evidence of the growing interest in such a broadening in training of the professional engineer is shown by the endowment three years ago with the British Institution of Civil Engineers of a series of annual lectures upon the relations between commerce and engineering. The founder, Frame Thomson, has been prominently identified with electric traction enterprises in many quarters of the globe, and he himself delivered the first three of these lectures. They showed that these relations are not confined purely to the matters of contracts, specifications and the purchase of materials and equipment, with which the engineer is assumed to be familiar. The successful engineer must also have the power of imagination to see the completed work before it is finished and the mutual relation of its various parts and should possess the ability to determine by calculations or instinct, or both, at least approximately, the com-

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mercial future of the enterprise. In this way, while all hazards cannot be eliminated, the adverse contingencies will be brought within the limits of ordinary business risks. The engineer should also be conversant with the legal and financial principles of corporate organizations, through the instrumentality of which most engineering work is now conducted, and it is equally important that he should be acquainted with the modern methods of accounting for the various forms of depreciation in engineering apparatus.

These were not the only qualifications mentioned by the speaker, but they are sufficient to indicate that the future of an engineering enterprise—and transportation is of this character—does not depend wholly or even largely upon the success of its purely engineering features.

THE EXPRESSION OF STEAM TURBINE EFFICIENCY

The large number of variable factors entering into the expression of steam turbine economy has for a long time been a thorn in the side of the manufacturer who wishes to compare by simple means the efficiency of his own and other machines. Increased steam pressure, vacuum or superheat all make surprising differences in the steam consumption as expressed in pounds per horse-power-hour, and the efficiency of the electrical apparatus adds still another variable when the kilowatt-hour is used as a basis. Unfortunately, engineers in general have accustomed themselves to think of turbine efficiency in terms of steam consumption per kilowatt-hour, although for large units a more misleading basis could hardly be devised. Of two turbines, one may happen to be operated with 100 deg. more superheat and a 1-in. better vacuum than the other, with the result that it will probably show an appreciably lower water rate. Yet this lower steam consumption by no means indicates a more efficient machine. The former turbine may, indeed, show a much poorer result if operated under the less favorable conditions surrounding the latter, although so long as the relative performances are expressed in pounds of steam consumed per kilowatt-hour this would never be apparent.

To overcome this difficulty a determined effort has been made to establish the use of cyclic comparisons in expressing turbine efficiencies, as the methods of conversion of heat into work have been reduced to but a few processes out of the infinite number possible and the cycles which represent these processes establish very definite standards. For steam-operated prime movers but two cycles, those of Carnot and Rankine, have received much consideration, the former being widely known as representing the action of the perfect heat engine and the latter giving a less efficient combination of processes, which, however, approximates very closely the practical operation of steam engines and turbines.

In both cycles heat is supposed to be supplied at constant pressure, as in the admission of steam from the boiler; then adiabatic expansion takes place corresponding to that which occurs after the cut-off in an engine cylinder or in the nozzles of a turbine, and this is followed by the discharge of heat and condensation, as in the exhaust to the condenser. In the final operation required to complete the cycles, however, the two differ in a radical manner. In the Carnot cycle adiabatic compression of the vapor takes place, which returns it to its original pressure and temperature ready for the heating at constant pressure, this constituting the first step in another cycle of operations. Such a process is, of course, impracticable with existing condensers which reduce all the steam vapor to the incompressible liquid form. In the Rankine cycle, however, the last step consists in heating the liquid at constant volume, which corresponds exactly to the action of heating in the boiler the condensate received from a surface condenser. For conditions found in modern practice a theoretical engine working on the Carnot cycle will give somewhat more than 10 per cent higher efficiency than one operating on the Rankine cycle.

However, the actual application of the Rankine cycle to present practice makes it singularly valuable as a standard in demonstrating the maximum attainable result with existing machines. For any given combination of steam pressure, superheat and vacuum the steam consumption per horse-power-hour of a perfect engine operating on the Rankine cycle may be worked out by formula, and the cyclic efficiency of an actual engine operating under the same conditions may be determined by dividing the theoretical steam consumption by that actually found in practice. Such cyclic efficiencies express with reasonable accuracy the true performance of the engine over the probable range of the variable factors and present comprehensive statements of engine or turbine performance in the simplest manner under circumstances where the figures for steam consumption are apt to be misleading.

A case in point was brought up by the expression of the guaranteed performance of the Interborough turbines, described briefly in a recent issue, on the basis of the Rankine cycle. The over-all efficiency to be required was given as 75¾ per cent, including the electrical losses in the generator. This, on the basis of a steam pressure of 175-lb. gage, 120 deg. of superheat and a 29-in. vacuum, would mean a steam consumption of about 11.25 lb. per kw-hr., yet with 200 lb. steam, 200 deg. superheat and 29.2 in. of vacuum (referred to a 30-in. barometer) the steam consumption would be only about 10.1 lb. per kw-hr. Here, with only small changes in the operating conditions, the economy of the turbine, as expressed in pounds of steam consumed per hour, varied more than 10 per cent. Obviously there is good reason for abandoning the steam consumption as a basis for comparison and instead using as a standard the performance of a perfect engine.

Unfortunately, the formulas for determining the theoretical efficiency or steam consumption on the Rankine cycle basis are of extreme complexity, and so far as we know none of the engineering handbooks contains tables to supply the information without necessity for calculation, although one enterprising turbine manufacturer has worked out an ingenious set of curves which approximate the data. Under these circumstances it is hardly likely that engineers in general will accustom themselves to thinking of turbine performance in terms of comparison with a perfect engine working on the Rankine cycle, and if the manufacturers are in earnest in their attempt to establish the method it would seem that the most necessary step would be the preparation and publication of tables of theoretical water rates worked out upon this basis.

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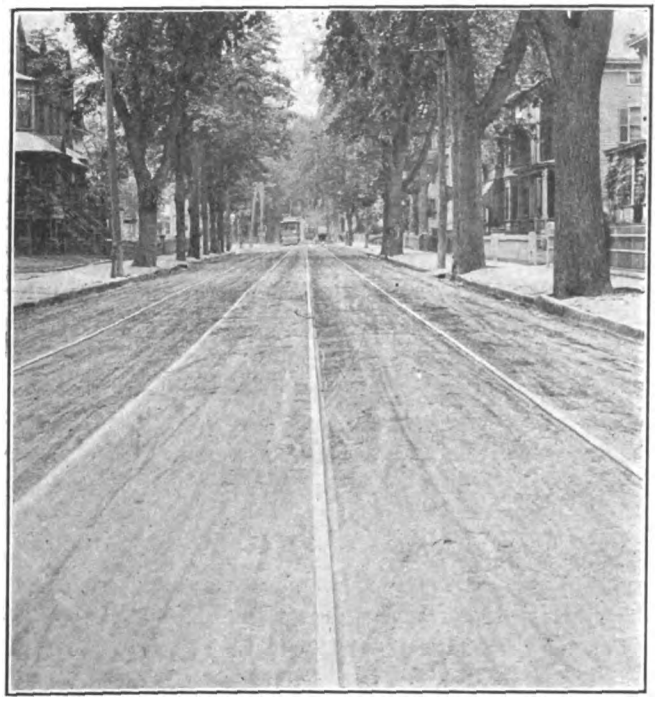
T-Rail in Paved Streets

The Writer Shows the Connection Between T-Rail Construction and Types of Paving as Disclosed by the Experiences of the Connecticut Company—Views Are Presented of the Effect of Service on Different Classes of Rail and Pavement Combinations

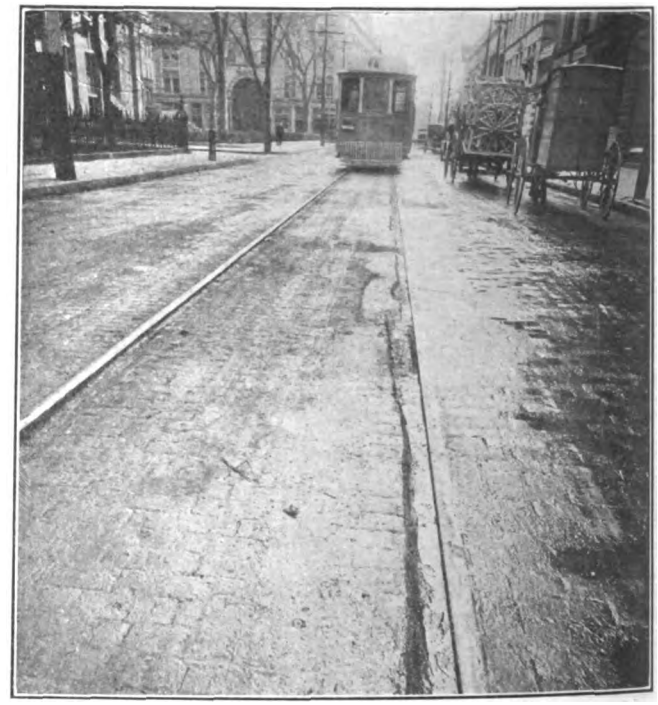
BY R. C. CRAM, ASSISTANT ENGINEER WAY AND STRUCTURE DEPARTMENT BROOKLYN RAPID TRANSIT SYSTEM AND FORMERLY ASSISTANT ENGINEER OF THE CONNECTICUT COMPANY

The issue of the ELECTRIC RAILWAY JOURNAL for Aug. 30, 1913, contained an article on "Way Construction of the Connecticut Company" showing several cross-sections of rails and pavements which had been developed by that company to meet the local requirements of the towns and cities in which its tracks are located.

It will be noted that only one of these cross-sections showed a groove girder rail, while all the others showed T-rail in connection with various types of pavement. This predominance of T-rail has come about partly as a legacy from the original constructors of the various properties now under control of the company and partly through the consistent endeavor of the company to substitute T-rail for girder rail in all reconstruction of girder rail tracks.



Rail and Paving Results—Nineteen-Year-Old T-Rail in Oiled Macadam



Rail and Paving Results—Hump Block Paving, Bridgeport, After Three and a Half Years' Service

When it is considered that the Connecticut Company operates practically 75 per cent of the total mileage in Connecticut and that its system embraces nearly all the principal cities of the State, the experience of the company with regard to T-rail in paved streets should be of much value.

Before proceeding to a study of the Connecticut Company's work it will be of interest to determine the situation with regard to the use of T-rail in connection with the entire mileage of the electric railways in the State of Connecticut.

DIVISION OF T-RAILS AND GIRDER RAILS IN CONNECTICUT

Recourse is had to the report of the Public Utilities Commission of Connecticut for the year ended June 30, 1912, which is one of the very few state reports giving data as to type of rails and pavements used by street railways. An analysis of the report shows that the ten operating companies reported a total of 1055 miles of single track. Five companies, operating about 150 miles, reported no girder rail whatever, thus confining the use of girder rail to the other five, four of which reported only 7 miles of girder rail about evenly divided between the tram and the groove girder types.

Of the total mileage in the State, approximately 93 per cent is laid with 40-lb./95-lb. T-rail, 4½ per cent with 70-lb./96-lb. tram girder and 2½ per cent with 85-lb./125-lb. groove girder. It may be remarked here that substantially 91 per cent of the girder rail mileage is confined to the lines of the Connecticut Company, with about 60 per cent of this confined, in turn, to the lines in Hartford. In that city practically all of the original tracks were laid with tram girder rail, and these must be replaced with groove girder, as occasion arises, in accordance with an agreement between the city and the company made several years prior to the time that the Connecticut Company acquired control of the property.

DIVISION OF PAVEMENTS IN CONNECTICUT

With regard to pavement, an analysis of the report shows a total of 336 miles of single track paved with various types of pavement. Included in pavement, however, are 26 miles of stone ballast (backfill above ties) which is not properly to be considered as pavement except for purposes of accounting. The net mileage of paved track is found to be 310 miles, or approximately 29 per cent of the total mileage of tracks reported. The Connecticut Company reported 288.1 miles paved, or substantially 93 per cent of the total paved mileage.

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Table I has been prepared to show the amounts of various types of pavement in percentage of paved mileage:

TABLE I—CLASS OF PAVEMENT IN PERCENTAGE OF PAVED MILEAGE

	Per Cent
Macadam	67.1
Brick	13.0
Cobble	5.6
Asphalt	5.4
Belgian and granite block	4.9
Wood block	1.8
Bituminous—macadam and bitulithic	1.1
Granitoid	0.8
Hassam	0.3

If the mileage within the limits of the city of Hartford is excluded, it appears that about 90 per cent of the paved mileage in Connecticut is laid in conjunction with T-rail.

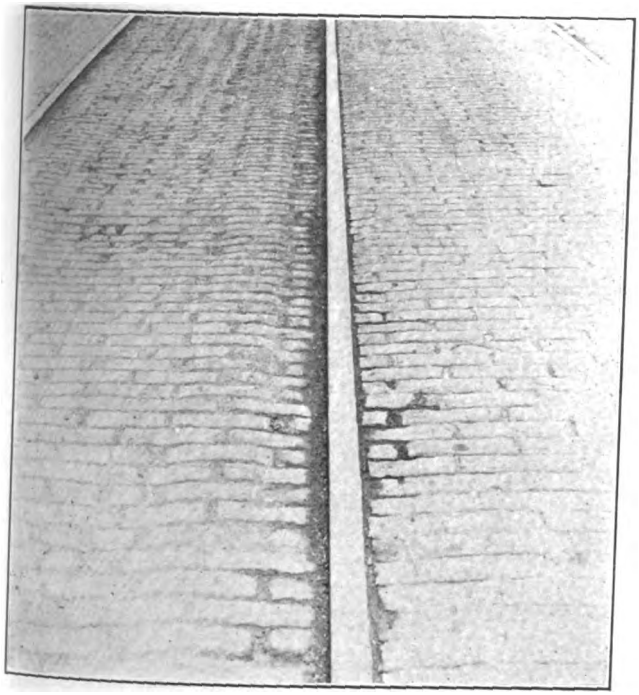
T-RAIL AND PAVEMENT DATA ON CONNECTICUT COMPANY'S LINES

In order to indicate the T-rail and pavement situation on the lines of the Connecticut Company, in the five largest cities in the State, Tables II and III have been prepared.

TABLE II—PERCENTAGE OF CONNECTICUT COMPANY'S MILEAGE PAVED AND PERCENTAGE OF T-RAIL IN FIVE LARGEST CITIES

City	Population	Mileage in City Limits	Per Cent Paved	Per Cent T-Rail	Per Cent Tram-Girder	Per Cent Groove Girder
New Haven	133,605	67.0	86.0	100.0	...	...
Bridgeport	102,054	40.0	99.0	88.0	8.0	4.0
Hartford	98,915	50.0	96.0	10.0	50.0	40.0
Waterbury	73,141	34.0	79.0	88.0	8.0	4.0
New Britain	43,916	13.0	81.0	100.0	...	...

In commenting on Tables I and III it is to be noted that macadam, in general, is the predominating pavement in the largest cities, as well as in the total paved mileage in the State. The exception noted for the city of Waterbury, where cobble is found to predominate, is accounted for mainly by the fact that much of the mileage in that city is laid on quite heavy grades, where macadam is exceptionally hard to maintain between the rails, and also because



Rail and Paving Results—T-Rail in Ordinary Brick Two Years After Paving Shown Above Had Been Repaired

it has generally been the custom to pave the tracks there with cobble whether the roadways outside are paved or not.

REQUIREMENTS MET IN T-RAIL PAVING DESIGNS

The accompanying halftones are presented in order to bring out the features of the standard cross sections, previously referred to, for T-rail track pavement. These sections provide for the use of standard paving brick, wood block or granite block and therefore do not require any special form of groove or nose block at the gage lines. Most of these cross-sections were developed about 1906, after a study of the then prevailing forms of construction in connection with T-rail throughout the State.

The objects sought were to provide a minimum flangeway for the maximum wheel flange in use, to eliminate both groove rail and special groove or nose block, to provide a reasonably smooth crossing for team traffic at right angles

Rail and Paving Results—Grooved Brick Pavement Three and a Half Years Old with T-Rail

to the tracks and to provide facilities for wagon wheels to turn out from the tracks with comparative ease as well as with safety. It is believed that these objects have been and are being satisfactorily attained, as observation and the continued acceptance of the cross-sections by the Public Utilities Commission and by the several cities would indicate. This is particularly worthy of note because the commission is the sole authority on the type of track construction to be used in streets, and its approval must be had in all cases of track reconstruction. In this connection it should be stated that while the commission, in many instances, has approved the installations of T-rail, it recog-

TABLE III—CLASSIFICATION OF PAVED MILEAGE OF THE CONNECTICUT COMPANY WITHIN CITY LIMITS OF THE FIVE LARGEST CITIES (IN PERCENTAGE OF PAVED MILEAGE)

City	Macadam	Brick	Wood Block	Cobble	Granite Block	Belgian Block	Asphalt	Bitulithic	Granitoid	Total
New Haven	52.0	13.0	4.0	10.0	0.5	7.0	1.5	5.0	7.0	100
Hartford	76.0	....	0.5	....	...	...	23.5	....	...	100
Bridgeport	61.0	16.0	20.0	....	2.0	...	1.0	....	...	100
Waterbury	6.0	21.0	1.0	52.0	11.0	...	....	9.0	...	100
New Britain	76.0	....	....	....	...	...	1.0	23.0	...	100

NOTE—Belgian and granite block are not separated in State report. Bitulithic included under bituminous macadam.

nizes the fact that at times there may be some locations where groove girder rail would be preferable, also that the width and grade of streets and the volume and character of traffic must be carefully considered in any decision as to which rail may be the more suitable under all conditions. In only one case so far, however, has the commission ordered a groove rail construction, after full investigation in the manner described.

EXPERIENCE WITH MACADAM PAVING

As to pavement, the experience in Connecticut has probably been about as extensive as that of any of the other important systems. The railways in Connecticut have only a limited control over the type of pavement laid within the

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track area, since they are required by statute to lay the same type of pavement in their section of the road as that laid by the municipalities in the other part of the street. Nevertheless, they are not required to lay a pavement which is more expensive, nor are they absolutely held to the same type, provided they lay a pavement which is considered equally good with that laid without the railway area. As a rule, however, the practice is to lay the same type, the work being done by the same contractor under a separate contract with the railway company. There have been a few exceptions to this rule, where the contractor's bid for the railway work was in excess of the bid for the rest of the roadway.

MACADAM

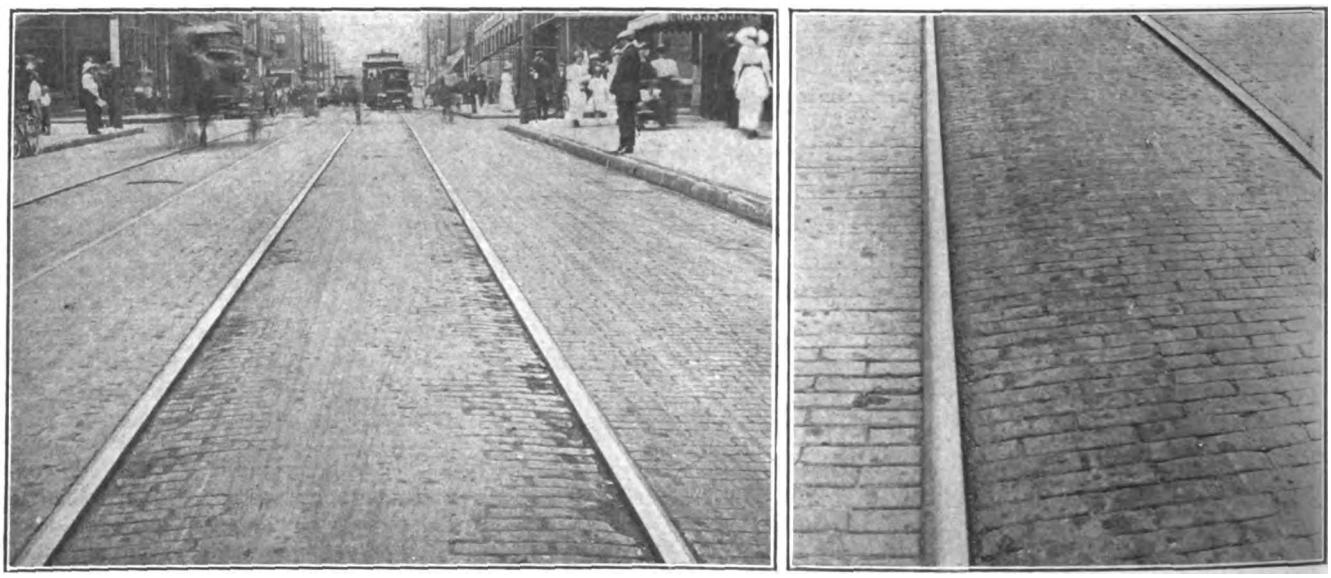
The predominance of macadam may be accounted for, in general, by its low first cost, the abundance of trap rock and the fact that until the advent of the automobile a good water-bound macadam roadway was sufficient to withstand all but the most concentrated traffic in the immediate centers of the cities and towns. Moreover, it can be well laid even with a 5-in., 80-lb. T-rail, is maintained at moderate cost and is somewhat more adaptable for use with T-rail than with the girder rail. It is thought that the tendency toward oiled macadam and the more recent forms of bituminous macadam will result in the continued use of such macadam pavement in connection with tracks where traffic is moderate and where the width of streets does not cause excessive wagon tracking at the gage lines.

An example of a T-rail installation in oiled macadam is shown in the view on page 368. This track was built with 7-in., 70-lb. T-rail in 1894 and had ordinary joints until 1910, when these joints were replaced by electric welds. This track has been re-tied once, and it is believed that the rail will last five or six years more under present traffic conditions. The width between the curbs is 31 ft.

BRICK PAVEMENT

According to the tables, brick pavement is found to be next in extent. The older types consisted mainly of the small vitrified shale pavers, while the more recent ones are constructed with the present standard paving brick or block. They have been laid almost universally with cement grouted joints on a sand cushion and a 6-in. concrete base. The quite general adoption of brick in the past as a pavement may have been due to the reason that until the introduction of the modern types of grouted granite and wood-block pavements, it was the only alternative to asphalt in the so-called "permanent pavement" class, and asphalt has never found much favor in Connecticut cities.

As a track pavement, brick has proved quite satisfactory up to the point where traffic, following the rails, becomes excessive. It can be well laid in connection with T-rail, and is quite readily replaced after street openings and track repairs, though at considerable loss of material. The use of any form of special "nose" or groove blocks, however, has proved very objectionable, and the results from such installations under heavy traffic at the rails are clearly shown in three illustrations on pages 368 and 369. Moreover, it should be stated here that these installations of groove block were made only under vigorous protest on the part of the company. In the pavement shown in the right-hand view on page 368 the failure of the rail block began to be serious after three years. In this case the entire area between the rails was replaced with wood block during the fifth year, and this wood-block paving is standing well after two years' wear. Another installation of "Arthur hump" groove blocks, shown in the upper view on page 369, was laid in the same year, 1906. It commenced to fail in the same manner in the year 1909. Repairs were made in 1911 just prior to the expiration of the guarantee period, by the installation of standard blocks at the gage lines after the concrete base was chipped down to receive these blocks. The blocks were then pitch-jointed, as the work had to be done under traffic. This repair is shown in the lower left-hand view on page 369, which is from a photograph taken in July of this year at the same spot as the preceding.



Rail and Paving Results—T-Rail in Regular Brick, Four Years Old, Showing Wear from Heavy Traffic in Narrow Street; and T-Rail in Regular Brick, Three and One-Half Years Old, on Wider Street with Slightly Less Traffic

It is pertinent to state here that experience with the standard brick at the gage line indicates that they should never be laid under the rail head with T-rail, that the best result is obtained by laying all headers and that only the best materials and workmanship will prove satisfactory.

As tending to show that even the best quality of paving brick will not withstand excessive gage-line traffic, the left-hand view on this page, taken in July, 1913, is presented. This pavement was laid in 1909 by the company's forces and in the best manner. The rail is 7-in., 95-lb. T. The tracks are on 9-ft. centers, and the width between curb lines varies between 31½ ft. and 32 ft., leaving a roadway about 8 ft. in width. A very heavy traffic is sustained, and teams are standing at the curbs almost constantly during the greater part of the day, thus forcing the traffic to the rails. After about two years, extensive repairs were required and, as will be seen, more will soon be necessary. As a companion, the right-hand view on this page, also taken in July of this year, is given to show the lack of such wear in a wider street with the same type of con-

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struction throughout and laid less than one year later. The street here is 42 ft. wide between curbs, with tracks on 10 ft. centers. A somewhat lighter traffic is sustained, but it is believed that the lack of wear may be almost wholly ascribed to the width of the street. It is also thought that this comparison alone justifies the belief that when track pavement is under consideration the width of the street and the character and volume of traffic must be more thoroughly taken into account, as influencing wear, in the selection of a proper paving material.

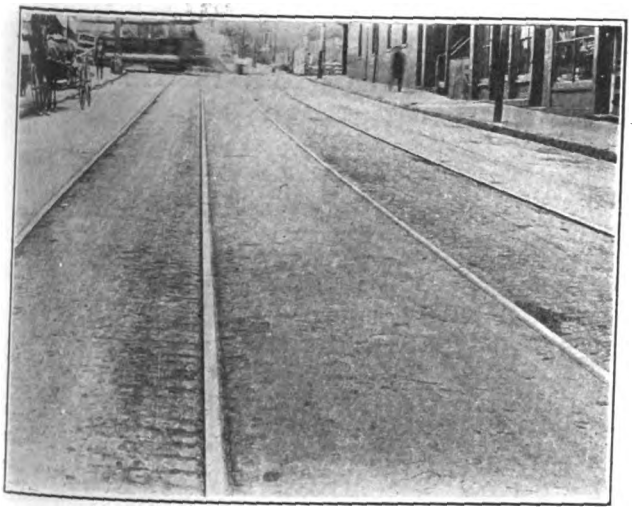
COBBLE PAVING

While cobble appears as next in importance in Table I, it will suffice to say that its use is generally confined to tracks in outlying districts, often on grades, in streets as yet otherwise unpaved. As a material for this purpose cobble is very good, providing good foothold for horses and preventing the rutting out between the rails which usually occurs, after a time, where tracks are merely backfilled with earth or gravel.

ASPHALT PAVING

Asphalt occupies a rather false position in the list, since it is confined practically to one city. What little remains in tracks elsewhere will no doubt be displaced within a year or two. There is every reason to believe that much of the disfavor in which asphalt is now held as a pavement for railway streets in Connecticut is the result of its installation in connection with tracks which were too old and were in no way as substantial as the modern construction. Later installations would indicate that asphalt can be laid and fairly well maintained, under moderate traffic, in connection with a heavy groove girder rail. It is thought, however, that the well-known troubles incidental to asphalt maintenance are sufficiently grave to make its installation undesirable and something to be avoided as far as possible.

In connection with the use of asphalt on the 2-ft. strips along the roadways, it may often be policy to allow its use, but here also it is better to avoid it, if possible, and use instead either wood or granite blocks laid stretcher in areas where asphalt is insisted upon for the roadways by the authorities.



Rail and Paving Results —Two-Year-Old T-Rail in Grouted Granite Block on Grade in Narrow Street

BELGIAN AND GRANITE PAVING

Belgian block occupies about the same position as cobble in so far as its value or use as a pavement is concerned, and it is rapidly disappearing.

Granite block as a track pavement has until recently been in little use in Connecticut. Such as there was consisted of the ancient type of 8-in. deep blocks, laid on sand, mainly with sand joints. Within the past two or three years the value of the modern type of comparatively smooth granite pavement began to be appreciated, and several installations have now been made. The construction has been composed of a moderately soft New Hampshire granite, with blocks about 5 in. deep, 4 in. wide and 8 in. to 10 in. long, laid with 1:1 cement-grouted joints on a 1½-in. sand cushion and a 6-in. concrete base. This construction has been adopted usually where grades and very heavy traffic are found. Such an installation, in connection with 7-in., 95-lb. T-rail, is shown in the left-hand view on this page.

Rail and Paving Results—Four-Year-Old T-Rail in Wood Block on Narrow Street

This pavement was laid in 1911, while the view was taken in July, 1913. As yet the wear is imperceptible and much of the grout may still be seen, although the pavement sustains a heavy traffic leading to a bridge. The dark spots which may be mistaken for defects are either accumulations of dirt or motor oil drippings. This street is 35 ft. wide between curb, with tracks on 10-ft. centers.

In connection with grouted granite-block pavement it may be well to mention a method of construction which is coming into use, although the writer has not seen it in Connecticut. The procedure consists simply in splitting old 8-in. to 12-in. granite blocks into from two to three parts, each about 4 in. deep, and laying them with the new split faces upward, all other parts of the construction being the same as with new granite. The cost of this method is, of course, much less than with new block, and the resulting pavement seems to be practically as good.

WOOD-BLOCK PAVING

Wood block has been steadily coming into favor in Connecticut. The relative importance of this kind of paving is not properly shown in Table I because several extensive installations were in progress at the date of the report on which the table is based. As a paving material it rivals granite even when wear is considered and is more readily cut in around obstructions. While trouble is had at times from the tendency of the blocks to buckle under certain conditions, such troubles are usually quite easy to remedy. The result is a smooth, clean, quiet pavement which is highly desirable, especially in residential sections. It is adaptable to both T and groove rail and may be quickly replaced after track repairs, even in the winter time, with the least loss of material. It has been customary to lay this pavement on a 6-in. concrete base with 1-in. sand cushion and sand joints.

The wood-block pavement, as presented in the right-hand view on this page, was laid in 1907, but the view was taken in 1911. In this section of track, which is about 2700 ft. long, it became necessary to remove the blocks temporarily in 1910 in order to raise the concrete base and install cement rail filler, the purpose being to get the block up and out from under the rail heads as originally laid. The work

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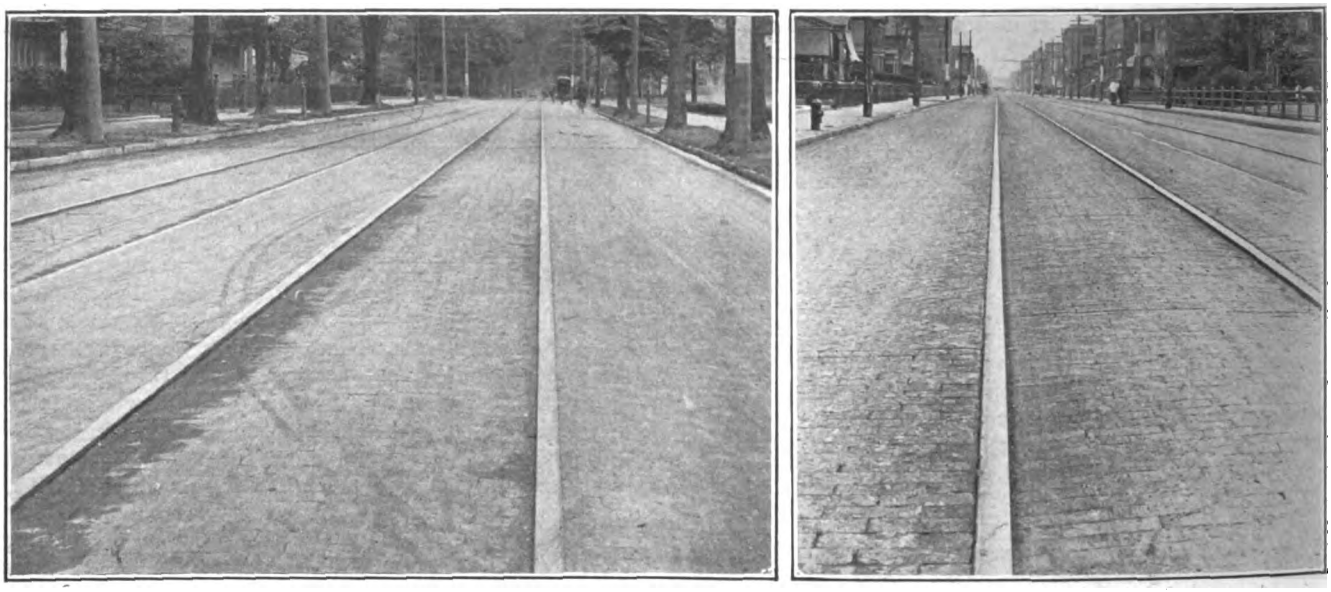
was done and the block was relaid with a loss of about 35 sq. yd. The left-hand view on this page, taken in July of this year at the same place as that shown in the previous cut, indicates no apparent change in conditions. The pavement was installed in connection with 7-in., 95-lb. T-rail without tie-rods, tracks on 9-ft. 8½-in. centers and a width between curb of 34 ft. One other view, taken in July of this year, of a wood-block installation is also shown on this page. This pavement was laid in 1911, with 7-in., 95-lb. T-rail, no tie-rods, tracks on 9-ft. centers and a width of 36 ft. between curbs. The street sustains a comparatively heavy traffic as it leads to important industrial plants.

BITUMINOUS MACADAM AND BITULITHIC PAVEMENT

The experience with bituminous macadam is not of sufficient length to enable a more definite opinion to be formed than that expressed in reference to ordinary macadam.

With regard to bitulithic, however, it has been found that it is quite satisfactory for streets carrying a moderate traffic. When laid in conjunction with T-rails it has been deemed advisable to place wood or granite block at either side of the rail heads. Several large installations have been made, the two earliest in 1906. Neither of these required any expensive attention from the contractor at the expiration of the five-year guarantee period. In fact, after seven years they appear to be good for an indefinite period. The most objectionable feature would seem to be the dependence upon the contractor for such repairs as may be necessary from time to time.



Rail and Paving Results—Construction of Installation Shown on Right-Hand Side Page 371 After Six Years' Service; and T-Rail with Wood Block, Two Years Old, in Narrow Street

GRANITOID AND HASSAM PAVING

Granitoid is a pavement with a concrete surface, usually laid out in block form on top to prevent slip. Where installed in Connecticut no attempt was made to interpose any form of joint or shock absorber between the rail and the pavement. It presents a neat appearance, but the block formations soon disappear under traffic. It is thought that perhaps for light traffic it may answer quite well, especially when first cost and comparative ease of repair are considered; but for heavy traffic following the rails, especially T-rails, the writer believes it will prove unsuitable. Such installations as have been made are also too recent to allow the formation of a well-defined opinion.

The experience with Hassam pavement has been confined to one early installation which was not very extensive. The contractors were experimenting with it themselves. It should suffice to say that it gives evidence of being worthy of further consideration and investigation for use in places where the requirements call for a low-cost, fairly durable pavement.

GENERAL CONCLUSIONS

In any track construction in paved streets, the pavement is perhaps the most important feature, both in relation to total cost of the track construction and the use of the street by the public. The writer believes that much of the objection which has been raised to the T-rail construction should more properly have been brought against the type of pavement used in connection with that rail. This observation is the result of experience in connection with several agitations over the T-rail question in Connecticut cities, where it was found that agitation ceased after a T-rail installation had been made in accordance with the Connecticut Company's standard cross-sections to replace old tram girder and asphalt pavement construction. In fact, the new T-rail construction has been praised highly by both the press and members of civic associations. The further importance of the pavement and its proper construction in connection with T-rail is more forcibly brought to mind when it is remembered that it is in connection with the pavement that the other users of the street are concerned in the problem and that the public, as personified by teamsters, automobilists and civic authorities, has a large control over the type of rail to be used in most municipalities, either through the influence of civic associations or by direct authority. It is from these sources that almost all of the objections to T-rail construction originate. Sometimes they are honest attempts to correct very visible pavement evils, but more often, especially upon the part of authorities, they are made chiefly for political purposes.

The revival of interest in T-rail track construction in paved streets points out the timeliness of the investigation of the subject by the committee on way matters of the American Electric Railway Engineering Association. The writer refers to these studies as timely, because several more or less new designs for this type of construction have been advanced recently, each having some acceptable features, but practically none having all of them combined. If this advantageous form of construction is to gain its proper place, the features of design which meet and overcome the objections to T-rail and pavement must be more fully known. One has only to read the discussion of a type of T-rail and pavement held recently before the American Society of Civil Engineers to realize the importance of this statement.

The subject is so very broad, however, that criticism and

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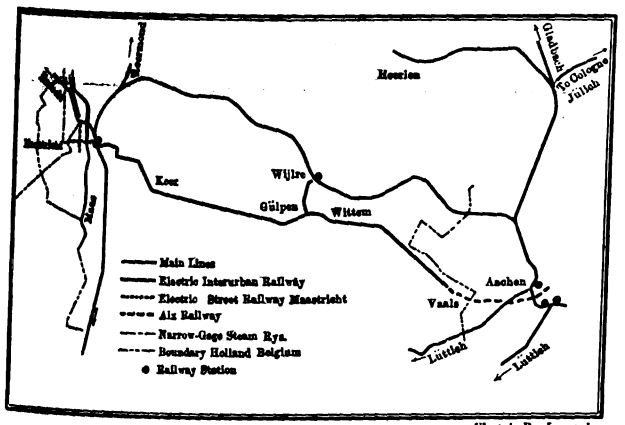
discussion of one or two new types adds little to the general knowledge concerning it. What are required, rather, are discussion and data covering the types of construction which have already been in use a sufficient length of time to indicate at least what modifications and combinations may be required to secure a type of construction which will meet most nearly the general conditions throughout the country.

In conclusion the writer should state that he is not fully convinced that the T-rail is the best one to use under all conditions, from the standpoint of maintenance cost. The possible exception is a narrow street with very heavy traffic which is apt to follow the rails. The use of groove girder rail under these conditions may well be considered, because the groove will take the larger portion of the wear, thus reducing the wear on the pavement. This brings us to the consideration of the relative importance of paving materials themselves. The lack of definite information as to the life of paving materials in connection with track, of whatever type of construction, is keenly felt. The advantage of traffic counts or records covering this phase of the subject has been pointed out. It is hoped that the way departments of some large companies will undertake traffic counts designed to obtain records of this character, along the lines laid down for obtaining such records by the American Society for Municipal Improvements.

A NEW HIGH-TENSION DIRECT-CURRENT RAILWAY FOR HOLLAND

The Netherlands government has recently concluded an agreement with the Allgemeine Elektricitäts Gesellschaft for the construction of a narrow-gage electric railway between Maastricht, Holland, and Aachen, Germany, via Vaals, with a branch from Gülpen to Wijlre. As shown in the accompanying map, the electric line will afford a shorter connection between Maastricht and Aachen than the present steam trunk line, aside from the fact that it will serve territory which now has no transportation service whatever. The condition that cheap energy could be obtained



Map Showing Route of New Line Between Maastricht and Aachen

from a power station at the nearby state mines led to the choice of electricity, despite the fact that the other narrow-gage lines in this territory are operated by steam in all cases.

The interurban line proper and the Maastricht street railway system will be supplied from a central station at the state mines at Herlen through a power company whose high-tension transmission lines traverse the territory to be served by the new railway. The line will be operated with high-tension direct current, but the energy purchased will be three-phase alternating current. The initial price will be approximately 1 cent per kw-hr. as measured at the substations of the railway. The interurban division between Maastricht and Vaals at the Aachen boundary will be 15.8 miles long It will be located on right-of-way, but as close to the highway as possible. The branch to Wijlre will be 1.25 miles long, the street railway in Maastricht as first constructed about 2 miles long and the entrance into Aachen about 3.1 miles long. Aachen and Maastricht have populations of 157,000 and 37,000 respectively, and the intervening territory has about 25,000 inhabitants, according to recent estimates.

Owing to the undeveloped nature of the territory, the new line will be subsidized by the communities served. The Maastricht and Aachen sections will be run as local street railways. As the several franchises embody some interesting conditions, they will be summarized in the following paragraphs.

The city of Maastricht has agreed to pay the operating company for ten years and annual deficit not exceeding $1,200. The fixed charges covering the Allgemeine company's investment in rolling stock and the city's investment in way construction are to be taken from an equal division of the surplus remaining after all operating costs and previous operating deficits have been paid. The maintenance of the track and paving will be in the hands of the city, although the interurban cars will also operate over the city tracks. The city reserves the right to take over the system at the end of thirty years or at succeeding intervals of five years each. If the city does acquire the property, it will permit the interurban line to operate over its track upon proportional payments covering the maintenance and renewal charges against the section used, upon payment for the energy taken and, further, upon payment of 0.4 cent for every passenger brought into the city. On the other hand, the city has agreed to make good any losses which the company might suffer from the construction of competing lines, and it has also agreed to provide connections to other narrow-gage lines. The electric railway in Maastricht will supersede horse lines.

At Aachen the interurban line has made a contract with the local railway company whereby passengers from the interurban line can be carried over the Aachen line without transfers. In payment for this use of the tracks all local fares collected on the city tracks are to be given to the Aachen company.

The interurban franchise, covering passenger and freight business, was granted by the Netherlands government for an indeterminate period. The government has loaned the railway $130,000, in addition to which the provincial government and interested communities have voted loans for twenty-five years at the rate of $6,720 a year. These sums do not have to be repaid until the interest on the investment exceeds 5 per cent and until all operating losses have been absorbed. State ownership of the interurban section is permissible at the end of twenty-five years, provided the state offers an equivalent for the capitalized net earnings. The state also has the privilege of buying the railways at any time on payment of the new replacement value of the way, of the estimated use value of the rolling stock and of a premium whose amount will depend upon the results of operation up to the time of purchase.

A concise volume, which contains statistics showing the foreign trade of each country of the world during 1911 compared with the previous year, has just been issued by the Bureau of Foreign and Domestic Commerce at Washington. This publication shows the principal articles and their value entering into the trade of each country and the itemization of the imports from and exports to the United States. The statistics were prepared by American consular officers and supplemented by other official data. The volume has been revised and brought up to date so far as statistics were available. Copies of the book may be obtained from the Superintendent of Documents, Washington, D. C., for 35 cents each.

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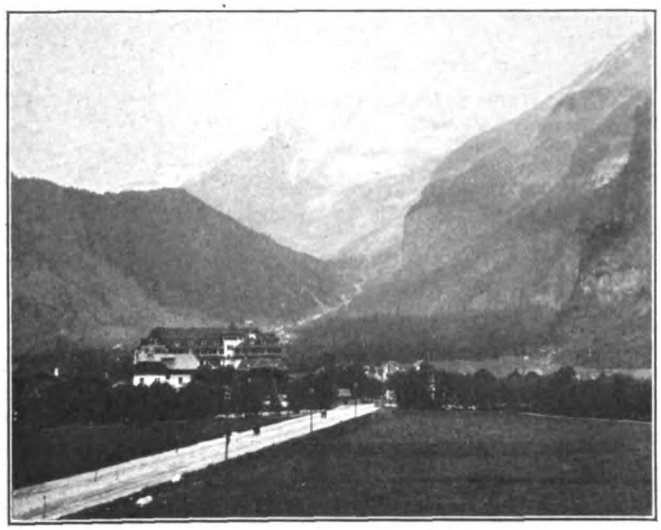
Notes on European Electric Railways

Impressions Gained During a Recent Trip Over the New Lötschberg Railway in Switzerland and the Older Lecco-Colico Line in Northern Italy—One Is Single-Phase, the Other Is Three-Phase

BY LOUIS BELL, PH.D.

The ELECTRIC RAILWAY JOURNAL has described the progress of the construction of the important Lötschberg railway and has had something to say about the electrical details of the remarkable new 2500-hp Oerlikon single-phase locomotives used on the line. I shall not attempt, therefore, to describe the technical features of these machines, but rather will attempt to give some notion of what the system seems like from the standpoint of railway operation. To begin with, the Lötschberg line is an outcome of the necessities arising from the peculiar topography of that part of the country. Right through the heart of Switzerland from the Lake of Geneva, stretching a little north of east half the length of the country runs a huge mountain mass. In a general westward direction and turning sharply northward around the western end of the mass runs the Rhone; eastward and sweeping northward around the eastern end runs the upper Rhine. The watershed between the two sources is in the neighborhood of the St. Gotthard as a culminating point, whence also flow streams north and south.



Lötschberg Railway—Views Near Kandersteg Near the Northern End of the Line

Now, the main channel of traffic has been via the St. Gotthard tunnel, which is nearly in the center of Switzerland. The other great tunnel, under the Simplon, gives access to the Rhone valley, but it must be followed clear to the Lake of Geneva before opportunity comes to turn northward to reach the region north of the Bernese Alps, which form the eastern portion of the huge mountain mass. The St. Gotthard line, following the streams running north and south, and going under the mountains, bears eastward into the Italian lake district. But until now there has been no direct route from northwestern Switzerland through into Italy. The Lötschberg line was built to fill this very definite want and comes, as will be seen by the map on page 644 of the ELECTRIC RAILWAY JOURNAL for Oct. 7, 1911, by a fairly direct course from Berne to Spiez on the Lake of Thun, and thence up the wild valley of the Kander, which it follows as far as practicable. Then it goes under the mountains by a succession of tunnels, the main one nearly 9 miles long, until it emerges on the brink of the Rhone valley and follows it on sharply descending grades to Brieg, just at the entrance to the Simplon tunnel. It is not a long line, only about 46 miles in all, to cover a distance of less than 30 miles as the crow flies, but it has cost hard on to $450,000 per mile, and when you go over it you wonder how they ever got out of it even at that figure. Its two ends are about 2000 ft. above sea level, and its middle, in the depths of the great tunnel, rises to about 4100 ft. From end to end it is a sensational succession of curves, grades, spiral bridges and tunnels.

You meet it, coming north, as I did, at Brieg, which you reach after being shot through the Simplon tunnel in a little over twenty minutes by the big three-phase locomotive from Iselle on the Italian side. You dive under your train in a subway and emerging find a bright new line of corridor cars bearing the label of the Lötschberg line. The first thing to strike one in strolling about the platform—they never hurry at junctions over here—is the extreme simplicity of the overhead work compared with that at your back toward the Simplon: just a nice, clean, well-insulated catenary construction with a modest trolley wire that looks as innocent as if it were carrying 500 volts instead of 15,000. One of the illustrations on the opposite page gives a view of the yard as seen from beside the train.

Presently one of the long single-phase locomotives slips quietly up the track beside you with never a wink at the pantograph collectors and shunts gently on ahead of the train. It is no small affair, this engine, with an over-all length of about 50 ft., a weight of 107 metric tons, of which a little more than three-quarters is on the drivers, and a rating of 2500 hp for one and one-half hours—the full length of a trip over the line. And the driving wheels look businesslike too, five pairs of them coupled, about 55 in. in diameter. The earlier locomotive for this line had six pairs of drivers, three pairs being coupled to each motor. The present one, although with two motors, has all the drivers pulling together and consequently the motors also. The two motors, each of 1250 hp, are sixteen-pole machines, taking current at a maximum voltage of 500. They are stated to be series-compensated, but with just what form of compensation I am uncertain—I hope that the details will soon be published—but I note that in nearly all descriptions of single-phase traction motors this matter is

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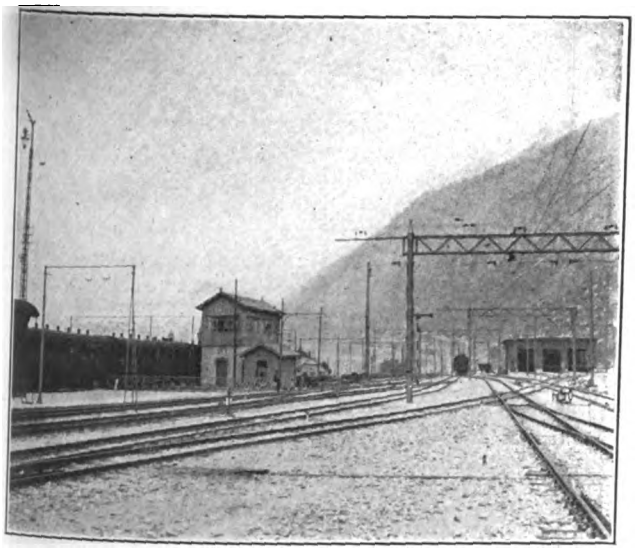
touched very lightly. However, all the compensating schemes seem to work if carried out judiciously. There are two transformers with forced ventilation each with a regulating secondary in 45-volt stages, the contactor for this regulation being mounted on the transformer and operated by an auxiliary motor. The pantograph trolleys impress one with the ease and smoothness of their working and they certainly function admirably at full speed and load—the curves give one ample opportunity to inspect them.

A second view shows the particular locomotive coupled to the train as I waited, and there were two similar ones standing in the yard. In due season the train starts up with exceeding smoothness, thanks to the regulating transformer and also to the Continental system of coupling, which is slow but effective in abolishing shocks. Full speed is reached quickly, and the train pushes ahead up a steady grade, mounting the brim of the Rhone valley. The road is standard-gage, and the train with its regular corridor cars and driver is not a particularly light one. There is no doubt of the ample power as the grades are conquered, and presently she is running along the mountain side, with the Rhone valley a quarter of a mile below and the river winding down it—of a curious greenish hue like most streams from glaciated mountains, a sort of pale, off-color turquoise.

I am not going to trouble you with banal comments on the scenery. If you want its details consult Baedeker—"To the left, fine view of the Kiental with the Blümlisalp and Gspaltenhorn," etc., etc.—but I do assure you that no one but a two-headed man with rubber necks could properly take in the startling sights on both sides of the train at once. You are over gorges and under cliffs, through tunnels and shooting along the edge of precipices all at pretty high speed, until you go through the Lötschberg tunnel proper and emerge near Kandersteg to find more of the same awaiting you. Two accompanying views are merely snapshots of the wild scenery about Kandersteg, taken when the train slackened speed enough to permit it. The roadbed is somewhat rough from its newness, and with its assortment of sensational curves never will be exactly smooth. We left Brieg about 12.30 and reached Spiez at 2 p. m. after

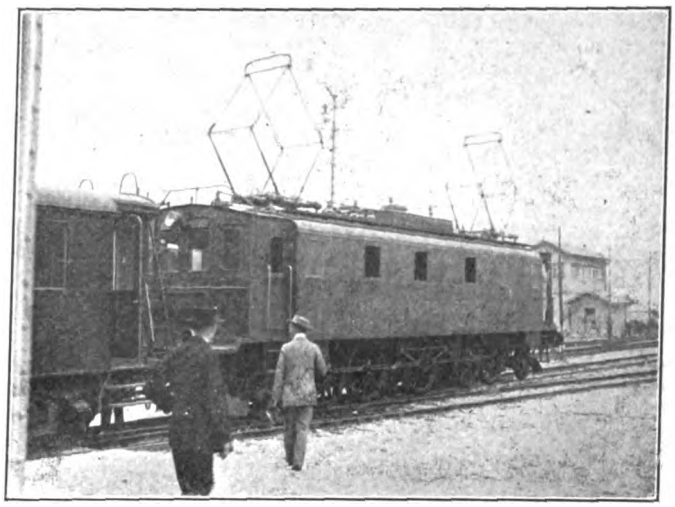


Lötschberg Railway—View of Overhead Construction

what is assuredly one of the most impressive railway rides in the world.

But I would advise those who wish to see it not to take it in in the course of a journey as I did, but to make a day's excursion of it from Spiez or Interlaken so as to get some real grasp of the fleeting scenery. One trip along the line is not enough. Incidentally I may mention that the Lötschberg line will prove a boon to visitors who are bound to or from Zermatt, previously reached by travelers not going by the Simplon only by a rather tedious trip up the Rhone valley to Visp. Now one can slip down from the country north of the Bernese Oberland very easily and then loop westward toward Geneva.

The road, from the standpoint either of electrical or civil engineering, is of immense interest. A single trip with an eye on the performance of the engine leaves one with an abiding faith in the practical capabilities of the single-phase locomotive. This road is no place for motors of



Lötschberg Railway—New Single-Phase Locomotive

dubious qualities—far from it—and the present locomotives are certainly from a practical standpoint up to their job. They are probably not yet so good as they may be eventually, but after one has had experience with them and the Simplon machines as well he is not in a mood to listen with patience to long-winded papers explaining how uneconomical, inefficient and unreliable a. c. railway motors are and ever must be. And until some one devises a scheme for using 15,000 volts d. c. on the trolley wire it is up to the man who stands pat on d. c. to do the explaining and experimenting when big long-distance work is on hand. The overhead structure of the Lötschberg speaks for itself.

NOTES ON THE LECCO-COLICO-SONDRIO LINE

This line is one of the earlier and more important of the three-phase railways of the Italian system. Its equipment, from the technical standpoint, has been often described so that here I shall waste no time in again going into these matters of detail. Some account of its present status of actual operation may not, however, be unwelcome to readers of the ELECTRIC RAILWAY JOURNAL who know it only by general repute.

It runs along the eastern shore of the Lake of Como, or rather that branch of it which is known as the Lake of Lecco, from Lecco itself, the junction point with the steam lines coming up from the general direction of Milan and the south, to Colico, where it turns sharply eastward and winds its way up the valley to Sondrio. From the constructional standpoint the line is interesting, with its many tunnels. It runs along the lake shore at a general height of 150 ft. or 200 ft., without any formidable grades in the southern portion of the route, although in the Colico-Sondrio section there are plenty of them.

The overhead construction is rather simple—two trolley wires suspended roughly a couple of feet apart on an ordinary bracket construction. The locomotive has but a single trolley, resembling the bow form in common use on the Continent, but with two sections of tubular contractor perhaps 2½ in. in diameter, insulated from each other, of course, but carried on the same axial support. One of the accompanying views is at the station at Lecco and shows one of the electric locomotives. Those which I saw were all of Gauz manufacture, looking very compact and power-

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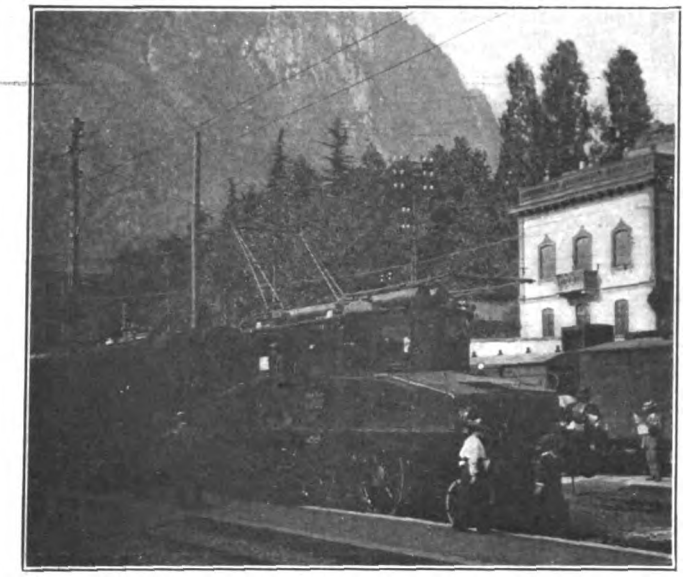
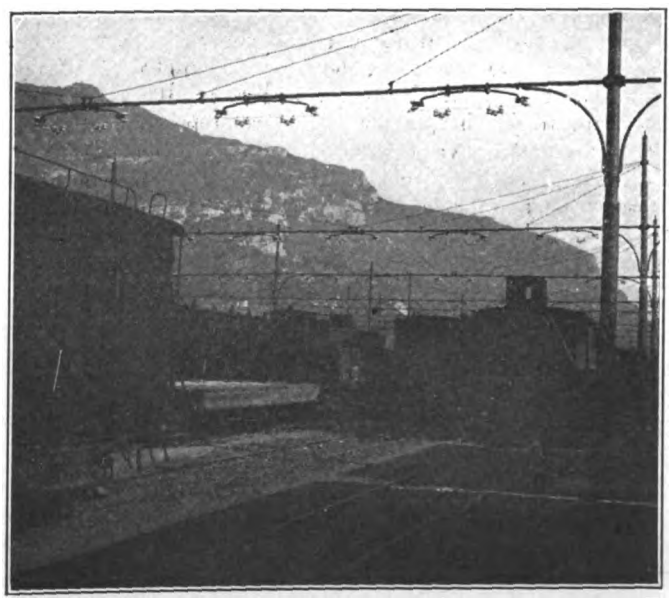
ful. The arrangement of drivers is out of the ordinary in these machines, somewhat different from the earlier types and much the same as on the latest Lötschberg locomotives already described. The two motor armatures drive cranks which are united by a jack shaft which carries the main driving crank, the other drivers being united to it by ordinary connecting rods. It looks queer at first glance, but it keeps everything pulling together and seems to work admirably. There is a single pair of small pilot wheels at each end of the locomotive, but nearly all the weight is on the drivers. They are doing considerable work of extension at Lecco, building a large addition to the three-phase yards, and, escaping the eyes of the officials, I wandered down into it and investigated. A view is shown of the new construction. It is of tubular iron poles bearing carefully trussed tubular cross members from which are carried the brackets with the suspended insulators. The construction spans five tracks, and while surprisingly light it looks strong and simple, and is a wide variation from the lattice poles and cross members generally used.



Lecco Railway—Three-Phase Locomotives at Lecco



Lecco Railway—Overhead Yard Construction

On the way back I devoted myself to line inspection. They are working up from Lecco with line reconstruction. The new line is of tubular poles set in concrete perhaps 40 ft. in over-all height, with three short steel cross-arms clamped firmly in place, and is fitted to carry two three-phase circuits. It is a good piece of line work, resembling several new Italian lines which I saw later. These poles are usually tapered in four sections, the lowest one about 8 in. in diameter, the uppermost scarcely half that figure.

The practical working of the Lecco-Colico-Sondrio line, from all I can learn, is excellent. Its locomotives handle the regular through trains easily, and it forms a commonplace section of the Italian railways in their ordinary course of operation. In other words, it represents main-line practice and makes good at the job. It is worth noting that all the really serious electric work here, as elsewhere, is with locomotives. The often-mentioned plan of running large single cars at short intervals has really never been carried out—the added cost of operation both for power and labor seems to be too seriously against it. Over here there is a rather general use of trailers even on the train lines, and in larger work the well-accepted principle of the economy of long trains is fully recognized. Just putting on an electric locomotive instead of a steam one, as in the case of this line, seems to be the normal and natural way of passing to electric traction.

TESTS OF BALL AND ROLLER BEARINGS AT ROCHESTER

The Rochester Lines of the New York State Railways have for the past twenty months been investigating the operation of ball bearings and roller bearings for street car service. The tests are being made under the direction of G. M. Cameron, master mechanic. In the spring of 1911 one car was equipped with roller bearings and one with ball bearings and tests of energy consumption were made. The cars were then put into regular service and have been in operation ever since with only very slight intermissions for repairs due to minor imperfections of the bearings. These endurance tests will be continued to determine the useful life of the bearings.

The cars equipped with the anti-friction bearings are of the prepayment type, each weighing without passengers 48,600 lb., the maximum passenger load being estimated at 11,250 lb. The total weight not carried by the journals is 10,838 lb., so that the maximum estimated load on each of the eight journals is, therefore, 6127 lb., or 3132 lb. per bearing. The bearings were designed by the manufacturers for this load. The cars are equipped with Brill 27-F-E-1 trucks and four G.E.-219 motors. The roller bearings cost, in place, about seven times as much as plain bearings and one-half as much as the ball bearings.

The energy tests showed a saving in energy ranging between 12 per cent and 13 per cent, or nearly the theoretical maximum, which Mr. Cameron estimates at 15 per cent. This maximum is all of the energy which is consumed by the bearings, the rest of the energy consumed by the car being due to motor losses, air resistance, gear friction, flange friction, etc. The difference in energy consumption between the two types of bearing is so small as to be negligible. With energy at 1 cent per kw-hr., and allowing 33,000 miles per year travel for the car, the saving in this item is from $130 to $140 as compared with plain bearings. To offset this are the interest charges on the investment and the still indeterminate depreciation.

The indications from the endurance tests so far are that the anti-friction bearings are durable and that a length of life can be expected sufficient to justify their cost so far as economy is concerned. Undoubtedly if these bearings could be produced at such a cost that a three-year life would show a good saving there would be a greater incentive for experimenting with them. Under the conditions of the present test, with a life of less than three years for the roller bearings and somewhere over five years for the ball bearings, the energy saving and the maintenance costs balance each other.

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Rapid Transit Development in Berlin and New York

A Review of the Development of Subway and Elevated Lines in These Cities—Includes Maps and Tables Showing Present and Authorized Lines in Both Cities and Their Mileage

The approval of the contracts between the city of New York and the Interborough Rapid Transit Company and the Brooklyn Rapid Transit Company for an extensive network of additional rapid transit lines should lend timely interest to the following review of rapid transit development in Berlin and New York.

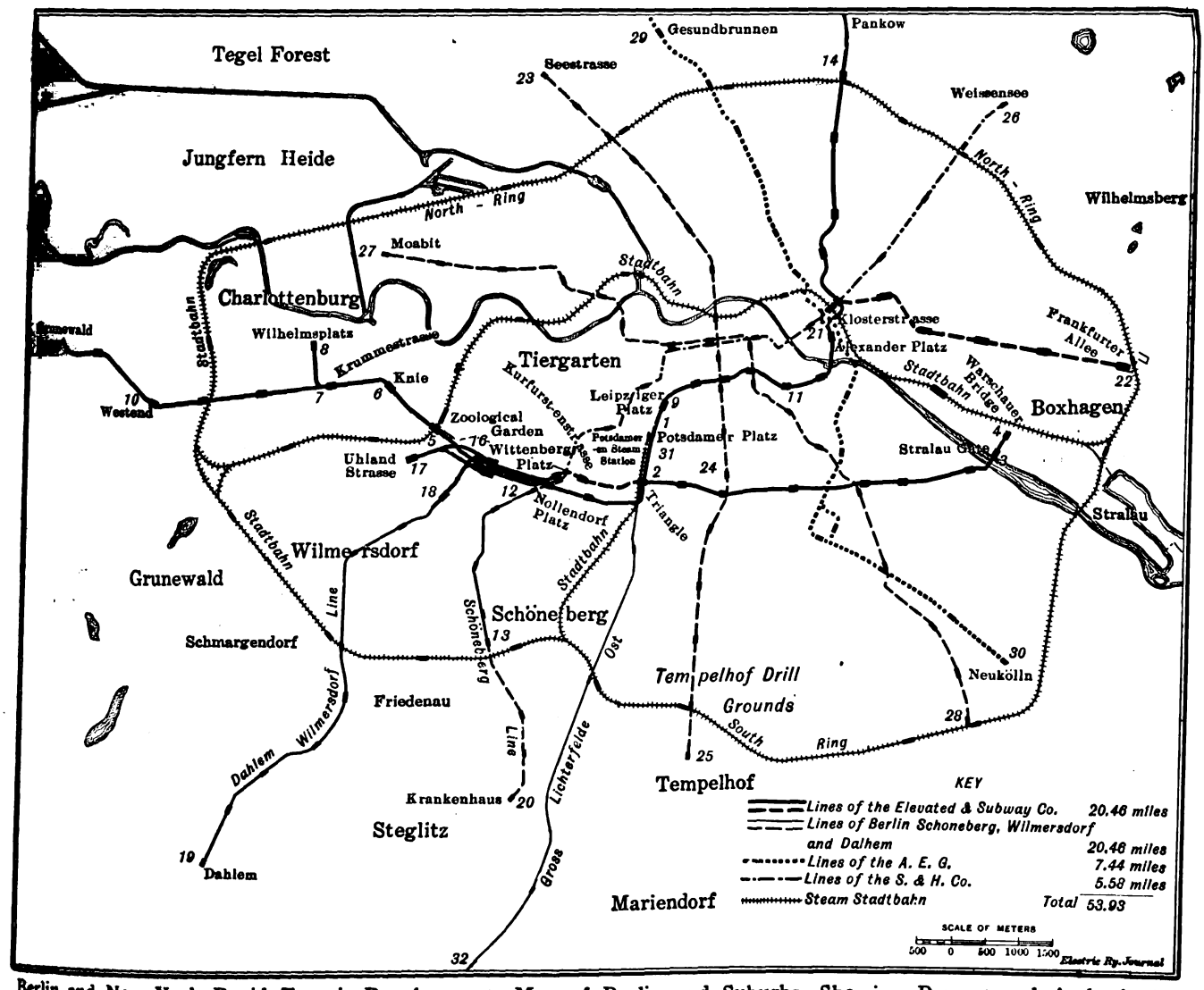
DEVELOPMENTS IN BERLIN

Up to about ten years ago the only non-surface line in Berlin was the Stadtbahn, a belt line system consisting of a northern, central and southern section with direct connection to most of the trunk lines. On Feb. 18, 1902, however, the Berlin Elevated & Underground Railway Company placed in operation the first section of its east-west trunk line. Since then additional lines have been constructed or proposed by this company, by other private interests and by the municipalities. The lines built by the original company afforded direct communication from the prosperous territory in the west to the great business and social centers of Berlin, while the new north and south lines will give better traveling facilities between the industrial districts and the homes of the working classes. The Stadtbahn is still operated by steam, but funds for electrifying 294 miles (single track) of city and suburban lines have been voted by the Prussian Diet.

The accompanying map shows all of the present electric rapid transit lines of Berlin and those which have been approved for construction, while the accompanying Table I presents the dates on which each section was opened to the public.

The Elevated & Underground Railway also operates, or will operate, the feeder lines owned by the municipalities of Schöneberg, Wilmersdorf and Dahlen. The Schöneberg line is not physically connected to the trunk railway because that municipality plans to operate its cars over a future extension northeast into Berlin, but passengers may buy tickets at Schöneberg stations to any station on the trunk line and vice versa.

At Wittenbergplatz trains converge from the three western terminals of the trunk line and, in the near future, will do so from the Wilmersdorf line. This traffic, as well as



Berlin and New York Rapid Transit Development—Map of Berlin and Suburbs, Showing Present and Authorized Rapid Transit Non-Surface Lines

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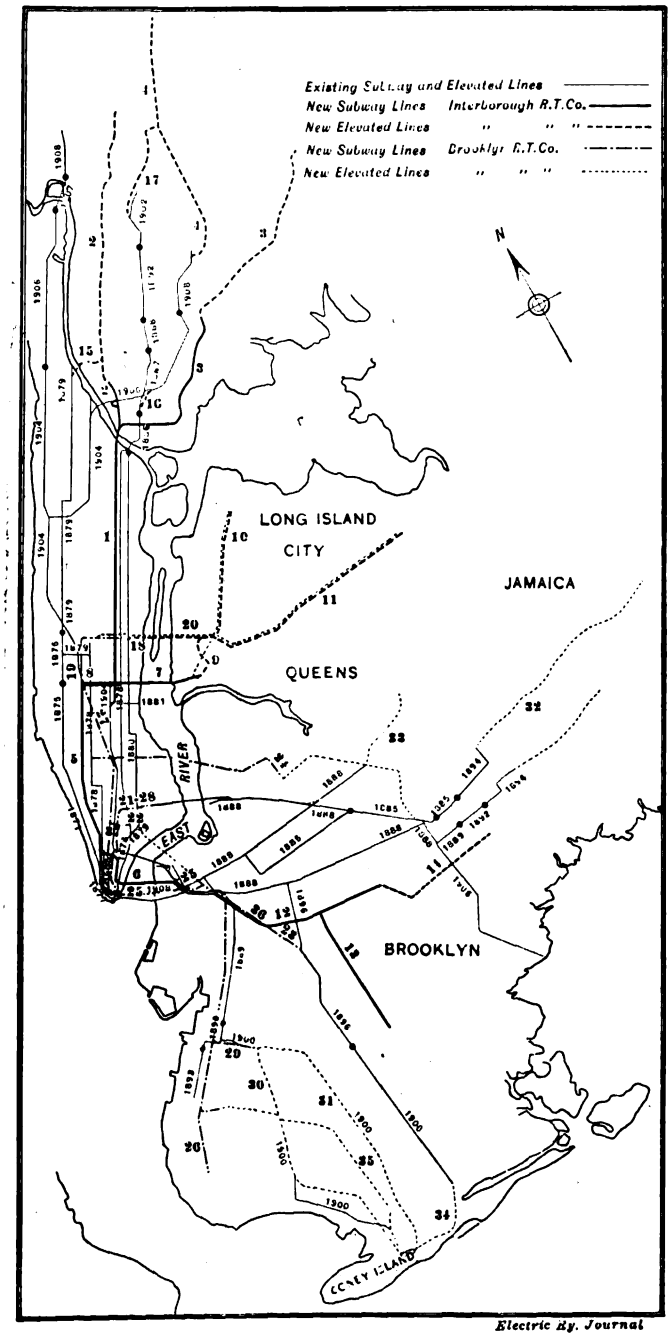
that from Schöneberg, must be carried on a two-track line which now has a two-and-one-half minute rush-hour and a four-minute normal headway. The station platforms and signal system impose limitations which will make any radical improvement in capacity impracticable. To relieve its main line, the company therefore is planning a separate route to the "triangle," which was changed from a one-level to a two-level transfer station because of a serious side-



Electric Ry. Journal

Berlin and New York Rapid Transit Development—Map of New York and Brooklyn, Showing Existing and Authorized Elevated and Subway Lines

wiping accident which occurred on Sept. 26, 1908, as described in the ELECTRIC RAILWAY JOURNAL for Oct. 10, 1908.

The original zone fares of the Berlin system have recently been reduced as they became prohibitive for the longer runs. The fare reductions, which also include the Schöneberg line, are on the following basis: 15 pf. (3¾ cents) reduced to 10 pf. (2½ cents); 20 pf. (5 cents) to 15 pf. (3¾ cents); 25 pf. (6¼ cents) to 20 pf. (5 cents), and 30 pf. (7½ cents) to 25 pf. (6¼ cents). The reduction is so applied that instead of adding 5 pf. (1¼ cents) for every three stations to the 10 pf. (2½ cents) minimum, this increment is added for successive zones of three, four and five additional stations, etc., so that the further the passenger rides, the greater is the number of stations for the additional fare. The report of the Elevated & Underground Railway for the year 1912 shows that 62,731,827 passengers were carrried and that the gross earnings were $2,042,369. The average earnings per passenger were 3.25 cents. The greatest number of passengers carried in one day was 223,992. The company operates 143 motor cars and 116 trailers in trains of two to six cars for a total performance of 2,349,275 car miles. An attempt was made by the company recently to abandon the use of smoking compartments because of the confusion to passengers when boarding trains. The company was obliged, however, to continue the present plan because any change was vetoed by the authorities.

The Schöneberg municipality's subway was described in the ELECTRIC RAILWAY JOURNAL for Aug. 5, 1911. The construction is of the most costly character, and as a large part of it was made through undeveloped territory, the traffic has not yet reached the density which profitable subway operation demands. The first year's service shows a deficit of $375,000. The Wilmersdorf Railway, now under construction, is similar to that of Schöneberg except that an open cut is used in the less developed territory.

The Siemens & Halske Company has received the contract for the construction of the North-South subway, which will pass through one of the best sections of the city, particularly Friedrichstrasse, the Broadway of Berlin. The map and table also show the route of the line to be built by the Allgemeine Company as well as the mileage of all other lines, built or proposed.

TABLE I—ELECTRIC ELEVATED AND UNDERGROUND RAILWAYS OF BERLIN

Section	Construction	Placed in Operation
	Lines in Operation	
1-2-3	Subway and elevated, Potsdamerplatz-Stralau Gate.	Feb. 18, 1902
1-2-5	Subway and elevated, Potsdamerplatz-Zoological Garden	Mar. 11, 1902
3-2-5	Intermediate division, Stralau Gate-Zoological Garden	Mar. 25, 1902
3-4	Elevated, Stralau Gate-Warschauer Bridge	Aug. 14, 1902
5-6	Subway, Zoological Garden-Knie	Dec. 14, 1902
6-7-8	Subway, Knie-Wilhelmsplatz	May 14, 1906
9	Subway, Leipzigerplatz station	Sept. 28, 1907
7-10	Subway, Krummestrasse-Westend	Mar. 29, 1908
9-11	Subway, Leipzigerplatz-Spittelmarkt	Oct. 1, 1908
12-13	Subway of city of Schöneberg, Nollendorfplatz-Hauptstrasse	Dec. 1, 1910
11-14	Subway and elevated, Spittelmarkt-Alexanderplatz-Nordring	July 1, 1913
2	Elimination of Triangle	Nov. 3, 1912
	Other Electrically Operated Lines	
31-32	Berlin Municipal Suburban line (Potsdam steam railway station), Gross Lichterfelde—Ost	.....
	Latest and Proposed Elevated and Subway Lines	
10-15	Westend-Grunewald with terminal	Completed
16-17	Wittenbergplatz-Uhlandstrasse	Under construction
16-18-19	Wittenbergplatz-Kaiser Allee-Dahlem	Under construction
23-24-25	Seestrasse-Tempelhof	Construction begun Dec. 1, 1912
13-20	Hauptstrasse-Krankenhaus	Proposed
21-22	Klosterstrasse-Alexanderplatz-Frankfurter Allee	Proposed
12-26	Nollendorfplatz-Weissensee	Proposed
27-28	Moabit-Neukölln	Proposed
29-30	Gesundbrunnen-Neukölln	Proposed
2-16	Triangle-Kurfürstenstrasse-Wittenbergplatz	Proposed

RAPID TRANSIT IN NEW YORK

The original rapid transit lines of New York comprise the Second, Third, Sixth and Ninth Avenue lines in the old city of New York (Manhattan and Bronx Boroughs) and the Myrtle Avenue, Lexington Avenue, Fulton Street, Brighton Beach and Fifth Avenue lines of Brooklyn Borough. Portions of the Brighton Beach and Fifth Avenue lines were originally operated as steam railroads. The first piece of elevated railway in New York was completed in 1871 and the first piece in Brooklyn in 1885. The accompanying map shows the dates when each section was opened for operation or taken over as an extension of the city systems. The electrification of the New York and Brooklyn elevated systems began in 1902. The former comprise 118 miles of track or 37.68 miles of route, and the latter 105 miles of track or 40 miles of route.

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The existing subway system, which is operated by the Interborough Rapid Transit Company, comprises 73 miles of track or 25.72 miles of route. The section under Contract No. 1, namely, City Hall, Manhattan, to 145th Street, was opened Oct. 27, 1904, and to the present terminals in the Bronx in 1906, 1907 and 1908. The section under Contract No. 2, City Hall south to the Battery and through tunnel to Brooklyn, was opened for traffic to South Ferry in 1905, and to Borough Hall and later to Atlantic Avenue, Brooklyn, in 1908. The longest 5-cent ride on the present Interborough system, Atlantic Avenue, Brooklyn, to 242d Street and Broadway, is 17.5 miles, but on the new Interborough lines the maximum 5-cent ride will be from 241st Street, White Plains, to New Lots Road, Brooklyn, a distance of 26 miles.

The accompanying Table II is a summary of the track and route mileage of the lines to be built by the city but operated by the Interborough Rapid Transit and Brooklyn Rapid Transit companies under the agreement made early in 1913 with the city of New York and the Public Service Commission, First District, State of New York. The sections indicated, as by numbers, will be found on the map. Of the lines named in the table, the Steinway tunnel and Center Street loop are ready for operation and the Fourth Avenue subway is almost completed. The Lexington Avenue and Broadway section of the Seventh Avenue subway is under construction.

TABLE II—SUMMARY OF EXISTING NEW YORK LINES

	Track Mileage	Route Mileage
Interborough Rapid Transit System:		
Existing subway lines	73	25.7
Existing elevated lines	118	37.7
	191	63.4
Brooklyn Rapid Transit System:		
Existing elevated lines	105	40.0
Grand total	296	103.4

This mileage will be supplemented by the construction of new lines as follows:

TABLE III—NEW LINES TO BE BUILT IN NEW YORK

	Track Mileage	Route Mileage
Lines for Operation by the Interborough Rapid Transit Company to Be Built Jointly by the City and the Company and Equipped by the Company		
1. Lexington Avenue line	20.6	5.2
2. River and Jerome Avenue line	18.2	6.2
3. Southern Boulevard and Westchester Avenue line	21.4	7.1
4. White Plains Road extension	13.7	4.9
5. Seventh Avenue line	15.2	4.2
6. Park Place, William and Clark Street line	4.5	2.3
7. Steinway tunnel	3.2	1.6
8. Steinway tunnel extension in Manhattan	0.8	0.4
9. Queens extension of Steinway tunnel to Queensboro Bridge Plaza	2.6	1.3
10. Astoria line	7.5	2.5
11. Corona and Woodside line	16.5	5.5
12. Eastern Parkway line	12.7	3.2
13. Nostrand Avenue line	12.7	3.2
14. Livonia Avenue line	5.1	2.6
Total	146.8	50.1
Elevated Railroad Extensions		
15. Putnam Bridge line	1.3	0.7
16. West Farms connection	3.1	0.8
17. White Plains Road connection	5.5	2.8
18. Queensboro Bridge line	0.5	0.2
Total of elevated extensions	10.4	4.5
Lines for Operation by the Brooklyn Rapid Transit Company to Be Constructed Jointly by the City and Company		
19. Broadway-Seventh Avenue subway	17.6	4.7
20. Fifty-ninth Street subway	4.5	2.2
21. Extension of Center Street loop lines subway	2.0	1.0
22. Canal Street connection	1.2	0.6
23. Connection with Brighton Beach line	2.4	1.2
24. Eastern District line	14.8	7.4
25. East River tunnel	4.0	2.0
26. Fourth Avenue subway extension	6.9	2.3
27. Fourth Avenue subway	17.0	3.9
28. Center Street loop subway	5.6	1.5
29. Connection Thirty-eighth Street, Fourth and Ninth Avenues, subway and open cut	1.9	0.9
30. New Utrecht Avenue, Thirty-ninth to Eighty-sixth Street, to Coney Island, elevated	16.5	5.5
31. Culver, Ninth Avenue to Coney Island, elevated	16.1	5.4
Total	110.41	38.6
To Be Constructed by Brooklyn Rapid Transit Company at Its Own Expense		
32. Jamaica lines	13.2	6.6
33. Myrtle Avenue (Lutheran Cemetery), Fresh Pond Road	2.0	1.0
34. Brighton Beach, open cut	2.0	1.0
35. Sea Beach, Sixty-fifth Street and Fourth Avenue to Coney Island, open cut and embankment	16.1	5.4
36. Eastern Parkway to Malbone Street, subway	1.8	0.9
37. Canal Street spur	0.24	0.1
Total	46.29	15.0

INFERIORITY OF ELECTRIC LOCOMOTIVES TO MOTOR CARS IN CITY AND SUBURBAN SERVICE

The desire of the Prussian government to electrify its Berlin city and suburban lines at the lowest first cost by using old steam trailers with electric locomotives instead of motor cars is stated to be short-sighted policy in a recent study in the *Elektrotechnische Zeitschrift* by E. C. Zehme, a well-known traction authority of Berlin. It is proposed to operate with pushing and pulling locomotives a maximum train of thirteen cars which would be split up into eight-car and five-car sections for the hours of lighter travel. The eight-car element would have two two-axle locomotives and the five-car element one three-axle locomotive. The current collectors, switching apparatus and motorman's cab are to be mounted in a car coupled behind the driving equipment. Mr. Zehme contends that the metropolitan traffic conditions of Berlin demand a system of propulsion which will give maximum capacity within the limits set by track conditions, station lengths, etc. The proposed division into eight-car and five-car trains would not give the economical flexibility of motor-car service where the number of units can be readily adjusted to service demands. Again, a locomotive train of permissible maximum length would seat only 592 passengers as compared with 662 passengers on a like motor-car train. Furthermore, the rate of acceleration of the locomotive train would be only 0.4 m per second per second (0.67 m.p.h.p.s.) compared with 0.7 m per second per second (1.53 m.p.h.p.s.) for motor cars. He points out that as the electrification does not involve any trunk-line runs, the only reason for using locomotives is the retention of the passenger cars, but this policy would defeat the very purpose of electrification, namely, maximum capacity. On the basis of superior acceleration and with due allowance for service delays the motor-car service will permit four to four and one-half trains more an hour, because the average station stops would be only 77.25 seconds instead of 86.75 seconds. Assuming forty-one maximum capacity trains per hour, the motor-car trains would carry 4500 passengers more in that time. On comparing weights, it is estimated that an empty thirteen-car train with single-phase locomotives would weigh 353 tons, whereas a single-phase motor-car train of five twin units of like capacity would weigh but 299 tons—a difference of 18 per cent. A similar motor-car train, if equipped with high-tension direct-current apparatus, would weigh 31 per cent less than the single-phase locomotive train. Mr. Zehme does not believe that the maintenance of motor cars would be higher than for the locomotives, basing this opinion on the fact that the gearless locomotives and multiple-unit cars of the New York Central & Hudson River Railroad show practically the same maintenance cost. In fact, he contends that the upkeep charge of the more complex jack-shaft locomotive is still an unknown quantity and in any event the proposed Berlin scheme of mounting the drive and control on separate vehicles would be sure to add to the cost. The great inertia of the large locomotive armatures is also a serious drawback in city service, with its frequent stops and necessarily high rate of retardation. Possibly the greatest disadvantage is that the shorter trains would depend on only one or two motors, and so be more liable to be crippled in case of motor failure.

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Estimating Operating Expense and Cost of Construction

An Analytical Study of the Probable Operating Expense and Cost of Construction of a Proposed Electric Interurban Railway, as Deduced from Results Obtained from Typical Existing Lines

BY LOUIS E. FISCHER, CONSULTING ENGINEER, ST. LOUIS, MO.

In an article published in the ELECTRIC RAILWAY JOURNAL of Aug. 23, 1913, the subject of the determination of possible operating revenue for a new electric interurban railway was discussed in all its various aspects. A thorough analysis was made of the results obtained by typical existing lines, and the various principles governing the operating revenue of an electric interurban railway were deduced. It was realized, however, that to stop here would leave the subject less than half discussed, for the investor in a proposed electric railway needs information concerning two other very important points, the probable operating expense and the probable cost of construction of the line. Typical electric interurban railways can afford generalized information on these subjects as well as on that of operating revenue, and it is the purpose of this article to put such information in a form that can be easily assimilated by promoters and investors who are interested in such transportation projects.

OPERATING EXPENSE

Of the two topics mentioned above, operating expense and cost of construction, operating expense is the one that naturally in the sequence of thought follows operating revenue. The classification of this, as prescribed by the Interstate Commerce Commission in Section 20 of an act to regulate commerce, is as follows:

General accounts:

I. Way and structures.
II. Equipment.
III. Traffic.
IV. Conducting transportation.
V. General and miscellaneous.

Each of these headings is subdivided into many primary accounts, but for the sake of clearness each group of subdivisions will be taken up separately in the order of the general headings given above.

WAY AND STRUCTURES

The first general account, way and structures, is detailed by the Interstate Commerce Commission in the following manner:

Primary accounts:

(1) Superintendence of way and structures.
Maintenance of way:
Maintenance of roadway and track:
(2) Ballast.
(3) Ties.
(4) Rails.
(5) Rail fastenings and joints.
(6) Special work.
(7) Underground construction.
(8) Roadway and track labor.
(9) Paving.
(10) Miscellaneous roadway and track expenses.
(11) Cleaning and sanding tracks.
(12) Removal of snow, ice and sand.
Other maintenance of way:
(13) Tunnels.
(14) Elevated structures and foundations.
(15) Bridges, trestles and culverts.
(16) Crossings, fences, cattle guards and signs.
(17) Signal and interlocking systems.
(18) Telephone and telegraph systems.
(19) Other miscellaneous way expenses.
Maintenance of electric lines:
(20) Poles and fixtures.
(21) Underground conduits.
(22) Transmission system.
(23) Distribution system.
(24) Miscellaneous electric line expenses.
(25) Buildings and structures.
(26) Depreciation of way and structures.
(27) Other operations—Dr.
(28) Other operations—Cr.

STATISTICS OF ACTUAL OPERATING EXPENSE FOR WAY AND STRUCTURES ON TYPICAL ELECTRIC INTERURBAN RAILWAYS

Before several of these primary accounts are taken up in detail it may be interesting to ascertain whether any consistency exists in the operating expense for way and structures on various electric interurban lines. Table I has been compiled at random from typical roads now in operation:

TABLE I—SHOWING STATISTICS OF ACTUAL OPERATING EXPENSE FOR WAY AND STRUCTURES ON TEN TYPICAL ELECTRIC INTERURBAN RAILWAYS

Case	Miles of Track	Expense per Mile of Track per Annum
(1)	52	$999
(2)	128	558
(3)	83	794
(4)	180	430
(5)	45	774
(6)	170	474
(7)	222	519
(8)	67	760
(9)	122	426
(10)	46	661
Average in above cases		555
Average on 243,229 miles of steam road in 1911		1,519

The above statistics clearly bring out two points. In the first place, such a great variation in operating expense for way and structures as is shown by the typical roads cited is quite conclusive proof that we need look no farther for consistency in this item of expense. But the second point, one more surprising, is the very great comparative difference between the average expense per mile of track per annum on electric interurban railways and the similar expense on steam roads. While it is obvious that a steam-operated road, moving a great volume of heavy traffic, requires a greater expenditure of money to maintain its way and structures than does an electric road with its lighter equipment and a greatly reduced number of car-mile movements, still it does not seem logical that there should be so great a difference. The fact is that electric interurban railways are undoubtedly making less outlay than necessary for way and structures rather than that the railroads are making more than is necessary. The average age of the existing electric interurban lines is only about five or six years, and a sufficiently high standard of maintenance under such a condition has not been generally adopted. It is quite probable that even the minimum expenditure for way and structures on normal electric interurban railways under average conditions is considerably higher than the average amount in Table I.

MOST IMPORTANT PRIMARY ACCOUNTS UNDER WAY AND STRUCTURES

If it is true, as intimated in the preceding paragraph, that electric interurban railways on the average are paying less

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than is advisable for way and structures, a closer examination into what ought to be the limits of expenditure under such a heading for average normal conditions would be of value at this point.

The various primary accounts outlined by the Interstate Commerce Commission under the general account, way and structures, do not all rank equally in importance so far as the aggregate amount of this account is concerned. The expenses of superintendence and depreciation are less than that of maintenance, and the items constituting the bulk of the total maintenance cost on average lines are as follows: ties; roadway and track labor; bridges, trestles and culverts, and sundry items constituting maintenance of electric lines.

It is obviously impossible to lay down the exact amounts for these several expenses, but as a result of careful study a statement of figures can be made that undoubtedly approximate the average for normal electric interurban railways serving normal territories.

The average road has 2600 ties per mile and the average life of these ties is ten years. Thus an average of 260 ties per mile of track per year must be renewed, which at an average of 70 cents per tie is equivalent to $182 per mile of track per year.

On an estimate, under average conditions, of two men and a foreman to a section of 6 miles, the least cost of roadway and track labor per mile of track per year is approximately $250.

The item of maintenance of bridges, trestles and culverts will naturally vary a great deal on different roads but will average at least $50 per mile of track per year.

Sundry items constituting maintenance of electric lines, including also the maintenance of telegraph and telephone lines, will average at least $100 per mile of track per year.

Although the allowance for depreciation is less than that for maintenance, still it forms an item of considerable size. If we proceed on the assumption that twenty years' use of rail will reduce its value from the cost of new rail to the cost of relayer, then one-twentieth of $10 per ton will represent the approximate amount to be set aside to cover the depreciation of the rail. The average electric road uses rail weighing approximately 100 tons to the mile, which then would be equivalent to a yearly depreciation of $50 per mile for rail only. If this is added to the probable depreciation of bridges and other structures, at least $100 per mile of track per year will be required for this expense.

The sum of the above estimated amounts is $682 per mile of track per year, which, as we said before, constitutes the bulk of the total cost of way and structures on the average electric interurban line. An estimate of $150 per mile of track for all other items not specifically enumerated above, including superintendence, is a very low minimum, which makes the least total cost logical and reasonable for way and structures $832 per mile of track per year.

The result of our examination, therefore, has indicated the fact that the average minimum expenditure for way and structures on normal electric interurban railways, approximately set at $832 per mile of track per year, is considerably above the average of $555 for the typical lines cited in Table I. Moreover, it is only about one-half of the similar expense on steam railroads. This estimate, be it understood, is by no means radical. It would seem, therefore, that, on the basis of the information in Table I and the above approximate figures, definite conclusions might be drawn in regard to the outlay for way and structures on electric interurban lines, and the two that appear to sum up the case best are these:

(1) That electric interurban railways are not now bearing the burden of operating costs under the heading of way and structures that they will ultimately have to bear; and

(2) That the actual expense of way and structures on the average electric road will vary between $800 and $1,000 per mile of track per year.

EQUIPMENT

The first general account for electric interurban railways under the Interstate Commerce Commission system, that of way and structures, having been disposed of, we may next turn our attention to the one following, or the equipment account. This is subdivided as follows:

Primary accounts:

(29) Superintendence of equipment.
Maintenance of power equipment:
(30) Power-plant equipment.
(31) Substation equipment.
Maintenance of cars and locomotives:
(32) Passenger and combination cars.
(33) Freight, express and mail cars.
(34) Locomotives.
(35) Service cars.
Maintenance of electric equipment of cars and locomotives:
(36) Electric equipment of cars.
(37) Electric equipment of locomotives.
Miscellaneous equipment expenses:
(38) Shop machinery and tools.
(39) Shop expenses.
(40) Horses and vehicles.
(41) Other miscellaneous equipment expenses:
(42) Depreciation of equipment.
(43) Other operations—Dr.
(44) Other operations—Cr.

STATISTICS OF ACTUAL OPERATING EXPENSE FOR EQUIPMENT ON TYPICAL ELECTRIC INTERURBAN RAILWAYS

The statistics in Table II have been prepared from ten cases indiscriminately selected from normal electric interurban railways serving normal territories:

TABLE II—GIVING ACTUAL OPERATING EXPENSE FOR EQUIPMENT ON TEN TYPICAL ELECTRIC INTERURBAN RAILWAYS

Case	Car Miles Operated per Mile of Track per Year	Expense per Car Mile	Expense per Mile of Track per Year
(1)	33,756	$0.0210	$699
(2)	41,066	0.0193	790
(3)	25,478	0.0224	567
(4)	22,149	0.0233	471
(5)	20,527	0.0232	476
(6)	19,274	0.0209	402
(7)	15,856	0.0225	357
(8)	21,095	0.0203	428
(9)	18,593	0.0202	379
(10)	20,460	0.0285	582
Average	22,490	$0.0212	$482
Average on 243,229 miles of steam road in 1911			1,775

The statistics of the expense covered by the equipment account of steam roads, as indicated by the above table, are in no wise comparable to those of electric interurban railways, and the comparison serves only to show the approximate relation existing between them.

The statistics in regard to electric interurban lines indicate that 2 cents per car mile is the minimum expense for equipment and 3 cents per car mile is the maximum. The expense per car mile will, of course, depend wholly on the number of car mile movements. The ordinary electric interurban railway, rendering an hourly passenger service for the greater part of nineteen hours per day, with its additional movements in the way of trail cars, express, mail, freight and work cars, will operate between 15,000 and 20,000 car miles per mile of track per year. The result for roads rendering half-hourly service is approximately double that.

MAINTENANCE AND DEPRECIATION OF EQUIPMENT

The expenses for maintenance of way and structures and for maintenance of equipment on electric interurban railways vary considerably in amount. The maximum expense of maintaining equipment in operative condition is reached in a year or two after the equipment is put in service. Therefore well-managed lines are now bearing approximately the maximum burden of expense of maintaining equipment, while on the other hand, as stated before, a

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high standard of maintenance of way and structures has not been widely adopted.

This is not the only difference that exists between the two general accounts, however, for the amount per mile of track that must be set aside for depreciation of equipment exceeds that necessary for depreciation of way and structures. The question of adequate depreciation for equipment, however, is at the present time receiving more serious consideration. In general a passenger motor car, costing approximately $10,000, will operate on an average about 50,000 miles a year. On the assumption that such a motor car after operating twenty years will have depreciated to one-third of its original value, then the annual depreciation will be approximately 3½ per cent, or $350 per year, which is equivalent to seven-tenths of a cent per car mile. When this amount of depreciation is considered in connection with the minimum expense of 2 cents per car mile derived from Table II, it is evident that we are safe in drawing this conclusion—that the average expense in connection with equipment, if proper provision is made for depreciation, is approximately 3 cents per car mile, which is equivalent in the case of the basic hourly service to from $450 to $600 per mile of track per year.

TRAFFIC

The schedule of primary accounts under the third general heading of traffic is as follows:

Traffic expenses:

(45) Superintendence and solicitation.
(46) Advertising.
(47) Miscellaneous traffic expenses.

STATISTICS FOR ACTUAL OPERATING EXPENSE FOR TRAFFIC ON TYPICAL ELECTRIC INTERUBRAN RAILWAYS

Table III has been compiled from ten cases indiscriminately selected from normal electric interurban roads serving normal territories:

TABLE III—SHOWING ACTUAL OPERATING EXPENSE FOR TRAFFIC ON TYPICAL ELECTRIC INTERURBAN RAILWAYS

Case	Cost per Mile of Track per Annum
(1)	$10
(2)	46
(3)	38
(4)	64
(5)	53
(6)	61
(7)	20
(8)	89
(9)	114
(10)	94
Average	48
Average on 243,229 miles of steam road in 1911	234

The above statistics indicate that as yet electric interurban railways have not employed extensive organizations for the purpose of developing traffic. As the electric interurban railway develops into a commercial electric railway the traffic expense will be increased. The question of the proper extent of such an organization, from an economic point of view, depends much on local conditions, but, speaking generally, we may say that electric interurban railways should maintain more extensive departments for the development of traffic than is now the practice.

In so far as it is possible to make deductions from the limited figures available in the traffic expense field, it seems that an electric interurban railway should expend from $50 to $150 per mile of track per year for the purpose of maintaining an active traffic organization to secure the available business as rapidly as possible.

CONDUCTING TRANSPORTATION

Continuing our analysis of the general accounts prescribed by the Interstate Commerce Commission for electric interurban railroads, we find that the fourth heading, that of conducting transportation, is subdivided as follows:

Primary accounts:

(48) Superintendence of transportation.

Group I—Power

(49) Power-plant employees.
(50) Substation employees.
(51) Fuel for power.

Other power supplies and expenses:

(52) Water for power.
(53) Lubricants for power.
(54) Miscellaneous power-plant supplies and expenses.
(55) Substation supplies and expenses.
(56) Power purchased.
(57) Power exchanged—balance.
(58) Other operations—Dr.
(59) Other operations—Cr.

Group II—Operation of Cars

Conductors, motormen and trainmen:

(60) Passenger conductors, motormen and trainmen.
(61) Freight and express conductors, motormen and trainmen.

Miscellaneous transportation expenses:

(62) Miscellaneous car service employees.
(63) Miscellaneous car service expenses.

Station employees and expenses:

(64) Station employees.
(65) Station expenses.

Carhouse employees and expenses:

(66) Carhouse employees.
(67) Carhouse expenses.

Signal, interlocking, telephone and telegraph systems:

(68) Operation of signal and interlocking systems.
(69) Operation of telephone and telegraph systems.
(70) Express and freight collections and delivery.
(71) Loss and damage.
(72) Other transportation expenses.

STATISTICS OF ACTUAL OPERATING EXPENSE FOR CONDUCTING TRANSPORTATION ON TYPICAL ELECTRIC INTERURBAN RAILWAYS

Table IV, given herewith, has been compiled from statistics obtained from ten representative electric interurban railways on the subject of expense per car mile and per mile of track per year for conducting transportation:

TABLE IV—GIVING STATISTICS OF ACTUAL OPERATING EXPENSE FOR CONDUCTING TRANSPORTATION ON TYPICAL INTERURBAN RAILWAYS

Case	Car Miles Operated per Mile of Track per Year	Expense per Car Mile	Expense per Mile of Track per Year
(1)	33,756	$0.0855	$2,672
(2)	41,060	0.0793	3,242
(3)	25,478	0.1011	2,564
(4)	22,149	0.0895	1,978
(5)	20,527	0.0841	1,702
(6)	19,274	0.0821	1,562
(7)	15,856	0.1057	1,676
(8)	21,095	0.0893	1,884
(9)	18,593	0.1059	1,977
(10)	20,460	0.0845	1,727
Average	22,490	$0.0907	$2,040
Average on 243,229 miles of steam road in 1911			3,887

The results per car mile shown by the above roads are surprisingly uniform. The expense per mile of track per year will naturally vary directly with the frequency of service.

PRINCIPAL PRIMARY ACCOUNTS FOR CONDUCTING TRANSPORTATION

The principal items making up the aggregate expense of conducting transportation are: First—All of Group I, or that composed of the various power expenses. This expense, with the improvement of the art of generating electricity and with the increase in the volume of power generated, has a downward tendency. Second—The wages of employees engaged in conducting transportation. This expense has a slow upward tendency, due to the gradual increase in wages, which possibly compensates the downward tendency in the expense of the power group. The higher expense for wages on steam roads is due to the fact that one of the greatest savings effected by electric operation over steam operation is in the lower wage paid the train crews

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of electric trains as compared with train crews on steam trains. A motorman or conductor of an electric train gets approximately 1½ cents per train mile operated, while an engineer or conductor of a steam train gets about 3 cents per train mile operated.

The character of these principal items and, indeed, all the expenses of conducting transportation, and the fact that there is no depreciation charge, indicate that the operating lines are now carrying the approximate maximum burdens under this heading. It is evident from the statistics given above that the average expense of electric interurban lines for conducting transportation is about 9 cents a car mile, which is equivalent to from $1,350 to $1,800 per mile of track per year on roads maintaining a basic hourly schedule.

GENERAL AND MISCELLANEOUS

The last of the general headings designated by the Interstate Commerce Commission for electric interurban railway accounts is that of general and miscellaneous, the primary accounts under which are as follows:

Primary accounts:

General expenses.

Salaries and expenses of general officers and general office clerks.

(73) Salaries and expenses of general officers.
(74) Salaries and expenses of general office clerks.
(75) General office supplies and expenses.
(76) Law expenses.
(77) Relief department expenses.
(78) Pensions.
(79) Miscellaneous general expenses.
(80) Other operations—Dr.
(81) Other operations—Cr.
(82) Injuries and damages.
(83) Insurance.
(84) Stationery and printing.

Store and stable expenses.

(85) Store expenses.
(86) Stable expenses.
(87) Rent of tracks and terminals.
(88) Rent of equipment.

STATISTICS OF ACTUAL OPERATING EXPENSE FOR GENERAL AND MISCELLANEOUS ITEMS ON TYPICAL ELECTRIC INTERURBAN RAILWAYS

The expenses per car mile and per mile of track for general and miscellaneous items for ten typical electric interurban railways are as follows:

TABLE V—GIVING STATISTICS OF ACTUAL GENERAL AND MISCELLANEOUS OPERATING EXPENSES ON TEN ELECTRIC INTERURBAN RAILWAYS

Case	Car Miles Operated	Expense per Car Mile	Expense per Mile of Track per Year
(1)	33,756	0.0169	$561
(2)	41,066	0.0461	1,893
(3)	25,478	0.0403	1,022
(4)	22,149	0.0172	379
(5)	20,527	0.0479	887
(6)	19,274	0.0392	750
(7)	15,856	0.0199	315
(8)	21,095	0.0268	565
(9)	18,593	0.0393	718
(10)	20,460	0.0286	585
Average	22,490	0.0321	$730
Average on 243,229 miles of steam road in 1911			287

Reference to the individual items of the schedule of general and miscellaneous expenses will disclose the cause for much of the variation in this branch of operating expense in the above cases. The item of rental of tracks and terminals must of necessity introduce a very indeterminate quantity, and the other items are also readily seen to be subject to large variations. It will be noted that this general account is the only one under operating expense in which the electric roads exceed the steam roads. This condition is probably due to the fact that this account is divisible into much greater mileages on steam roads than on electric roads.

While no fixed costs can be determined as applicable to all electric interurban railways, yet from the above statistics it can be seen that an allowance of from 3 cents to 4 cents per car mile for general and miscellaneous operating expenses is adequate for the average electric road, which is equivalent to from $450 to $800 per mile of track per year for roads operating on a basis hourly schedule and using the tracks of other roads in entering terminals.

TOTAL OPERATING EXPENSE

We have now taken up one by one the five general operating expense accounts, ways and structures, equipment, traffic, conducting transportation and general and miscellaneous, and by means of an analysis of the primary accounts involved we have arrived at the decisive factors in the allowances necessary under these headings for a normal electric interurban railway serving normal territory. It would now be well to assemble these various results to obtain if possible a general deduction in regard to the total operating expense of such a line. The complete summary of the statistics for the cases already cited is given in Table VI:

TABLE VI—SHOWING A SUMMARY OF THE ACTUAL GENERAL OPERATING EXPENSES FOR THE TEN TYPICAL CASES BEFORE CITED

	Per Mile of Track per Year							
Case	Way and Structures	Equipment	Traffic	Conducting Transportation	General and Miscellaneous	Total	Car Miles Operated	Total Expense per Car Mile
(1)	$999	$699	$10	$2,672	$561	$4,950	33,756	$0.1495
(2)	558	790	46	3,242	1,893	6,521	41,066	0.1595
(3)	792	567	58	2,564	1,022	4,984	25,478	0.1965
(4)	430	471	64	1,978	379	3,322	22,149	0.1514
(5)	774	476	53	1,702	887	3,892	20,527	0.1892
(6)	474	402	61	1,562	750	3,249	19,274	0.1696
(7)	519	357	20	1,676	315	2,887	15,856	0.1821
(8)	760	428	89	1,884	565	3,726	21,095	0.1766
(9)	426	379	114	1,977	718	3,614	18,593	0.1949
(10)	661	582	94	1,727	585	3,649	20,460	0.1784
Average	$562	$482	$48	$2,049	$730	$3,872		$0.1702
Average on 243,229 miles of steam road in 1911						$7,957		

The above statistics indicate that the approximate average expense per mile of track per year for electric operation is one-half that for steam railroad operation. These statistics also show that the average expense of operating the roads represented by the above cases, under the system of accounting now in vogue, is approximately 17 cents per car mile.

GENERAL CONCLUSIONS CONCERNING THE COST OF OPERATING ELECTRIC INTERURBAN RAILWAYS

From the preceding discussion of the operating expense of existing electric interurban railways and the discussion of elements of the operating expense not now properly taken into account, the general summary of the approximate operating expense of a normal electric interurban railway shown in Table VII has been prepared:

TABLE VII—SHOWING THE ESTIMATED OPERATING EXPENSE UNDER THE GENERAL OPERATING EXPENSE ACCOUNTS FOR NORMAL ELECTRIC INTERURBAN RAILWAYS

Operating Account	Expense per Mile of Track per Year	
Way and structures	$806	$1,000
Equipment	450	600
Traffic	50	150
Conducting transportation	1,350	1,800
General and miscellaneous	450	800
Total	$3,100	$4,350

These figures of $3,100 to $4,350 for the operating expense of electric interurban railways apply to such as serve normal territories and operate a basic schedule of hourly service.

TAXES

One other important expense which an electric interurban railway has to meet and which is not included in the operating expense, that of taxes, may well be considered at this point. Taxes vary largely on different roads in different states, as illustrated by the statistics in Table VIII.

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The variation in taxes per mile of road as indicated is largely due to the fact that the electric interurban railway is of modern date and no uniform valuation for the assessment of these properties has been established in the various states. The fact that the taxes on electric interurban railways are considerably below those on steam railway lines indicates that the former are likely to have a general upward tendency, until they approximately equal those of the steam railways. As a general conclusion it may be stated that taxes on electric interurban railways will be increased, and that $250 per mile of track per year is the minimum amount that can be safely used for estimating this item.

TABLE VIII—SHOWING THE ACTUAL TAXES ASSESSED ON TEN TYPICAL ELECTRIC INTERURBAN RAILWAYS

Case	State	Miles of Track	Total Taxes	Taxes per Mile of Track
(1)	Indiana	58.7	$11,729	$199
(2)	Indiana	32	3,870	121
(3)	Illinois	406	117,147	288
(4)	Illinois	160	51,090	318
(5)	Iowa	74	9,525	128
(6)	Ohio	222	41,312	186
(7)	Ohio	41	6,122	149
(8)	New York	180	29,289	162
(9)	Connecticut	21	7,511	357
(10)	Massachusetts	21	2,016	96
Average taxes per mile of track				$156
Average on 243,229 miles of steam road in 1911				448

COST OF CONSTRUCTION

Thus far in this article we have covered the salient points in connection with the operating expense of existing electric interurban railways and deduced the general principles underlying this operating feature for a proposed electric interurban railway. But the promoter and investor desire to know about more than operating expense, more even than the subject of the previous article, operating revenue. They are also highly concerned in the subject of cost of construction, and we shall now take up this other division of our subject and endeavor to give general estimates that may be of value to a proposed electric interurban line.

CLASSIFICATION OF CONSTRUCTION COSTS

Expenditures for the road and equipment of electric railways, as prescribed by the Interstate Commerce Commission in accordance with Section 20 of an act to regulate commerce, fall under three main heads:

General accounts:

I. Road.
II. Equipment.
III. General expenditures.

Each of these general headings is divided by the commission into detailed primary accounts, as follows:

Primary accounts:

I. Road:
(1) Engineering and superintendence.
(2) Right-of-way.
(3) Other land used in electric railway operation.
(4) Grading.
(5) Ballast.
(6) Ties.
(7) Rails, rail fastenings and joints.
(8) Special work.
(9) Underground construction.
(10) Paving.
(11) Track laying and surfacing.
(12) Roadway tools.
(13) Tunnels.
(14) Elevated structures and foundations.
(15) Bridges, trestles and culverts.
(16) Crossings, fences, cattle guards and signs.
(17) Interlocking and other signal apparatus.
(18) Telegraph and telephone lines.
(19) Poles and fixtures.
(20) Underground conduits.
(21) Transmission system.
(22) Distribution system.
(23) Dams, canals and pipe lines.
(24) Power-plant buildings.
(25) Substation buildings.
(26) General office buildings.
(27) Shops and carhouses.
(28) Stations, waiting rooms and miscellaneous buildings.
(29) Docks and wharves.
(30) Power-plant equipment.
(31) Substation equipment.
(32) Shop equipment.
(33) Park and resort property.
(34) Cost of road purchased.

II. Equipment:
(35) Cars.
(36) Locomotives.
(37) Electric equipment of cars.
(38) Other rail equipment.
(39) Miscellaneous equipment.

III. General expenditures:
(40) Law expenses.
(41) Interest.
(42) Injuries and damages.
(43) Taxes.
(44) Miscellaneous.

It is obvious that no fixed rule may be laid down for the amount of money to be expended by a proposed electric interurban railway for any of the above items, and they are so numerous and the outlays of the existing companies for them so varied that we shall not take the space here for the detail work leading up to our generalizations. Suffice it to say that as a result of careful study of the cost of construction of existing roads we have arrived at maximum and minimum expenditures for each item that fairly approximate the limits of outlay of a proposed electric interurban railway under average conditions. Taking up each primary account, therefore, under the number given it in the above classification, we shall state only what it covers and our estimated limits of expenditure for it.

PRIMARY ACCOUNTS FOR ROAD CONSTRUCTION

What each primary account under the first main heading of road construction includes and what a promoter may figure on expending therefor is shown by the following:

(1) Engineering and superintendence:

This account covers expenditures for services of engineers, draftsmen, superintendents employed on preliminary and construction work and all expenses incidental to the work. This item will run approximately 5 per cent of the cost of the work and will vary between $1,000 and $2,000 per mile of single track.

(2) Right-of-way:

This includes the cost of land acquired for roadbed and all expenses incidental thereto, such as cost of condemnation proceedings, abutting property damages, etc. The cost of procuring right-of-way is entirely dependent on local conditions, and no set rule can be established. The right-of-way will measure 2 acres per mile for each rod in width, and a well-constructed line should be 4 to 5 rods in width, making a total of from 8 to 10 acres per mile. It may be roughly estimated that the acreage cost of right-of-way will be twice the prevailing acreage price of the adjacent land. On a line constructed through a farming country in which the land is worth $100 an acre, therefore, the right-of-way will probably cost $200 an acre, or $2,000 per mile, for 5 rods in width.

(3) Other land used in electric railway operations:

This covers the cost of land acquired for use in operating the road other than for roadbed purposes. In general, this item of cost is small and is made up almost wholly of the cost of the ground for power house and carhouse purposes. It may be roughly estimated at from $100 to $500 per mile of track.

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(4) Grading:

The cost of grading the roadbed and all things incidental to the making of the roadbed, such as retaining walls, rip-rap, ditches for waterway, etc., comes under this heading. The amount of grading is entirely dependent upon the topography of the country traversed and the maximum gradient under which the line is built. For a well-constructed line it may be generally estimated that the grading will vary beween 10,000 cu. yd. and 20,000 cu. yd. per mile, at an average cost of from 25 cents to 30 cents per cubic yard, making the approximate limits $2,500 and $6,000 per mile of track.

(5) Ballast:

Ballast includes the cost of material used and the expenses of loading, hauling, transporting and unloading along the track. The ballast used will vary from 2000 cu. yd. to 3000 cu. yd. per mile, and the cost will vary, with the availability of the material, from 75 cents to $1.50 per cubic yard, making the approximate cost per mile of track vary between $1,500 and $4,500.

(6) Ties:

This heading includes the cost of cross, switch, bridge and other ties, and the cost of transportation, inspection, handling, and preservation, but not the final distribution. Ties will run approximately 2600 to the mile, and will vary in cost from 70 cents to $1, making the cost from $1,820 to $2,600 per mile.

(7) Rails, rail fastenings and joints:

This is similar to the above, covering the cost of rails, rail fastenings and joints, and transportation, inspection and handling, but not the final distribution. The quantity will vary with the weight of the rail used. An 80-lb. rail weighs 126 tons per mile, and a 70-lb. rail weighs 110 tons per mile. The price of the rail will be about $30 per ton. The cost of rail fastenings and joints will be about 11 per cent of the cost of the rail, so that the cost per mile for a 70-lb. rail, with fastenings and joints, will be approximately $3,700 and for an 80-lb. rail approximately $4,200.

(8) Special work:

By this is meant the cost of steam and street railway crossings, switches, turn-outs, etc., including transportation, inspection and handling, but not the final distribution. The special work expense will vary with local conditions but will usually be between $400 and $600 per mile of track.

(9) Underground construction:

This refers only to railways operated by underground electric contacts and therefore does not apply to electric interurban railways.

(10) Paving:

This embraces the cost of labor and material for paving between rails and the outside thereof, as may be required by city ordinances. As electric interurban railways generally operate over leased tracks into cities with paved streets, this item does not usually enter into the cost of constructing roads. If it does enter into the construction expense, the expense will vary in proportion to the amount of paving required.

(11) Track laying and surfacing:

The cost of distributing the track materials and of constructing the track, together with the cost of spreading the ballast and placing it under the track, are all included herein. This cost will vary from $800 to $1,200 per mile of track.

(12) Roadway tools:

This heading covers the cost of the first outfit of tools necessary to equip the maintenance of way and structures gangs for properly maintaining and repairing the property when it is opened for the handling of commercial traffic. It may be roughly estimated at $50 per mile.

(13) Tunnels:

The cost of tunneling, material used and labor expended in the construction of tunnels are factors in this account. As tunnels are rare on electric interurban railways, however, this item will not be further considered.

(14) Elevated structures and foundations:

This refers only to companies operating elevated railway systems and does not apply to electric interurban railways.

(15) Bridges, trestles and culverts:

These items include the cost of materials used and labor expended in the construction of bridges and trestles, both substructure and superstructure, erected to carry tracks over streams, ravines or the tracks of other railways, and of culverts. The expenditure here depends absolutely upon the local conditions and will show a great variation on different roads. For the general purpose of showing the approximate cost to electric interurban railways, it may be assumed to vary between $2,000 and $4,000 per mile of track.

(16) Crossings, fences, cattle guards and signs:

This account contains the cost of material used and labor expended in constructing street, road and farm crossings at grade, overhead bridges, viaducts, fences, cattle guards, etc. The cost may be roughly stated at varying between $500 and $1,000 per mile.

(17) Interlocking and other signal apparatus:

This heading covers the cost of material used and labor expended in constructing interlocking and other signal apparatus, complete. The outlay per mile will depend entirely upon the amount of signaling installed. As most roads have been constructed without the installation of any signal system, however, the cost may be said to vary from a nominal sum to $2,500 per mile.

(18) Telegraph and telephone lines:

By this heading is meant the cost of material used and labor expended in constructing telegraph and telephone lines, for use in dispatching and other business of the railway. This item will vary in cost from $100 to $500 per mile.

(19) Poles and fixtures:

This account contains the cost of poles, cross-arms, insulating pins, brackets and other pole fixtures, also other structures for supporting overhead transmission lines, and all labor expended in connection with the construction of pole lines or structures. These items will vary from $500 to $1,500 per mile in cost.

(20) Underground conduits:

This embraces the cost of material and labor expended in constructing conduits required for underground wires and cables. It does not usually enter into the construction of electric interurban railways and therefore will not be considered as a probable cost of construction.

(21) Transmission system:

The transmission system account is composed of the cost of the high-tension transmission system, including cables, wires, insulators and insulating material. The cost will vary between $500 and $1,200 per mile of track.

(22) Distribution system:

Here is included the cost of material used and labor expended in constructing the distributing system for transmission of low-tension power, including insulators and connections; track bonding and all labor incidental to the same; overhead trolley lines, including cost of trolley, guard, span, strain and other wires; the cost of the third rail and all materials used and labor expended incidental to laying the third rail. The expenditure in this case will vary from $1,500 per mile (in the case of overhead lines) to $5,000 per mile for the third rail.

(23) Dams, canals and pipe lines:

This has reference primarily to dams and canals, etc., for the utilization of water power, which, not being a usual feature in the construction of electric interurban railways, will not be further considered.

(24) Power-plant buildings:

This covers the cost of material used and labor expended in erecting buildings to be used for power generating plants, as well as the excavations, gas and water pipe connections, etc., incidental thereto. The cost here will vary between $15 and $20 per kilowatt of station capacity, which capacity

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will range from 40 kw to 60 kw per mile of track, making the cost of the power house buildings from $600 to $1,200 per mile of track.

(25) Substation buildings:

This caption embraces the cost of material used and labor expended in erecting buildings for use as power substations. The cost will range between $300 and $500 per mile of track.

(26) General office buildings:

As it is unusual for electric interurban railways to own a general office building in fee, this cost will be eliminated from this discussion.

(27) Shops and carhouses:

The cost of material used and labor expended on buildings to be used as shops, sheds or carhouses, and on plants for furnishing power for heating and lighting, is included in this account, as well as the cost of construction of oil houses, sand houses and storehouses. This outlay will vary between $400 and $600 per mile of track.

(28) Stations, waiting rooms and miscellaneous buildings:

This covers the cost of material used and labor expended in the erection of stations, waiting rooms and other buildings not heretofore classified. It includes also the furniture and fixtures used to complete these buildings. This cost will run from $100 to $200 per mile of track.

(29) Docks and wharves:

As this item is not usual in electric interurban railway construction, it will not be considered further.

(30) Power-plant equipment:

By this heading is meant the cost of material and labor expended in equipping plants for generating power; the cost of engines, boilers, pumps, condensers and all equipment for generating electric current, and also the cost of foundations for any of the foregoing equipment, switchboards and all fixtures and appliances connected therewith. This item of cost will vary between $50 and $75 per kilowatt of capacity, and as the power requirements will vary from 40 kw to 60 kw per mile of track, the cost will be between $2,000 and $4,500 per mile of track.

(31) Substation equipment:

Here is embraced the cost of material used and labor expended in equipping power substations and the cost of storage batteries, transformers, rotary converters, switchboard and foundations therefor. The outlay will vary between $750 and $1,500 per mile of track.

(32) Shop equipment:

This includes the cost of machinery and tools used in shops and carhouses, including also boilers, engines, motors and all appliances and tools first necessary to equip the shops. The estimated expenditure for this account is from $150 to $300 per mile of track.

(33) Park and resort property:

The cost of property for amusement parks or resorts is herein provided for. As this is not an essential to the construction of an electric interurban railway, it will not be considered in this discussion.

(34) Cost of road purchased:

For obvious reasons this item will also be eliminated from this discussion.

PRIMARY ACCOUNTS FOR COST OF EQUIPMENT

Following out the same plan as given for the cost of road construction, we find that the information concerning the primary cost of equipment accounts may be classified as follows:

(35) Cars:

This account covers all expenditures for passenger, baggage, express, freight, mail and other cars, from the operation of which revenue is to be derived, and the car bodies, trucks, and all fixtures or appliances inside of, or attached to, the car bodies or trucks except the electric equipment of the cars. Electric interurban railways require from one car for every 5 miles operated to one car for every 3 miles operated. Cars will vary in cost from $4,000 to $8,000, and therefore the cost of this item will be between $800 a mile and $2,600 a mile.

(36) Locomotives:

This means all expenditures for locomotives, including all appurtenances, furniture, fixtures and electric equipment, necessary to fit them for service. As locomotives are not essential to the service rendered by an electric interurban railway, this item will not be considered as a necessary construction cost.

(37) Electric equipment of cars:

This includes all expenditures for electrical equipment and wiring of all cars of whatsoever nature. The outlay for this will vary from $3,000 to $5,000 per car and from $600 to $1,600 per mile of track.

(38) Other rail equipment:

Herein are grouped all expenditures for water cars, sprinkling cars, sand cars, salt cars, supply cars, and other work cars; also snow plows, sweepers and scrapers. This cost will vary between $200 and $500 per mile.

(39) Miscellaneous equipment:

This account contains all expenditures for horses, wagons, harness, automobiles and other road equipment. As the expenditures under this item are relatively small, the cost is considered negligible and is therefore eliminated.

PRIMARY ACCOUNTS FOR GENERAL CONSTRUCTION EXPENDITURES

The various primary accounts prescribed by the Interstate Commerce Commission for general expenditures in connection with construction are as follows, with our estimate of cost for each item:

(40) Law expenses:

By these are meant expenditures for counsel, solicitors and attorneys, their clerks and attendants and expenses of their offices, together with all incidental legal expenses during the construction of the road. This cost will run from $200 to $500 per mile of track.

(41) Interest:

This includes the interest on the moneys used incidental to, and during the period of, construction but does not include discounts and commissions on securities issued for construction purposes. This will vary from $1,000 to $2,000 per mile of track.

(42) Injuries and damages:

This account covers all expenses incidental to injuries to persons or damages to property caused directly in connection with the construction of the road and equipment. The expenditure necessitated here will lie between $100 and $200 per mile of track.

(43) Taxes:

This embraces all taxes and assessments levied and paid on the company's property while under construction. This outlay usually amounts to very little and is estimated at from $50 to $100 per mile of track.

(44) Miscellaneous:

Under this caption are grouped all organization expenses, including the payment of all organization fees, the cost of preparing certificates of stocks and bonds, the payment of trustees' fees, expenses incurred in the disposal of securities, salaries and expenses of executive and general officers of a road under construction and general office clerks, rent of office space, and all items of special and incidental nature which cannot properly be charged to any other account in this classification. The cost here will vary from $500 to $1,000 per mile of track.

SUMMARY OF CONSTRUCTION COSTS

In the above discussion we have taken up one by one the primary road, equipment and miscellaneous construction accounts and given for each one what we deemed to be fair maximum and minimum limits of expenditure for a proposed electric interurban railway under average conditions. It might be to the reader's advantage now briefly to summarize these estimates in table form, in order that he may see

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at a glance their sum total and relative weights. This information is accordingly presented in Table IX.

TABLE IX—SHOWING A SUMMARY OF THE PRIMARY CONSTRUCTION COSTS PREVIOUSLY CITED FOR A PROPOSED ELECTRIC INTERURBAN RAILWAY

	Accounts	Cost per Mile of Track Minimum	Maximum
(1)	Engineering and superintendence	$1,000	$2,000
(2)	Right-of-way	2,000	4,000
(3)	Other land used in electric railway operations	100	500
(4)	Grading	2,500	6,000
(5)	Ballast	1,500	4,500
(6)	Ties	1,820	2,600
(7)	Rails, rail fastenings and joints	3,700	4,200
(8)	Special work	400	600
(9)	Underground construction	...	...
(10)	Paving	...	...
(11)	Track laying and surfacing	800	1,200
(12)	Roadway tools	50	50
(13)	Tunnels	...	...
(14)	Elevated structures and foundations	...	...
(15)	Bridges, trestles and culverts	2,000	4,000
(16)	Crossings, fences, cattle guards and signs	500	1,000
(17)	Interlocking and other signal apparatus	...	2,500
(18)	Telegraph and telephone lines	100	500
(19)	Poles and fixtures	500	1,500
(20)	Underground conduits	...	...
(21)	Transmission system	500	1,200
(22)	Distribution system	1,500	5,000
(23)	Dams, canals and pipe lines	...	...
(24)	Power-plant buildings	600	1,200
(25)	Substation buildings	300	500
(26)	General office buildings	...	...
(27)	Shops and carhouses	400	600
(28)	Stations, waiting rooms and miscellaneous buildings	100	200
(29)	Docks and wharves	...	...
(30)	Power plant equipment	2,000	4,500
(31)	Substation equipment	750	1,500
(32)	Shop equipment	150	300
(33)	Park and resort property	...	...
(34)	Cost of road purchased	...	...
(35)	Cars	800	2,600
(36)	Locomotives	...	...
(37)	Electric equipment of cars	600	1,600
(38)	Other mail equipment	200	500
(39)	Miscellaneous equipment	...	...
(40)	Law expenses	200	500
(41)	Interest	1,000	2,000
(42)	Injuries and damages	100	200
(43)	Taxes	50	100
(44)	Miscellaneous	500	1,000
	Total	$26,720	$58,650

GENERAL CONCLUSIONS CONCERNING COST OF CONSTRUCTION

The summary in the above table shows that the probable limits of cost for the construction of electric interurban railways are $26,720 and $38,650. These figures clearly indicate the possible wide variation of such expenditures. The approximate average cost of constructing existing electric interurban railways that are in the category of what are herein called normal electric interurban railways was about $35,000 per mile. It is true, on the other hand, that there are a number of roads, also qualifying as normal roads, which cost less than the minimum shown in the summary in Table IX, due perhaps to the lack of sufficient car equipment, of power plant buildings or equipment, or of any other elements of construction. Such a low construction cost might also be caused by the company having been subsidized by monetary subscriptions, free right-of-way or other benefits. At any rate, the figures for the average case are those given above, and they should prove enlightening to those who are laboring under the erroneous impression that electric interurban railways can be built for insignificant amounts.

We have endeavored thus far to obtain by a study of existing electric interurban railways general figures for construction costs that will be of value to the layman interested in such projects. These figures are not definite, however; they cannot be, for it is difficult to give even an approximate statement with regard to the cost of building a proposed line unless a full knowledge has been obtained of the constructional elements entering therein and of the requirements for power and car equipment. As in the case of determining operating revenue, it would be best to leave it to a competent expert, of good judgment, to estimate this cost of construction, yet we believe that if the layman makes a proper study of conditions surrounding the projected enterprise, he will be aided in judging its worth by a reference to Table IX to find out the maximum and minimum limits for normal roads fully equipped with the necessary power stations and cars and operating in normal territory. He must distinctly bear in mind, however, that none of these conclusions refers to abnormal lines serving abnormal territory. In fact, many short electric roads have been constructed with light rail and equipment for astonishingly low costs, but usually the advantage of the low cost of construction has been offset by the high cost of operation.

FURTHER DISCUSSION

In this and the preceding article we have been discussing proposed electric interurban railways from the three general standpoints of operating revenue, operating expense and cost of construction, and from the experience of existing lines we have carefully compiled statistics in regard to these subjects that should be of value to both promoter and investor. The time has now come for us to get a bird's-eye view of all these factors combined. The last article, therefore, will bring this about by stating the general economic relations that exist between these three topics previously discussed and by means of a hypothetical case will show the application of the principles and figures heretofore deduced.

MAINTENANCE ON THE PACIFIC ELECTRIC

Through the courtesy of the Pacific Electric Railway, Los Angeles, the following statistics are published of cost of maintenance of car equipment on that system. Data are also published upon the monthly averages of car failures, the cost of lubricating all cars and wheel mileage.

TABLE I, SHOWING AVERAGE COST OF MAINTENANCE OF EQUIPMENT PER CAR MILE, ETC.

	1907 Cents	1908 Cents	1909 Cents	1910 Cents	1911 Cents
Average cost of power for operating cars, per ton mile	0.1196	0.1420	0.1208	0.1125	0.1096
Average cost of maintenance of passenger cars, other than electrical equipment, per car mile	2.22	2.30	2.12	1.69	1.51
Average cost of maintenance of electrical equipment for all cars, per car mile	1.46	1.57	1.21	1.28	.92
Average cost of maintenance of electrical equipment for motor cars only, per car mile	1.60	1.64	1.33	1.52	1.03

TABLE II, SHOWING MONTHLY AVERAGES OF CAR FAILURES

	Cars Operated		Failures		Mileage	
Year	Total	Per Failure	Total	Per Cent of Cars Operated	Total	Per Failure
1907	9,948	31	314	3.15	1,246,580	3,970
1908	9,431	86	109	1.15	1,166,409	10,701
1909	9,367	123	76	0.81	1,203,232	15,832
1910	9,943	192	52	0.52	1,356,056	26,078
1911	9,994	158	63	0.63	1,665,783	26,441
1912	15,282	163	94	0.62	2,077,118	22,097

TABLE III, SHOWING COST OF LUBRICATING ALL CARS

Year	Total Mileage, All Cars	Cost Material Total	Cost Material Per 1000 Car Miles, Cents	Cost Labor Total	Cost Labor Per 1000 Car Miles, Cents	Cost of Labor and Material Total	Cost of Labor and Material Per 1000 Car Miles, Cents
1907	.....	....	1.4054	....	1.0061	.....	2.4115
1908	10,467,391	$6,475	0.6186	$8,108	0.7746	$14,583	1.3932
1909	11,976,222	7,256	0.6059	7,910	0.6605	15,166	1.2664
1910	14,316,722	6,110	0.4267	7,036	0.4915	13,146	0.9182
1911	19,699,081	7,607	0.3862	7,593	0.3855	15,200	0.7717
1912	29,892,269	12,946	0.3996	10,639	0.3559	23,586	0.7555

Note.—Averages for 1907 based on statistics for last six months of year, no figures being available preceding July, 1907.

TABLE IV, SHOWING MONTHLY AVERAGES OF CAR WHEELS SCRAPED AND MILEAGE MADE BY THEM

Make and Description	1909 No.	1909 Average Mileage	1910 No.	1910 Average Mileage	1911 No.	1911 Average Mileage	1912 No.	1912 Average Mileage
Manufacturer "A":								
30-in. single-plate	53.1	40,998	37.5	46,904	6.3	23,518	1.1	32,074
30-in. double-plate	52.7	41,118	40.7	45,447	57.6	44,914	40.9	56,051
33-in. double-plate	81.4	37,830	41.1	44,389	25.3	36,896	23.3	48,904
Manufacturer "B":								
33-in. double-plate	23.0	37,685	74.4	41,104	38.7	45,910	.3	22,819
30-in. double-plate	2.4	35,214	10.7	52,515	6.8	72,138	4.4	68,129
30-in. single-plate	1.2	35,339	6.2	45,780	...	.....	9.7	53,842
33-in. double-plate	...	.....	...	.....	...	.....	2.4	43,275
Total	213.8	38,031	210.6	46,023	134.7	43,257	82.1	53,615
Wheels with incomplete mileage record	15.6	.....	43.0	.....	74.5	.....	90.4	.....
Total number wheels scraped	229.3	.....	253.6	.....	210.5	.....	172.7	.....

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Program for A. E. R. A. Convention

The Program for the Meetings of the American Electric Railway Association and Its Affiliated Organizations Has Been Made Public, and This Is Presented in Full

The annual convention of the American Electric Railway Association and its affiliated organizations will be held at Young's Pier in Atlantic City, N. J., Oct. 13-17, 1913. The meetings of the several associations will take place in accordance with the following program, the meeting place for each association being included with its individual program. All sessions of the American Association are without exception to be open to persons interested in the proceedings. The programs as published are, of course, subject to minor revisions, and in some cases they are incomplete. Any changes or additions which may be made will therefore be announced in later issues of the ELECTRIC RAILWAY JOURNAL.

PROGRAM OF AMERICAN ASSOCIATION

Meetings will be held in the Greek Temple, Convention Pier.

Tuesday, Oct. 14

9:30 a. m. to 12:30 p. m.

Registration and distribution of badges at booth, entrance to Young's Million-Dollar Pier.

2 p. m. to 5 p. m.

Annual address of president.
Annual report of executive committee.
Annual report of secretary-treasurer.
Announcements.
New business.
Reports of committees:
- (a) Subjects—James D. Mortimer, chairman, Milwaukee Electric Railway & Light Company.
- (b) Membership (Company)—Richard McCulloch, chairman, United Railways of St. Louis.
- (c) Membership (Individual)—John L. O'Toole, chairman, Public Service Railway.
- (d) Education—Prof. H. H. Norris, chairman.

Addresses on "Valuation."
- (a) "Physical Valuation." Speaker to be announced later.
- (b) "Franchise Values," Frank Bergen, Public Service Corporation of New Jersey.
- (c) "Other Elements of Value," C. M. Rosecrantz, Milwaukee Electric Railway & Light Company. University of Michigan."

Wednesday, Oct. 15

2 p. m. to 5 p. m.

Appointment of nominating committee.
Reports of committees:
- (a) Insurance—H. J. Davies, chairman, Cleveland Railway.
- (b) Public Relations—Thomas N. McCarter, chairman, Public Service Railway.
- (c) *Aera* Advisory—C. Loomis Allen, chairman, Newport News & Old Point Railway & Electric Company.

Address, "Publicity Work in Detroit," by A. B. Van Zandt, Detroit United Railway.
- (d) Welfare of Employees—J. J. Burleigh, chairman, Public Service Railway.

Addresses on "Profit Sharing with Employees"—
- (a) W. F. Ham, Washington Railway & Electric Company.
- (b) David W. Ross, Interborough Rapid Transit Company.

Reports of special committees:
- (a) Electrolysis—Calvert Townley, chairman, Lackawanna & Wyoming Valley Rapid Transit Company.
- (b) Company Sections—C. N. Duffy, chairman, Milwaukee Electric Railway & Light Company.
- (c) Gold Medal—E. C. Foster, chairman, Manchester Traction, Light, Heat & Power Company.
- (d) Constitution and By-laws—C. L. Henry, chairman, Indianapolis & Cincinnati Traction Company.
- (e) Relations with Sectional Associations—C. L. Henry, chairman, Indianapolis & Cincinnati Traction Company.

Address on "The Relations of Carriers to the Development of the Territory They Serve," by Paul Shoup, Pacific Electric Railway.
Address on "The Relief of City Congestion by the Construction of Subways and Viaducts," by C. S. Sergeant, Boston Elevated Railway.

Thursday, Oct. 16

2 p. m. to 5 p. m.

Reports of committees:
- (a) Compensation for Carrying United States Mail—T. H. Tutwiler, chairman (resigned), Memphis Street Railway.
- (b) Taxation Matters—C. L. S. Tingley, chairman, American Railways Company.
- (c) Federal Relations—Arthur W. Brady, chairman, Union Traction Company of Indiana.
- (d) Joint Use of Poles—W. J. Harvie, chairman, Hagerstown & Frederick Railway.
- (e) Cost of Passenger Transportation Service—James D. Mortimer, chairman, Milwaukee Electric Railway & Light Company.

Address, "Electric Railway Securities from the Investor's Viewpoint," by C. W. Beall, Harris, Forbes & Company, New York.
Addresses on "Present Tendency of Public Utility Laws and Regulations"—
- (a) Frank Hedley, Interborough Rapid Transit Company.
- (b) C. L. S. Tingley, American Railways Company.
- (c) Richard McCulloch, United Railways Company of St. Louis.

Report of the committee on nominations.
Election of officers.
Installation of officers.
Resolutions.
Unfinished business.
Adjournment.

PROGRAM OF ACCOUNTANTS' ASSOCIATION

Regular meetings will be held in Accountants' Hall, on second floor of Convention Pier.
Joint meetings with Engineering Association will be held in Engineers' Hall, Convention Pier.
Joint meetings with Transportation & Traffic Association will be held in Greek Temple, Convention Pier.

Monday, Oct. 13

2 p. m. to 5 p. m.

Registration and distribution of badges at booth, entrance to Young's Million-Dollar Pier.

Tuesday, Oct. 14

9:30 a. m. to 12:30 p. m.

Annual address of president.
Annual report of executive committee.
Annual report of secretary-treasurer.
Reports of committees:
- (a) Education—F. J. Pryor, Jr., chairman, American Railways Company.

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(b) Destruction of Records—H. S. Swift, chairman, Toledo Railways & Light Company.

Paper, "Sinking Funds," by W. H. Forse, Jr., Union Traction Company of Indiana.

(c) Standard Classification of Accounts—H. L. Wilson, chairman, Boston Elevated Railway Company.

(d) To Represent Association at Convention of Railway Commissioners—W. F. Ham, chairman, Washington Railway & Electric Company.

Appointment of committees:

(a) Resolutions.

(b) Nominating.

New business.

1 p. m.

"Get Together" Luncheon, Marlborough-Blenheim Hotel.

Wednesday, Oct. 15

9:30 a. m. to 12:30 p. m.

Joint session with the Transportation & Traffic Association.

Reports of committees:

(a) Prepayment car operation (Accountants' Association), M. R. Boylan, Public Service Railway; and Fares and Transfers (Transportation & Traffic Association), F. T. Wood, chairman, New York Railways.

(b) Express and Freight Traffic—F. D. Norviel, chairman, Union Traction Company of Indiana.

(c) Express and Freight Accounting—Walter Shroyer, Union Traction Company of Indiana, and J. K. Choate, J. G. White Management Corporation, co-chairmen.

(d) Statistical Unit for Car Operation—C. H. Lahr, Northern Ohio Traction Company, and C. B. Buchanan, Virginia Railway & Power Company, co-chairmen.

(c) Best Methods of Collecting and Accounting for Variable Rates of Fare (acting with the Committee on Determining the Cost Passenger Transportation Service), M. R. Boylan, chairman, Public Service Railway.

Address, "Factors Affecting the Cost of Passenger Service," by Edwin Gruhl, Milwaukee Electric Railway & Light Company.

Thursday, Oct. 16

9:30 a. m. to 12:30 p. m.

Joint session with Engineering Association.

Reports of joint committees:

(a) Engineering Accounting—F. B. Lasher, Republic Railway & Light Company, and J. H. Hanna, Capitol Traction Company, co-chairmen.

Address, "Engineering Accounting." Speaker to be announced later.

(b) Life of Railway Physical Property—R. N. Wallis, Fitchburg & Leominster Street Railway, and Martin Schreiber, Public Service Railway, co-chairmen.

Address, "Life of Railway Physical Property." Speaker to be announced later.

Friday, Oct. 17

9:30 a. m. to 12:30 p. m.

Reports of committees:

(a) Interline Accounting—L. T. Hixson, chairman, Terre Haute, Indianapolis & Eastern Traction Company.

Paper, "A Unit Cost Work Order System," by G. W. Kalweit, Milwaukee Electric Railway & Light Company.

Paper, "Accounting Department Conferences," by F. B. Lasher, Republic Railway & Light Company.

(b) Co-operating with the United States Bureau of the Census—A. L. Linn, Jr., chairman, Harrison Williams, New York.

Address, "The Census of Electric Railways," by William M. Steuart, United States Bureau of the Census.

(c) Overhead Charges—P. S. Young, chairman, Public Service Railway.

Address "Overhead Charges," by Henry Floy, New York.

Report of committee on resolutions.

Report of nominating committee.

Election of officers.

Installation of officers.

Adjournment.

PROGRAM OF ENGINEERING ASSOCIATION

As in 1911 and 1912, there are to be no afternoon sessions, except on Monday, and the large amount of work to come before the convention will, therefore, require all meetings to be started promptly at scheduled hour. The afternoons of Tuesday, Wednesday, Thursday and Friday will be available for the inspection of exhibits.

All regular and joint sessions will be held in Engineers' Hall, Convention Pier.

Monday, Oct. 13

9:30 a. m. to 12:30 p. m.

Registration and distribution of badges at booth, entrance to Young's Million-Dollar Pier.

2 p. m. to 5:30 p. m.

Annual address of president.

Annual report of executive committee.

Annual report of secretary-treasurer.

Appointment of convention committees.

Reports of committees:

(a) Standards, Section A, covering matters relative to changes in procedure for the adoption of standards and preparation of the engineering manual, Paul Winsor, chairman, Boston Elevated Railway Company.

(b) Power Distribution—G. W. Palmer, Jr., chairman, Bay State Street Railway Company.

(c) Standards. (On recommendations contained in above report.)

(d) Electrolysis—Prof. A. S. Richey, chairman.

Tuesday, Oct. 14

9:30 a. m. to 11 a. m.

Joint session with Transportation & Traffic Association

Reports of committees:

(a) Block Signals—J. M. Waldron, chairman, Interborough Rapid Transit Company, and C. D. Emmons, vice-chairman, Chicago, South Bend & Northern Indiana Traction Company.

(b) Joint Sub-committee of Committee on Block Signals and Rules—J. M. Waldron and F. A. Boutelle, co-chairmen.

(c) Train Operation (City)—H. H. Adams, Chicago Railways Company, and W. H. Sawyer, Ford, Bacon & Davis, co-chairmen.

(d) Train Operation (Interurban)—E. C. Faber, chairman, Aurora, Elgin & Chicago Railroad Company.

Wednesday, Oct. 15

9:30 a. m. to 1:30 p. m.

Appointment of committee on nominations.

Reports of committees:

(a) Buildings and Structures—R. H. Pinkley, chairman, Milwaukee Electric Railway & Light Company.

(b) Standards. (On recommendations contained in above report.)

(c) Heavy Electric Traction—E. R. Hill, chairman; consulting engineer, New York.

(d) Power Generation—B. F. Wood, chairman, Pennsylvania Railroad.

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Thursday, Oct. 16

9:30 a. m. to 1:30 p. m.

In part a joint session with Accountants' Association—See program of Accountants' Association

At conclusion of joint session—

Reports of committees:

(a) Way Matters—J. M. Larned, chairman, Pittsburgh Railways.

(b) Standards. (On recommendations contained in above report.)

Friday, Oct. 17

9:30 a. m. to 1:30 p. m.

Reports of committees:

(a) Equipment—F. R. Phillips, chairman, Pittsburgh Railways.

(b) Standards. (On recommendations contained in above report.)

(c) Education—William Roberts, representative, Northern Ohio Traction & Light Company.

General business.

Report of the committee on nominations.

Election of officers.

Installation of officers.

Adjournment.

PROGRAM OF CLAIMS ASSOCIATION

Meetings will be held on the second floor of Entrance Hall

Monday, Oct. 13

9:30 a. m. to 12:30 p. m.

Registration and distribution of badges at booth, Young's Million-Dollar Pier.

2:30 p. m. to 5:30 p. m.

Annual address of president.

Annual report of executive committee.

Annual report of secretary-treasurer.

Reports of special committees.

Appointment of convention committees.

Paper, "Mechanical Devices for Preventing Accidents," by John J. Reynolds and M. P. Spillane, Boston Elevated Railway.

General discussion.

Paper, "The Investigation of Street Railway Accident Cases," by W. P. Christiansen, Chicago Railway Company.

Tuesday, Oct. 14

9:30 a. m. to 1 p. m.

Paper, "The Prevention of Accidents," by H. V. Drown, Public Service Railway.

Written discussion:

(a) P. C. Nickel, New York Railways.

(b) E. H. Odell, Pacific Coast Claim Agents' Association.

Paper, "The Value of Safety Committees," by George Carson, Puget Sound Traction, Light & Power Company.

Written discussion:

(a) R. E. MacDougall, New York State Railways.

(b) H. K. Bennett, Fitchburg & Leominster Street Railway.

Wednesday, Oct. 15

9:30 a. m. to 12:30 p. m.

Paper, "Motor Vehicles," by M. B. Bracken, United Railways of St. Louis.

Written discussion:

(a) C. G. Rice, Pittsburgh Railways.

(b) W. F. Weh, Cleveland Railway.

(c) James R. Pratt, United Railways & Electric Company, Baltimore, Md.

Paper, "Adjustment of Accident Claims," by F. D. Edmunds, Interborough Rapid Transit Company.

General discussion.

General business.

Reports of convention committees.

Reports of nominating committees.

Election of officers.

Installation of officers.

Adjournment.

PROGRAM OF TRANSPORTATION & TRAFFIC ASSOCIATION

Regular sessions will be held in the Greek Temple, Convention Pier.

Joint sessions with Accountants' and Claims Associations in the Greek Temple, Convention Pier.

Joint sessions with Engineering Association in Engineers' Hall, Convention Pier.

Monday, Oct. 13.

9:30 a. m. to 12:30 p. m.

Registration and distribution of badges at booth, entrance to Young's Pier.

2:30 p. m. to 5:30 p. m.

Annual report of the executive committee.

Annual report of the secretary-treasurer.

Resolutions.

Appointment of convention committees.

Reports of special committees.

Reports of regular committees.

(a) Individual Membership—L. C. Bradley, chairman; Stone & Webster Companies, Texas District.

(b) Uniform Definitions—M. C. Brush, chairman, Boston Elevated Railway.

(c) Rules (Consolidated), excepting that portion relative to block signal rules, which will be presented at joint session of Tuesday—F. A. Boutelle, chairman.

Tuesday, Oct. 14.

9:30 a. m. to 12:30 p. m.

Joint session with Engineering Association—See program of Engineering Association.

Wednesday, Oct. 15.

9:30 a. m. to 12:30 p. m.

Joint session with Accountants' Association—See program of Accountants' Association.

Appointment of committee on nominations.

Thursday, Oct. 16.

9:30 a. m. to 12:30 p. m.

Reports of committees:

(a) Construction of Schedules and Timetables—J. E. Duffy, chairman, New York State Railways.

(b) Training of Transportation Employees—C. B. Wells, chairman, Denver City Tramway.

(c) Passenger Traffic—J. E. Gibson, chairman, Kansas City Railway & Light Company.

Address, "Regulations on Sanitation, as Relating to Public Carriers." Speaker will be announced later.

General business.

Report of nominating committee.

Election of officers.

Installation of officers.

Adjournment.

Secretary McConnaughy of the American Electric Railway Manufacturers' Association is making arrangements for a stereopticon in the main building of the entrance to the pier. This will be used for bulletin purposes, for making announcements when papers and reports will be read, and for paging people. Any manufacturer who has moving picture films may make arrangements to run them during certain parts of the day.

The method of registration is being carefully studied with a view to improvement, and it is expected that the secretary's office shortly will send out a definite announcement regarding a new and simple method of registration. No doubt the registration will begin on Friday, Oct. 10, and will be carried through Saturday and Sunday prior to the opening of the convention. This, it is expected, will materially reduce the congestion which is likely to occur on Sunday and Monday.

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COMMUNICATION

A QUESTION OF NAMES

SAN FRANCISCO, Aug. 28, 1913.

To the Editors:

With reference to the last paragraph of Mr. Murray's communication dated Aug. 16, in your issue of Aug. 23, I am perfectly willing to be classed in agreement with Mr. Murray, provided he and other single-phase enthusiasts do not lose sight of the essentials. Those who have found themselves reluctantly obliged to report adversely on the use of single-phase railway apparatus have been unanimous, so far as I have ever been able to ascertain, in their opinions as to the almost ideal simplicity of its distribution system. They have not been able, however, to shut their eyes to some very expensive disadvantages of the single-phase railway motor, by which is now meant a motor of the type in use on the locomotives of the New Haven railroad for example, namely, the single-phase commutator motor—a motor that will run as well, if not better, on direct current than it does on the single-phase current furnished it in normal operation.

Those of us who have been privileged to study the performance of locomotives equipped with polyphase induction motors—and by performance I mean their economic results as well as their technical performances—have been equally unanimous, I think, in approval thereof and have recognized that the great drawback to such installations, particularly in mountain electrification, has been the necessity for a double contact-wire system.

I have not yet heard of anyone who has not been enthusiastic when told of the possibilities now being realized, so far as I know for the first time, in the Norfolk & Western electrification, namely, a system that combines the advantages and eliminates the main disadvantages of both the single-phase and the polyphase systems of propulsion. Whatever our enthusiasm may be, we shall not be at all disposed to sit back quietly if in the future such installations as the last named are held up as demonstrations of the success of what has been known for some years as the "single-phase system" *of propulsion*. Easily, by inference, the hybrid, if not correctly named, can be claimed as the system to which certain advocates of the "single-phase system" have loyally and enthusiastically and consistently given their support, and equally by implication it can be made to reflect on the professional judgment of those who just as honestly and consistently and earnestly have opposed the use of the "single-phase system," so-called. By all means, let us unite in acknowledging the good points of all systems and in taking advantage of their combined possibilities, but let us be decent enough to call things by their right names, if not for the sake of our own reputations, in justice to those from whom we have differed honestly. And the surest way to "start something," as Mr. Murray says, is to appear to be unfair in an engineering discussion, where facts and facts only are legitimately employed.

After all, is not this a case for the standards committee of the American Institute of Electrical Engineers, where reason and logic rather than personal feelings will rule?

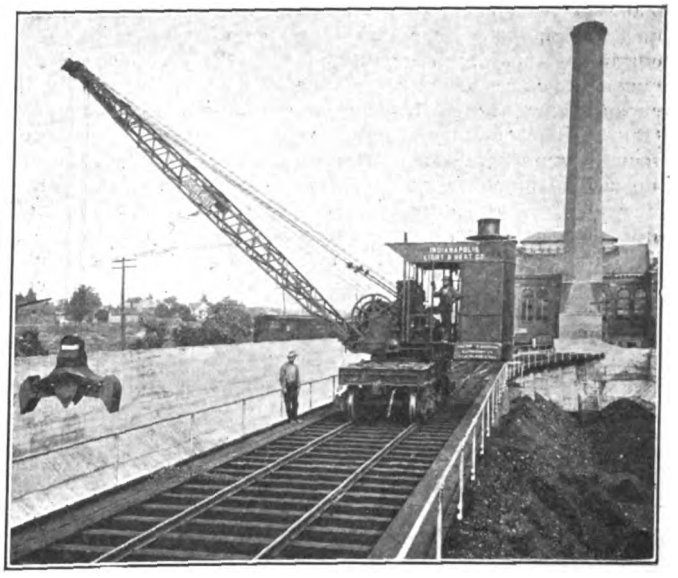
A. H. BABCOCK.

By replacing the 110-volt d.c. inclosed arc lamps with 250-watt Mazda lamps, the shops of the Memphis (Tenn.) Street Railway have been able to show a saving of 50 per cent in current consumption and at the same time are obtaining a more satisfactory general illumination. There is a marked absence of the shadows and flickering which characterized the illumination of the former light and which were a detriment in shop work. Each Mazda lamp is provided with a Holophane metal shade, the whole being mounted on the bracket formerly used for the arc lamps.

SUBMERGED COAL STORAGE IN CONCRETE PIT

A submerged type of coal-storage plant has recently been erected by the Indianapolis (Ind.) Light & Heat Company to prevent spontaneous combustion. The storage capacity of 30,000 tons is ample to provide against coal storage due to strikes, car shortage, etc. The plant consists of a large concrete pit, as shown in the accompanying illustration, 300 ft. long by 100 ft. wide and 28 ft. deep. It is 18 ft. below ground level, having a 10-ft. wall rising above the ground. Below the ground the wall slopes at an angle of 45 deg., in order to reduce the cost of construction. This slope makes the pit 72 ft. wide by 272 ft. long on the bottom. The concrete is from 12 in. to 18 in. thick and is reinforced throughout with twisted ½-sq. in. rods to withstand any pressure from water that may rise in the gravel around the pit.

A row of concrete piers placed on 15-ft. centers extends lengthwise through the middle of the pit. These piers support a trestle with a standard-gage track. A 15-ton Brownhoist locomotive crane travels back and forth on this trestle and handles the coal on both sides with a Brownhoist 2-yd. coal grab-bucket, suspended on a 40-ft. boom. The crane and bucket are operated by one man from his



Locomotive Crane with Coal Grab-Bucket at Storage Pit

stand in the cab. As the crane is self-propelled and equipped with M. C. B. trucks, couplers and steam brake, it does the switching of the cars off and on the trestle. The coal cars are run out on the trestle with the crane and dumped, and when the coal is required in the power house it is loaded into cars by the crane and is then carried to the boilers.

Forty-pound rails are embedded in the bottom of the pit, on 18-in. centers, with ½ in. of the head standing above the surface of the concrete. When the grab-bucket is working on the bottom of the pit the rails prevent the bucket from striking the concrete. When the pit is filled with water up to the ground level 13,000 tons of coal are covered. The water is pumped from the power house supply well into the pit by a 4-in. centrifugal pump and enters the pit at the ground level. A trough 12 ft. wide and 1ft. deep through the center of the pit and beneath the trestle is fitted with a drain pipe which carries the water to either of two manholes, one at each end of the pit. The outlet openings are protected by grating to prevent any coal from entering the drain pipe.

The pit was designed by Thomas A. Wynne, vice-president of the company, and was built under his supervision. The locomotive crane and bucket were furnished by the Brown Hoisting Machinery Company, Cleveland, Ohio.

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LONDON LETTER

(From Our Regular Correspondent)

The select committee appointed by the House of Commons to inquire into London traffic dangers has issued its report. The committee recommends the creation of a new traffic branch of the Board of Trade to be the chief traffic authority for London, which authority would combine the duties hitherto undertaken by the Home Office, the Board of Trade and the Local Government Board and would advise Parliament in all metropolitan traffic matters. It recommends also that the veto of borough councils in regard to tramway schemes be replaced by a full hearing before the new Traffic Board, which shall report to Parliament; that the county councils have the widest possible powers of making by-laws, subject to confirmation by the new department; that public motor vehicles be brought under closer control; that the licensing of motor cabs and omnibuses be transferred to the county and county borough councils, subject to a right of appeal to the new board; that special speed limits for omnibuses and other heavy traffic be imposed; that closer control of traffic be exercised by the police; that means be taken to relieve the congestion caused by tramways with dead-end terminals, and that measures be taken to warn school children and their parents about street dangers. It is suggested that the traffic board consist of a small number of specially qualified persons not necessarily government officials. The committee also recommends that the traffic board retain expert advisers and that the board be empowered to fix special speed limits for motor omnibuses and all motor traffic. The committee points out the necessity for a uniform system of signals between drivers. It suggests that the use of horns be restricted and that dazzling headlamps be prohibited in lighted streets. It suggests that the London County Council be empowered to run omnibuses to link up its tramways. As many streets would probably require widening, it is suggested that subways be constructed to contain tramways. The number of fatal street accidents in London has steadily increased from 155 in 1904 to 537 in 1912.

The report of the select committee has not met with the approval of the London omnibus companies, the officers of which feel that their rights are jeopardized by the recommendations contained in the report. The chairman of the New Central Omnibus Company is reported to have stated that little else could be expected from a committee which consisted of an ex-chairman of the London County Council, an ex-chairman of the tramway committee of the London County Council, an ex-chairman of the tramway committee of the Manchester Town Council, and other county councilors. He is even reported as having charged that the members of the committee are municipal traders who desire the tramways to have a monopoly. The report is also being criticised by the members of the borough councils, who claim that the recommendations which have been made are impracticable. The report states that the system of paying drivers of motor buses by mileage tends to induce drivers to make speed regardless of traffic conditions. It is suggested that the men be paid by the day.

In the annual report of the Aberdeen tramways department reference is made to the pay-as-you-enter system which has been in service on ten cars for some months. It is stated that the public has become accustomed to the cars, that there is no congestion or delay through the prepayment of fares, and that there have been no rear platform accidents. The receipts have increased steadly, owing undoubtedly to the prepayment of fares.

The report of the Wolverhampton Corporation Tramways, the only tramways in England which are operated by the Lorain surface contact system, has just been issued. The profit amounted to more than £12,000 on a capital expenditure of about £278,000, enabling the committee to hand over 2½d. in the pound to the relief of rates and to bring the renewals fund up to £50,000. The length of track is 21½ miles, and the number of passengers carried was nearly 12,000,000. The operating cost per mile was 6.272d.

At the height of the tourist and holiday season tramwaymen of Edinburgh to the number of about 700 were on strike for a period of about ten days. The dispute arose regarding wages. The men asked for an increase of a halfpenny per hour. The company which operates the tramways offered a farthing per hour increase. The men refused this offer. During the strike men were imported from Manchester, Glasgow and elsewhere, and after a few days' delay a partial service was established. The strike was settled by the men accepting the farthing per hour increase. The directors conceded the men one week's holiday a year with pay. A conference is to be held later to discuss any matters in dispute.

The tramway committee of the Reading Corporation has recommended the installation of trolley buses at a cost of about £24,000 for the proposed extension to connect Reading with the added areas of Caversham and Tilehurst. In recommending the trolley buses instead of the motor buses, the committee states that should the traffic eventually warrant the construction of tramway lines the poles and wires can be used for the tramcars on those routes.

The House of Lords has decided that a tramway is not a railway and must pay rates on its full net annual value, not on one-fourth as in the case of railways. Lord Moulton read the judgment of the House of Lords, in which the Lord Chancellor and Lord Shaw concurred. Lord Moulton said that a tramway was not in the same position as a railway, as the street provided the base for the rails and that the loading and unloading platforms were the streets along the whole of the tramway route. The company also reaped the advantage of the great municipal expenditure on lighting, cleaning and keeping the streets in order. In his opinion, the contention that a tramway was a railway because the cars ran on rails was of no moment in this matter. It was his view that the term railway was not meant by the legislature to cover tramways.

A bill is being prepared for presentation to Parliament next session for the construction of a tube railway from the Strand to the Crystal Palace on a system differing from that of the existing underground railways. The project, the cost of which is placed at £3,000,000, is being advanced by E. W. Chalmers Kearney, the Australian inventor of the high-speed railway system, in which the cars run on a single rail with a guide rail overhead. The scheme, as explained by Mr. Kearney, provides for a "tube" for the 4½ miles to Herne Hill, whence the remainder of the line would be above ground, except for the final 500 yd., which would be in a cut-and-cover tunnel. The six stations—Westminster Bridge, the Oval, Brixton, Herne Hill and the two terminals—would be immediately below the street level and reached by short stairways, except that at Herne Hill, which it is proposed should be on the level of the street.

R. W. Blackwell & Company, who carried out the electrification of the South London circle of the Brighton Railway and the subsequent extension to the Crystal Palace, have begun the extension of the electrification from Balham to Croydon via Norbury and Thornton Heath. Later on the electrified suburban system will be carried as far as Epsom.

The London County Council has posted notices in all its tramcars intimating its intention of at once availing itself of the power conferred by the act of Parliament passed during the past session, to allow straphangers on the lower deck of the tramcars during inclement weather, and on various holidays and special days, to the extent of one-third of the licensed accommodation. It was during the miners' strike of 1911 that the Board of Trade first allowed straphanging in the London County Council tramcars, when, owing to a shortage in the supply of coal, a curtailed service had to be used. Again, in March last, when the Greenwich generating station broke down and the number of cars running had to be reduced, the Board of Trade granted temporary permission for passengers to stand in the cars.

A report has been prepared on the working of the Dublin & Blessington Light Railway, which is at present run by steam. It is stated that the cost per train mile is no less than 19.6d., and this is compared with a similar cost of 3.9d. for the electrically worked Lucan tramway as an argument in favor of electric traction.

A. C. S.

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News of Electric Railways

New Officers Elected by the United Railroads of San Francisco

Jesse W. Lilienthal was formally elected president of the United Railroads of San Francisco by a vote of the stockholders of that corporation at a meeting held on Aug. 28. Other officers elected were: vice-president, Charles N. Black; secretary, George B. Willcutt; treasurer, A. M. Dahler. The following directors were named: John A. Buck, president Honolulu Plantation Company and vice-president of the National Ice Company; J. C. McKinstry, law partner of President Lilienthal; Albert H. Payson, president of the Northwestern Pacific Railroad; Charles N. Black, vice-president of the United Railroads under Mr. Calhoun; George B. Willcut, secretary of the United Railroads; Washington Dodge, vice-president of the Anglo & London-Paris National Bank, and former city and county assessor of San Francisco; A. W. Foster, capitalist and former president of the Northwestern Pacific Railroad; Henry T. Scott, president of the Mercantile National Bank and of the Pacific Telephone & Telegraph Company; Leander Sherman, president of Sherman, Clay & Company; B. S. Guinness, New York, representing the banking house of Ladenburg, Thalmann & Company. Mr. Lilienthal is ex officio a member of the board of directors.

Following his election, Mr. Lilienthal gave out the following statement:

"I have accepted the presidency of the United Railroads of San Francisco only because of my ambition to improve the relations between the company on the one hand and the public and public officials on the other. The people may be assured that it will be my aim to confine the activities of the company strictly to the operation of street railroads, and in a manner that will give full recognition to the duties of a public utility. There will be no interference in political controversies, and if any attempt ever is made to influence public opinion, it will be done openly and in the name of the company.

"I have no fault to find with those who favor municipal ownership, but I believe that if such ownership should obtain, the actual operation of the properties can, with the greatest good and with the greatest profit to the public, be best intrusted to private management under public regulation.

"I shall always be ready to listen to any grievance, either on the part of the public or of any citizens, and the public may be assured that my endeavor will be to operate the roads in such a way as to give the people of San Francisco the most efficient service practicable. Finally, I cordially invite the co-operation of all good citizens to the end that the duties imposed upon the company may be adequately performed."

Progress on Boston Subways

Rapid progress is being made on the subway extensions and new lines now under construction by the Boston Transit Commission. The Boylston Street subway, through the Back Bay district, is walled in and roofed over from Kenmore Street, the western portal of the tube, to the vicinity of Berkeley Street, with the exception of the station locations at Massachusetts Avenue and Copley Square. Contracts will shortly be let for the construction of the remainder of the tunnel from Kenmore Street to a temporary connection with the Tremont Street subway near the Public Garden, the total distance between these points being 7950 ft. The Boston Transit Commission is to report to the next Legislature upon the desirable location of the easterly terminus of the subway, the choice being between Park Street and Post Office Square. A new incline will be built under the Public Garden in connection with the work.

Work on the Dorchester tunnel, which is an extension of the Cambridge subway eastward to the South Station and thence southward to the large centers of population lying between the harbor and the Dover-Dudley Street-Fields Corner district in a general way, is being pushed chiefly on the Winter and Summer Street sections of the route. The tunnel begins under the Park Street station of the Tremont Street subway, 40 ft. below the street surface, and has now been completed between Tremont and Washington Streets, being under construction at present between Washington and Arch Streets, where a station will be built with passages leading to the Summer and Winter stations of the Washington Street tunnel. Stations will be located on this line at Washington Street, Dewey Square, a point near Broadway and Dorchester Avenue, for South Boston service, and at the Andrew Square terminus. The total length of the subway is 11,000 ft., between Park Street and Andrew Square, the total length of underground line between Harvard Square and Andrew Square being about 5 miles as now planned. At Dewey Square the tunnel will be carried low enough to enable a projected railroad tunnel to be built between the North and South Stations, and the line will be 50 ft. below the street at some points.

The extension of the East Boston tunnel from Scollay Square toward an outlet on the surface in the West End district is now practically completed between Hanover and Stoddard Streets. A station is to be built on this route at Bowdoin Square, with a loop permitting various cars to be turned back to East Boston, while others proceed to Cambridge. About one-tenth of the total extension of 2500 ft. is now completed. The subway extensions and new construction now in progress at Boston will cost approximately $15,000,000 when finished.

Committee Appointed to Draw Traffic Rules for Cities

A committee upon traffic and public safety has been appointed by the governors of the International Travel Club, New York. At the last meeting of the board expression was unanimous that the club should proceed at once to perform some effective work in the interest of users of the public highways, especially in view of the need of uniformity in traffic regulations in the larger cities. The committee on traffic and public safety will meet in the near future for the purpose of organizing and will consider a new code of traffic regulations to be submitted to the proper authorities in at least fifteen of the principal cities in this country and abroad for criticism and suggestions. The new rules and regulations when finally adopted by the committee will be known as the Standard Code of Traffic Regulations and will be sent with recommendations for adoption to the municipal authorities in all of the larger cities throughout the world. The committee is composed of the following: Charles Jerome Edwards, chairman; William Phelps Eno, vice-chairman; Howard Elliott, Julius P. Meyer, Edward G. Connette, David Beecroft, Charles Henry Davis, Samuel Walter Taylor, Carl H. Page, Albert S. Callan, Burns Lyman Smith, Robert Lee Morrell and Frederick H. Elliott, secretary of the Travel Club.

Charles Jerome Edwards, chairman of the committee, is a well-known traveler and has been an executive officer of many clubs, societies and associations, and is at present vice-chairman of the Aero Club of America. William Phelps Eno is the author of the present traffic regulations now in use in several cities in the United States, as well as in London and Paris. Mr. Smith is an extensive traveler. Mr. Taylor is editor of the *Rider and Driver*. Mr. Davis is president of the National Highways Association, which is conducting an extensive campaign in behalf of the good roads movement. Mr. Beecroft is directing editor of the *Automobile*, *Motor Age* and *Commercial Vehicle*. Mr. Morrell has been prominently identified with automobiling and good roads affairs for many years, and has only recently been selected as chairman of the law and ordinance committee of the Manhattan Automobile Club. Mr. Page is well known as a pioneer automobile distributer and is at the head of the large and successful corporation bearing his name. Mr. Callan is a former member of the New York State Assembly and is the author of the present Callan motor vehicle law of New York State. Howard Elliott is president of the New York, New Haven & Hartford Railroad. Mr. Meyer

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is director of the Hamburg-American Line, and Mr. Connette, formerly chief engineer of the Public Service Commission, First District, State of New York, is president of the International Railway, Buffalo.

In drawing up its plans the committee will take into consideration various suggestions which have been received by the club bearing on the safeguarding of travelers in every mode of travel. Consideration is to be given to plans for safeguarding vessels at sea as well as regulations for railroad and electric railway traffic. Some of these suggestions will be forwarded for consideration to the Interstate Commerce Commission.

Development Plans of Glasgow Corporation

The Corporation of Glasgow has before it a large number of schemes of an engineering or semi-engineering character, all of which will be embodied in a bill which is to be submitted to Parliament. Power will be asked for the construction of a bridge across the River Kelvin at the Botanic Gardens and a new road across that bridge for the purpose of carrying tramway lines; for the better regulation of street traffic, and for the provision of motor omnibuses on city and suburban routes where the traffic is not yet sufficiently developed to warrant the laying of tramway lines. There are also proposals for the construction of a new bridge across the Clyde and the laying of tramways leading to and from that bridge, but these will not take definite form until the conclusion of the investigations which are at present being made by James Dalrymple, manager of the Glasgow Corporation Tramways, and Thomas Nisbet, who are in America. The Corporation already has power "to provide and run a service of omnibuses in prolongation of existing tramway routes, or for testing the amount of traffic along any route, subject to the consent of the local authority"; but it wishes more than this. The members have noted that the Corporation of Edinburgh has obtained general powers for the running of omnibuses in that city, and they wish to have similar powers, so that they may test traffic on any city route or supplement the tramway service temporarily or permanently in any district within their area of service.

Representatives of the County Councils of Lanark, Renfrew and Dumbarton are to meet to consider the proposed extension of the Glasgow Corporation car lines into their territory. In view of the interference with the roads the county authorities deem it advisable that united action should be taken to protect their interests.

There is a motion on the agenda of Glasgow Corporation for the appointment of a special committee to consider and report on the question of establishing a system of underground electric railways between the east and west ends of the city district. It is urged that such a system would help to solve the problem of street congestion and would facilitate the further expansion of the city.

Losses on Southern Pacific Suburban Lines

Even though it is operating 877 suburban trains daily out of the Oakland and Alameda moles and has carried in the last year about 19,000,000 passengers, the Southern Pacific Company is losing approximately $3,250,000 annually on the suburban electric service in Alameda County, according to figures received from authoritative sources. It is said that the total passenger revenue for the twelve months ended June 30, 1913, was $1,365,707, while the total expense was $4,613,262, leaving a deficit to the company of $3,247,555.

In the hearing before the California State Railroad commission on Aug. 7, C. W. Durbrow, an attorney for the railroad, testified that, without interest on $46,000,000 invested in the properties and without the taxes, amounting to $54,000, the loss on direct operating expenses alone was $364,000 for the year. With the interest, taxes and other fixed charges added to this amount, the figures given above are obtained.

The statement is made by the company that in these computations 90 per cent of the items are those exclusively for electric trains and not for steam trains. On the remaining 10 per cent, only that proportion is included which can properly be allotted to suburban service. For every mile the Southern Pacific Company carried a passenger on its ferries and trains on suburban trips it received less than 1 cent, while the cost of the same service was three times as great, or something like 3 1/6 cents. That is to say, on all of the 19,000,000 travelers the company lost 2 1/5 cents for every mile it transported each one of them. Again, each passenger, on the average, paid about 7 1/5 cents, regardless of distance, and yet it cost the carrier over 24 cents to serve him. On every one of the 19,000,000 passengers the loss to the company was over 17 cents. According to the company these statistics are taken from the actual records of the railroad and from the same reports as are submitted by the company to the state and federal commissions.

The property investment of $46,000,000 is in accordance with a detailed exhibit already filed with the State Railroad Commission. Interest on it at 6 per cent would be $2,772,000. It would thus seem that the passenger earnings are actually only one-half of the interest charges alone, to say nothing of the cost of managing the business and of paying the state taxes. Six per cent is taken as the interest rate in order to be on a conservative basis. Were 7 per cent to be taken, the loss on the Alameda County lines would be $462,000 a year greater. It is pointed out, further, that the equipment of the company at the present time is new, and that, therefore, the charges for maintenance are less than they will be when the equipment is older.

Reaching the Public Through the Newspapers

In the issue of Aug. 25, 1913, the New York *Times Annalist* published an article, "The Straight Story," in which it dealt with the subject of corporations reaching the public through the newspapers. Referring to the instinct of the newspaper reader for fair play and to the method which should be adopted to place a matter of importance before the newspaper reader properly, the *Times Annalist* said in part:

"People have a true instinct for fair play. To reach it the corporations have only to tell a straight story, tell it directly, and tell it explicitly. Told in that way it is bound to be interesting. People will read it, partly because it is interesting and partly, if they have the time, because they are always willing to hear the other side. That is the corporation manager's undeveloped opportunity. If he will talk to the public as he talks to his friends at the club, he will be amazed, and the more he trusts the public the more it will respond. Instead, he hires a publicity agent, whose business it is to get disguised advertising matter into the newspapers and periodicals. So basically is this the publicity agent's work that a secret is sometimes made of his official connection with the corporation, so that he may the more easily procure his stuff to be printed under misrepresentation of its purpose. When he can the publicity agent buys up reading columns and prints his matter therein as if it were the editorial product of the publication whose space is dishonestly let. It is not so much to be said that this kind of work is disingenuous as that it is wasteful and ineffective. It ought to be the publicity agent's work to write the case as the corporation manager can talk it, and then to bring it straight to the public, under plain, unmistakable legends.

"The railroads of the East are conducting a campaign for higher freight rates. They have a case; it may not be perfect, but it is a strong case. They are telling it in every way but the one effective way. The public does not understand statistics and percentages and would disbelieve them if it did; the railroads are telling their story through numerous publicity agents, whose work, for the reason stated, is futile; they are telling it in the form of speeches to chambers of commerce and boards of trade. The right way would be to take thirty or forty pages of newspaper space every morning and evening in all the territory involved and say, simply: 'This is our story. We buy this space to tell it and we tell it as we please, unbeholden to the favor of editors, without fear of politicians and unhampered by traditions of advertising.' And then in that space to tell the story of the railroads as any railroad president can tell it when he sits down with a few friends to talk shop from his heart. Keep figures out; tell the truth; tell secrets; visualize railroad service in its physical terms—and it is irresistible."

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Attempted Strike at Indianapolis Fails

The attempted strike of the employees of the interurban railways operating into Indianapolis, Ind., called on Aug. 23, has failed. Some fifty or sixty men, principally from the lines of the Indianapolis & Cincinnati Traction Company, Indianapolis, Columbus & Southern Traction Company, the Martinsville Division of the Terre Haute, Indianapolis & Eastern Traction Company, and the Logansport Division of the Union Traction Company of Indiana, failed to report when the strike order was issued, and for several days only partial service was operated on these lines. The main interurban trunk lines of the Terre Haute, Indianapolis & Eastern Traction Company and Union Traction Company were operated on regular schedules without difficulty. Following the notices posted by C. L. Henry, president of the Indianapolis & Cincinnati Traction Company, on Aug. 25 to the effect that men must return to work the following morning at 5 o'clock if they expected to continue in the employ of the company, the men promptly reported, and both the Greensburg and Connersville divisions commenced operating under full schedules. The men in the employ of the Union Traction Company at Logansport who had gone out received a similar ultimatum and went back to work Aug. 25. On Aug. 27 the rest of the men on the Martinsville and Crawfordsville divisions of the Terre Haute, Indianapolis & Eastern Traction Company capitulated and as individuals requested that they might be allowed to go back to work and abandon all connection with the union. Full service was restored on these divisions, which had been operating only about two-thirds of the regular schedules. The men on the Indianapolis, Columbus & Southern Traction Company and other lines who did not report at the time stated in the notices posted by the several companies were given to understand that their employment with the company had ceased. Men who returned to work were reinstated at their old rate of pay, but were not allowed to take their old runs.

City of Seattle Scored by Court in Railway Case

On the issues involved in the petition of the city of Seattle, Wash., for a court order on the receivers of the Seattle, Renton & Southern Railway to fill the right-of-way on Rainier Avenue between Atlantic and Bay View Streets, Judge A. W. Frater on Aug. 24 filed a memorandum decision, criticising the city officials severely for imposing annoyances on the railway, and charged that it was the action of the City Council in seeking to annul the franchise which resulted in throwing the railway into the hands of receivers. In his ruling the judge calls attention to the fact that the city in December, 1910, passed an ordinance purporting to revoke the franchise, that it was afterward restrained by the federal court from carrying out the plan and that since then it has made no attempt to try the case in the United States court and determine the rights of the parties. He says in part:

"The city has been planning street improvements in the Rainier Valley for several years, knowing all the time that the issues in the federal court case would have to be determined before the company could be compelled to pay for its share of the improvements under the terms of its franchise. This matter resolves itself purely to one of common honesty and fair dealing. The city has paralyzed the railway's property by declaring its franchise forfeited as well as in many other petty ways, and yet asks the court to compel its receivers to carry out this one provision of its franchise which requires the company to pay its share of street improvements. This is so clearly unjust that no court should be expected to lend itself to the carrying out of any such program."

Judge Frater declares that all the courts and the receivers are trying to do is to bring all concerned together in a quick and fair transaction for the sale of the property of the company to the city on a basis acceptable to those who have invested their money in the property, and as desired by the people of Seattle, especially by the residents of the Rainier Valley.

The developments in the negotiations for the sale of the property of the company to the city have been followed in the ELECTRIC RAILWAY JOURNAL.

Details of Routes and Costs of New San Francisco Municipal Lines

The following details of routes and costs show how the proceeds of the issue of $3,000,000 of bonds voted in San Francisco on Aug. 26 will be used in extending the municipal railway system:

Van Ness Avenue Line.—Cost, $479,200; double-track road from Market Street to Fort Mason, 2.07 miles; will carry most of the traffic from south of Market Street to the Exposition site, the transfer traffic from Geary Street and some from Union Street.

Potrero Avenue Line.—Cost, $348,800; from Potrero and Twenty-fifth Streets, over Mariposa, Florida and Twelfth Streets to Market, thence one block to connect with Van Ness line; distance, 2.2 miles.

Union Street Line.—Estimated cost, rails and equipment, after franchise reverts to city, $779,400; 3.78 miles long.

North Point Line.—Cost, $235,600; out Columbus Avenue, from Union Street and Columbus to North Point Street, thence to foot of Van Ness Avenue; distance, 1.05 miles.

Steiner Street Line.—Cost, $119,700; extension of Union Street line from Union to Greenwich, thence to Scott Street and Chestnut.

Stockton Street Line.—Cost, $229,200; through the tunnel from Market, 1 mile, to junction with Union Street line at Columbus Avenue; shortest line to Exposition.

Chestnut Street Line.—Cost, $225,100; Van Ness Avenue to Devisadero Street, 1 mile, forming loop with Steiner and Union Street lines.

Church Street Line.—Cost, $500,000; out Market Street from Twelfth to Church, thence to Thirtieth Street, 2.45 miles.

California Street Line.—Cost, $500,000; connections with the Geary Street line probably will be built on some street near Arguello Boulevard and at Thirty-third Avenue, as the franchise for the present line has expired between First and Thirty-third Avenues.

Report on Toronto Valuations Expected Soon.—Mayor Hocken, of Toronto, Ont., expects that the experts' report on the valuation of the property of the Toronto Railway and the Toronto Electric Light Company will be ready by Sept. 6.

Omnibus Application in New York.—The Board of Estimate of New York has under consideration the application of George W. Loft and others for a franchise to operate a large number of motor omnibuses in the borough of Manhattan.

Fare Charged on St. Louis Municipal Waterworks Railway.—On Aug. 18 the city of St. Louis inaugurated the policy of carrying passengers on the Municipal Waterworks Railway for a 5-cent cash fare. Eight tickets are sold for 25 cents. Tickets good for children under twelve years old are sold eight for 25 cents. The city has been carrying passengers free by issuing individual and annual passes. The line is a very short one and was built primarily to accommodate the employees of the waterworks.

Fares on Toronto Civic Lines.—A 2-cent fare, with six tickets for 10 cents, for the St. Clair Avenue Civic Line, Toronto, Ont., was determined on recently by the Board of Control, in the absence of Works Commissioner Harris, who had recommended a 5-cent fare. There was some discussion as to the advisability of making the rate 2 cents flat, but the Mayor thought that it would be awkward for the public and conductors alike. Regret was expressed that the 2-cent fare had been established on the Gerrard Street line. The opinion prevailed, however, that a uniform rate for all civic lines would be most satisfactory.

Valuing the Properties at Seattle.—The Public Service Commission of the State of Washington has announced that the physical valuation of interurban railroad property in the vicinity of Seattle is now being made by the department's engineering force and that like valuations are already planned for the lines operating in Seattle which are affected by the recent federal court ruling against the Seattle city ordinance requiring the sale of 4-cent tickets on the cars as beyond the jurisdiction of the city. Just how soon the matter will be reached by the commission could not be an-

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nounced, though it is expected to be taken up at an early date, comparatively.

University Chair for Public Utility Valuation.—The establishment of a chair in the University of Missouri to give instruction to young men on the subject of physical valuation and appraisement of public utilities of every character is to be recommended to the curators of the university by John M. Atkinson, chairman of the State Public Service Commission. The underlying motive for this step is the desire to have such a course operated in connection with the economic and engineering departments, the graduates from which might be taken into the employment of the commission.

Detroit Arbitration Hearings Adjourned.—At the request of W. D. Mahon, the board of arbitration which has been holding hearings in regard to the terms of service of the employees of the Detroit (Mich.) United Railway adjourned its hearings on Aug. 27 until after the annual convention of the Amalgamated Association of Street & Electric Railway Employees to be held at Salt Lake City. It is probable that Chairman Naylon will call no further meetings until about Sept. 16. No formal work was done by the board on Aug. 27, although some of the points in dispute were discussed by W. D. Mahon and F. W. Brooks, general manager of the company.

Action Postponed on Steinway Tunnel Proposal.—The Board of Estimate and Apportionment of New York has postponed action on the proposition submitted by the Public Service Commission of the First District in July for the reconstruction of the Steinway tunnel for temporary operation by the Interborough Rapid Transit Company. The Interborough Rapid Transit Company is willing to reconstruct the tunnel at cost plus 15 per cent, but in July the Public Service Commission adopted a resolution cutting down the extra allowance to 10 per cent. The company insists upon receiving 15 per cent. The Board of Estimate and Apportionment will refer the proposed contract back to the commission.

Chicago Terminal Plans.—A number of public-spirited citizens of Chicago, Ill., have organized and provided funds for the purpose of securing comprehensive information and expert and disinterested conclusions with respect to the best and most practicable solution of Chicago's railway terminal problem, which has been made pressing by the desire of the Pennsylvania depot group of roads to improve their facilities. The movement is in no sense antagonistic to the efforts of the City Council to arrive at the desired solution through the employment of John F. Wallace. It is simply more comprehensive. The city could give Mr. Wallace only $10,000 with which to start. The citizens' terminal plan committee proposes to raise $100,000 and has $65,000 already pledged. It has retained Bion J. Arnold to direct the investigation.

Ohio Public Utilities Commission Organizes.—The Ohio Public Utilities Commission organized on Aug. 22 with Judge Oliver H. Hughes as chairman. Judge W. L. Dechant, Middletown, was ill at Battle Creek, Mich., and was not able to meet Judge Hughes and E. W. Doty, the other two members. C. A. Radcliffe, secretary of the old commission, will be secretary of the new commission, and O. P. Gothlin, of the former commission, will be superintendent of the bureau of rates and service. J. C. Sullivan, the third member of the old commission, who was slated as head of a department in the new organization, will enter private business in Columbus. Charles C. Marshall, who was special counsel of the Public Service Commission in the Attorney-General's office, will continue in the same capacity with the new commission. Mr. Dechant has since died.

Municipal Line Suggested for Swope Park, Kansas City.—Members of the park board of Kansas City, Mo., have suggested that the city build an electric railway in Swope Park, extending from the entrance to the zoo, lagoon, lake and other points of interest. A fare of 5 cents would be charged on this line. The proposal was advanced at one of the recent conferences in regard to the new franchise for the Metropolitan Street Railway. Mayor Jost said he feared the plan to have the Metropolitan Street Railway build the line would not fit in with the scheme of the proposed franchise, which does not contemplate any more extensions than are absolutely necessary. He suggested that the park board issue bonds and construct a line through the park, and that an arrangement be entered into with the Metropolitan Street Railway to sell the city power and rent it the necessary cars.

Progress of Electrification at Portland.—It is expected that the Portland, Eugene & Eastern Railway, Portland, Ore., will be ready about Dec. 1, 1913, to run electric trains on Fourth Street, Portland, into the Willamette Valley along the west side of the river. Outside the city limits the work of electrification is going on steadily. The new loop lines at Hillsboro, Forest Grove and Newberg, together with new substations at each of these cities, have been completed and the bonding of the rails is all finished as far as McMinnville. Ninety per cent of the overhead work, poles, high-tension and feeder wires is completed to the same point. Power will be supplied by the Portland Railway, Light & Power Company, which will deliver current at 60,000 volts at the substation of the Portland, Eugene & Eastern Railway at Oswego. There it will be transformed into 13,200 volts and supplied to the feeders at 1500 volts. This current will serve the line as far as Independence, a contract with a Eugene power company providing for energy on the south half of the line when completed.

PROGRAMS OF ASSOCIATION MEETINGS

New York Railroad Club

The next regular meeting of the New York Railroad Club will be held at the building of the United Engineering Societies in New York on Friday evening, Sept. 19, 1913, at 8 o'clock. William Walter Wheatley will present a paper, "Railway Economy versus Political Economy."

Keystone Railway Club

The seventh meeting of the Keystone Railway Club will be held in the pavilion on Mount Penn, Reading, Pa., on Sept. 16. A special car will leave Fifth and Penn Streets, Reading, at 9 a. m. to take members to Mount Penn station. The entertainment committee has arranged for music and flowers and for a chicken and waffle dinner, which will be served at $1.25 a plate at the hotel near the pavilion. The program of papers which are to be presented at the meeting follows:

Paper, "The Prevention of Accidents," by W. B. Rockwell, manager of the Eastern Pennsylvania Railway, Pottsville, Pa.

Paper, "Air-Brake Maintenance," by W. G. Kaylor, of the Westinghouse Traction Brake Company, New York, N. Y.

Among the questions prepared for the question box discussion are the following:

Is a lined or solid journal considered best for city service?

Why has the Pennsylvania Railroad for the past few months been placing four-hole plates on new track work as against six-hole plates?

What is the proper method to record the consumption of current for motorman's record—time clock, ampere-hour or watt-hour meter?

What percentage of drop should be allowed on motor fields before they are condemned?

What should be the maximum and minimum weight of a scrap brake shoe?

Which brake shoe wears steel wheels the most—hard or soft?

Which is better for car cleaning—soap water or car-cleaning compound?

Has the hardened steel bushing and pin been a success for brake and beam levers?

What mileage should a car make before being overhauled and inspected?

Which is the best method of testing motor fields and armatures—transformer, drop volt or telephonic?

How often should armature and axle bearings of modern type motors be oiled and inspected?

Would it be better to change the design of the association standard brake-shoe heads or use a more durable material to overcome excessive wear?

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Financial and Corporate

Stock and Money Markets

Sept. 3, 1913.

The selling movement which set in on Sept. 2 on the New York Stock Exchange continued at the opening of business on the exchange to-day. Stocks worked still lower in the second hour of business and in the early afternoon brokers reported continued liquidation. On the decline the market showed an increased volume of dealings. In the last hour fractional recoveries occurred from the extreme low point. Rates in the money market to-day were: Call, 2½ @ 3 per cent; sixty days, 3¾ @ 4 per cent; ninety days, 4½ per cent; four, five and six months, 4¾ @ 5 per cent.

The Philadelphia market was irregular to-day. The trading was broad, but the volume of transactions was small.

The dealings on the Chicago market covered a wide range of issues with a considerable volume of transactions. The bulk of the bond transactions was in Chicago Railways 5's, Series B.

The Boston market was weaker to-day, although there was a slight recovery in the specialties near the close.

A steady tone was displayed on the Stock Exchange in Baltimore to-day. The demand for bonds lessened, the sales to-day totaling only $9,500.

Quotations of traction and manufacturing securities as compared with last week follow:

	Aug. 27	Sept. 3
American Brake Shoe & Foundry (common)	91	91
American Brake Shoe & Foundry (preferred)	132¼	132¼
American Cities Company (common)	36½	33¼
American Cities Company (preferred)	64½	63½
American Light & Traction Company (common)	347	350
American Light & Traction Company (preferred)	104	104
American Railways Company	38¼	38⅜
Aurora, Elgin & Chicago Railroad (common)	40½	41
Aurora, Elgin & Chicago Railroad (preferred)	82	a83
Boston Elevated Railway	88	89
Boston Suburban Electric Companies (common)	7½	7
Boston Suburban Electric Companies (preferred)	55	56½
Boston & Worcester Electric Companies (common)	*8	a10
Boston & Worcester Electric Companies (preferred)	42	40
Brooklyn Rapid Transit Company	89	89⅜
Capital Traction Company, Washington	115	115½
Chicago City Railway	*170	*170
Chicago Elevated Railways (common)	*25	*25
Chicago Elevated Railways (preferred)	*70	*70
Chicago Railways, ptcptg., ctf. 1	94	95
Chicago Railways, ptcptg., ctf. 2	30⅞	32
Chicago Railways, ptcptg., ctf. 3	8	8¼
Chicago Railways, ptcptg., ctf. 4	3	3
Cincinnati Street Railway	102½	a110
Cleveland Railway	103½	103¾
Cleveland, Southwestern & Columbus Ry. (common)	*5½	*5½
Cleveland, Southwestern & Columbus Ry. (preferred)	*30	*30
Columbus Railway & Light Company	18	18
Columbus Railway (common)	69½	a69½
Columbus Railway (preferred)	88	88
Denver & Northwestern Railway	*104	*104
Detroit United Railway	a80	a80
General Electric Company	145¼	145
Georgia Railway & Electric Company (common)	114½	114⅝
Georgia Railway & Electric Company (preferred)	83	83
Interborough Metropolitan Company (common)	16¼	15⅛
Interborough Metropolitan Company (preferred)	62½	62
International Traction Company (common)	*30	*30
International Traction Company (preferred)	*95	*95
Kansas City Railway & Light Company (common)	*18	*18
Kansas City Railway & Light Company (preferred)	*37	*37
Lake Shore Electric Railway (common)	*5	*5
Lake Shore Electric Railway (1st preferred)	*92	*92
Lake Shore Electric Railway (2d preferred)	*26	*26
Manhattan Railway	128	131
Massachusetts Electric Companies (common)	14	14
Massachusetts Electric Companies (preferred)	*71½	70
Milwaukee Electric Railway & Light Co. (preferred)	95	*95
Norfolk Railway & Light Company	25	25
North American Company	71¼	71½
Northern Ohio Light & Traction Company (common)	60¾	60¾
Northern Ohio Light & Traction Company (preferred)	a100	100
Philadelphia Company, Pittsburgh (common)	43¼	43½
Philadelphia Company, Pittsburgh (preferred)	40	40
Philadelphia Rapid Transit Company	23	22½
Portland Railway, Light & Power Company	55	55
Public Service Corporation	109	109
Third Avenue Railway, New York	37¾	37
Toledo Traction, Light & Power Company (common)	..	a30
Toledo Traction, Light & Power Company (preferred)	..	a80
Twin City Rapid Transit Co., Minneapolis (common)	105⅜	106
Union Traction Company of Indiana (common)	*5	*5
Union Traction Company of Indiana (1st preferred)	*80	*80
Union Traction Company of Indiana (2d preferred)	*20	*20
United Rys. & Electric Company (Baltimore)	27⅛	27
United Rys. Inv. Company (common)	21	21
United Rys. Inv. Company (preferred)	39½	41
Virginia Railway & Power Company (common)	52	52
Virginia Railway & Power Company (preferred)	91	92
Washington Ry. & Electric Company (common)	89½	89½
Washington Ry. & Electric Company (preferred)	88	87⅞
West End Street Railway, Boston (common)	72	72
West End Street Railway, Boston (preferred)	88	88
Westinghouse Elec. & Mfg. Company	72½	71½
Westinghouse Elec. & Mfg. Company (1st preferred)	114	114

*Last sale. a Asked.

ANNUAL REPORTS

Easton Consolidated Electric Company

The comparative consolidated statement of income, profit and loss of the Easton (Pa.) Consolidated Electric Company for the years ended Dec. 31, 1911 and 1912, is as follows:

	1912	1911
Gross revenue—railway lines	$427,536	$401,736
Operating expenses, including provision for depreciation and payment of damage claims	277,298	258,759
Earnings from operation	$150,238	$142,977
Deduct:		
Interest on bonds, taxes, etc.	53,239	51,913
Deficit—Eastern Amusement Company	2,663	3,585
Total company deductions	$55,902	$55,498
Net earnings from operation of railway lines	$94,336	$87,479
Edison Illuminating Company:		
Rentals, less taxes and expenses	24,719	27,792
Interest received	64	95
Total earnings	$119,119	$115,366
Deduct charges of Eastern Consolidated Electric Company:		
Interest on collateral trust bonds	61,850	61,850
Expenses and taxes	7,835	7,842
Net earnings	$49,434	$45,674
Less:		
Taxes paid applying to prior years	3,884	.....
Loss on carrousel sold	2,170	.....
Dividends paid	30,000	15,000
Total deductions	$36,054	$15,000
Surplus	$13,380	$30,674

Joseph S. Lovering, president of the company, says in part in his report to the stockholders:

"There has been no material change in the mileage of railway during the year. Your company owns or controls 53,847 miles of railway extending from Easton to Bethlehem, South Bethlehem, Nazareth and the town of Phillipsburg, N. J.

"The car equipment consists of fifty-five passenger cars fully equipped, ten service cars and thirty-six open car bodies.

"Gross revenue from the railway lines for the year ended Dec. 31, 1912, increased $25,799, 6.42 per cent. The increase in the number of passengers carried was 6.31 per cent. Passenger receipts increased 6.4 per cent and car mileage 1.28 per cent. The operating expenses for 1912 were 64.85 per cent of the revenue, an increase of 0.44 per cent.

"Net earnings from the operation of railway lines amount to $94,336; net receipts from the Edison Illuminating Company, $24,783; total, $119,119, or an increase of 3.25 per cent. The fixed charges of the Easton Consolidated Electric Company and its expenses, amounting to $69,685, are deducted, leaving net earnings for the year of $49,434 (6.59 per cent on the paid-up capital stock), out of which dividends of 4 per cent, or $30,000, were paid, and also $3,884 for taxes due in 1910-11 not paid, pending litigation. The surplus for the year of $13,380 transferred to the general surplus account increased the credit in that account at Dec. 31, 1912, to $141,964.

"Current assets have increased over $35,000 and the bonded debt of the Easton & South Bethlehem Transit Company has been reduced $5,000. The reserves have increased approximately $25,000."

Glasgow Corporation Tramway

The nineteenth annual report of the tramways committee of the Corporation of Glasgow contains an exhaustive résumé of the financial condition and operations of the Glasgow Municipal Tramways during the year ended May 31, 1913. Besides the usual revenue, expense and capital accounts the report contains tables of weekly and yearly traffic revenue, the valuations of various component lines, a list of all sections of the permanent way and tables of routes, stages and fares.

The gross revenue for the year shows an increase of £29,327 as compared with that of the preceding year, and the average traffic revenue per car mile has been decreased from 10.561d. to 10.364d. The working expenses increased £36,706, or 0.137d. per car mile, this increase being mainly due to higher wages, extra expenditure incurred in permanent way maintenance, Pinkston fuel and the larger amount

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paid in local taxation. As a result of the increased working expenses the net revenue was only £392,196, against £408,435 the previous year, largely owing to the increase in distance granted to halfpenny fares. Including interest on investments and rental, the total net revenue was £450,827, of which £417,824 was required to pay interest and provide for sinking fund payments and amounts carried to depreciation and permanent way renewal, leaving a net balance of £33,003, which was paid over to the common good. Last year the sum so paid over was £52,067.

The net amount of borrowing powers of the company as of May 31, 1913, was £2,640,089, the amount borrowed £2,479,408 and the balance of unexhausted borrowing powers £160,681.

The increase in capital expenditure during the year was £161,407, making a total of £3,694,143 on May 31. After adding £215,756 out of current revenue to the depreciation fund and deducting £48,721 for track renewals, etc., the balance in the depreciation and permanent way renewals fund on May 31 was £1,873,247. Through an addition of £96 realized from sales of obsolete plant in excess of book value, and a subtraction of £8,848 for alterations to cars, road widenings, etc., the general reserve fund was £39,362 at the end of the fiscal year.

The total length of tramways owned by the Corporation of Glasgow is over 196 miles, of which over 148 are in the city itself. The Corporation has decided to ask power to vote extensions to the tramways of more than 15 miles.

Detailed statistics in the report show that the average fare paid by a passenger was .776d. and that the average working expenses per passenger were .477d., so that each of the 311,000,000 passengers yielded a net profit of three-tenths of a penny. The halfpenny fare now yields 39 per cent of the receipts, while the penny fare yields only 36 per cent, nearly two out of every three passengers taking halfpenny fares.

The capital liabilities amount to £3,553,584. To meet these the department has a sinking fund, a depreciation and permanent way renewals fund, and a small general reserve fund, amounting in all to £3,153,822. The net capital liabilities on the undertaking are therefore only £399,762.

Great Berlin Street Railway

The report of the Grosse Berliner Strassenbahn (Great Berlin Street Railway) for the calendar year 1912 has been made public. The number of passengers carried in 1912 was 463,300,000, as compared with 447,000,000 in 1911; the gross earnings from all sources in 1912 were $11,395,993, as compared with $10,871,014 in 1911; the car miles in 1912 were 64,846,991, as compared with 62,919,500 in 1911. The total expenses per car mile in 1912 were 16.88 cents, as compared with 16.81 cents in 1911, and the ratio of operating expenses to gross earnings in 1912 was 56.66, as compared with 54.99 per cent in 1911. Salaries and wages in 1912 were $3,923,534, as compared with $3,611,688 in 1911. The company also spent $235,756 in 1912 for welfare work, as compared with $238,602 in 1911. The sum of $878,228 was required in 1912 for the maintenance of rolling stock, as compared with $778,942 in 1911; $60,605 was spent in 1912 for office and carhouse maintenance, as compared with $48,695 in 1911; $1,340,411 was spent in 1912 for the purchase of electrical energy, as compared with $1,272,700 in 1911; $333,594 was spent in 1912 for maintenance of way, including feeder system, as compared with $227,609 in 1911; $218,339 was spent in 1912 for damages and injuries, of which $113,782 was put aside for reserve.

The total trackage of the system in 1912 was 353, compared with 338 miles in 1911. The number of motor cars is 1757 and of trailers 1091. After setting aside the usual amounts for the various depreciation, amortization and sinking funds, etc., and paying to the municipalities $826,656, the directors declared a dividend of 8½ per cent on the stock capitalization of $25,020,600.

The company reports 12,107 employees. The pension society, of which 8797 employees were members, has a fund of $2,765,850, from which 568 incapacitated employees and 163 widows received allowances. The membership of the sick benefit fund numbered 12,406 in 1912, as compared with 11,707 in 1911.

The number of car miles for 1912 was 64,826,991, of which approximately 79 per cent was motor car mileage. This mileage was 3.03 per cent greater than the preceding year. The average number of passengers carried daily in 1912 was 1,265,847, as compared with 1,224,658 in 1911, equivalent to 3584 passengers per mile of track. The greatest number of passengers carried any one day was 1,412,538. During the year eighteen people were killed, 146 were severely injured, and 943 were slightly injured through their own negligence; six were killed, twenty-six severely injured and 289 slightly injured through the negligence of others. In addition, four people were severely injured and thirty-eight were slightly injured through causes unknown.

Vienna Municipal Tramways

The report of the Vienna Municipal Tramways for the fiscal year 1912 shows that the company operated 159,530 car miles daily on 149 miles of single track and carried an average of 845,585 passengers a day. The average daily revenue was $26,938. The railway has 1254 cars and 1442 trailers, which are operated at an average schedule speed of 7.3 m.p.h. The latest rolling stock of the company comprises vestibuled cars with separate platform aisles for exit and entrance. These cars are also furnished with commutating pole motors. An experimental double-deck car has also been constructed. The total seating capacity of the rolling stock is 57,375 and the permissible standing room, 49,473. The maximum traffic day was Nov. 1, 1912, when 965,000 passengers were carried in 1191 motor cars and 1386 trailers for a total distance of 194,049 miles, using the services of 6700 platform men. A popular traffic innovation was the introduction of "winter sport" cars on which the passengers were permitted to carry snowshoes, skis, etc.

The electric lines carried 309,484,129 passengers for a total of 30,375,660 car miles. Of this mileage 52 per cent was performed by motor cars and 48 per cent by trailers. The average earnings per car mile were 16.77 cents.

The total number of injuries was 310, of which 205 were slight, ninety-nine severe and six mortal. Only 16 per cent of the accidents were due to crossing the tracks.

The undertaking employed 11,738 people, including the 2246 motormen and 4638 conductors. The total expenditures for employees, including welfare purposes and uniforms, was equivalent to more than one-half of the gross earnings. The report of the sick benefit fund shows an average of ten and one-tenth sick days per member for the year. The ratio of operating expenses, including welfare work, to gross earnings was 70.3 per cent and, exclusive of welfare work, 64.3 per cent. The total earnings for the year were $9,863,076.

Questions and Answers Under Uniform System of Accounts

Another series of tentative answers to questions raised in connection with the uniform system of accounts established by the Interstate Commerce Commission is published below. Agreement on these answers, as on those published previously in the ELECTRIC RAILWAY JOURNAL, has been reached by members of the committee on a standard classification of accounts of the American Electric Railway Accountants' Association and representatives of the commission. As these answers have not yet received the formal approval of the commission, however, it should be understood that the decisions do not represent its final conclusions and that they are subject to such revision as may be thought proper before final promulgation in the accounting bulletins of the commission.

Q. To what account should an electric railway company charge the loss resulting from a fire which destroyed a station building not covered by insurance?

A. If the building is not to be replaced, its cost should be credited to Road and Equipment Account No. 28, "Stations, Waiting Rooms and Miscellaneous Buildings," and charged to profit and loss. If it is to be replaced, the cost should be charged to operating expenses and not to profit and loss.

Q. Is it permissible to make an apportionment of rent paid for the use of land occupied by a building used in part as a carhouse, in part as a repair shop and in part as a storeroom?

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A. The rent may be apportioned on an equitable basis among Accounts No. 67, "Carhouse Expenses," No. 39, "Shop Expenses," and No. 85, "Store Expenses," in the classification of Operating Expenses of Electric Railways.

Q. What account should be charged with the cost of repairs to a transformer located on a pole outside of a station building for the purpose of stepping down high-tension current in order to furnish electric light for the station?

A. Operating Expense Account No. 65, "Station Expenses."

Q. To what account should an electric railway company charge the cost of labor and material required for repairs to transformers and meters and wiring used in connection with the sale of power to some patrons along the line?

A. Operating Expense Account No. 23, "Distribution System."

Q. An electric railway company sells current for lighting and power directly from the trolley line. What account should be charged with the first cost of meters installed in connection with this business and the cost of reading the meters?

A. The cost of installing meters for the purpose described should be charged to Road and Equipment Account No. 22, "Distribution System." No charge should be made for the wages of an employee who reads the meters if the work is incidental to his ordinary duties.

Q. What account should be credited with the amount of a trainman's deposit not called for on his leaving the service of the company?

A. If the company chooses to close the liability account for such a deposit, the amount should be credited to profit and loss.

Q. A company operates a coal mine as a co-ordinate department, the railway department furnishing cars to haul material for both maintenance and construction in the coal-mining department and rendering bills for the cost of power used, the cost of maintaining the cars and the wages of the train crews. To what account should the railway department credit amounts so received?

A. The amounts received for power and the maintenance of the cars should be credited to the "Other Operations—Cr." accounts, No. 44 and No. 59 respectively, while the amounts received for wages of the train crews should be credited to the accounts to which the wages were originally charged.

Q. To what account should the cost of tracing cloth and blueprint paper used by the engineering department be charged?

A. Operating Expense Account No. 84, "Stationery and Printing."

Q. What accounts should be charged with the cost of constructing and maintaining a line of railway on right-of-way held under perpetual lease?

A. The cost of construction should be charged to the appropriate accounts in the classification of Expenditures for Road Equipment, and the cost of maintenance to operating expenses.

Q. To what account should be charged the wages paid to flagmen employed to facilitate car movement during renewals of track?

A. Operating Expense Account No. 62, "Miscellaneous Car-Service Employees."

Acquisition of American Cities Company's Common Stock by United Gas & Electric Corporation

Reasonable assurance has been received that the United Gas & Electric Corporation, New York, N. Y., will acquire a majority of the $16,264,700 of the common stock of the American Cities Company by the issue in payment therefor of $75 of graduated second preferred stock and $25 of common stock for each $100 common share of the American Cities Company, according to the plan mentioned in the ELECTRIC RAILWAY JOURNAL of Aug. 30, 1913.

George Bullock, president of the United Gas & Electric Corporation, has issued the following statement:

"Through this contemplated purchase the preferred stock of the corporation will have placed behind it the common stock of the American Cities Company to be acquired without cost to such preferred stock, thereby largely increasing the equity behind it and the earnings applicable to it. The common stock of the corporation will have the benefit of such acquisition to the extent that the profits derived therefrom exceed the dividends accruing on its second preferred stock and, furthermore, will enjoy the constantly increasing value of the equities of the subsidiary companies of the American Cities Company. A thorough examination of the present earnings of the subsidiary companies of the American Cities Company and a careful estimate of their earnings for the future has been made by the president and other officers of the corporation, and we are convinced that through the acquisition of the common stock of the American Cities Company and the resulting earnings and economies in the purchasing and operating department of both companies there will be a decided increase in the net profits applicable to the common stock of the corporation, including the increase of its common stock which would result from the completion of the purchase. The board unanimously recommends the purchase."

Buffalo & Lake Erie Traction Company, Buffalo, N. Y.—The minority holders of the Buffalo & Lake Erie Traction Company's first refunding thirty-year gold bonds will organize a committee to represent them at a hearing before the Public Service Commission of the Second District of New York on Sept. 12. This hearing is another postponement, the original hearing having been adjourned from Aug. 1 to Aug. 22 for the benefit of the minority bondholders, as noted in the ELECTRIC RAILWAY JOURNAL for Aug. 8, 1913. The minority bondholders claim that their interests will be seriously affected by the proposed plan of reorganization of the Buffalo & Lake Erie Traction Company and the acquisition by the reorganized company of the capital stock of the Buffalo, Lockport & Rochester Railway and the Canadian American Power Corporation, which latter company was recently incorporated in Albany to import 46,000 hp to supply the Niagara Frontier Electric Railway and the reorganized lines with electricity.

Denver & Northwestern Railway, Denver, Col.—Clark, Dodge & Company, New York, N. Y., have announced that the time for receiving deposits of Denver & Northwestern Railway 5 per cent bonds for exchange under the terms of the offer of the Denver City Tramway, which was to have expired on Aug. 25, has been extended to Sept. 25.

Halifax (N. S.) Electric Tramway.—A meeting of the stockholders of the Halifax Electric Tramway was set for Aug. 30, 1913, to vote on increasing the capital stock from $1,400,000 to $2,000,000. This is the limit up to which stock may be issued under the company's charter as extended at the last session of the Legislature. The proceeds of the new issue, in case both the stockholders and the Public Utilities Commission approve, are to be used for extensions and improvements.

Hudson & Manhattan Railroad, New York, N. Y.—The first statement of the earnings of the Hudson & Manhattan Railroad since the reorganization of its finances, as noted in the ELECTRIC RAILWAY JOURNAL of Jan. 18, 1913, July 5, 1913, and several included dates, was published on Aug. 28, showing increased gross earnings for the five months ended June 30, 1913, and decreased net earnings for the same period. Gross earnings for the five months were $2,296,659, as compared with $2,220,199 for the corresponding period last year. Operating expenses and taxes increased from $949,564 last year in the five months operated to $1,063,171 this year. Operating revenue was reduced from $1,270,652 last year to $1,233,488 this year. After income deductions other than bond interest of $124,755, against $92,217 last year, the net income applicable to bond interest was $1,108,732, against $1,178,435 last year. After deduction of interest on the first mortgage bonds there remained for the payment of interest on the adjustment bonds $296,941. The interest declared amounts to $279,390, which leaves a surplus of $17,551. The percentage of operating expense as compared with operating revenue was 38.53, against 35.91 last year. This statement of earnings for five months was accompanied by a declaration of interest at the rate of 2 per cent per annum on the 5 per cent adjustment income bonds, payable Oct. 1, 1913. The declaration was $8.34 per $1,000 bond for the five months from Feb. 1 to June 30, 1913. Holders of the certificates of deposit representing 4½ per cent mortgage

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bonds, preferred and common stock, and voting trust certificates have been notified by the company that the new securities to which they are entitled under the reorganization plan are ready for delivery in temporary form, together with $22.50 for every one-thousand-dollar bond deposited.

New York (N. Y.) Railways.—The New York Railways will pay on Oct. 31 to the adjustment mortgage income bondholders the sum of $16.36 per $1,000 bond for the first six months of the present calendar year, as compared with $7.70 in the corresponding period last year, an increase of 112 per cent.

Oakland (Cal.) Railways.—On Aug. 20 interest on the $1,100,000 of the Oakland Terminal Company's note issue was paid. The principal due on the same day may be extended.

Shore Line Electric Railway, Saybrook, Conn.—The Public Service Commission of the Second District of New York has issued an order authorizing the New York, New Haven & Hartford Railroad to acquire and Charles L. Livingston to assign all his right, title, and interest to receive from the Shore Line Electric Railroad so much of the capital stock of the last-named company as may be hereafter authorized by the commission.

South Shore Traction Company, New York, N. Y.—It is stated that the lines of the South Shore Traction Company between West Sayville and Blue Point, which were recently sold at public auction on an order from Judge Chatfield in the United States District Court at Brooklyn, have been transferred to the Suffolk Traction Company, and that the lines will soon be put in operation by the latter company. The South Shore Traction Company's line was constructed several years ago, but has never been operated between Blue Point and Sayville, owing to injunctions, although the tracks are laid ready for use, except for a few hundred feet on Railroad Avenue, Bayport, which the Suffolk Traction Company will construct at once in order to reach Bayport over the newly acquired line.

United Properties Company, Oakland, Cal.—The F. M. Smith advisory committee on Aug. 18 made public the following statement regarding the option giving to R. G. Hanford until Jan. 1, 1914, the right to sell Mr. Smith's holdings in the United Properties Company to a British syndicate, as noted in the ELECTRIC RAILWAY JOURNAL of Aug. 30, 1913: "The option secured by R. G. Hanford was given to the committee composed of James K. Moffitt, William A. Bissell, Vanderlyn Stow, W. I. Brobeck and Gavin V. McNabb, known as the United Properties Committee, which has been handling the affairs of that company and its constituent companies under an agreement made by F. M. Smith, William S. Tevis and R. G. Hanford under date of Jan. 25, 1913. That committee controls the holdings of Mr. Smith in the United Properties Company only, and the option which the committee gave to Mr. Hanford was upon Mr. Smith's holdings in this property alone. The United Properties Company has no interest whatever in the stock of the Realty Syndicate, Pacific Coast Borax Company or any of the borax companies or any of the Smith companies, except the railroads, of which it indirectly owns about 30 per cent of the preferred 'A' stock and a majority of the common stock. The committee in charge of the principal properties of Mr. Smith is composed of F. B. Anderson, W. W. Garthwaite and C. O. G. Miller, and this committee has not given any option to Mr. Hanford. Its plans or work will not be halted or affected in any manner by the option given by the other committee, nor will the powers of the United Properties Company be interfered with by the option, because it is provided therein that the committee's powers shall not be limited or restrained in any way by the outstanding option unless and until the properties shall be purchased thereunder."

Washington Water Power Company, Spokane, Wash.—In a circular dated July 20 the Washington Water Power Company has offered its shareholders the right to subscribe to an issue of about $500,000 of 7 per cent notes due Feb. 2, 1914, payable at the office of the Farmers' Loan & Trust Company, New York, N. Y., par $5,000 or multiples thereof. These notes have been already fully subscribed. The company also expects to put out an issue of six weeks' notes next December. As of Feb. 1, 1914, there will be outstanding about $2,000,000 of notes, and to provide for those due Feb. 1, 1914, the company will probably issue 10 per cent new stock on April 1, 1914, offering the same to shareholders with the privilege of prepayment on Feb. 2, 1914.

West Penn Traction Company, Pittsburgh, Pa.—The West Penn Traction Company, which is controlled by the West Penn Traction & Water Power Company, showed a gross gain of $170,851, or slightly over 10 per cent, for the first six months of 1913, while net receipts from operations increased $98,485, or 15 per cent. The actual gross gain for all the light and power companies and the electric railways of the controlling company for the six months was $291,624. The declaration of a quarterly dividend of 1½ per cent on the preferred stock of the West Penn Traction & Water Power Company, payable Sept. 15, means that none of the underlying companies of the American Water Works & Guarantee Company will default in its dividends on securities held by the public. Interest was paid Sept. 1 on outstanding bonds of several of these companies.

Dividends Declared

American Railways, Philadelphia, Pa., quarterly, 75 cents, common.

Brooklyn (N. Y.) Rapid Transit Company, quarterly, 1½ per cent.

California Railway & Power Company, San Francisco, Cal., quarterly, 1¼ per cent, prior preferred.

Chicago (Ill.) Elevated Railways, quarterly, 1½ per cent, preferred participating certificates.

Connecticut Valley Street Railway, Greenfield, Mass., 3 per cent, preferred.

Elmira Water, Light & Railroad Company, Elmira, N. Y., 2½ per cent, preferred.

Louisville (Ky.) Traction Company, 2½ per cent, preferred; quarterly, 1 per cent, common.

Northern Ohio Traction & Light Company, Akron, Ohio, quarterly, 1¼ per cent, common.

West Penn Traction & Water Power Company, Connellsville, Pa., quarterly, 1½ per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

BATON ROUGE (LA.) ELECTRIC COMPANY

Period			Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m.,	June,	'13	$12,299	*$7,311	$4,989	$2,076	$2,913
1 "	"	'12	12,420	*8,418	4,002	1,734	2,268
12 "	"	'13	150,215	*91,150	59,065	22,505	36,560
12 "	"	'12	134,811	*81,551	53,260	20,758	32,501

BROCKTON & PLYMOUTH STREET RAILWAY, PLYMOUTH, MASS.

1m.,	June,	'13	$12,102	*$8,980	$3,122	$1,116	$2,006
1 "	"	'12	11,766	*8,271	3,494	1,051	2,444
12 "	"	'13	122,103	*94,892	27,211	12,871	14,340
12 "	"	'12	120,056	*89,300	30,755	12,605	18,150

CAPE BRETON ELECTRIC COMPANY, SYDNEY, N. S.

1m.,	June,	'13	$30,645	*$17,913	$12,732	$6,082	$6,650
1 "	"	'12	29,448	*16,792	12,657	5,703	6,954
12 "	"	'13	373,788	*200,743	173,045	70,311	102,734
12 "	"	'12	246,438	*191,445	154,993	67,930	87,063

DALLAS (TEX.) ELECTRIC CORPORATION

1m.,	June,	'13	$168,592	*$100,490	$68,101	$24,692	$43,409
1 "	"	'12	142,342	*87,607	54,735	24,666	30,069
12 "	"	'13	2,008,282	*1,174,350	833,931	295,771	538,170
12 "	"	'12	1,709,020	*1,105,418	603,602	259,852	343,750

GALVESTON-HOUSTON ELECTRIC COMPANY, GALVESTON, TEX.

1m.,	June,	'13	$206,916	*$111,908	$95,008	$34,755	$60,253
1 "	"	'12	171,085	*94,493	76,592	33,860	42,731
12 "	"	'13	2,216,830	*1,273,960	942,860	410,586	532,284
12 "	"	'12	1,733,952	*1,059,623	674,329	318,100	356,229

HOUGHTON COUNTY (MICH.) TRACTION COMPANY

1m.,	June,	'13	$26,163	*$14,467	$11,696	$5,630	$6,067
1 "	"	'12	27,379	*14,672	12,707	5,707	7,000
12 "	"	'13	311,526	*177,861	133,665	67,980	65,685
12 "	"	'12	301,107	*180,176	120,931	64,470	56,461

JACKSONVILLE (FLA.) TRACTION COMPANY

1m.,	June,	'13	$56,702	*$36,363	$20,340	$10,513	$9,827
1 "	"	'12	50,174	*33,356	16,817	9,821	6,996
12 "	"	'13	593,015	*399,550	193,464	126,995	66,469
12 "	"	'12	579,363	*361,799	217,563	112,811	104,752

NORTHERN TEXAS ELECTRIC COMPANY, FORT WORTH, TEX.

1m.,	June,	'13	$174,568	*$93,577	$80,990	$18,994	$47,826
1 "	"	'12	144,975	*76,303	68,670	20,846	47,825
12 "	"	'13	2,004,713	*1,066,081	938,632	283,153	655,479
12 "	"	'12	1,643,215	*894,029	749,185	251,765	497,420

*Includes taxes.

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Traffic and Transportation

Officers of Peninsular Railway Co-operate with Automobilists to Reduce Accidents

At the regular monthly meeting of the joint safety committee of the Peninsular Railway and San José Railroads, San José, Cal., held on Aug. 16, 1913, it was noted that the number of collisions between automobiles and cars had diminished considerably, and members of the committee expressed the opinion that this was largely due to the work done by the newspapers of Santa Clara County in calling attention to the danger arising from careless and reckless operation of autos. At the preceding meeting of the committee, George B. Polhemus, president, and John R. Chace, secretary of the San José & Santa Clara County Automobile Association, were present on invitation, with a view to devising ways and means of securing greater care in the operation of automobiles. As a result of the meeting, the matter was brought to the attention of the newspapers, reports of the meeting received a generous publicity, and in addition, several papers published editorials on the subject. The view was expressed that there can be no question that the concerted action of the press has had good effect and has impressed upon the drivers of automobiles the great responsibility that rests with them. It would seem, according to the expression of members of the committee, as if recourse to special legislation would not now be needed to require automobilists to exercise greater care in running their cars.

F. E. Chapin, general manager of the Peninsular Railway and the San José Railroads, states that he is not asking the officials of the automobile association to meet with the safety committee of the companies every month, but he hopes to secure their presence at every quarterly meeting, as he considers the co-operation of responsible motorists of the utmost importance to the safety movement. At these quarterly meetings reports of collisions of autos and cars will receive special consideration.

Another point brought out at the meeting on Aug. 16 was the difficulty experienced by conductors in preventing passengers from alighting from the car before it comes to a stop.

Large Increase in Freight Business of Louisville Road.—An unusual feature of the business done by the Louisville & Interurban Railroad, Louisville, Ky., is that freight traffic is running ahead of passenger business, relatively. The receipts of the freight department for the fiscal year ended June 30 were in excess of $100,000, showing an increase of nearly 15 per cent over the preceding year, while the gain in passenger earnings was not nearly so great.

Increase in Freight Rates Urged by Publisher.—E. W. Beedle, president of the company which publishes the *Inland Printer*, has a signed article in the September issue of that paper urging other publishers and members of the printing trade to advocate an increase in steam railroad freight rates. He bases his argument upon the economic necessity to the steam railroads of such an increase and upon the theory that prosperity in all lines of trade is dependent to a large extent upon the prosperity of the steam railroads.

Free Transportation Curtailed in Detroit.—The Detroit (Mich.) United Railway announces that owing to the large reduction made in fares within the city the fare to the State Fair Grounds will upon all occasions, including the Michigan State Fair, be a city fare plus the township fare. In the past the company has carried passengers to the fair grounds for the annual State fair at a city fare. The company also says: "The seven-for-a-quarter ticket agreement between the city and the company has so decreased earnings that the company is obliged to withdraw all free transportation and transportation at reduced rates heretofore granted charitable and quasi-public institutions."

Safety League in Denver.—It has been the purpose of the Denver (Col.) City Tramway for some time to establish among employees and officials an organization to be known as the Tramway Safety League. A very handsome enameled button has been prepared, which will be worn by members of this league. Owing to lack of time the company has not as yet perfected the organization and prepared a constitution and by-laws, but this will be done later. Numerous requests for permission to wear the safety league button have been received from employees and the company sent a supply to each division superintendent, in order that all of the trainmen might be provided with one during the Knights Templar Conclave.

Rhode Island Company Answers Fare Complaint.—The Rhode Island Company has filed with the Public Utilities Commission of Rhode Island an answer to the petition of the East Providence Town Council, in which it avers that the reduction in fare which has been asked on its line between the Union Station and Riverside would create unjust discrimination. The answer denies that the company would not be materially affected by the proposed change of the zone limit and asserts that such a change would result in an undue preference in favor of Riverside passengers as against patrons of other stations on the line. The adoption of the change in the zone, the answer reads, "would disturb existing logical and equitable conditions and create unjust discrimination."

Heavy Traffic on Louisville & Interurban Railroad.—The Louisville & Interurban Railroad handled a tremendous volume of passenger business during the Shelbyville fair, which was held Aug. 26-29. Three-car and four-car trains were run out of Louisville and six-car and seven-car trains were run from the fair grounds, these being the largest trains ever run over the road. It was especially difficult to handle the traffic on account of the fact that large numbers were returning east to Shelbyville and others were boarding westbound trains for Louisville. R. H. Wyatt, general freight and passenger agent of the company, issued a special bulletin of appreciation to the employees of the operating department, complimenting them on the record which they made.

Bulletin on Co-operative Buying in Philadelphia.—The Philadelphia (Pa.) Rapid Transit Company has issued a bulletin of twenty-four pages on co-operative buying. The publication reviews briefly the plan devised by which the employees secure the benefits of co-operative buying and contains a complete list of the merchants authorized to accept coupons, this list arranged by dealers, and a list of names arranged by districts. In regard to the possibilities of the plan the company says: "Purchases exceeding $4,000,000 per annum are made by the families of the members of the association. It now only remains for this membership to demonstrate its combined purchasing power by the greatest possible use of these cash coupons. This should insure that not only larger discounts may be obtained on new contracts, but that a still greater number of representative dealers in foodstuffs and merchandise throughout the city may be added to the list of those accepting these coupons—this with the result that the price at which the beneficial association can sell the coupon books to its members may be correspondingly reduced."

Howard Elliott on the Outlook for the New Haven Railroad.—Howard Elliott has succeeded Charles S. Mellen as president of the New York, New Haven & Hartford Railroad, but Mr. Mellen will remain with the company in an advisory capacity. On Aug. 29 Mr. Elliott was quoted as follows: "It is a matter of common knowledge that the margin between income and outgo on the American railroads is very narrow and too small for the best interests of the country, which needs the very best of transportation facilities. The results on the New York, New Haven & Hartford Railroad for the year ended June 30, 1913, as published in the newspapers, show that the road failed to earn the dividends paid by $4,630,000. The decision about dividends rests, of course, with the directors. I do not know their views, but it seems obvious that dividends cannot long be paid unless earned. I have faith in the future growth of all kinds of business in the United States and in New England, but if earnings decrease to a greater extent than it is possible to reduce expenses it would seem to be better to face the issue and consider the ultimate welfare of the property, even at the cost of temporary loss and inconvenience."

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Personal Mention

Mr. Frank Pratt has succeeded Mr. Philip Palm as roadmaster of the Burlington (Vt.) Traction Company.

Mr. H. T. Jones has been appointed acting general superintendent of the United Railroads of San Francisco to succeed the late E. D. Hibbs. Mr. Jones was formerly division superintendent of the Fillmore and Turk Street lines of the company.

Mr. E. B. Nance has been appointed chief accountant of the Idaho Railway, Light & Power Company, Boise, Idaho. The Idaho company has five power plants and more than 100 miles of interurban lines and supplies numerous towns with electrical energy.

Mr. James Dalrymple, general manager of the Glasgow Corporation Tramways, who is on a visit to the United States, was in Chicago from Aug. 29 to Sept. 2. Mr. Dalrymple expects to attend the convention of the American Electric Railway Association in Atlantic City in October and to sail from New York for Glasgow on Oct. 18.

Mr. J. W. Hancock, general manager of the Roanoke Railway & Electric Company, Roanoke, Va., has had his jurisdiction extended to include the property of the Lynchburg Traction & Light Company, Lynchburg, Va. Mr. Hancock retains his connection with the Roanoke Railway & Electric Company and will manage both properties, dividing his time between them.

Mr. Charles S. Mellen, who has been president of the New York, New Haven & Hartford Railroad for the past ten years, relinquished his duties to Mr. Howard Elliott on Aug. 30. It was announced that Mr. Mellen had agreed to place at the disposal of the president and directors such information as he acquired from his long connection with the property, and to give advice from time to time as requested.

Mr. F. H. Hill, operating engineer of the United Gas & Electric Corporation, New York, N. Y., has been appointed acting general manager of the Elmira Water, Light & Railroad Company, Elmira, N. Y. For a number of years Mr. Hill was with the Mellen banking interests on interurban electric railway work. Later he was with the Pennsylvania Railroad on construction and maintenance of way work. At the time of his appointment to the Elmira Water, Light & Railroad Company he was the operating engineer of the United Gas & Electric Corporation.

Mr. Patrick F. Sullivan, president of the Bay State Street Railway, Boston, Mass., was the guest of the members of the Fall River branch of the union of employees of the company in the Y. M. C. A. building in Fall River on Aug. 27, 1913, and at the conclusion of the address which he made Mr. Sullivan was presented with a silver loving cup by the men of the branch as a token of esteem. Mr. Sullivan impressed upon the men the necessity of complying with the rules and regulations as laid down and complimented the men of the branch on the fine record which they have made.

Mr. Patrick Calhoun, who has been succeeded as president of the United Railroads of San Francisco, Cal., by Mr. Jesse W. Lilienthal, has been in executive charge of the United Railroads since 1903. He was born at Fort Hill, S. C., on March 21, 1856, and is a grandson of John C. Calhoun, who was Vice-president of the United States. Mr. Patrick Calhoun was admitted to the Georgia bar in 1875 and to the Missouri bar in 1875 and practised law at Atlanta, Ga., from 1878 to 1894, his chief clients being corporations and railroads. He was interested in consolidating the Central Railroad of Georgia, the Richmond & Danville Railroad and the Richmond & West Point Terminal Railway & Warehouse Company, for all of which he was counsel from 1889 to 1892. Since then he has devoted himself chiefly to consolidating and developing electric railway properties and took an active part in the consolidations of the railway systems in Pittsburgh, St. Louis, Baltimore and San Francisco. He is a director of the Philadelphia Company, the Pittsburgh Railways of Pittsburgh, United Railroads of San Francisco, United Railways Investment Company and a number of industrial and manufacturing companies. The United Railroads of San Francisco had just been brought under Mr. Calhoun to a fair earning and physical basis when the earthquake destroyed a considerable part of the company's property. Almost immediately after the fire one of the most disastrous strikes of its kind in the history of American cities followed. The victory which the company won in this conflict was the first of its kind over union labor in the history of San Francisco. Mr. Calhoun's interests outside of San Francisco have for some time been making a more constant demand on him and he decided to retire from the company so as to devote himself more largely to his other interests. Last year Mr. Calhoun made eleven trips between New York and San Francisco in the interests of the property in the latter city. It is understood that he will retain his financial interest in the property. Mr. Calhoun has long been interested in the affairs of the American Electric Railway Association and was a speaker at the midyear banquet of the association held on Jan. 27, 1911. His subject was "Intelligent Popular Government and Public Utilities." He also addressed the members of the association at the midyear conference on Jan. 26, 1912, on "Lessons of the San Francisco Strike." He also spoke at the 1910 annual convention of the American Electric Railway Association at Atlantic City.

Mr. Jesse W. Lilienthal, who has been elected president of the United Railroads of San Francisco to succeed Mr. Patrick Calhoun, was born in New York in 1855. At an early age his family moved to Cincinnati, where he received his primary education. He studied at the University of Cincinnati and later at the Harvard Law School, from which he was graduated in 1876. For fourteen years thereafter he practised law in New York. On account of the ill health of his wife Mr. Lilienthal in 1894 removed to San Francisco, where his law offices are located. He has been exceedingly successful in his profession and is identified as a director with numerous Western corporations, among them the Anglo & London-Paris National Bank, the Anglo California Trust Company, the Marin County Water Company, the La Grange Gold Dredging Company, the Sierra & San Francisco Power Company, the Western Meat Company and a number of incorporated enterprises in South San Francisco. He is also senior vice-president of the San Francisco Bar Association. Mr. Lilienthal is known and respected in San Francisco as a philanthropist of high ideals. He is president of the Recreation League, the Tuberculosis Association and the Society for the Study of the Exceptional Child. He is a member of the probation committee of the juvenile court, the members of which are appointed by the judges of the Superior Court, and is a director of the Boys and Girls' Association and the Remedial Loan Association.

J. W. Lilienthal

OBITUARY

Almon S. Balsden, chief electrician for the London & Lake Erie Railway & Transportation Company, St. Thomas, Ont., and formerly manager of the St. Thomas (Ont.) Municipal Railway, was almost instantly killed on Aug. 28, when he came in contact with a transmission wire of the Hydroelectric Power Commission of Ontario.

F. H. Daniels, chairman of the board of engineers of the United States Steel Corporation, chief engineer of the American Steel & Wire Company, president of the Washburn & Moen Company, and a member of the board of directors of the Massachusetts Employees' Insurance Association, died at his home in Worcester, Mass., on Aug. 31 after an illness of about a year. He was sixty years of age.

Clarence Buckingham, formerly president of the Northwestern Elevated Railroad, Chicago, Ill., is dead. Mr.

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Buckingham was born at Zanesville, Ohio, on Nov. 2, 1854, and moved with his parents to Chicago when a boy. He became associated with the J. & E. Buckingham Company, dealer in grain, later absorbed by the Illinois Central Railroad. He then became a broker and was elected to the directorate of the Corn Exchange National Bank and the Illinois Trust & Savings Company. He was fifty-eight years old.

C. E. Newman, chief clerk of the Peninsula Railway and the San José Railroads, San José, Cal., is dead. Mr. Newman was private secretary to Mayor Ellert of San Francisco during the latter's entire administration, and served one term as license collector of San Francisco. He was connected with the United Railroads, San Francisco, for some time, and since 1904 had charge of the accounting department of the Southern Pacific Company's electric lines at San José. He was a native of California, aged fifty-seven years, and a bachelor.

Elwood D. Hibbs, general superintendent of the United Railroads of San Francisco, is dead. Mr. Hibbs was born in Bristol, Pa., Oct. 27, 1859. He began his railroad career with the Pennsylvania Railroad at its executive offices in Philadelphia. In 1896 he was appointed general auditor of the Consolidated Traction Company, Newark, N. J., afterward the North New Jersey Street Railway, and later the Public Service Corporation of New Jersey, remaining with the last-mentioned company until 1904, when he went to San Francisco as general superintendent of the United Railroads.

Henry L. Harris, superintendent of the railway department of the Southwestern Gas & Electric Company, Texarkana, Ark., is dead. Mr. Harris was born at Hickory, N. C., on March 17, 1873. He removed to Texarkana from Dallas more than two years ago, to become connected with the Southwestern Gas & Electric Company. Before becoming connected with the company at Texarkana Mr. Harris was with one of the electric railways in Dallas, and was connected for a number of years previous to that with the New Orleans Railway & Light Company, New Orleans, La.

S. Crozier Fox, who was killed in the accident on the New York, New Haven & Hartford Railroad on Sept. 2, 1913, was connected with the Philadelphia banking house of George S. Fox & Sons. Mr. Fox was graduated from the University of Pennsylvania, and besides being a member of the banking firm he was an officer and a director of a number of the constituent companies of the Philadelphia Rapid Transit Company, a director of the Midvale Steel Company, the Keystone Watch Case Company, the Pennsylvania Railroad Company and several banks and trust companies.

Thomas Langan White, formerly connected with several electric railways in Allegheny County, Pa., is dead. Mr. White was born in McKeesport, Pa. He practised medicine there for some time, but subsequently abandoned his profession on account of his many business interests. He was president of the White Electric Traction Company, which was taken over by the West Penn Traction Company. He was also at one time president of the McKeesport Light Company and the McKeesport & Duquesne Bridge Company. At the time of his death Mr. White owned the White Theater and the White Hotel and was president of the Skelley Dry Goods Company, McKeesport.

Howard F. Martin, for twenty years general sales manager of the Pennsylvania Steel Company, was killed in the accident on the New York, New Haven & Hartford Railroad on Sept. 2, 1913. At the time of his death Mr. Martin was general sales manager of the Eveland Engineering Company, Philadelphia, having resigned from the Pennsylvania Steel Company about a year ago. For many years he was prominent in the rail and the electric railway industries, and as a member of the executive committee of the American Electric Railway Manufacturers' Association he had a wide acquaintance and gained many friends. Personally Mr. Martin was kindly, modest and unassuming and at all times evidenced his readiness to assist the industry in a broad and generous way. He was fifty-six years old. At the time of the accident he was returning from Maine with Mrs. Martin, who also was killed in the collision. Mr. and Mrs. Martin lived at Bryn Mawr. They had no children.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Los Angeles & San Joaquin Valley Railroad, Los Angeles, Cal.**—Application for a charter has been made by this company in California to build an electric railway between Los Angeles, Olig and Tejon Pass. Capital stock, $3,000,000. Incorporators: W. C. Sheldon, J. E. Stephens, J. E. Shelton and J. R. Colburn, Jr.

Miami & South Florida Railway, Miami, Fla.—Application for a charter has been made by this company in Florida to build a 100-mile railway from Detroit, Fla., to West Palm Beach, with several branches. Capital stock, $500,000. Incorporators: H. C. Roome, Nathan A. Cole, J. M. Cobb and A. A. Boggs, Miami, and R. E. McDonald, Fulford, Fla. [E. R. J., May 10, '13.]

***Henryetta (Okla.) Interurban Railway.**—Incorporated in Oklahoma to build an electric railway from Henryetta to Muskogee and another from Henryetta to Shawnee, the entire length of the line being 100 miles. Capital stock, $50,000. Incorporators: C. H. Kellogg, W. M. Brink, John Kincaid and C. J. Harrison.

***Minneapolis & Northwestern Traction Company, Pierre, S. D.**—Incorporated in South Dakota to build an interurban railway from Minneapolis, Minn., to Brainerd, but the exact route is not yet decided upon. Capital stock, $1,000,000. Incorporators: D. Woodbury and A. E. Woodbury, Theodore A. Chadwick, Achille D. Soulite, Eugene C. Garwood, William E. Ellis, August Schaugen, Edward Houlit and G. M. Lawrence.

***Elkhorn Valley Traction Company, North Fork, W. Va.**—Chartered in West Virginia to build an electric railway in Clark County. Capital stock, $50,000. Incorporators: L. E. Tierney, Powhatan; L. H. Clark, Kyle; W. E. Stuart, Keyser; C. C. Cale, Keystone; A. Katzen, North Fork.

FRANCHISES

***Selma, Ala.**—Ernest Lamar and associates have received a franchise to build an electric railway in Selma.

Little Rock, Ark.—The Little Rock, Pine Bluff & Eastern Traction Company has received a franchise over the free bridge and along Main Street to Markham Street in Little Rock.

Tulare, Cal.—The Big Four Electric Railway will ask the Council for an extension of its franchise in Tulare. This line will connect Porterville, Tulare, Visalia and Poplar. [E. R. J., Aug. 30, '13.]

***Sarasota, Fla.**—E. O. Burns and C. B. Fish have asked the Council for a franchise to build an electric railway in Sarasota.

Macon, Ga.—The Macon Railway & Light Company has asked the Council for a franchise to double-track Spring Street from Ocmulgee Street to Spring Street bridge in Macon.

Carrollton, La.—The New Orleans Railway & Light Company will bid on franchises that will permit the construction of new lines in Carrollton.

Northampton, Mass.—The Northampton Street Railway has asked the Council for a franchise to extend its lines in Northampton.

Winchester, Mass.—The Bay State Street Railway has asked the Council for a franchise to extend its line in Winchester near the Medford line and to relocate the tracks on Clark Street and Main Street in Winchester.

Corunna, Mich.—The Michigan United Traction Company has received a franchise from the Council in Corunna.

Brainerd, Minn.—The Minnesota Central Railway has received a franchise from the Council in Brainerd. This line will connect Minneapolis, St. Cloud, Brainerd and Cuyuna E. G. Potter, Minneapolis, president. [E. R. J., Aug. 9, '13.]

West Orange, N. J.—The Public Service Railway, Newark, has asked the Council for a franchise to double-track

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Central Avenue in West Orange. It is planned to extend the line through private property to the South Orange and Maplewood line.

Cleveland, Ohio.—The Cleveland Railway has asked the Council for a franchise to extend its St. Clair Avenue line from its present terminus to d'Ile Road in Cleveland.

Portland, Ore.—The United Railways, Portland, has asked the Council for a twenty-five-year franchise to extend its lines in Portland.

Jackson, Tenn.—The Jackson Railway & Light Company has asked the Council for an extension of time on its franchise to build the line into West Jackson.

***Cleburne, Tex.**—E. P. Turner and associates have received an electric railway franchise with the privilege of two routes in Cleburne.

Westhampton, Va.—The Virginia Railway & Power Company has received a franchise from the Henrico Board of Supervisors to construct a loop around the Richmond College grounds at Westhampton.

Kenosha, Wis.—The Milwaukee Electric Light, Heat & Traction Company has asked the Council for a franchise for several extensions in Kenosha.

TRACK AND ROADWAY

Birmingham-Tuscaloosa Railroad & Utilities Corporation, Birmingham, Ala.—This company has succeeded in locating a low-grade route between Tuscaloosa and Bessemer, the maximum grade being seven-tenths of 1 per cent and the maximum curvature 4½ deg., while 70 per cent of the line will be tangent. This 47-mile line will connect Birmingham, Tuscaloosa and Bessemer. It will connect with the Tuscaloosa Belt Line, which is owned by the company. At Bessemer it will connect with the Birmingham, Ensley & Bessemer Railway, which is owned by the same interests. Through the latter connection will be made with all the steam railroads in the Birmingham district. F. E. Calkins, New York, N. Y., president. [E. R. J., May 31, '13.]

Edmonton (Alta.) Interurban Railway.—It is understood that the first section of this railway, which will extend from Edmonton to St. Albert, will be in operation within the next few weeks. Gasoline-electric cars will be operated.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—This company has placed in operation its line between Oakland and Sacramento.

Geary Street Municipal Railway, San Francisco, Cal.—This company has been voted bonds in the sum of $3,500,000 for the extension of its lines in San Francisco. The proposed line will converge toward the site of the Panama-Pacific Exposition and will be operated in conjunction with the ocean-to-bay railway recently opened to traffic by the municipality.

Arcadia, Fla.—Preliminary arrangements are being made to build a gasoline interurban railway to connect Arcadia, Hall City, Christian Colony and Lake Okeechobee and intermediate points. E. Prouty, Arcadia, is interested. [E. R. J., Aug. 23, '13.]

Chicago (Ill.) Elevated Railways.—Work will be begun at once by this company extending the platforms on its lines in Chicago. The principal extensions will be at Clark Street and Lake Street, Randolph Avenue and Fifth Avenue, and Wabash Avenue and Adams Avenue. Overhead bridges are to be built at a few places so as to expedite the movement of passengers who desire to transfer from one line to another. The new work is being done in connection with the plan to establish through routes on some of the elevated lines in Chicago.

Illinois Traction System, Peoria, Ill.—This company is asked to consider plans to build a line north and south through Saybrook; that is, south to Bellflower and thence south and west to Clinton and north from Saybrook to Anchor and then to Fairbury and on to Kankakee.

Union Traction Company of Indiana, Anderson, Ind.—This company has completed its new line from Newcastle to Muncie.

Indianapolis & Delphi Traction Company, Indianapolis, Ind.—Officials of this company were in Hamilton County recently in company with representatives of a Montreal syndicate of capitalists going over the proposed route of this railway with a view of placing bonds for the construction of the lines. The survey has been made, and if the project is financed soon it is said to be the intention of the company to build the line from Carmel north through Westfield and Hortonville to Sheridan by the first of the year. Next season it may be continued to Frankfort and Delphi. The plan at present is to connect with the Union Traction Company's line at Carmel and enter Indianapolis on the old line. [E. R. J., May 10, '13.]

New Albany & French Lick Valley Traction Company, New Albany, Ind.—This company is being organized in New Albany to build an electric line from New Albany to West Baden Springs and French Lick Springs, Ind., a distance of 60 miles. The route will be via Mooreville, Greenville, Palmyra, Hardingsburg and Paoli. It is intended to construct a 4-mile branch from Mooreville to Corydon by way of Georgetown and Lanesville. A survey has been completed and an estimate of the cost arrived at, the total cost of construction being placed at $1,399,563. It is intended to sell $400,000 of stock to residents along the route of the proposed line and to bond the company for the remainder of the necessary amount. Charles W. Schindler, New Albany, is attorney for those who are planning the construction of the railway, their identity not yet having been announced.

Clinton (Ia.) Street Railway.—Several extensions are being built in Clinton by this company. When the extensions are completed work will be begun on the reconstruction of the Eagle Point Park line and of portions of the lines in Bluff Road and in Comanche Avenue in Clinton.

Union Electric Company, Dubuque, Ia.—Rapid progress is being made by this company on the construction of its new West Locust Street extension in Dubuque.

Louisville & Interurban Railway, Louisville, Ky.—This company, which is considering the extension of its Orell line to Kosmosdale, is making arrangements to use a right-of-way over private property instead of over the Lincoln Way.

North Louisiana Electric Railway, Shreveport, La.—This company plans to build a 100-mile electric railway from Shreveport to Monroe via Homer, Minden and Arizona. The property owners of Ward 7 of Claiborne parish, including the towns of Homer and Arizona, have voted a bonus of $50,000 to the company. A. B. Blevins, Jefferson, president. [E. R. J., March 15, '13.]

Bangor Railway & Electric Company, Bangor, Maine.—Construction has been begun by this company on its 1-mile extension from Hampden toward Winterport.

Detroit (Mich.) United Railway.—On the evening of Aug. 26 the Council adopted a resolution providing for the construction of a crosstown line on Junction Avenue between West Jefferson and Michigan Avenues and from Michigan Avenue over other streets to a connection with the Grand River Avenue line. Another resolution provides for the extension of the Kercheval Avenue line.

Electric Short Line Railroad, Minneapolis, Minn.—Work on this company's line to Wayzata and Long Lake is nearing completion, and plans are being considered to build extensions west and south to Redwood Falls, Marshall, Vesta and Bird Island.

Luce Electric Short Line Company, Minneapolis, Minn.—Financial arrangements are being made by this company to build an electric railway between Minneapolis and Redwood Falls. [E. R. J., Aug. 2, '13.]

Laurel & Ellisville Interurban Railway, Laurel, Miss.—This company has placed in operation its line between Laurel and Ellisville.

***Hollister, Mo.**—Preliminary surveys are being made to build an electric railway to connect Hollister, Power Site and Branson. It is proposed to organize a company with a capitalization of $500,000 to build the proposed line. W. J. Campbell, St. Louis, is interested.

***Kansas City, Mo.**—Plans are being considered to have a municipally owned electric railway in Swope Park, to extend from the entrance to the zoo, lagoon, lake and other points of interest.

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Jamestown (N. Y.) Street Railway.—Work has been begun by this company on its Willard Street extension in Jamestown.

Lake Erie & Youngstown Railway, Youngstown, Ohio.—This company has awarded the contract for the construction of its line from Conneaut to Youngstown to the Caldwell Construction Company, Columbus, Ind.

***Henryetta (Okla.) Interurban Railway.**—This company, the incorporation of which is noted elsewhere in this issue, will begin the surveys at once for its proposed 100-mile electric railway to connect Henryetta with the various coal mines and oil fields within a radius of 10 miles. One line will be built from Henryetta to Muskogee and the other from Henryetta to Shawnee. This line will connect with the Rock Island Railroad and the Santa Fé Railroad at Shawnee, with the Fort Smith & Western Railroad near Okemah and with the Missouri, Oklahoma & Gulf Railroad at Henryetta. C. H. Kellogg is interested.

Dunnville, Wellandport & Beamsville Electric Railway, Wellandport, Ont.—It is announced that work on this railway, which has been projected for several years, will be begun within the next ten days. The line will connect with the Hamilton, Grimsby & Beamsville Railroad at Beamsville, Ont., and from Beamsville to St. Catharines a connecting line will be built to connect with the Niagara, St. Catharines & Toronto Railway for Niagara Falls. At Niagara Falls this line will connect with the Canadian Northern Railroad for Toronto and points east and also with the proposed line of the Frontier Eiectric Railway to Buffalo. [E. R. J., June 21, '13.]

Sandwich, Windsor & Amherstburg Railway, Windsor, Ont.—Double tracks are being laid by this company on Wyandotte Street from Ouellette Avenue to Mercer Street in Windsor.

Portland & Oregon City Railway, Portland, Ore.—Grading will be begun at once by this company, which is a subsidiary of the Clackamas Southern Railroad, about 4 miles south of Milwaukee, on the 6-mile stretch between Milwaukee and Gladstone.

Monongahela, Ellsworth & Washington Railway, Washington, Pa.—About 90 per cent of the right-of-way between Monongahela and Voorhis has been secured by this company. Grading is being carried along rapidly and it is planned to have this section of the line in operation by Oct. 1. James Bryant, Pittsburgh, engineer. [E. R. J., May 24, '13.]

Montreal & Southern Counties Railway, Montreal, Que.—This company has completed its extension to Marieville, 4 miles beyond Richelieu and 22 miles from Montreal. The greater part of the roadbed on the line to St. Césaire is also completed.

Quebec (Que.) Rapid Transit Company.—This company states that it will not begin construction of its system of radial lines to connect Quebec, Charlesbourg, Loretteville, Cap Rouge, Ste. Foye and the Island of Orleans until the spring of 1914. Capital stock authorized, $1,000,000. All communications should be addressed to A. Taschereau, Quebec. [E. R. J., Aug. 9, '13.]

Bryan & Central Texas Interurban Railroad, Bryan, Tex.—This company has completed its extension to the Brazos section.

Puget Sound Electric Railway, Tacoma, Wash.—Numerous improvements to interurban line between Seattle and Tacoma will be made at once by this company. It will also begin the installation at once of a block signal system.

Morgantown & Wheeling Railway, Wheeling, W. Va.—Plans are being made by this company to build a 14-mile line from Cassville to Blacksville. J. A. Martin, Morgantown, general manager. [E. R. J., Jan. 25, '13.]

Chicago & Wisconsin Valley Railroad, Madison, Wis.—This company, which was recently reorganized and recapitalized, has obtained the necessary franchises from various cities and counties on condition that within sixty days the company shows proof that $300,000 has been set aside to start construction work and pay debts contracted previous to the reorganization. The first line will be built from Madison to Portage, including city systems. About 250 miles of electric railway will ultimately be built, radiating from Madison and will connect Portage, Prairie du Sac, Merrill, Madison, Janesville, Friendship and Easton. J. E. Jones, Portage, is the general manager of the company. [E. R. J., Aug 2, '13.]

SHOPS AND BUILDINGS

Southern Pacific Company, San Francisco, Cal.—Plans are being made by this company to construct a new Arcade depot in Los Angeles.

Freeport Railway & Light Company, Freeport, Ill.—Plans are being considered by this company to build a new passenger station in Freeport.

New Orleans Railway & Light Company, New Orleans, La.—Plans are being considered by this company to build a new depot at West End in New Orleans.

New York State Railways, Rochester, N. Y.—This company plans to build a new carhouse on Lake Avenue Boulevard in Rochester. The structure will be of steel and concrete construction, 65 ft. x 205 ft., and 21 ft. high. There will be two buildings, one in front to be used as an administration building and one in the rear for housing cars. Three tracks will enter the latter building, which will be capable of holding between seventy-five and 100 cars. The buildings will be made so that they can be extended and doubled to hold more cars, if necessary. There will be room for a machine department, a storeroom, boiler room, and sand and hard-coal storage rooms.

Piedmont & Northern Railway, Charlotte, N. C.—The new carhouses and repair shop of this company at Greenville, S. C., are nearly completed. The machine shop is 160 ft. x 75 ft. and is built of white pressed brick with a steel roof. The machinery is now being installed. A stock room, 120 ft. x 20 ft., is in the main building, the supplies for the Greenville, Spartanburg & Anderson Railway to be kept there. The carhouse is 200 ft. x 65 ft., is constructed of pressed brick and has a steel truss roof. Four tracks extend the entire length of the building, making a total of 400 ft. of storage trackage within the carhouse. About 2 miles of storage track have been laid on the 20 acres which have been set apart for freight yards.

Jefferson County Traction Company, Beaumont, Tex.—This company has purchased two lots and a three-story brick building on Bonham Street in Beaumont. The building will be remodeled and transformed into a depot and office building for the Jefferson County Traction Company and the Beaumont Traction Company.

Wisconsin Traction, Light, Heat & Power Company, Appleton, Wis.—This company has recently bought the lot just north of its present carhouse property in North Third Street in Appleton to prepare for future extensions to its carhouses and power plant. The additions will not be built this year.

POWER HOUSES AND SUBSTATIONS

Pacific Electric Railway, Los Angeles, Cal.—This company plans to move its power plant, now at the corner of Fifth and Lacy Streets, to North Main Street in or near Santiago Creek in Santa Ana. The company proposes to sell the property on which the present power house is located.

Benton Harbor, St. Joe Railway & Light Company, Benton Harbor, Mich.—This company will equip one of its substations with a 300-kw rotary converter which was recently ordered from the General Electric Company.

Piedmont Railway & Electric Company, Burlington, N. C.—This company will install at its substation at Mebane three 100-kva transformers, switchboard and accessories which were recently purchased from the General Electric Company.

Northern Ohio Traction & Light Company, Akron, Ohio.—This company will add to its power-station equipment three 1000-kva transformers. The order has been placed with the General Electric Company.

Columbus, Delaware & Marion Railway, Columbus, Ohio.—Arrangements have been made by this company to place in operation in its power station a 750-kw Curtis turbo-generator, switchboard and accessories. The apparatus has been ordered from the General Electric Company.

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Manufactures and Supplies

ROLLING STOCK

Philadelphia (Pa.) Rapid Transit Company is in the market for new elevated cars.

Frankfort, Tacony & Holmesburg Street Railway, Tacony, Pa., is in the market for two double-truck cars.

Harrisburg (Pa.) Railways is reported to be considering the purchase of five additional double-truck passenger cars.

Hershey (Pa.) Transit Company is in the market for two double-truck passenger cars and one double-truck milk car.

Ohio Electric Railway, Cincinnati, Ohio, has ordered three freight cars and six freight trail cars from the Cincinnati Car Company.

Conestoga Traction Company, Lancaster, Pa., is preparing specifications for six double-truck closed cars, six double-truck open cars and six single-truck cars.

Cumberland & Westernport Electric Railway, Cumberland, Md., has ordered four double-truck cars from The J. G. Brill Company. National air-brake equipments are specified.

Lehigh Valley Transit Company, Allentown, Pa., is building in its shops two flat cars, which are sample cars. When completed it is intended to build four or six additional cars of the same type.

TRADE NOTES

D. W. Smith, formerly with the Westinghouse Electric & Manufacturing Company, has been appointed manager of motor sales of the Robbins & Myers Company, Springfield, Ohio.

Dossert & Company, New York, N. Y., have received orders for connectors from the Havana Electric Railway, Light & Power Company, Havana, Cuba, and the Fort Dodge, Des Moines & Southern Railroad.

Automatic Ventilator Company, New York, N. Y., has received an order to equip the twelve new cars now being built by the Wason Manufacturing Company for the Maryland Electric Railways with automatic ventilators.

Best Pipe Engineering & Supply Company, Pittsburgh, Pa., has been recently organized by George Best and his son, George H. Best. George Best, formerly president of the Best Manufacturing Company, has severed his connection with that concern in order to form the new company.

J. R. McKee has resigned as a vice-president of the General Electric Company in order to devote all of his time to personal affairs. Mr. McKee joined the Thomson-Vanderpoel Electric Mining Company as president at the time of its organization and was also manager of the Thomson-Houston Motor Company. In 1893 he was made manager of the newly organized power and mining department of the General Electric Company. Mr. McKee was appointed chairman of the sales committee in 1908 and in 1912 was elected a vice-president of the company.

General Electric Company, Schenectady, N. Y., is receiving incoming business at a rate equal to the capacity of the plants, or about $110,000,000 a year. This is a considerable falling off from the first six months of the year, which, however, set a new record on orders, at a rate of $15,000,000 or more above current business. Unfilled orders at the beginning of this year were so large and the excess of orders in the first six months above capacity was so great that the company has business enough in sight to carry it through the rest of the year. The total value of orders received last year was practically $103,000,000. The company has received orders for four-motor car equipments from the following companies: Portland, Eugene & Eastern Railway, Portland, Ore.; Pittsburgh & Butler Street Railway, Pittsburgh, Pa.; Charleston (W. Va.) Interurban Railroad; United Railways & Electric Company, Baltimore, Md.

Smith-Serrell Company, New York, N. Y., announces that the Francke flexible coupling is being used by the Public Service Railway of New Jersey, the New York Edison Company and the Interborough Rapid Transit Company of New York. The Rochester Railway & Light Company is one of the most recent purchasers. This all-metal coupling is adaptable to a wide range of service. With the growing popularity of the direct-connected turbo-generator set has come an increasing demand for the coupling from the leading manufacturers of such units, and the General Electric Company is furnishing it with the new 1000-kw set recently placed on the market and operating at 3600 r.p.m. The couplings are made for all shaft sizes from ¾ in. up to 20 in.

E. R. Mason, New York, N. Y., has resigned from the Electric Service Supplies Company and has organized the E. R. Mason Company, Inc., with offices at Room No. 2038 Grand Central Terminal, where his company will act as manufacturers' representatives and as dealers in electric railway specialties. Mr. Mason has been manager of the New York office of the Electric Service Supplies Company for nearly five years, previous to which he represented the same company in the Central Western territory with headquarters in Chicago. Before the formation of the Electric Service Supplies Company he was vice-president of Porter & Berg, Inc., Chicago, Ill. His earlier activities were with McGill & Pomeroy and his father, W. R. Mason, in and about Chicago. Mr. Mason's entire business career has been confined to the electric railway supply field. He is well posted and has a large circle of friends throughout the country. The new company will represent in New York and the Middle Atlantic States the following manufacturers: the Johnson Fare Box Company, the Hunter Illuminated Car Sign Company, the Kerwin Machine Company, the Speer Carbon Company and the Esterline Company, and also will handle a complete line of overhead material and manufactured mica products.

ADVERTISING LITERATURE

The J. G. Brill Company, Philadelphia, Pa., has issued an illustrated catalog describing its "Radiax" or special swing-link radial-axle truck.

Pyrene Manufacturing Company, New York, N. Y., has issued the *Pyrene Bulletin* for August, 1913, describing recent instances in which fires were put out by use of its extinguishers.

Trigger-Lock Reversible Controller Finger, Niagara Falls, N. Y., has issued a folder describing its controller fingers, which are equipped with easily removable and interchangeable tips.

Delta-Star Electric Company, Chicago, Ill., has issued a new bulletin devoted to high-tension outdoor substation and protective equipment for use in selling power along transmission lines.

National Quality Lamp Division of the General Electric Company, Cleveland, Ohio, has issued a bulletin describing and illustrating the application of its Mazda lamps in cars, carhouses and subways.

Barrett Manufacturing Company, New York, N. Y., has issued a catalog containing illustrations of the Grand Central Terminal as it will appear when the yards are entirely completed. It describes the application of Barrett Specification pitch and tarred felt as waterproofing materials for the viaducts, subway walls and roofs of the various office buildings.

NEW PUBLICATION

The Trolley Wayfinder. 1913. New England Street Railway Club, Boston, Mass. Paper, 10 cents.

The 1913 edition of the *Trolley Wayfinder*, the official publication of the New England Street Railway Club, has recently been published. The book has an attractive gray paper cover, printed in red and black, being filled with the cut of a car whose center headlight throws a white cone across the bottom of the page. The book contains an alphabetical list of cities and towns reached by trolley, either a statement regarding distance, fare and time or else a reference to some table being given under each name. In preparing the book the club has endeavored to answer the questions "Where shall I go?" and "How can I get there by trolley?" in a simple and comprehensive manner, and what little information is not obtainable in the book the tourists can easily secure from conductors while en route.

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ADVANCE REGISTRATION AT THE CONVENTION

One of the methods which have been introduced by the American Electric Railway Association during the past few years to expedite the work at the annual convention has been the plan of advance registration. It is an excellent idea, because with an attendance of from 3000 to 4000 which may be expected at an electric railway convention the actual mechanical work of transcribing this number of names and titles and issuing badges takes a great deal of time, and there are many possibilities for mistake. This year the plan is being extended to include the representatives of manufacturing companies which are planning to exhibit at the convention, so that the greater part of those expected at Atlantic City will now be included. The success of this plan depends entirely upon the active co-operation of those to whom advance registration cards have been sent. Unless they forward the names, the preliminary efforts of the association to reduce congestion at the registration booth during the early part of the convention will be nullified. The replies to cards already sent out indicate that the attendance this year will probably be the largest in the history of the association, so that it is necessary that everything should be done to facilitate the work at the opening of the convention and thus not delay the beginning of the sessions. Those who are still considering the question whether it will be worth while to attend the convention would do well to read again the program published in the last issue of this paper. It is not too much to say of it that at no previous meeting have the topics to be considered by each association been of such vital interest to the membership at large. It would be impracticable as well as unnecessary to refer here to each program in detail, but the subjects committee as well as the executive committee of each organization should be congratulated upon its work during the past year.

CURVED TRACK SPACING FOR NEW CARS

A recent accident, fortunately of negligible importance, calls attention to the undesirability of double-track curves upon which any two cars on the system cannot pass each other without fouling. In the case in point only a few of the cars on the line are too long to clear each other when run simultaneously around a certain curve in opposite directions, and the rule covering car operation at this place was apparently quite prominently featured, for it was not until the day of a motormen's outing, when the regular service was being conducted by the less experienced extra motormen, that an accident occurred. This happened to amount to only a broken side post or two and a general scraping, but if any passengers had been seated at the point of impact a very serious accident might have occurred together with an incontestable claim for damages which would have covered the cost of replacement of the improperly spaced tracks several times over. Such cases are by no means rare even in cities where there are no physical difficulties in the way of a wider spacing of tracks. The reason for this is that as new cars have been purchased they are often longer and sometimes wider than those for which the curves on the line were originally laid out. Yet the increased size of these cars ought to offer advantages sufficient to warrant the expense of arranging the necessary track spacing because the necessity for the avoidance of passing another car on a curve is a limitation which may often be overlooked by a new motorman.

ANNUAL OUTINGS FOR RAILWAY EMPLOYEES

In a recent issue mention was made of an outing given by Benjamin S. Hanchett, president of the Grand Rapids Street Railway, for the company's employees and their families at Lakewood, his suburban home. This picnic is a good illustration of the spirit with which the delicate problem of labor versus capital can be handled by executive officials. Too few public utilities recognize the value of such an outing as a means of establishing a more intimate relation between officers and employees and of obtaining the confidence and good will of the men. It is often forgotten that electric railway employees have to work hardest while others play. On the big national and local holidays, like Independence Day and Labor Day, they are busy at all hours, and for this reason they can particularly appreciate a day all their own. For eleven years this practice has been carried out on the Grand Rapids line, but this year the crowning glory was reached through the opening of the president's home to the men and their families. This, of course, is a step not always possible for electric railway officials, but where it can be done, we can conceive of no better means of showing the employee that he is regarded as more than a mere cog in the machine. Such knowledge is of infinite weight in the inspiration it gives the employee

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to loyal and willing labor. Ordinary welfare work from day to day has its place, of course, but its value can be enhanced if one day of the year is set aside when office men, shop men, motormen, conductors, switchmen and trackmen may all rub elbows. Such an assembly not only has a great influence on the *esprit de corps* of the whole organization, but while cementing the friendship of the employees and the company it serves to secure the good will of the public. The Grand Rapids *Evening Press,* in speaking of the outing under discussion, said: "It is the spirit on the part of the corporation which arrests the attention. If the attitude toward its employees were more general on the part of corporations throughout the country there would be fewer and less costly strikes."

ANALYZING LENGTH OF SERVICE

The broadest administration of an electric railway of any real magnitude requires many analyses outside the equipment field, and of these none is of greater interest and value than the investigation of the length of employees' service. The classification of motormen and conductors according to their terms of employment may be highly suggestive, particularly on properties where a sliding scale of wages prevails. If there is any tendency on the part of a considerable number of men to leave the service at the expiration of any stated period, it deserves early investigation, and the analysis of employment records to find out the existence of critical points in the relations of individuals to the company should be kept up year after year.

It goes without saying that every progressive manager desires to retain the services of efficient trainmen and to reduce to the lowest feasible amount the work of breaking in raw recruits. The cost of replacing an efficient man at either end of the car represents a waste of money in many cases, as we have frequently said. New human material must always be entering railway service, and its training must form an important part of the transportation department's work, but in the past the evils associated with a constantly shifting rank and file have not always received sufficient thought. Here, then, is the opportunity of the service period analysis, including the listing of men in groups from one year's service or less up to the maximum and the consideration of equipment changes, wage changes and other matters affecting the employee's satisfaction in his working conditions. If a large percentage of new men leave the service at the end of six months or a year, let the reasons for this be tabulated and studied without prejudice; or, again, if the majority leave at the end of two years or of eighteen months, the reasons should be sought and if possible the trouble should be corrected. Then, too, the attitude of the men toward long service may vary from year to year, and if by curve plotting or other graphic methods tendencies in the direction of resignations and discharges can be seen, much good may be accomplished. In brief, the trained man represents a certain capitalization of expenditure for instruction just as the modern soldier represents an investment which efficient administration seeks to preserve to the longest term of service. The comparison of service statistics with wage scales from year to year is illuminating, disclosing now and then breaks in the rate of increase or irregularities in compensation which might be corrected without hardship to the company, and which would tend to encourage longer service from desirable men. There is ample material here for some very thorough study in relation to the maintenance of an efficient operating force, and the data are so easily assembled and analyzed that there is little excuse for overlooking their interest. There is a sharp dividing line between the elimination of the unfit and the voluntary and perhaps preventable withdrawal from the service of many excellent men upon slight cause.

A NEW POLITICAL SLOGAN

The political situation in New York in connection with the coming mayoralty election has suddenly become changed as a result of the death of Mayor Gaynor, one of the candidates. In consequence there will have to be a re-alignment of forces. But it is interesting to record that in spite of other radical differences in policy all of the three parties which nominated candidates for Mayor of New York this year were a unit on one matter. Each of them tried to claim for its nominees as much credit as possible for the execution of the present contract for rapid transit extension now going on in the city. One nominee boasts that he was chairman of the Public Service Commission at the time when the contracts were signed and so made the system possible. Another, Mayor Gaynor, early adopted as his campaign emblem the shovel to typify his great interest in railway construction. The third recognized that his record was somewhat weak in this matter because at one time he opposed the contracts. But he has announced that now that they are signed he has no power or intention of changing them, and his supporters urge that any previous lukewarmness on his part in regard to this matter is more than made up by the undoubtedly good work done by his two associates on the ticket, who steadfastly supported the rapid transit plan and probably did more than any other two city officials to bring it about.

In other words, each of the three political factions or parties that nominated candidates for Mayor recognizes that the most popular action by the city for a long time has been the arrangement by which the two existing rapid transit companies in Manhattan and Brooklyn will be able to extend their systems and add to their trackage in this city. It should be pointed out in this connection that the extensions permitted under the contract are by no means exclusively subway, but are in a large part elevated. In fact, even exclusive of the new third track which will be laid on the existing elevated lines in Manhattan, the miles of elevated track for which provision is made under the new contracts exceed in length the miles of track which are to be underground.

The moral is obvious. In many cities it is supposed to be a part of political wisdom for candidates for office to attack the large corporations, especially the public utility corporations, and to put every obstacle in the way of the extension and improvement of their systems. This was thought to be the popular course at one time in New York. But the long discussion of the rapid transit problem made the voters realize that their interests and the interests of the public utility companies are largely the same. It took

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some time for the political powers to understand this because it was so different from any of their traditions. But now they have begun to see the light, and the best claim for popularity now in New York is advocacy of the new subway and elevated railway lines.

THE REMUNERATION OF STREET RAILWAY OFFICIALS

The publication in connection with the Boston arbitration hearings of the salaries of the fifty-one principal officers of the Boston Elevated Railway Company is an unusual incident in proceedings of this kind. In its willingness to afford the arbitrators every possible scrap of information of use in the case the company prepared such a list, and it was introduced into the testimony at the request of the counsel for employees and made public by a ruling of the board of arbitrators. The list in its entirety may have satisfied the curiosity of some people, but it is hard to see just what connection exists between the compensation of an executive officer on such a system as that of the Boston Elevated Railway and the question under consideration by the board. The market value of human services varies extraordinarily in different parts of the world and in all lines of business, while the principal factor of the examination under consideration is the market price of the ability to perform the tasks required in car operation by motormen and conductors.

In all large corporations, especially in those where men of different degrees and classes of ability are required, the rates of compensation are certain to vary in considerable and even in great degree. But the fact that one man receives a higher salary than another is no evidence that he is being paid more than he is worth. In fact, it would be the worst kind of economy for a large industrial or transportation company to intrust its important corporate, financial or engineering affairs to men with low salaries, if this meant men of mediocre ability, because they might easily make an error in judgment every day or every week which would cost their employers many times their annual salary.

Nevertheless, a close examination of the salary list in Boston does not disclose any startling figures. Of the officials named, who range from the chief executive to a yardmaster at the mechanical headquarters, the average annual compensation is $4,492. There are eight officers receiving individually $10,000 or more per year. Sixteen receive $5,000 or over; twenty-nine, $3,000 or over, and forty-three, or 84 per cent of the list, receive $2,000 or more per annum. These salaries are not excessive in a company with a stable organization and office holdings of long duration. Many boards of astute directors can be found who gladly authorize such salaries, and the officers in question could undoubtedly obtain as high if not higher remuneration in other lines of work. Certainly in a great deal of the work involving the rehabilitation of railway companies in receivership, where the adequacy of the payments is passed upon by the court, it is easy to find examples of much greater payments for services in corporate affairs similar to those rendered by the officials of the Boston Elevated Railway.

NIAGARA POWER IN BUFFALO

The Buffalo Railway Company, one of the earliest large purchasers of Niagara power, did not rush into the new venture when this power became available but tried it out on a small scale for a time to supplement the output of a power plant which when built represented the best practice in its line. Since then Niagara power, proving satisfactory as to cost and reliability, has been used increasingly until of late it has become the main reliance of the railway, now the International Railway Company.

In making payments for power a certain minimum or "firm" power, approximately set for different seasons in advance, is charged for at a reasonable rate regardless of consumption. Power drawn in excess of the firm power is charged for at a higher rate, which encourages the use of all devices tending to keep down the peaks in the load line. As a consequence the railway company has utilized its steam plant and a large storage-battery equipment to their utmost capacities in a remarkably successful attempt to keep down the peaks and to maintain a uniform load. The load-factor of the purchased power, according to the typical charts used in the descriptive article printed in this issue, was over 68 per cent on Feb. 24, 1913; and over 62 per cent on July 15, 1912.

Unfortunately from the standpoint of economy, there is no method available for filling in the nightly load-line depression so that 20 per cent, more or less, of the energy which must be paid for cannot be utilized, and the storage batteries, large as they are, are unable to eliminate in this condition. However, the International Railway Company has recently added several hundred near-side cars to its rolling-stock equipment, thus greatly increasing the demand for power. This demand is being met by providing new substations and utilizing more Niagara power, and the fact that the steam plant is not to be enlarged is significant.

The Buffalo storage batteries have been of interest to railway men for a long time. When installed ten or more years ago they were of notable size. They have been maintained and operated with great care and have served as reserve and for the keeping down of peaks. Judged merely from the financial standpoint, the cost of the energy which they deliver, slightly over 1 cent per kw-hr., is very high. This involves the maintenance expense and the fixed charges only, the cost of energy in this case being nothing as the batteries are charged with power which could not otherwise be utilized.

The fact, however, that the company continues the use of the batteries and has closed a contract for ten years' additional maintenance is evidence that this high cost is justified in the ways mentioned. The fixed charges at 6 per cent amount to ⅗ cent per kw-hr., and it would pay to scrap the battery to save maintenance cost if its expensive output was not really economical. The reserve power supplied by the steam plant costs only half as much per kilowatt-hour as that furnished by the batteries, but, on the other hand, the battery is always ready for use and automatically adjusts itself to load conditions. It therefore supplements the steam reserve and justifies its existence to the extent that it keeps down fluctuations and maintains power on the line while the steam equipment is being brought into action.

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New 3000-kw Substation in Fort Worth, Tex.

A Description of a Modern Substation Recently Completed by the Northern Texas Traction Company Which Embodies Meritorious Features in General Arrangement, Station Wiring and Building Design

With the completion of the Fort Worth Southern Traction Company's 32-mile interurban line between Fort Worth and Cleburne, Tex., and a number of extensions to the city lines of the Northern Texas Traction Company in Fort Worth, additional substation capacity was required to assume the increased railway load. The management of the Northern Texas Traction Company anticipated this demand and the Stone & Webster Engineering Corporation, representing the holding company, prepared plans and specifications, and the work of building the substation was started so that it would be ready for service when the new lines were completed.

According to the original plans, one 750-kw rotary was to be transferred and two 400-kw rotaries and one 300-kw rotary, with the other substation equipment, were to be removed from the old substation to the new building. During the progress of construction, however, it was decided that the total substation capacity obtained by the addition of one new 750-kw machine to the three old ones would not be sufficient to meet immediate future requirements. Following this decision, three more 750-kw machines were purchased for the new station, and the old rotaries and other substation equipment were utilized in increasing capacity at other points.

Forth Worth Substation—View of Interior

SUBSTATION BUILDING

As the greater portion of the load coming to this new substation was from the Fort Worth Street Railway, it was considered more economical to locate it near the center of the street railway system. In pursuance of this decision, property was purchased just outside the business district of Fort Worth not only large enough for the proposed substation building but with sufficient ground area to admit of a duplication of the proposed installation when it becomes necessary. This site is situated just off the street occupied by the tracks of the interurban lines entering Fort Worth, and a spur track from this main line leads to an alleyway beside the substation building. In case of an emergency, a portable substation may be set on this track and the substation transformers and switchboard equipment used in the operation of the portable station. Provision for a quick connection between the portable and the high-tension bus in the building was made by installing tile bushings in the building wall and a structural steel bracket on the wall exterior to support the wires leading to the portable substation.

The substation building is a brick, steel and concrete structure, 48 ft. 6 in. by 53 ft. 6 in. in plan. As it is situated in an industrial district, the building is quite plain architecturally but is of a substantial fireproof construction. The building walls are 29 ft. 2 in. over all in height and 15 in. thick, which is ample to carry the roof trusses and leave a 22-ft. 10½-in. clear headroom under the lower chords. Provision for an overhead traveling crane of 6-ton capacity as well as for a gallery for the oil switches and high-tension buses was made by installing structural steel columns in one of the exterior walls and a second row of columns 13 ft. 7 in. from the opposite exterior wall. The overhead crane occupies the 32-ft. 5-in. space over the rotaries, and the gallery is in the 13-ft. 7-in. space between the columns and building wall. The roof and gallery floor are of reinforced concrete 4 in. thick, supported on steel purlins and floor beams. The ground floor is concrete, 6 in. thick, with a sidewalk finish.

A liberal installation of 36-in. globe ventilators and windows assures ample natural illumination and ventilation. Two door openings, 10 ft. wide by 9 ft. high, one at each end of the aisle between the rotary converters and the switchboard, each provided with wrought-iron gates, also supplement the natural ventilation of the substation building.

Four compartments inclosed on three sides with brick partition walls were built under the oil-switch gallery. This arrangement permitted the four sets of transformers supplying the rotary converters to be installed in separate rooms, thus facilitating repairs or renewals. With the 8-in. brick partition walls separating the transformer sets, when one is disconnected for repairs there is little opportunity for a workman to come in contact with the live high-voltage circuits in the other compartments. To provide for transformer oil leakage and at the same time facilitate the renewal of transformers, each unit is mounted on a truck which spans a concrete pit sufficient in size to hold the oil. The partitions between these oil pits under the transformers serve as foundations for the rails over which the transformer trucks are removed to the substation transfer pit. This transfer pit is just in front of the transformer compartments and extends the full length of the building. It is provided with a truck and running rails so that a transformer may be transferred from its compartment to the large doors at each end of the substation building. A drain from these transformer and transfer pits as well as from the transformers themselves leads to an underground stor-

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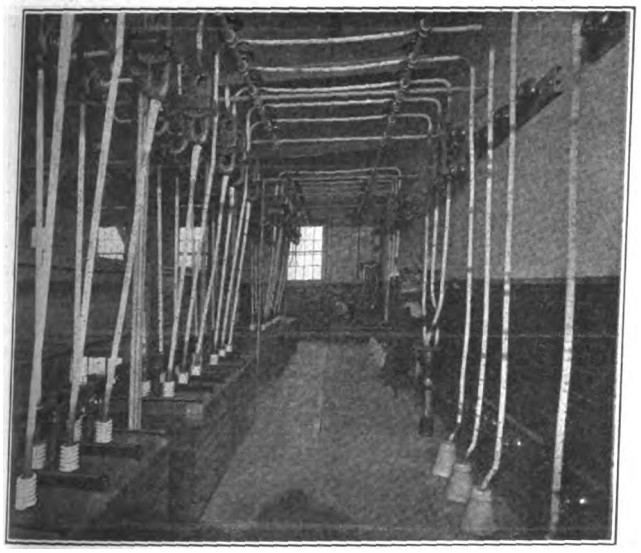
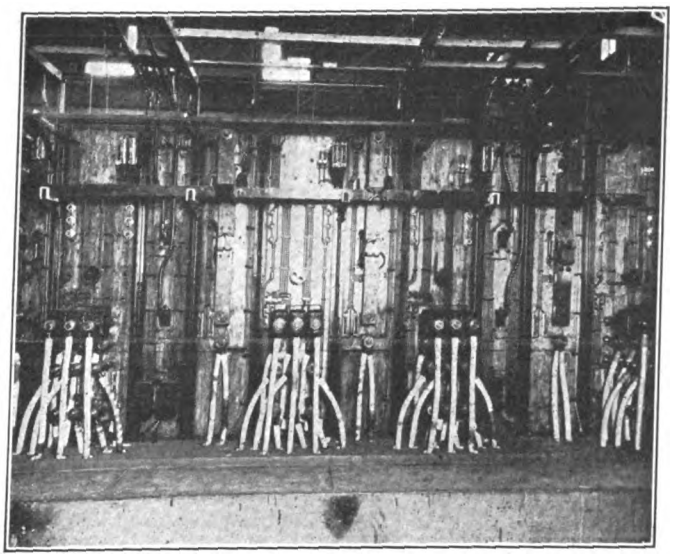
age well outside the building. In case of fire a system of valves controlled from outside the building permits the drainage of any or all transformers to the storage well.

INCOMING TRANSMISSION LINES

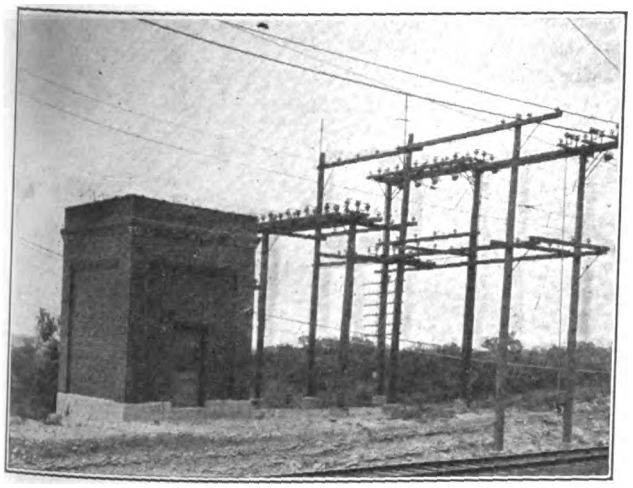
Although nothing in the city ordinances of Fort Worth prohibits the installation of 15,000-volt a.c. overhead transmission lines on the city streets, it was considered more desirable from a civic standpoint to install them underground. The Northern Texas Traction Company's generating station is situated approximately 7½ miles east of Fort Worth. Two 15,000-volt a.c. three-phase transmission lines lead from this generating station to Fort Worth. Where the interurban line leaves a private right-of-way and occupies the streets, a distance of approximately one mile from the new substation, the two transmission lines enter the underground system by way of pole towers and a terminal building. The pole towers at the terminal building, which is the junction of the overhead lines on the Dallas and the Cleburne interurban lines, are equipped with pole-top switches, making it possible to obtain any desired arrangement of transmission circuits.



Fort Worth Substation—Gallery Showing High-Tension Wiring, Incoming Transmission Cables and Oil Switches



Fort Worth Substation—Back of Switchboard at Rotary Converter Panels



Fort Worth Substation—Pole Tower and Building for Connections to Terminals of Underground Conductors

The underground terminal building is of brick and steel construction and of sufficient size to house the high-tension disconnecting switches, lightning arrester set and choke coils. A view of the underground terminal building and pole tower construction is shown in the illustration. Leading from the terminal building into the underground system two three-phase, 25-cycle, 15,000-volt a.c. lines occupy the two top ducts in ordinary vitrified conduit containing four ducts. The transmission cables are lead-covered and designed for 18,000-volt, three-phase transmission.

The underground cables enter the substation building on the transformer and gallery side and are separated into the three phases in the gallery. These three-phase, 15,000-volt a.c. circuits on leaving the cable pass through a set of disconnecting switches mounted on the building wall and thence overhead and down to the oil switches also on the gallery. From the oil switches an emergency connection is made to a bus line which leads to the tile bushings through the building wall, to which the portable substation may be connected. The other circuit passes to pipe brackets swung from the roof beams, thence to insulators on the building wall and down to the transformers in the compartments on the ground floor. All high-voltage circuits are heavily insulated in addition to being liberally spaced, thus reducing human as well as fire hazard to a minimum.

SUBSTATION EQUIPMENT

As before mentioned, the 750-kw rotaries are each supplied through three 275-kva self-cooled transformers which step down from 15,000 volts to 390 volts a.c. The rotaries are Westinghouse design of the self-starting type, provision having been made, however, for starting if it is found necessary in the future. These starting motors will be mounted on one end of the armature shaft and a speed-limit device is now placed on the opposite end. All leads from the transformers to the rotaries and switchboard are installed in conduit under the substation floor.

The switchboard also was supplied by the Westinghouse Electric & Manufacturing Company and contains twenty-five panels, namely, ten d.c. feeder panels, one totalizing panel, four transformer panels, eight rotary panels and two high-tension line panels. The board is 41 ft. in length by 7 ft. 6 in. high and is so placed as to form a barrier between the transformer compartments and the space occupied by the rotary converters. The marble panels are mounted on a grounded structural-steel frame with struts running to the columns supporting the gallery. Special instruments on the switchboard include a recording ammeter, a recording voltmeter and a total output meter. The field control rheostats are mounted on the struts supporting the switchboard and are remotely controlled through hand wheels installed at the approximate center of each rotary panel.

All lighting circuits are taken off a special 15,000-to-110-volt a.c. lighting transformer, and after passing through a central control cabinet board, they lead to the various lamps through pipe conduit. The lamp fixtures for general

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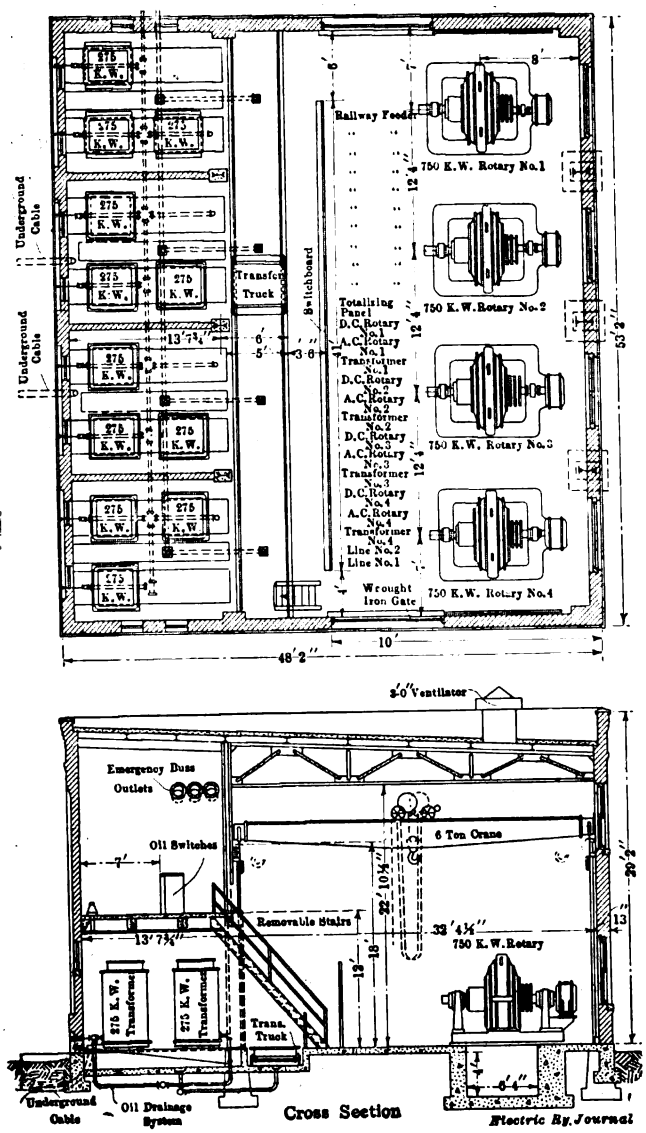
illumination are swung from the roof slab and individual lamps in pipe fixtures are supplied where required.

In addition to the 6-ton overhead bridge crane equipped with a hand-operated trolley for use in maintenance and repairs, a compressed-air system also has been installed. A G.E. type C.P.-28 air compressor set has been placed at one end of the gallery, and a pipe system with taps and hose connections reaches all points in the station where air may be needed in cleaning machines. To keep the electrical



Fort Worth Substation—Plan and Cross-Section

engineer advised of the amount of current in the cable sheaths of the underground system, a Westinghouse Model 80 voltmeter has been installed between it and the ground. Daily readings of this instrument are taken and recorded. Any electrolytic action on the cable sheaths may be noted from the difference in potential and proper precautions taken before a serious breakdown occurs.

PASSING OF THE "DOUBLE-DECK" STATION AT FORT WAYNE, IND.

The electrical energy for the operation of the Fort Wayne & Northern Indiana Traction Company lines has been generated in what is known as a "double-deck" station at Fort Wayne, Ind., but in the course of work of rehabilitation at Fort Wayne this double-deck feature will be done away with. The excavation and the concrete work for the 40-ft. by 100-ft. addition to the front of the building are under way. In the completed plant all turbines will be set on the ground floor. The two twenty-five-cycle machines which are now over the boiler are to be placed beside two new 6250-kva, 4000-volt, three-phase, four-wire General Electric turbo-generator sets purchased recently. The new machines will be fitted with directly connected exciters, and in addition a turbine-driven exciter will be installed for break-down service. All turbines, feeder circuits and oil switches will be remotely controlled from a benchboard. The present jet condensing equipment will be supplanted by Worthington surface condensers. Two 500-kw rotary converters now in the plant will be taken out and shipped to synchronous motor-generator sets. The switchboard will be entirely new and all switching apparatus on the board will be installed in duplicate to insure continuity of service. When the plant is completed the entire system will be changed from two-phase, 2200-volt, to three-phase, 4000-volt, four-wire operation. The change in phase will be effected by means of transformers installed on one feeder circuit at a time, and the motors of the customers will either be exchanged or rewound and replaced. Sargent & Lundy, Chicago, Ill., are the engineers for the redesign of the station.

CO-OPERATION TO PROMOTE A GREATER ELECTRICAL INDUSTRY

A meeting of a number of the active leaders in the electrical industry, called for the purpose of promoting co-operation for the benefit of the consumer as well as the manufacturer, was held at Association Island, Lake Ontario, Sept. 3 to 6. Joseph B. McCall, of Philadelphia, president of the National Electric Light Association, presided over the sessions, and addresses were made by Samuel Insull, president Commonwealth Edison Company of Chicago; Dr. C. P. Steinmetz, General Electric Company; Frank A. Vanderlip, president of the National City Bank of New York; John H. Roemer, chairman of the Railroad Commission of Wisconsin; J. M. Wakeman, general manager of the Society for Electrical Development, Inc., and others.

MR. INSULL ON THE FUTURE OF ELECTRICITY.

Mr. Insull took as his subject the "Distribution of Electric Energy, Present and Future." He said that the problem of transmission of energy was perhaps of more importance than transportation. In the early days of electrical energy production, when steam was the source of energy, electricity was utilized largely for light, motor service being a by-product. To-day the conditions were reversed, and in many of the large systems electric light was a by-product and motor service was the chief source of income.

Mr. Insull expressed the opinion that the central station should produce energy for all transportation and industrial purposes as well as for lighting. The production and distribution of energy for all purposes should be under the control of one organization, even if it must become a public rather than a private enterprise

Energy could now be produced in a large station so economically and at such low cost that it could be distributed more economically that it could be produced locally. On account of the low load-factor the lighting load represented the poorest business a central station could obtain. However, it must supply energy for lighting as an obligation to the public rather than from the point of view of income. Taken in connection with the motor load it could be handled profitably, but it was a very poor load when considered alone.

Discussing the future of energy distribution, Mr. Insull remarked that agitation with reference to the conservation of fuel would force the concentration of production of electrical energy. The concentration movement would also be forwarded by the limitations in finance, the trouble in financing small systems being much larger than that in combined

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large systems. Just as the country had found it desirable to combine its railroads into great trunk-line systems, so it would be found desirable to consolidate electrical transmission systems into networks supplying energy for all purposes. Concentration of production represented the solution of great industrial problems in that it meant low cost of production, low cost of transmission and a minimum selling price to the community.

FUTURE TECHNICAL DEVELOPMENT

Dr. Steinmetz said that the limit in size of steam turbines and turbo-generator apparatus had not been reached, and that units reaching much more than 30,000 hp would be built when a demand arose for such equipments. Although transmission systems had covered distances greater than 200 miles and areas as large as 20,000 sq. miles and were operating at electromotive forces as high as 150,000 volts, the limit had not been reached in either length of circuit, transmission area covered or voltage utilized.

Applications had been made of the electric motor in transportation only for local work, there being as yet no long-distance railways operated electrically. However, local electric railway service had been developed to such an extent that these railways consumed at present more power than would be required for operating all of the steam trains electrically. The development of local electric railway service had brought about a revolution not only in domestic life but also in industrial activity. Factories could now be located at the most economical sites from the point of view of operation and the workmen could select sites for their homes within a wide radius, from the point of view of convenience in domestic arrangements and comfort.

As compared with other forms of energy electricity was superior in three important characteristics relating to transmission, conversion and concentration. Electrical energy could be produced most economically at one place and transmitted efficiently to be utilized just when and where wanted without regard to the location of the source of supply of coal or water. Chemical energy could also be transmitted in the form of fuel, but not so economically as can electrical energy.

With reference to the utilization of electrical energy, Dr. Steinmetz said that it was not necessary to-day to discuss the possibilities but that merely the economical features should be considered. The question was not whether such a thing could be done electrically, but whether it could be done electrically more economically than by some other method. In many cases, such as the substitution of electricity for steam, marked economies could be obtained by revising the system to meet changes in the conditions brought about by the utilization of electricity. The problem involved reorganization to accommodate electrical service. For example, when electricity was substituted for steam for transportation, the electrical trains need not be duplicates of the steam trains. Better results could be obtained by utilizing a larger number of trains of shorter length. This change represented an improvement not only in service to the public but also in the load on the system.

REGULATION IN WISCONSIN

Mr. Roemer described the theory of regulation which is embodied in the Wisconsin law and the practices of the commission. In the course of his address he said that the commission had never established and did not intend to establish any fixed rate of return. In conclusion he said:

"No regulation can be effective which is not based upon accurate information and which is not actuated by a sense of justice and equity. In the light of the past, it must be conceded that an independent tribunal, free from local influences and prejudices and assisted by a corps of trained experts, is better qualified to regulate efficiently public service corporations and individuals engaged in public services than any municipal council or local tribunal. In few instances would it be possible for municipalities to maintain the necessary organization of competent assistants to deal intelligently with the problems involved in the regulation of public utilities. The cost of such an organization would be prohibitive to most municipalities. In central control there is therefore not only efficiency but also economy. One body can serve all municipalities as well as one municipality and serve them better.

"After five years of administration of the Wisconsin law, the results obtained from its operation have been generally satisfactory. Our experience indicates that a comprehensive system of regulation such as is provided by our law is not only advantageous to the general interests of the public but as well to the business interests of utilities."

ELECTRICAL CAPITAL REQUIREMENTS

Mr. Vanderlip said that the capital requirements of central stations in the last five years had been $900.000,000, or an average of $180,000,000 a year.

"When we think what is certain to be done in the way of electrification of steam railroad terminals and heavy mountain grades," he added, "when we reflect on the larger use of electrical energy for industrial power, in agricultural uses, and in the continued growth of necessary interurban lines, we need to look no further into the possible development of the industry to see a requirement for $400,000,000 a year of new capital. That means a new capital issue of $8,000,000 every week for the next five years.

"Four out of five investors at the present time have their minds closed against any investment in securities of electrical corporations, and that is true largely because they fear the effect of present political conditions and tendencies.

"The time has now come, in my opinion, when no man with capital to invest in corporate securities, if he has a desire for return that is any larger that government obligations will pay, can longer hold back from the study of public utility investments. The experimental inventive stage is past. The business has a background that has now become broad enough so that one can make valuable comparisons and sound deductions. It has ceased to be a business of only small units, and the tendency is markedly in the direction of great capital issues which shall have at all times a broad market. The dangers from a prejudiced, unwise or unfair vote of a municipality or a board of aldermen are being greatly lessened by the newly organized public service commissions, and these same bodies, recognizing the monopoly character of the business, are guarding it from useless and venal competition, as they are also guarding the investor from too free capital issues by the optimistic developer or the enthusiastic promoter.

"I can see that, with a little more time for investors to become convinced that a public service corporation is not another name for a target against which to level unfair state and municipal enactments, we may have four out of five investors buying such securities, rather than refraining from doing so.

"In the mind of the investor, the outlook for fair public treatment of public service corporations is the most important single factor in directing investment of capital toward or away from the electrical field.

"I firmly believe that this matter of fair public treatment lies largely in your own hands. If you will do as well with that as you are doing with the technical side of the business the $400,000.000 a year of fresh capital which you need will be forthcoming."

SOCIETY FOR ELECTRICAL DEVELOPMENT, INC.

Mr. Wakeman, outlined the plans of the Society for Electrical Development, Inc. The campaigns of this society will include the publication of articles in popular magazines showing the proper applications of electricity. These articles will be written to appeal to the general public. In the trade press use will be made of articles prepared by men identified in each case with the industry which the paper represents. Articles will be prepared for the daily newspapers in order to present the truth concerning electrical devices, public utilities and corporations.

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The New York City Brake Order

The Public Service Commission, First District, New York, Required That All Passenger Cars Weighing More Than 25,100 lb. Be Equipped with Air Brakes—Tests Conducted by One of the Companies Justified This Order in the Opinion of the Commission, and Its Course Has Been Upheld by the Supreme Court, Appellate Division—The Article Is Followed by a Reply from Mr. Fowler, Who Conducted the Tests for the Company and Disagrees with the Conclusions Reached

BY J. N. DODD, ENGINEER PUBLIC SERVICE COMMISSION, FIRST DISTRICT

On July 10 the Supreme Court, Appellate Division, handed down a decision sustaining the action of the Public Service Commission, First District, New York, in ordering all companies operating surface cars in Greater New York to equip certain of their cars with power brakes. This decision closes a long and interesting proceeding.

In the Public Service Commission act of 1907, creating the commissions and defining their duties, it was specified (Sec. 53) that if, in the judgment of the commission having jurisdiction, improvements to or changes in any property or device used by any street railroad corporation ought reasonably to be made in order to promote the security of the public, the commission shall after a hearing make and serve an order directing such improvements or changes to be made.

In conformity with its duties under this section, the commission for the first district at an early date took up for consideration the adequacy of the brakes with which the surface cars in New York are equipped.

As the weight of a car and the corresponding difficulty of control increase, the weight eventually reaches a figure at which air or other power is necessary to operate the brakes.

PREVIOUS TESTS

At first glance it seems reasonable to suppose that exhaustive tests had been made by some authority to determine the maximum weight of cars which may be operated safely with a hand brake. A long search failed to reveal any such series of tests. When comparative tests had been made by any company or other authority, most of the cars tested were of the same weight. No thorough, exhaustive test apparently had been made for the purpose of determining the limiting weight of cars which may be safely operated with hand brakes. Moreover, when available records of various tests were examined, they were found to be contradictory and inconsistent. For example, the tests by the New York Railroad Commission in 1899 on cars weighing about 20,000 lb. showed hand brakes better than air brakes at almost all speeds. On the other hand, tests on the Hanover street railways, reported to the International Street and Interurban Railway Congress, Munich, 1908, on cars of about the same weight showed air brakes far superior at all speeds.

In the course of this search it became apparent that tests do not always furnish a reliable criterion of the relative value of different brakes. They merely state the stopping distance of the car under the particular conditions that obtained at the time of the test. Most of the conditions that affect this distance vary widely. Among these varying conditions may be mentioned the brakeshoe adjustment, the weight of the car, the condition of the rail, and the human element. Most of these factors vary widely also during the course of the day, and each of them may change independently of any of the others. Thus, on account of the wear of the brakeshoes, the brake adjustment may change materially even in the course of a single trip. The weight of the car is continually changing, owing to the varying number of passengers. The condition of the rail may alter entirely in the course of a few seconds. This change is often such that a visual inspection of the rail fails to reveal its quality. Thus, a wet rail may provide an ideal surface for stopping a car quickly, or it may offer the reverse. In the same way, though not to the same extent, the distance in which a car may be stopped on a dry rail varies according to whether the rail is clean or covered with dust or dirt. For this reason it is impossible to be sure that the rail conditions are the same in tests of two different brakes or that the rail conditions at the time of the test correctly represent average rail conditions under which the car must operate throughout the year.

The human element also is extremely variable. In actual service there are many strong motormen and many who are physically weak, many who are intelligent and mentally alert and many the reverse, many in fresh physical and mental condition and many tired from a day's work.

During most tests the motorman usually knows that he is soon to receive the stopping signal and, knowing what he is expected to do, is intent upon doing that thing in the most efficient manner. During such tests, also, the streets are usually bare of traffic and the motorman's attention is not distracted by other duties such as making up lost time, keeping a lookout to pick up passengers and obeying the conductor's signals. Usually a picked motorman is chosen, selected for his general intelligence and interest in his work. The motorman is generally in fresh physical condition and therefore in good mental condition and to that extent capable of responding to any demands made upon him. The results obtained in service at the close of a long wearying day's work would be entirely different from the results obtained in any series of tests. It is impossible to devise any series of tests under conditions which even approximate the average conditions existing in actual service because it is impossible to tell what the average of these varying factors may be.

Hence it is not wise to place too great reliance upon tests as a method to determine the type of brake which must be used on any type of car.

GENERAL PRACTICE IN REGARD TO BRAKES

The United States Census reports for 1902 and 1907 of the cars for city service give the following figures:

	Total Number Cars	Number Equipped with Air Brakes	Per Cent Equipped with Air Brakes
1902	66,784	7,905	11.8
1907	83,641	31,684	37.8
Increase	16,857	23,779	

According to these figures practically all new cars purchased during this period were equipped with air brakes and many of the old cars had air brakes added.

On the other hand, although these facts show the growing esteem in which the air brake is held throughout the country, they give no indication of the weight of cars equipped.

More definite information is obtained from a study of the braking practice observed in various cities. It appears that all cars are operated with power brakes in the cities of Cleveland, Detroit, Los Angeles, Milwaukee, Minneapolis, St. Paul and St. Louis. In addition to these cities all double-track cars are equipped with power brakes

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Chicago, Cincinnati, Indianapolis, Louisville, Omaha, Seattle and in the State of New Hampshire. In the city of Denver all new cars purchased by the company are equipped with air brakes and practically all the old ones are so equipped.

This evidence is important as showing the opinion on this subject of managers and municipal authorities over the country.

DATA COMPILED BY THE COMMISSION

The New York law requires all street railroad companies under jurisdiction of the Public Service Commissions to report all accidents which occur on their lines. A study was made of these accidents in the First District by the commission of that district to determine what evidence could be obtained from them bearing on the subject.

From the accidents so reported for the years 1909 and 1910 all those caused by the front end of a moving car were selected. These accidents were listed according to the weight of the car. By means of the average number of cars of each weight operated throughout the year, the figure representing the total number of such accidents listed under each weight of car was reduced to the number of accidents per 100 cars.

The maximum weight of single-truck cars is about 20,000 lb. The weight of double-truck hand-brake cars used in New York City varied from 20,000 lb. to about 40,000 lb. The weight of air-brake cars varies from about 25,000 lb. to about 50,000 lb. The list of accidents reported for the various weights of cars is given in Table I printed in this column.

TABLE I—ACCIDENTS TO SURFACE CARS REPORTED TO PUBLIC SERVICE COMMISSION, FIRST DISTRICT, DURING 1909 AND 1910

	1909	1910	Both Years
Hand-brake single-truck cars, weight 16,000-20,000 lb.:			
Number of accidents	55	111	166
Number of cars	875	765	820
Accidents per 100 cars	6.3	14.5	20.2
Hand-brake double-truck cars, weight 20,100-25,000 lb.:			
Number of accidents	20	42	62
Number of cars	281	281	281
Accidents per 100 cars	7.1	15	22
Hand-brake double-truck cars, weight 25,100-40,000 lb.:			
Number of accidents	239	412	651
Number of cars	2018	2001	2010
Accidents per 100 cars	11.9	20.6	32.4
Air-brake double-truck cars, weight 25,000-40,000 lb.:			
Number of accidents	50	162	212
Number of cars	723	959	841
Accidents per 100 cars	6.9	16.9	25.2
Air-brake double-truck cars, weight 40,000 lb. and up:			
Number of accidents	93	94	187
Number of cars	695	704	699
Accidents per 100 cars	13.4	13.3	26.8

The value of such a list lies in great part in the fact that it deals with large numbers. A large number of cars will usually be operated under average conditions. A small number of cars may be and often is operated under special conditions. For example a small number of cars may be operated in a very congested territory or the reverse, or the daily mileage may be exceptionally large or small. Such criticisms do not usually hold when large numbers are dealt with.

The list in Table I indicates the following conclusions:

(1) On single-truck cars weighing not more than 20,000 lb. hand brakes are satisfactory, and no improvement could be obtained by the use of air brakes.

(2) On double-truck cars weighing not more than 25,000 lb. the evidence is inconclusive. Although the number of accidents per 100 cars is small, the number of cars is small so that the record lacks weight.

(3) Cars weighing from 25,000 lb. to 40,000 lb. equipped with hand brakes were involved in about 30 per cent more accidents than were an equal number of cars of the same weight equipped with air brakes.

An examination was also made of the number of accidents reported on cars weighing from 25,000 lb. to 30,000 lb. In this class there were a great many cars and the record showed even more strongly in favor of air brakes than did the record of the larger class, including cars weighing from 25,000 lb. to 40,000 lb.

A more accurate criterion would have been a comparison on a mileage basis—that is, a record of the accidents, say, per 1000 miles—but the mileage of the various cars was not furnished to the commission and such a comparison was impossible. However, the comparison on a car basis, as it was made out, is probably much more favorable to hand brakes than would be a comparison on a mileage basis. Air-brake cars being newer are more popular with the traveling public than are hand-brake cars. It is well known that with the same motor equipment the schedule speed of an air-brake car is higher than that of a hand-brake car. Air-brake cars are in much greater favor with the motormen because of their ease of operation. The power consumption of air-brake cars is considerably less than that of hand-brake cars on account of the fact that with hand-brake cars motormen usually operate with the brake partially applied so as to be able to stop the car quickly when necessary, while with the air-brake they run free. For all these reasons it appears probable that for cars of the same weight the mileage of cars equipped with air brakes is much greater than that of an equal number of cars equipped with hand brakes. It therefore follows that a record of accidents on a mileage basis would be much more favorable to air brakes than the record given above.

HISTORY OF HEARING

On July 7, 1911, a hearing on the subject was called by the commission for July 20, 1911. The various companies in the city interested were notified of the hearing and were represented by counsel. The hearings lasted until Sept. 20, 1911. The arguments of the companies were principally in favor of a dividing line higher than 25,000 lb. They are perhaps best summarized by quoting from the opinion of the presiding commissioner, rendered Oct. 11, 1911:

"The inquiry developed a great difference of opinion as to the cause of accidents and the efficiency of different types of brakes. The only real contention at the hearing was as to where the dividing line should be drawn in respect to weight. It appeared that the cars were chiefly of the double-truck type and varied in weight from about 22,000 lb. to 50,000 lb. The transportation engineer of the commission testified that single-truck cars could be safely operated with improved hand brakes, and also the lighter type of double-truck cars. He was of the opinion, however, that no cars should be operated with what is known as the 'staff and chain brake' except the very light cars.

"This dividing line, as suggested in the hearing order, and one recommended by the transportation engineer, was double-truck cars weighing over 25,000 lb. It appeared that some of the companies have a considerable number of cars that are only slightly in excess of this weight, one class of cars weighing 25,100 lb. These companies thought that 26,000 lb. should be the dividing line. Other companies had cars varying in weight from 26,000 lb. to 28,000 lb. or 29,000 lb., and they thought that the dividing line should be 30,000 lb. It was not claimed by anyone that cars weighing 30,000 lb. or over did not require power brakes. In fact, it appeared that most of the cars of that weight are already so equipped.

"It was suggested in behalf of one of the companies that a distinction should be made between closed and open cars, there being a large number of open cars weighing in the neighborhood of 26,000 lb. or 27,000 lb., which are operated only in the summer time, when the rail is dry and the brakes operate more efficiently. On the other hand, one witness, called by one of the companies, testified that the rail was safer in the winter time than it was in the summer time. It also appeared that open cars have greater seating capacity, and so, when loaded, are heavier than the closed cars of corresponding weight."

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His recommendations follow:

"I am of the opinion that hereafter all new cars put into service within the city of New York weighing over 25,100 lb. should be equipped with power brakes, and that, as to the present equipment, a reasonable time should be given for the companies to make the necessary change.

"I recommend, therefore:

"(1) That all double-truck passenger surface cars in service weighing over 27,000 lb. should be equipped with power brakes and geared hand brakes on or before June 1, 1912. This will give the companies an opportunity during the next six months to equip with power brakes all of their open cars weighing 27,000 lb. and upward, and also their closed cars during the summer of 1912 which will be required to go into service in the autumn;

"(2) That all double-truck passenger surface cars in service weighing over 25,100 lb. should be equipped with power brakes and geared hand brakes on or before June 1, 1912;

"(3) That all double-truck passenger cars weighing 25,100 lb. or less should be equipped with geared hand brakes on or before June 1, 1913:

TABLE II—No. 400 SERIES. BRAKING DISTANCES, VARIOUS LOADS AND SPEEDS. DRY RAIL

Car No.	432	432		432		432		432		454	454	454	448	441	422	432	453
Brakes	Air, 85%	Air, 85%		Air, 90%		Air, 95%		Air, 100%		"A"	"A"	"A"	"B"	"C"	"D"	"E"	"E"
	No sand	No sand	Sand	No sand	Sand	No sand	Sand	No sand	Sand	No sand	No sand	Sand	No sand	No sand	No sand	No sand	No sand
Empty car:															1912	1912	1912
Date	12/19/11	4/6/12		4/6/12		4/7/12		4/7/12		1/26/12	4/12/12	4/12/12	1/1/12	1/4/12	30/11	23/11	29/11
Weight, lb.	30,300	30,300		30,300		30,300		30,300		28,760	28,760	28,760	28,200	28,500	28,200	30,300	28,000
Distance:																	
5 M.P.H.	4′ 6″	7′ 4″	7′ 3″	6′ 3″	6′ 3″	5′ 5″	6′ 6″	6′ 1″	5′ 9″	3′ 6″	5′ 4″	4′ 8″	3′ 8″	5′ 7″	6′ 8″	8′ 0″	6′ 0″
10 M.P.H.	18′11″	26′11″	25′ 8″	25′ 0″	21′ 9″	25′ 3″	22′11″	22′ 5″	23′ 1″	18′ 3″	25′ 3″	24′10″	18′10″	26′ 7″	24′ 5″	27′ 8″	23′ 7″
15 M.P.H.	48′10″	57′ 4″	53′ 2″	54′ 1″	53′ 9″	56′10″	49′ 0″	53′ 3″	46′ 5″	44′ 1″	52′ 6″	52′ 0″	44′ 4″	51′ 7″	51′10″	69′10″	50′ 5″
20 M.P.H.	85′ 1″	99′ 8″	103′ 5″	95′ 6″	90′ 2″	97′ 7″	88′ 3″	88′ 0″	91′ 3″	81′ 6″	95′ 2″	98′ 8″	82′10″	100′ 4″	95′10″	129′ 3″	101′10″
Seated load:															1912	1912	1912
Date	12/17/11	4/8/12		4/8/12		4/8/12		4/7/12		1/25/12	4/12/12	4/12/12	1/1/12	1/2/12	30/11	28/11	29/11
Weight, lb.	40,100	40,100		40,100		40,100		40,100		38,500	38,500	38,500	38,000	38,300	37,900	40,100	37,800
Distance:																	
5 M.P.H.	7′ 2″	6′ 2″	7′ 3″	5′10″	6′ 0″	5′ 1″	6′ 2″	6′ 3″	6′ 9″	6′ 1″	7′ 9″	6′10″	5′ 6″	6′ 9″	8′ 2″	8′ 5″	7′10″
10 M.P.H.	29′ 9″	25′ 1″	22′ 8″	23′ 6″	22′ 8″	21′ 9″	21′ 7″	27′ 6″	24′10″	24′ 0″	26′ 3″	26′ 6″	25′ 6″	27′ 2″	29′ 8″	30′ 5″	31′ 8″
15 M.P.H.	63′ 3″	55′11″	49′ 9″	52′10″	51′ 1″	50′ 7″	47′ 8″	58′ 7″	55′ 6″	51′ 3″	60′10″	57′ 0″	54′ 4″	57′ 1″	60′ 8″	51′ 2″	63′ 1″
20 M.P.H.	108′ 6″	102′ 3″	94′ 4″	89′ 1″	89′ 3″	89′ 1″	86′ 6″	102′ 9″	104′ 4″	99′ 5″	107′ 9″	108′ 1″	106′ 2″	115′11″	110′ 4″	137′ 8″	118′ 6″
Standing load:															1912	1912	1912
Date	12/18/11	4/11/12		4/11/12		4/8/12		4/11/12		1/26/12	4/12/12	4/12/12	1/1/12	1/2/12	30/11	28/11	29/11
Weight, lb.	45,300	45,300		45,300		45,300		45,300		43,700	43,700	43,700	43,200	43,500	43,100	45,300	43,000
Distance:																	
5 M.P.H.	6′ 7″	6′ 1″	6′10″	6′ 8″	7′ 1″	6′ 0″	6′ 2″	6′ 4″	6′ 4″	5′ 8″	7′ 5″	7′ 5″	7′11″	6′10″	8′ 6″	8′ 3″	9′ 8″
10 M.P.H.	26′ 3″	26′ 4″	24′ 6″	23′11″	25′ 9″	23′ 1″	23′ 7″	24′11″	24′ 4″	23′ 9″	29′ 6″	28′ 0″	32′ 3″	29′ 4″	34′ 5″	35′ 6″	34′10″
15 M.P.H.	65′11″	56′ 3″	55′ 6″	55′ 8″	55′ 5″	53′ 5″	50′ 1″	58′ 9″	55′ 9″	55′ 2″	62′10″	62′ 9″	69′ 0″	70′ 7″	68′ 3″	82′ 4″	73′ 9″
20 M.P.H.	108′ 5″	117′ 5″	105′10″	101′ 3″	102′ 1″	97′ 9″	96′ 7″	104′ 7″	102′ 0″	107′ 1″	112′10″	116′ 8″	129′10″	126′ 5″	128′ 7″	152′ 7″	133′ 5″

NOTE.—Brakes "A," "B," "C," "D" and "E" are hand brakes.

TABLE III—No. 2700 SERIES. SEMI-CONVERTIBLE CARS. BRAKING DISTANCES, VARIOUS LOADS AND SPEEDS. DRY RAIL

Car number	2720		2721			2722			2723									
Brake	Air, 85%	"D"	Air, 85%		"C"	Air, 85 per cent		"B"	Air, 85 per cent		Air, 90 per cent		Air, 95 per cent		Air, 100 per cent		Air, 85 per cent		"A"	
	No sand	No sand	No sand	Sand	No sand	Sand	No sand	Sand	No sand	Sand	No sand	Sand	No sand	Sand	No sand	Sand	No sand	Sand	No sand	Sand
Empty car:																				
Date	1/20/12		3/18/12		3/18/12	4/4/12		4/4/12	3/19/12	2/12/12	3/31/12		3/30/12		3/31/12		4/24/12	4/21/12	4/24/12	4/21/12
Weight, lb.	31,300		31,500		31,500	31,200		31,200	31,400		31,400		31,400		31,400		31,400		31,400	
Distance:																				
5 M.P.H.	7′ 5″	8′ 6″	7′ 8″	7′ 3″	7′11″ ..	7′10″	6′ 6″	6′11″ ..	8′ 5″	..	5′ 9″	6′ 0″	5′ 0″	5′ 8″	5′10″	6′ 4″	8′10″	9′ 4″	6′ 6″	7′ 6″
10 M.P.H.	30′ 8″	31′11″	27′ 2″	27′11″	33′ 0″ ..	24′ 4″	24′ 3″	25′ 6″ ..	29′ 2″	..	23′ 8	23′11″	22′10″	23′ 5″	28′ 7″	24′ 0″	29′ 8″	29′ 2″	28′ 4″	26′11″
15 M.P.H.	62′ 7″	70′ 3″	61′ 7″	59′11″	66′ 5″ 64′ 9″	57′11″	53′ 2″	57′ 8″ 57′ 4″	57′ 1″	..	59′ 7″	49′ 2″	46′ 9″	49′ 0″	52′ 0″	49′ 3″	63′ 0″	58′ 8″	64′ 5″	57′ 8″
20 M.P.H.	109′ 0″	118′ 2″	108′ 3″	103′10″	110′ 2″ 119′ 7″	93′11″	91′ 9″	98′ 9″ 100′ 7″	111′11″	92′ 8″	96′ 1″	88′ 8″	92′ 9″	86′ 4″	96′ 9″	87′ 4″	102′10″	99′ 0″	115′ 2″	106′11″
Seated load:																				
Date	1/20/12	4/21/12	3/19/12		3/19/12	4/5/12		4/4/12	3/27/12		3/30/12		3/30/12		3/27/12		4/24/12	4/21/12	4/24/12	4/21/12
Weight, lb.	36,700		37,000		37,000	36,600		36,600	36,800		36,800		36,800		36,800		36,700		36,700	
Distance:																				
5 M.P.H.	7′ 3″	8′ 0″	9′ 5″	9′ 6″	9′10″ ..	8′ 5″	7′ 8″	8′ 3″ ..	6′ 6″	7′ 3″	7′ 5″	7′ 4″	6′ 6″	6′ 8″	6′11″	6′ 6″	10′ 1″	10′ 0″	9′ 3″	8′ 3″
10 M.P.H.	23′10″	31′ 6″	33′ 5″	33′ 1″	35′ 1″ ..	29′ 6″	28′ 3″	30′ 9″ ..	28′ 8″	24′ 7″	28′ 2″	25′10″	29′ 1″	23′10″	26′ 6″	23′ 0″	32′ 7″	30′ 6″	32′ 0	29′ 1″
15 M.P.H.	58′ 3″	66′ 0″	71′ 1″	71′ 3″	84′ 0″ 75′11″	60′ 0″	61′ 8″	66′ 9″ 60′ 9″	59′ 3″	52′ 4″	64′11″	53′10″	53′ 2″	50′ 5″	56′ 7″	52′ 1″	65′ 8″	64′ 0″	66′ 9″	65′ 3″
20 M.P.H.	120′10″	137′ 5″	121′10″	121′ 1″	127′ 8″ 139′ 4″	108′ 6″	104′ 9″	110′10″ 109′ 0″	104′11″	98′ 0″	111′ 5″	97′10″	103′ 7″	95′ 4″	105′ 8″	92′ 7″	116′ 4″	112′ 7″	116′10″	118′ 9″
Standing load:																				
Date	1/21/12		2/12/12		2/12/12	4/5/12		4/5/12	3/26/12		3/26/12		3/26/12		3/27/12		4/21/12		4/21/12	
Weight, lb.	43,300		43,500		43,500	43,200		43,200	43,400		43,400		43,400		43,400		43,400		43,400	
Distance:																				
5 M.P.H.	8′10″	9′ 5″	10′ 8″ ..		10′ 5″ ..	10′ 0″	9′10″	10′11″ ..	7′ 3″	8′ 6″	6′ 4″	5′ 9″	8′ 0″	8′ 6″	8′ 1″	8′ 0″	11′ 7″	10′ 7″	9′ 4″	9′ 2″
10 M.P.H.	33′ 0″	34′ 1″	35′ 8″ ..		34′ 7″ ..	34′11″	32′ 0″	36′ 9″ ..	31′ 1″	24′10″	25′ 1″	22′ 8″	31′ 4″	26′ 1″	26′ 7″	29′ 2″	34′ 9″	32′10″	32′ 5″	33′ 6″
15 M.P.H.	73′ 0″	92′ 0″	67′ 6″ ..		77′ 2″ ..	73′ 5″	64′ 6″	91′ 0″ 81′ 1″	65′ 4″	55′ 9″	64′ 2″	54′ 3″	66′ 6″	56′ 8″	66′11″	57′ 1″	70′10″	71′ 4″	70′ 6″	72′11″
20 M.P.H.	137′ 3″	162′10″	130′ 5″ ..		133′ 3″ ..	138′ 9″	136′10″	134′11″ 165′10″	110′ 0″	119′ 2″	104′ 4″	110′ 6″	114′ 2″	107′ 5″	122′ 9″	109′ 8″	127′ 4″	128′ 8″	136′ 5″	128′ 0″

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"(4) That all cars other than passenger cars should be equipped with power brakes and geared hand brakes on or before June 1, 1912."

A ruling was made by the commission according to the recommendation.

The company most affected by this order was the Brooklyn Rapid Transit. This company owned 1125 cars on which both air brakes and geared hand brakes must be provided according to the order. As estimated by it, the cost of equipping its cars as directed in the order was $560,000. This included an allowance for the loss of service of the car while it was being equipped with brakes.

REHEARING

On Oct. 31, 1911, the Brooklyn Rapid Transit applied for a rehearing. This was granted by the commission on Nov. 14, 1911. The rehearing was requested on broad grounds.

In order to learn more of the operation of brakes the companies engaged the services of a well-known consulting engineer to make a series of tests on the relative stopping distances that could be obtained with air brakes and various makes of hand brakes.

The series included tests of five different makes of hand brakes and air brakes adjusted to four different ratios or pressures, three different weights of cars, tests on wet and on dry rail and tests with and without sand. In most cases the car was stopped by means of the brake and also by reversing the motors. With the air brake the car was stopped by the "service" application and by the "emergency" application. Tests were made on an empty car, on a car loaded with sand to represent a seated load and on a car loaded to represent a standing load. The car was stopped when running at 5, 10, 15 and 20 m.p.h. Three stops were made at each speed and load, making thirty-six stops for each complete test on any brake and method of braking.

From these tests an enormous number of data were obtained. For the sake of simplicity it was necessary to eliminate from consideration as many as were not essential or for any reason not reliable.

The wet-rail tests were very erratic. In many instances they were much longer than the corresponding stop made on the dry rail, and also in many instances they were much shorter. Two consecutive stops, made apparently under identical conditions, would vary from each other in a ratio sometimes as high as four to one. Although operation under bad rail conditions is very important, the results of these wet-rail tests was such that no consistent conclusions could be obtained from them, and they were for that reason disregarded.

The motor-reverse stops were disregarded. This was for many reasons. In the motor-reverse stops the stop was obtained principally by the motor. It was not a test of the brake. Such a method of braking requires an entirely different procedure in an emergency from that employed in ordinary "service" braking. Consequently it is probable that the results obtained in these tests by this means of braking were superior to what would be obtained in actual operation, inasmuch as in the tests the motorman knew in advance that he was to stop the car in a certain manner. It also appeared that although reversing the motors often gave better results than stopping by means of the brake, these instances were usually at low speeds. At high speeds reverse stops usually gave poorer results than brake stops, and at these speeds the superiority of the brake stops was much more marked than the superiority of the motor stops at low speeds. For these reasons the reverse stops were eliminated from consideration and attention was kept to the brake stops.

For the purposes of the hearing the object of the tests was to determine what brake would stop a car in the shortest distance in order to avoid an accident. For this reason the "service" stop was not considered, the brakes being considered solely on an "emergency" basis.

Since the purpose of the tests was to determine the action of the brake in its operation throughout the year, individual stops were disregarded and the average length of stops was the only figure considered.

TABLE IV—NO. 2500 SERIES SEMI-CONVERTIBLE CARS. BRAKING DISTANCES, VARIOUS LOADS AND SPEEDS. DRY RAIL.

Car number	2500		2500		2500		2500		2501		2584	
Brake	Air, 85 per cent		Air, 90 per cent		Air, 95 per cent		Air, 100 per cent		"E"		"A"	
	No sand	Sand	No sand	Sand	No sand	Sand	No sand	Sand	No sand	Sand	No sand	Sand
Empty car:												
Date	3/11/12		3/14/12		3/11/12		3/14/12		2/29/12		3/31/12	
Weight, lb.	38,300		38,300		38,300		38,300		36,600		36,600	
Distance:												
5 M.P.H.	5′ 4″	6′ 4″	5′ 4″	5′ 5″	4′11″	5′ 0″	5′ 8″	5′ 4″	4′ 9″	..	5′ 0″	4′ 7″
10 M.P.H.	19′10″	19′ 7″	19′ 6″	18′11″	18′11″	18′10″	19′11″	19′ 8″	23′ 4″	..	20′10″	20′10″
15 M.P.H.	41′ 2″	42′11″	43′ 1″	40′ 6″	41′10″	40′ 5″	40′ 4″	41′ 6″	45′ 9″	47′ 6″	48′ 4″	44′ 5″
20 M.P.H.	74′ 6″	80′ 3″	66′11″	75′ 4″	73′ 2″	77′10″	74′ 7″	76′ 6″	82′ 6″	86′ 2″	82′ 5″	87′10″
Seated load:												
Date	3/14/12		3/14/12		3/16/12		3/16/12		2/29/12		4/1/12	
Weight, lb.	43,800		43,800		43,800		43,800		41,800		42,000	
Distance:												
5 M.P.H.	6′ 8″	6′10″	5′ 2″	5′ 5″	5′ 9″	6′ 1″	4′ 7″	5′ 1″	5′ 4″	..	6′ 9″	5′11″
10 M.P.H.	22′ 6″	24′ 0″	20′ 0″	19′ 8″	22′10″	22′ 9″	18′ 9″	21′ 8″	22′ 6″	..	22′10″	22′ 6″
15 M.P.H.	47′10″	49′ 8″	46′ 5″	46′ 1″	49′ 5″	52′ 1″	43′ 0″	45′ 2″	48′ 1″	45′ 1″	50′ 9″	47′ 6″
20 M.P.H.	87′ 2″	91′ 1″	81′ 0″	83′ 0″	84′ 3″	91′ 6″	80′10″	80′ 5″	84′ 4″	79′11″	88′ 6″	87′10″
Standing load:												
Date	3/17/12		3/17/12		3/17/12		3/17/12		2/29/12		4/1/12	
Weight, lb.	50,400		50,400		50,400		50,400		48,600		48,600	
Distance:												
5 M.P.H.	8′ 4″	7′ 7″	8′ 3″	6′ 9″	6′ 8″	6′ 1″	6′ 5″	6′ 4″	5′ 4″	..	6′ 6″	6′ 9″
10 M.P.H.	28′ 0″	32′ 5″	24′ 9″	25′ 0″	22′ 0″	25′11″	21′ 8″	22′ 0″	24′ 3″	..	24′ 8″	24′10″
15 M.P.H.	61′ 9″	67′ 8″	55′ 5″	54′ 7″	51′ 5″	54′ 3″	47′ 8″	48′ 0″	51′ 7″	52′ 1″	51′ 2″	53′ 4″
20 M.P.H.	107′ 0″	116′ 8″	100′ 9″	107′10″	92′ 3″	98′ 6″	83′11″	92′ 6″	94′ 6″	91′10″	93′ 5″	94′ 6″

NOTE.—Brakes "A" and "E" are hand brakes.

Tables II, III and IV show the average dry-rail stopping distance obtained by the various brakes on the three types of cars at each speed and load.

COMPARISON OF TESTS

To analyze properly the record of these tests it was necessary to use some method of summarization. To compare directly stops at all speeds and loads is impossible. A method should be used, if possible, which will summarize accurately into a single figure the results obtained with a given brake at all speeds and loads.

The usual method of comparing stops at different speeds is by means of the braking rate; that is, by the amount by which the speed is reduced per second. However, this method is open to objection when the speeds differ by a relatively large amount. At low speeds the braking distance is short. A change of a small amount in the braking distance is a large percentage and appears as a considerable change in the braking rate. The damage caused in an accident is usually a question of the distance covered in braking. Comparison by means of the braking rate at all speeds would have the result that a small difference in the braking distance obtained with two different brakes at low speeds (due possibly to the different efficiency of the brakes at those speeds) might cause a considerable change in the final summary figure.

If all brakes are tested at the same speeds, a more

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satisfactory method of summarizing results is to add the distances obtained at the several speeds. Two brakes may be compared by a comparison of this sum. This total figure takes due account of the amount by which either brake is superior at each speed. A small difference in the distances covered at certain speeds does not affect unduly the final figure.

This was the method of summarizing employed by the commission. The distances covered in braking from all speeds were added. A total figure was thus obtained for each of the three loads and the three totals were averaged. This final average was the summary figure used to express the value of the brake.

In Table V the results of the tests have been summarized in this manner and the brakes arranged in the order of their value. The curious relative standing of the various ratios of the air brake on Car 2500 is due to the fact shown in Table IV that with the seated load the braking distances at 95 per cent pressure were longer than the braking distance at 90 per cent or 100 per cent. No explanation is given of this inconsistency.

TABLE V—RELATIVE VALUE OF VARIOUS BRAKES

Type of Brake	Sand	Car No.	Sum of Braking Distances
No. 400 Series			
Air, 95 per cent	Yes	432	168′ 4″
Brake "A" (Jan.)	No	454	173′ 3″
Air, 90 per cent	Yes	432	177′ 1″
Air, 95 per cent	No	432	177′ 3″
Air, 90 per cent	No	432	179′ 10″
Air, 100 per cent	Yes	432	182′ 1″
Air, 85 per cent (April)	Yes	432	185′ 5″
Air, 100 per cent	No	432	186′ 6″
Air, 85 per cent (Dec.)	No	432	191′ 1″
Brake "B"	No	448	193′ 5″
Air, 85 per cent (April)	No	432	195′ 7″
Brake "A" (April)	No	454	197′ 7″
Brake "A" (April)	Yes	454	197′ 10″
Brake "C"	No	441	208′ 1″
Brake "D"	No	422	209′ 1″
Brake "E"	No	453	218′ 2″
Brake "E"	No	432	253′ 8″
No. 2700 Series			
Air, 95 per cent	Yes	2723	179′ 9″
Air, 90 per cent	Yes	2723	181′ 7″
Air, 100 per cent	Yes	2723	181′ 8″
Air, 95 per cent	No	2723	193′ 3″
Air, 90 per cent	No	2723	199′ 0″
Air, 100 per cent	No	2723	201′ 1″
Air, 85 per cent	No	2723	206′ 6″
Air, 85 per cent	Yes	2722	206′ 11″
Air, 85 per cent	No	2722	215′ 10″
Air, 85 per cent	Yes	2723	218′ 9″
Air, 85 per cent	No	2720	220′ 8″
Brake "A"	Yes	2723	221′ 4″
Air, 85 per cent	No	2723	224′ 6″
Air, 85 per cent	No	2721	224′ 11″
Brake "A"	No	2723	229′ 4″
Brake "B"	No	2722	229′ 8″
Brake "B"	Yes	2722	231′ 3″
Brake "C"	No	2721	243′ 2″
Brake "D"	No	2720	256′ 8″
No. 2500 Series			
Air, 100 per cent	No	2500	149′ 1″
Air, 100 per cent	Yes	2500	154′ 9″
Air, 95 per cent	No	2500	157′ 10″
Air, 90 per cent	No	2500	158′ 10″
Brake "E"	Yes	2501	162′ 8″
Air, 90 per cent	Yes	2500	162′ 10″
Brake "E"	No	2501	164′ 1″
Air, 95 per cent	Yes	2500	166′ 5″
Brake "A"	Yes	2584	166′ 11″
Brake "A"	No	2584	167′ 1″
Air, 85 per cent	No	2500	169′ 8″
Air, 85 per cent	Yes	2500	181′ 8″

Two conclusions may be drawn from these tables:

First—On each series of cars air brakes appeared superior. It is true that on the 400 series one hand brake showed to advantage, though even this was inferior to air. However, a second test on the same brake gave results inferior to any results obtained with an air brake.

Second—No hand brake tested showed itself consistently better on all cars than air even at 85 per cent pressure, a pressure which in these tests gave the poorest results.

With the other data submitted to the commission blueprints were supplied showing the leverage with each type of brake. These are given in Table VI. From this table it appears that to exert 85 per cent pressure on the wheels a pressure must be exerted on the brake handle ranging from 22.8 to 108.3 lb. Dynamometer readings taken during the tests showed that the motorman exerted 105 lb. pressure on the brake handle. In view of the fact that it is necessary to exert 108.3 lb. to obtain 85 per cent pressure on the wheels, it appears reasonable to assume that 105 lb. is a pressure which may be exerted by most motormen when necessary in actual operation and will often be exceeded, especially at times when the motorman's only thought is to apply the brakes quickly and with the greatest possible force.

Table VI also gives the final summary from Table V and the braking ratio caused by 105 lb. on the brake handle.

From Table VI two conclusions seem evident:

First—Although there are inconsistencies in the results, the braking distance obtained in the test varied with the brake-handle pressure necessary to give 85 per cent braking ratio. The result is that the tests were to a great extent an index not of the relative value of the different hand brakes but of one brake leverage over another.

Second—Almost every hand brake exerted a very high pressure on the wheels. With air brakes the maximum pressure exerted on the wheels was 100 per cent. With hand brakes the table shows pressures as high as 392 per cent, and this figure may be exceeded by strong motormen.

TABLE VI—BRAKE PRESSURE CAUSED BY 105-LB. BRAKE-HANDLE PRESSURE

No. 400 Series:	Brake-Handle Pressure to Give 85 Per Cent Brake Ratio, lb.	Average of Sum of Braking Distances	Brake Ratio Caused by 105-lb. Brake Handle Pressure, Per Cent
Brake "A"	28.5	185′ 5″ (Ave.)	313
Brake "B"	34.4	193′ 5″	259
Brake "C"	39.3	208′ 1″	227
Brake "D"	41.8	209′ 1″	214
Brake "E"	70.0	235′11″ (Ave.)	127
No. 2700 Series:			
Brake "C"	36.0	243′ 2″	248
Brake "A"	42.4	229′ 4″	210
Brake "B"	42.4	229′ 8″	210
Brake "D"	63.5	256′ 8″	140
Brake "E"	108.3	...	82
No. 2500 Series:			
Brake "A"	22.8	167′ 1″	392
Brake "E"	Not given	164′ 1″	...

NOTE.—The braking distances given in this table are the distances obtained without sand.

It appears therefore that practically all hand brakes tested exerted a much greater strain on the rigging than air brakes even when the air brakes are adjusted to comparatively high braking pressures.

Skidding occurs when the friction between wheel and shoe exceeds the friction between the wheel and rail. The effect of the skidding is greatly to increase the braking distance. When the motorman can pay entire attention to stopping the car in the shortest possible distance he is often able to avoid skidding by the "feel" of the brakes. At the time of an emergency, however, scientific braking becomes impossible. The motorman instinctively applies the brake as quickly and with as much force as possible. With the enormous pressures at his command with most hand brakes as tested, skidding is certain at times of emergency, and the distance covered in braking would be far greater than the distances obtained in these tests. On the other hand, with air brakes, the maximum pressure which can be applied to the wheels is fixed and the distances obtained in these tests should closely represent the distance which would be obtained in actual service.

CONCLUSIONS

Therefore to the extent that the tests were a reliable source of evidence, they proved:

(1) That air brakes properly adjusted are superior to any hand brake tested.

(2) That in actual service the strain produced in the

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rigging by an air brake is much less than that caused by those hand brakes which showed themselves most efficient.

(3) That in an emergency the possibility of skidding is much greater with a hand brake than with an air brake, and that therefore the results obtained in actual service with a hand brake would be inferior to those obtained here.

The result of the tests, therefore, was to confirm the commission in its previous opinion. In the final order on the motion, made June 21, 1912, Sec. 4 of the order relative to service cars was rescinded, increased time was given to the companies to comply with the order, but no change was made in the weights affected.

STATEMENT BY MR. FOWLER

With the permission of Mr. Dodd, the foregoing article was shown before publication to George L. Fowler, engineer in charge of these brake tests for the Brooklyn Rapid Transit Company. Mr. Fowler replied by letter as follows:

To the Editors:

I have read the article prepared by Mr. Dodd on the Brooklyn brake tests with a great deal of interest, and it reminds me very forcibly of a remark made by the late M. N. Forney. He said that if you would let him take any locomotive in the country and paint its smokestack a pale sky blue and then let him conduct the tests, he would show a saving in coal over any other locomotive that could be pitted against it. In short, he said that one could take any series of tests ever conducted and by a careful selection of data could prove any proposition whatever.

That is exactly what Mr. Dodd has done. He has carefully eliminated every particle of data that bore in favor of the hand brakes, such as the wet-rail or bad-rail tests and the reversal stops, and has regarded as available only that which tended to prove his previously determined position. He has also absolutely ignored a great mass of other tests, several hundred in number, the results of every one of which were adverse to his position.

To answer him in full would require taking up every item that he presents and showing how carefully he has eliminated all adverse evidence touching it, and it is doubtful if your readers would care to wade through it. The suggestion is, therefore, offered that if anyone is really interested he should consult the original records before forming a final opinion regarding the matter which Mr. Dodd has so ingeniously treated.

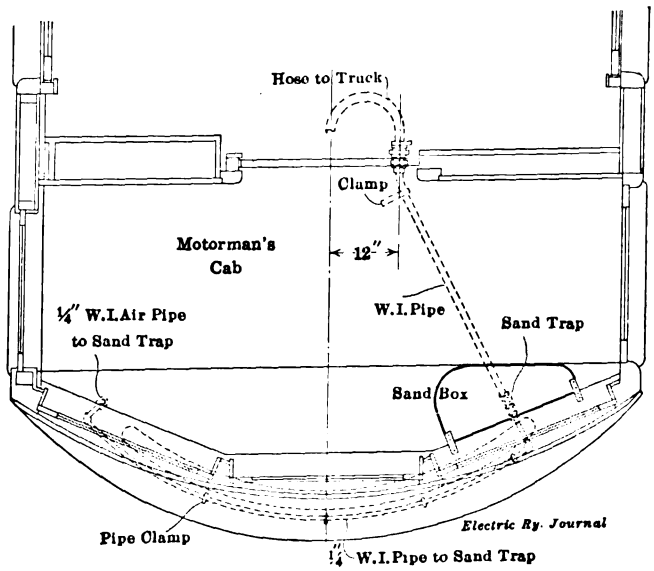
GEO. L. FOWLER.

AIR SANDER ON INTERURBAN CARS

A. C. Adams, superintendent motive power Oregon Electric Railway and United Railways, has designed and had in operation for over a year on all of their passenger motor cars the simple and efficient air sand rigging which is shown in the accompanying illustrations.

A large sand box made of No. 14 iron and having a sloping bottom is provided in the cab or vestibule of the car. The sand drops by gravity from the sand box through a 1¼-in. iron pipe into a trap made of a 1¼-in. x 1-in. standard pipe cross which is closed on the bottom with a 1¼-in. pipe plug. Should the trap become clogged the plug can be easily removed.

Air is admitted to the trap from the whistle pipe through a ¼-in. pipe into a horizontal nozzle which extends about three-fourths of the way through the trap and at right angles to the drop of the sand. The admission of air is controlled by a globe valve close to the motorman's brake valve. From the trap the sand is blown through a 1-in. pipe which connects to a 1⅛-in. air hose 36 in. long, providing for the swing of the truck. The bottom end of the hose has a nipple which connects through a street ell into a 1-in. x 1-in. pipe cross, where the sand is separated by means of a wedge-shaped plug in the bottom of the cross. The separated sand goes to each leading wheel through 1-in. pipes which are bent to deliver sand to the rails directly ahead of the wheels. The pipes to the wheels are securely fastened to the truck frame.

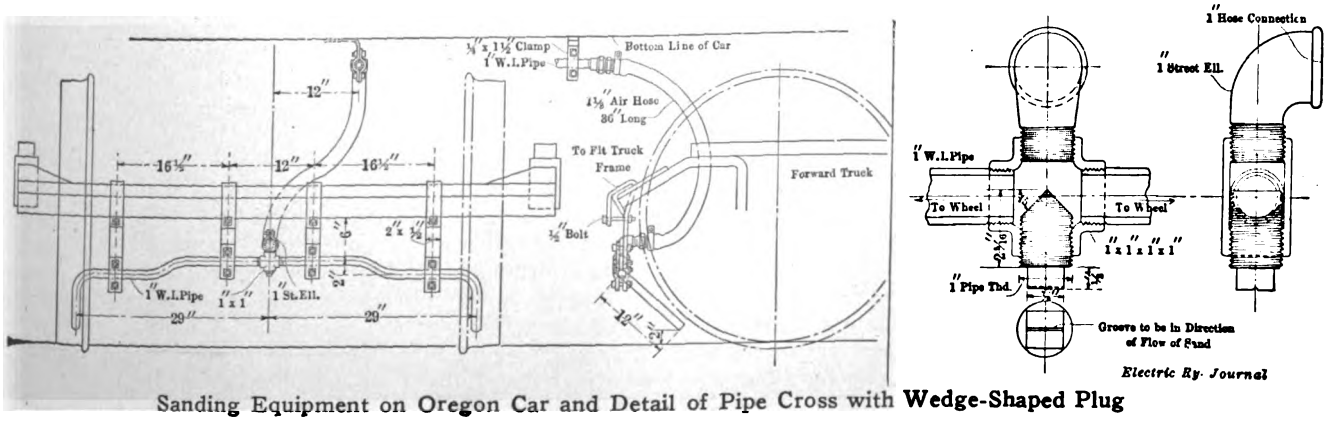


Layout of Sanding Equipment on Oregon Cars

The rigging is made up in the company's shops, as all the material which enters into the construction is easily available in any shop of moderate size and it can easily be put together by ordinary mechanics.

In the entire time that it has been in operation not a single case has occurred where sand did not flow freely to rails. An over-supply of sand cannot feed into the trap, nor has any trouble been experienced from sand blowing back into the sand box.

Good sharp, clean sand is used, and this sand is thoroughly dried in a sand drier at the Portland shops.



Sanding Equipment on Oregon Car and Detail of Pipe Cross with **Wedge-Shaped Plug**

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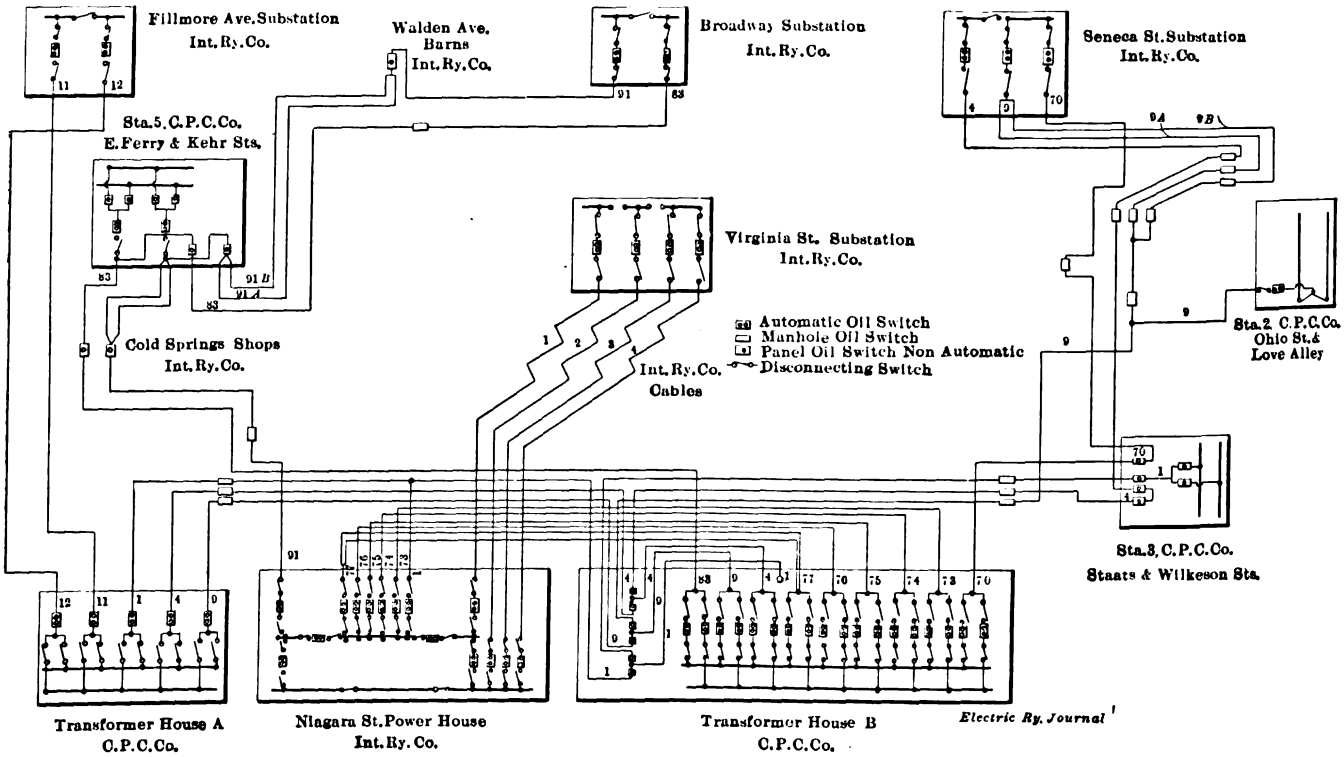
Niagara Power for the International Railway Company

Power Purchased from the Niagara Falls Companies Is Used Almost Exclusively by the Buffalo Street Railway—The Company's Steam Stations Are Operated Only During Rush Hours and Large Storage Batteries Are Used to Reduce the Peaks

The Buffalo Railway Company, now part of the International Railway Company, was one of the first large railway customers of the Niagara Falls power companies, having used Niagara power about fifteen years. At first four 400-kw rotary converters were added to the equipment of the Niagara Street power house as an experiment. The results were so satisfactory that no new steam generating equipment has since been purchased, and additional substations have been installed as the demand for power has grown. Two new substations have been opened recently, making a total of nine, including one in the International Railway Company's power house in Buffalo and one in the heaters take the exhaust from the auxiliaries, but the piping is arranged so that the engine exhaust can be delivered to one heater if desired.

The direct-current output of this plant is used in the vicinity and is supplemented by the output of two 400-kw and two 1000-kw rotary converters located in the engine room. The former are 500-r.p.m. and the latter 250-r.p.m. machines. A large storage battery also placed in the plant assists the d.c. generators and the rotaries in supplying the local demand for d.c. power. The station is operated for several hours each day during the morning and evening peaks. It is loaded to the limit during the evening peak, 40



Buffalo Power—Diagram of High-Tension Distributing System

power house of the Cataract Power & Construction Company at Niagara Falls. At present the steam plant is operated merely as an auxiliary to carry as much of the peak loads as is possible. Five very large storage batteries also assist in handling the peaks.

The steam plant in Buffalo comprises two sections, one producing alternating, the other direct current. In the a.c. section are two Allis-Chalmers Corliss engines of 2150-hp capacity each, direct-connected to G. E. alternators of 1500-kw capacity producing three-phase current at 11,000 volts and twenty-five cycles. These generators are operated in phase with the Niagara Falls current. There are three Lake Erie vertical compound engines, each of 1250 hp, direct-connected to 800-kw, 600-volt d.c. generators. The boiler plant contains nineteen B. & W. water-tube boilers rated at a total of 5800 hp and containing 68,000 sq. ft. of heating surface. A 27-in. vacuum is maintained by means of Worthington jet condensers, and the feed water is passed through two Goubert heaters of 2000 hp capacity each. Ordinarily these per cent overload being carried at times. Even with this output and that of the batteries there is still a considerable peak in the load line of the transmission system.

In addition to the steam plant in Buffalo the company owns and operates a small hydroelectric station on the Canadian side of the river nearly abreast of the Horseshoe Fall. This has a capacity of 2500 kw. This supplies d.c. power to a railway line connecting Queenstown and Chippewa and forming part of the famous international belt line.

Niagara power is received from the terminal stations of the Cataract Power & Construction Company, which are near the Niagara Street power house and in which the voltage is reduced to 11,000 for distribution in underground cables about the city. The general lay-out of the cables and substations is shown in the accompanying drawing, which, with the key, is self-explanatory. Each substation is supplied with power over at least two independent cables so that continuous service is assured. Temporary interruption can also be cared for in most cases by the batteries.

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In Buffalo there are four substations in addition to the one in the power house. In these substations 1000-kw rotaries have been standard for some time, although the first ones, which are still operating satisfactorily, were of 400-kw capacity. The early 1000-kw machines had twelve poles rotaries in the power house of the Niagara Falls Power Company.

There are five storage batteries connected with the distribution system, one at the Buffalo power plant, two at the Virginia Street substation, one at Lockport and one at

TABLE SHOWING TYPICAL POWER CONSUMPTION RECORDS FROM ALL SOURCES OF INTERNATIONAL RAILWAY COMPANY

SUMMARY FROM OPERATIONS JULY 16, 1912

	PURCHASED POWER				STEAM POWER			STORAGE BATTERIES		
	Buffalo	Tonawanda, Lockport, Olcott	Niagara Falls	Total	A.C.	D.C.	Total	Buffalo	Tonawanda, Lockport	Total
Maximum hp	16,702	2,507	....	19,209	2,209	1,977	4,186	4,284	1,236	5,520
Minimum hp	1,908	220	....	2,128	1,395	824	2,219	....	....	....
Average hp	10,474	1,595	....	12,069	2,172	1,311	3,483	1,809	370	2,179
Kw-hr.	187,541	28,555	....	216,096	2,965	3,914	6,879	7,868	2,622	10,490
RECORDING WATTMETER READINGS										
D.c. kw-hr.	....	....	....	....	....	4,410	....	....	....	....
A.c. kw-hr.	....	34,400	11,800	....	3,500	....	....	....	....	....

Maximum No. cars in service in Buffalo, on B., B. & L. and S. L.. 549
Car miles in Buffalo, on B., B. & L. and S. L. 51,254
Kw-hr. per car mile in Buffalo, on B., B. & L. and S. L. 3.81
Car miles outside Buffalo, exclusive of B., B. & L. and S. L. 12,746
Kw-hr. per car mile outside Buffalo, exclusive of B., B. & L. and S. L. 3.86
Average volts at d.c. bus, Buffalo, 615; T., L. & O., 615.
State of weather, 8 a. m., partly cloudy; 6 p. m., clear.
Temperature, 8 a. m., 67 deg. Fahr.; 6 p. m., 73 deg. Fahr.

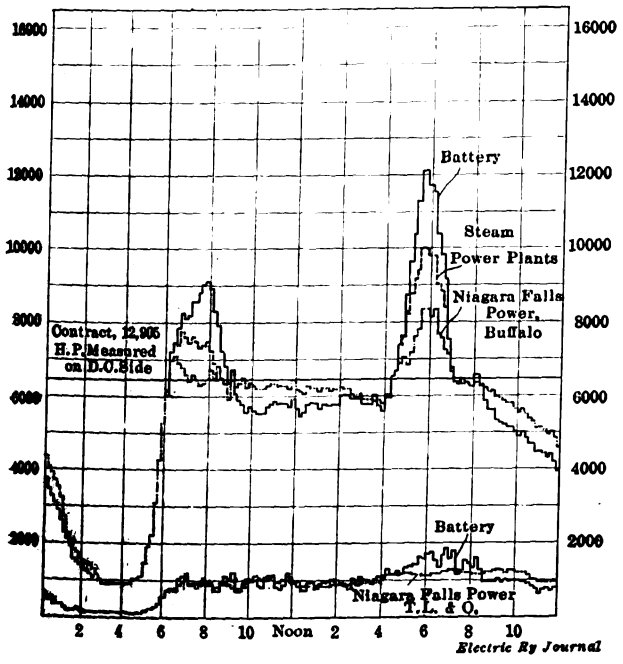
SUMMARY FROM OPERATIONS FEB. 24, 1913

	PURCHASED POWER			STEAM POWER			STORAGE BATTERIES		
	Buffalo	Tonawanda, Lockport, Olcott	Total	A.C.	D.C.	Total	Buffalo	Tonawanda, Lockport	Total
Maximum hp	20,281	2,802	23,083	4,884	2,966	7,850	4,120	1,483	5,603
Minimum hp	4,772	589	5,361	931	824	1,755	....	....	....
Average hp	13,814	2,039	15,853	3,732	2,334	6,066	1,576	549	2,125
Kw-hr.	247,331	36,520	283,851	21,805	11,900	33,705	4,895	3,216	8,111
RECORDING WATTMETER READINGS									
D.c. kw-hr.	....	....	....	....	11,900	....	....	....	....
A.c. kw-hr.	....	41,500	....	24,500	....	....	....	....	....

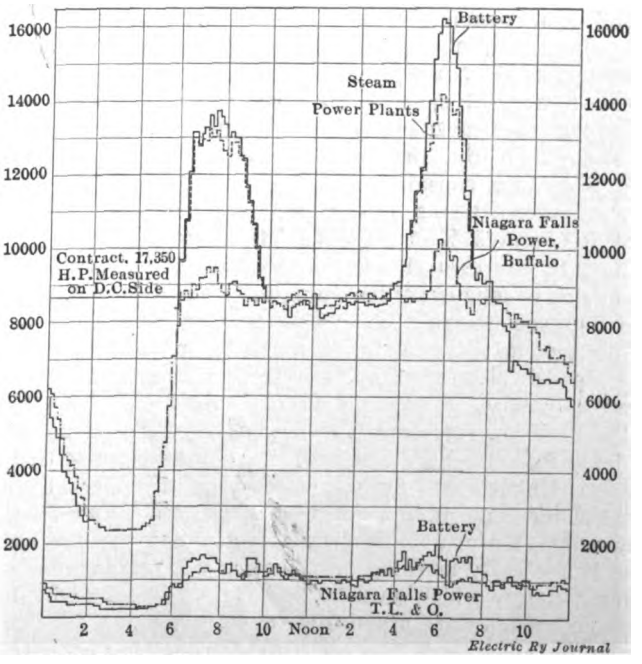
Average volts at d.c. bus, Buffalo, 615; T., L. & O., 615.
State of weather, 8 a. m., snow; 6 p. m., clear.
Temperature, 8 a. m., 12 deg. Fahr.; 6 p. m., 13 deg. Fahr.
6:20 p. m., Falls power off Tonawanda and Lockport stations.
6:26 p. m., all d.c. feeders on Falls power, Tonawanda station.
6:33 p. m., all d.c. feeders on Falls power, Lockport station.
Cause: Ground on feeder No. 80.

and made, therefore, 250 r.p.m. Later the eight-pole type, with a speed of 375 r.p.m. were used, and the last ones purchased and recently put into operation are six-pole interpole converters making 500 r.p.m.

The substations outside of Buffalo are at Tonawanda, Tonawanda. These were originally installed by the Electric Storage Battery Company, the first one in May, 1898. They have the following sizes, the capacities given being based on a one-hour discharge rate: Buffalo power house, 2160 amp-hour capacity, fifty-five G plates; Virginia Street substation,



Buffalo Power—Typical Summer Load Curve



Buffalo Power—Typical Winter Load Curve

Lockport, Olcott and Niagara Falls. The former three are for the interurban lines and a small street system in Lockport. They occupy separate buildings. The Tonawanda and Lockport stations are each provided with a storage battery. The Niagara Falls lines are supplied with power from two batteries each of 1920 amp-hr. capacity, forty-nine G plates; Lockport and Tonawanda, each one battery of 1280 amp-hr. capacity, thirty-three G plates. The total battery capacity is, therefore, 8560 amp-hr. The cells all have Tudor positive and box negative plates, the original Man-

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chester plates having been gradually replaced with the latter type, the last having been but recently installed.

The batteries are now maintained by the Gould Storage Battery Company under a guarantee that the capacity shall always be above 90 per cent of the rated value. The maintaining company does all repairing and treating to keep the battery up, mends leaky tanks, etc. The railway company has simply to supply the necessary acid and operate the batteries. At the termination of the contract, which is for ten years, the batteries are to be in perfect condition.

The batteries are regulated by motor-driven boosters controlled by the standard carbon-pile regulator made by the Electric Storage Battery Company. They are used for regulation and the control of peaks, the latter purpose being the principal function in Buffalo, the former in Lockport and Tonawanda. As the company cannot use the power for which it has to pay at times of very light load, it costs nothing to charge the batteries, and the only expenses are the overhead and maintenance charges on them. On the other hand, the batteries reduce the transmission line load at the time of the peak when the production of energy is most expensive.

The operation of the engines and batteries in modifying the load line is brought out clearly in the accompanying charts. These have been selected to show typical summer and winter loads. Neither shows extreme conditions. The charts do not show the output of the substation in the Niagara Falls power plant. This is operated by the power company which keeps the record separately. The Buffalo load is shown in the center of the chart and the Tonawanda, Lockport and Olcott load at the bottom. On the peaks of the Buffalo load line the solid line is the combined output of all sources of power. The dash line shows the combination of Niagara and steam power, and the dash-and-dot line the Niagara power. The difference between the outputs shown by the solid and dash lines is that of the storage battery. When the solid line is above the other the battery is discharging. When the reverse is true the output is negative, i.e., the battery is charging. The chart shows that the battery is charged immediately after the evening peak.

The "firm" or minimum power which was charged for on these dates is also shown for comparison with the actual consumption of Niagara power. The value of the firm power is decided upon in advance for each day of the year and the consumption of Niagara power is kept very close to the firm power line. This is remarkable when one considers that the operators of the battery and steam plants do not know what the total load is until the records from the different plants have been telephoned to the central office and combined. During the peaks this is done every ten minutes. The chart of Feb. 24 and the accompanying table show that the maximum load on the 4300-hp a.c. steam plant was 4884 hp and that on the 3750-hp d.c. plant 2966 hp. At the same time the entire storage battery equipment gave out 5603 hp, which, at a voltage of 615, corresponds to about 6800 amp, enough, if maintained, to discharge the batteries in one and one-quarter hours. With all of the supplementary power, however, the load on the transmission line went over 3000 hp above the minimum. Unfortunately there is a depression in the load line in the early morning representing a large quantity of unused energy which must be paid for, as by midnight the storage batteries are practically fully charged.

On the Tonawanda, Lockport and Olcott line the battery is used for regulating purposes, although it is of assistance also during the peaks. The peaks, however, are small compared with those in Buffalo and when compared with the capacity of the batteries. There are from sixteen to twenty-four interurban cars using power from the Tonawanda substation besides ten or twelve small cars in Lockport and two locomotives and two work cars which handle freight on this division.

The load on the small hydroelectric plant before mentioned has a considerable value all night, owing to the fact that power is supplied for lighting to Queen Victoria Park, Niagara Falls, Ontario, located along the right-of-way and that the power plant is heated by electric power. These non-railway elements of the load produce an unusually high load factor for this plant.

ELECTROLYTIC CORROSION OF IRON IN SOILS

A paper with this title, presented at the annual convention of the American Institute of Electrical Engineers at Cooperstown last June, described a series of tests conducted by the Bureau of Standards at Washington, D. C., as part of a more general investigation of the subject of electrolysis and electrolysis mitigation which has been in progress for some time past. The whole subject will be treated in a report which will be issued shortly by the Bureau of Standards dealing exclusively with the subject of electrolysis mitigation. The conclusions were in part as follows:

"Current density has a marked effect on the efficiency of corrosion, the efficiency being in general greater the lower the current density.

"The moisture content in the soil also has a marked effect on efficiency of corrosion, the corrosion efficiency being in general greater with increasing moisture content up to saturation of the soil. Beyond this point increased moisture content has comparatively little effect.

"There is no material difference in the efficiency of corrosion shown by the various kinds of iron commonly used in the manufacture of underground pipes.

"The efficiency of corrosion was found not to be a function of the voltage except in so far as the current density may be affected. Voltages as low as 0.1 volt to 0.6 volt showed practically the same efficiency of corrosion as 5 volts to 10 volts or higher.

"The experimental results given in this paper have an important bearing on the subject of electrolysis mitigation through the limitation of voltage drop in the negative return.

"For some years the chief means of preventing trouble from electrolysis in certain foreign countries has been the limitation of the permissible voltage drop between any two points on the return circuit. In some places the limit has been placed on the maximum voltage during peak load, whereas in other cases the average voltage for twenty-four hours has been the determining factor. It will be evident that if the total amount of damage which results is proportional to the average current, then the limitation of the average voltage would be more logical than the limitation of the peak-load voltage.

"In case the average voltage is the basis the cost of meeting the voltage limitation in any given case would be proportionate to the danger involved irrespective of the station load factor, whereas, if the voltage at peak load is the determining factor, the cost of complying with the requirements depends not only on the danger involved, but on the load factor of the system, and the poorer the load factor the greater its cost will be. It appears from the data presented in this paper that the rate of damage does not increase as fast as the voltage increases, because of the tendency toward lower corrosion efficiences at higher current densities.

"This fact indicates that, with a given average all-day current, the actual amount of electrolysis that would occur would be less with a bad load factor than with a good load factor, and hence points to the undesirability of penalizing a high peak of short duration. It would appear very much more logical, therefore, in so far as the damage itself is concerned, to make the average all-day voltage the basis of the limitation rather than the voltage at time of peak load."

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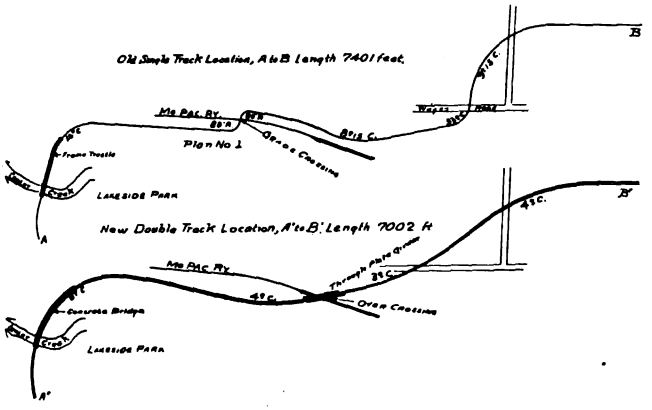
TRACK IMPROVEMENT ON THE SOUTHWEST MISSOURI RAILROAD

When the Southwest Missouri Railroad was built some twenty years ago to serve the rich mining district in the extreme southwestern corner of the State of Missouri the roadway was located and constructed in accordance with the practice prevalent at that time. But little consideration was given to the possibility of high-speed operation through the avoidance of sharp curves, and permanence of construction took secondary place to initial cost of construction.

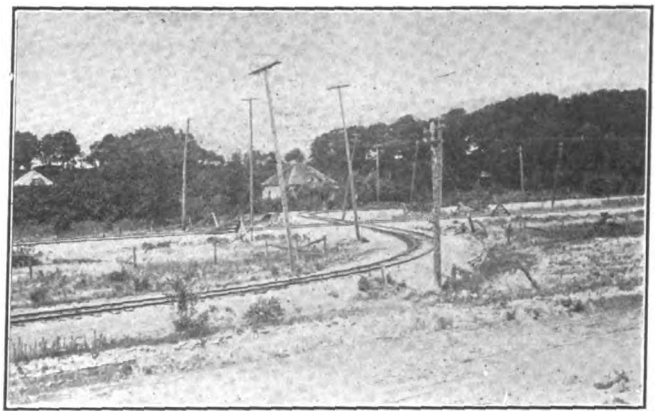


Old Single-Track and New Double-Track Construction

The line operates an interurban service between the cities of Galena, Joplin, Webb City and Carthage, with branches to the smaller communities in the district, and maintains an extensive amusement resort called Lakeside Park some miles west of Carthage.

That part of the road which extends between Carthage and Lakeside Park was constructed in 1895, and notwithstanding the fact that the tracks of the Missouri Pacific Railroad were crossed at grade at a point a short distance east of Lakeside Park, the approach to the grade crossing from either side was made over exceedingly circuitous track, the actual crossing being made in the middle of a reverse curve with 80-ft. radii on both sides. In addition, from one side the electric railway track approached the steam railroad crossing over a descending grade of 3 per cent, thus involving a difficulty in braking and hampering the motormen in case quick stops were necessary.

Just outside of Lakeside Park the line was carried over Center Creek, a stream of considerable volume during the greater part of the year, by means of a steel bridge of the through-truss type. This was approached from one side by a long wooden trestle, the opposite bank of the river having a considerable elevation so that the track could be laid at grade practically to the river's edge. The wooden trestle, owing to its location, was exposed to action of drift during freshets in the river, and this, in addition to the ever-present possibility of fire, made it an undesirable form of structure where permanence as well as substantial construction was desired.

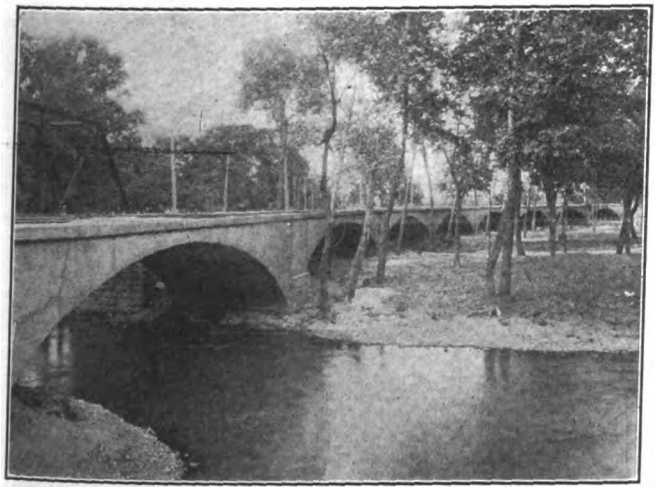


Grade Crossing Before Reconstruction

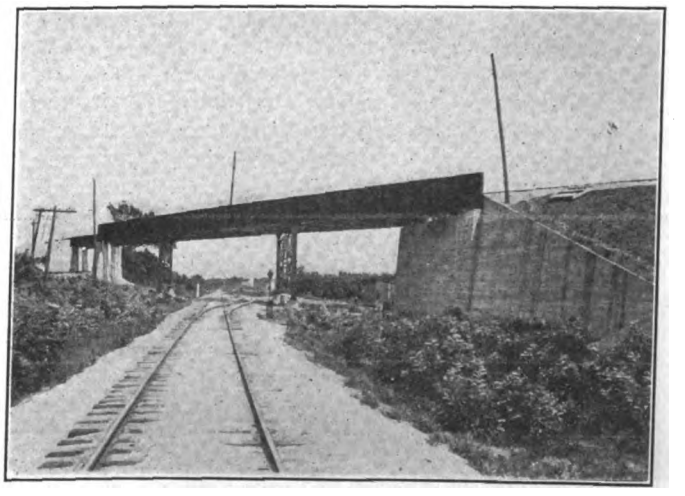
Of late the traffic between Carthage and Lakeside Park has grown to very considerable proportions, so much so, in fact, as to constitute a serious handicap upon the through service from Carthage west. In consequence, the management decided to reconstruct the entire right-of-way for 1½ miles west of Lakeside Park, straightening out the line, eliminating the dangerous grade crossing over the Missouri Pacific Railroad tracks, and double-tracking the whole section to permit handling large fleets of cars to and from the park without interference with the through traffic carried on the main line.

The work of reconstruction, which has just been completed, is shown in the accompanying line cut and halftones, the former showing that the severe curves have been eliminated, as the maximum curvature on the new line is only 8 deg. This straightening of the line shortened the distance between the two points marked *A* and *B* on the plat from 7400 ft. to a length of 7000 ft., or practically 6 per cent, and as the grade crossing over the Missouri Pacific track has been eliminated, a relatively enormous saving in running time has been effected, together with a marked reduction in the number of cars and men required to handle the local traffic.

The elimination of the grade crossing was effected by raising the grade of the electric railway tracks and spanning



Concrete Viaduct Replacing Wood Trestle and Truss Bridge



New Plate Girder Bridge Over Missouri Pacific Tracks

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the steam railroad, as shown in the accompanying illustration, by a through steel girder bridge. As a part of the reconstruction the wooden trestle approach and the bridge over Center Creek were replaced by a concrete deck viaduct with eight arches, the last of which bridges the river in one clear span.

All of the 7000 ft. of new construction, including both bridges, is double-tracked, and the cost of the entire work, including the purchase of the necessary right-of-way, was approximately $100.000, or about $15,000 per mile.

A STUDY OF ELECTRIFICATION ON THE SOUTHERN PACIFIC

In a paper read before the American Institute of Electrical Engineers this week, Allen H. Babcock, electrical engineer Southern Pacific Company, presented the results of a study recently made to determine whether there was such a reasonable chance for profitable electrification of the company's mountain lines as would warrant the expenditure of time and money involved in an exhaustive and final investigation of the problems of railroad electrification over the Sierra Nevada Mountains.

Mr. Babcock, in his paper, took under consideration the line through Tehachapi Pass, assuming the problem of its electrification from Bakersfield to Summit, or 49 miles of track, on the west slope and also from Mojave to Summit, or 18 miles, on the east slope, a total of about 67 miles of line, having an actual ruling grade of 2.2 per cent, or the equivalent, if compensated for curvature, of 2.4 per cent. The average grade on the west slope is, however, 1.44 per cent and that on the east slope 1.33 per cent.

In determining the energy consumption of trains moving over the mountain the actual characteristics of the line were used, and for load diagrams and substation spacing close approximations were adopted. An average east-bound train of 2000 tons such as was being hauled by four consolidation locomotives and an average west-bound train of 1250-1500 tons were therefore assumed, and to provide a flexible electrical unit it was proposed to use a 100-ton electric locomotive capable of handling a train of 500 tons, as many units being used per train as the load required. Passenger trains varying from 250 tons to 600 tons were assumed to be handled by single electric locomotives weighing 150 tons. A recent maximum train movement which occurred over the division in question consisted in twelve full-size freight trains east-bound and eight full-size trains west-bound in addition to the normal passenger movement of seven trains each way per day.

Experience with similar earlier reports, he said, had shown that, in general, there was little difference in total first cost and annual operating costs whether an overhead or a third-rail system was considered. The double overhead contact system gave maximum first cost and operating costs for the overhead construction and minimum costs and maintenance charges for locomotives. A single contact wire gave high operating costs for the overhead system but maximum costs and maintenance charges on the locomotives. The third-rail, on the other hand, gave high first cost but low operating costs for the contact system, with moderate first costs and minimum maintenance charges for the locomotives, but the total costs of operation were raised up to the level of the first two systems by reason of the necessary substation apparatus and attendance. In a preliminary study such as was made in this case it therefore mattered little what particular system of propulsion was chosen, and a 2400-volt d.c. third-rail system was assumed for the main line with an overhead contact wire in the yards and terminals.

The first cost of such an installation, based upon actual operating conditions existing at the present time, was estimated to be as shown in Table I.

The estimated annual operating costs with steam and electric locomotives are shown in Table II.

From the comparison of operating costs a loss of $34,487 was shown, but this did not take into consideration any taxes or depreciation, which would increase the loss by $285,000 if assumed at 5 per cent.

TABLE I.—PRELIMINARY TABLE OF FIRST COSTS

Six 2000 kw substations, approximate spacing 12 miles, at $35 per kw	$1,610,000
Generating station; three 18,000-kw turbines (rated on two-hour maximum capacity), 15,000 hp oil-fired boilers, condensers, piping, building, etc.	1,760,000
Twin-circuit 60,000-volt transmission line, with ten steel poles per mile suspension insulators at $6.088 per mile, power house 20 miles from railroad; total length 70.5 miles	430,050
Overhead contact system in yards; single trolley carried on span wires across all tracks, steel poles	155,250
Contact system for main line; 140-lb. contact rail on long wood ties at $10,225 per mile, 65.8 miles; siding with 75-lb. third-rail at $7,000 per mile, 21.6 miles; total	825,000
Bonding, main line, 65.8 miles at $1,120; sidings, 21.6 miles at $900; total	122,300
Block signals; required on account of change from present d. c. signal apparatus to the a. c. apparatus necessitated by using track rails for propulsion current return	175,000
Shops and inspection shed	10,000
Electric locomotives; forty-seven 100-ton, for freight, at $35,000; eleven 150-ton, for passenger, at $40,000; this includes an allowance of eight freight and three passenger for shopping; total	2,085,000
Total	$7,172,600
Credit by release of thirteen passenger, forty-seven consolidation and thirteen Mallet steam locomotives, plus 20 per cent for shopping	1,464,900
Net first cost	$5,707,700

With purchased power the cost of transmission line and power stations would be eliminated, reducing the investment to $3,827,700, and the total annual operating costs, exclusive of the cost of power, would then become $450,609

TABLE II.—COMPARISON OF OPERATING EXPENSES WITH STEAM AND ELECTRIC LOCOMOTIVES

	Steam	Electric
Substation labor and supplies		$59,700
Power house labor at $64,780; repairs and supplies at $20,000; total		84,780
Transmission and contact system maintenance; this includes high tension transmission at $50 per mile, overhead construction at $250, contact rail at $150 for main line and $100 for sidings, main-line bonding at 10 per cent of cost and side-track bonding at 5 per cent; total		36,576
Maintenance of way as affected by locomotives; estimated	$126.890	83,285
Locomotive repairs; figures for steam taken from records and for electric assumed at 4 cents per mile	270,990	70,701
Passenger engine men's wages; for freight service assumed to be the same; in both cases for passenger the helper is eliminated	48,300	29,100
Fuel; oil to be used in both cases at a price of 40 cents per barrel; cost for steam taken from records; cost for electric estimated from gross average daily passenger tonnage of 4050 and freight traffic of 16,040 tons east and 10,600 tons west plus 10 per per cent for slow movements, giving 144,000 kw-hr. per day at station; 70 per cent over-all efficiency of transmission	240,852	100,530
Total annual cost of operation	$687,032	$464,672
Bond interest on cost of electrification at 4½ per cent		256,847
Net totals exclusive of depreciation	$687,032	$721,519

for electrical operation. The saving, exclusive of power, over operation by steam would then become $236,423 less $191,385 for depreciation if assumed at 5 per cent, leaving $45,038 with which to purchase about 53,000,000 kw-hr. at an annual load factor of 20 per cent. This would give a rate of about 0.45 cent per kw-hr., which was too low to be considered.

In conclusion, Mr. Babcock pointed out the difficulty of recommending electrification under such conditions if the opinion was to be based upon the direct financial profit to be realized. In fact, in the great majority of cases the profits of electrification had to be obtained indirectly, through increased track capacity or similar effects incident to electric operation.

The New York Public Library has just published a list of works to be found on its shelves relating to electric welding, compiled by William B. Gamble, chief of the division of technology. This bibliography is arranged in chronological order and contains an index of authors.

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GISBERT KAPP ON PROGRESS IN HEAVY ELECTRIC TRACTION

In his presidential address delivered to the engineering section of the British Association for the Advancement of Science at the Birmingham convention, held Sept. 10-17, Prof. Gisbert Kapp presented a report on progress in heavy electric traction. After briefly describing the different systems of electric traction he gave more extended data on three-phase development. He said that the most obvious objections which had been raised against three-phase locomotives had been found to be of little weight in practical work. These objections were the complication of a double overhead wire, the danger that the motors would not share the load fairly and the inability to run the motors without rheostatic waste at intermediate speeds or to run at a higher than synchronous speed to make up for lost time. It had been found that the most objectionable feature was not the wire itself but the poles or bridges on which it is carried, and these are the same no matter what system of line current is used. The sharing of the load between three-phase motors had been solved by K. von Kando by the use of liquid resistances in which the level of the liquid was controlled by a solenoid under the influence of the operating current. This current, and consequently the tractive effort exerted by each motor, was automatically kept constant no matter what difference existed in the size of the drivers on the locomotives. Incidentally, this liquid rheostat control gave perfectly constant acceleration. The waste of energy consequent on rheostatic speed control and inability to run at more than synchronous speed in order to make up for lost time could be remedied by an adjustment of the time-table so that the synchronous speed would be high enough to make up for lost time and also by the employment of motors which could run economically at less than synchronous speed. In practice, three-phase trains were not less punctual than trains drawn by other kinds of locomotives. A train pulled by a.c. or d.c. series motors ran slower on an up grade or when it carried an abnormally heavy load. While this characteristic was valuable in limiting the excess load thrown on to the source of power, it was clearly not a condition which made for punctuality. A series motor could not recover lost time on an up grade whereas a three-phase motor would maintain practically the same speed as on the level or down grades so that the process of gaining time was not restricted to the easy parts of the line.

The problem of speed control without rheostatic waste had been solved in several ways, the simplest and most generally adopted being that of cascade and single working. In some of the Simplon locomotives only the stator was arranged for pole changing, the rotor being a squirrel cage. In this arrangement the advantages of cascade connection had to be given up, but the system had the merit of great simplicity because four speeds without rheostatic waste were possible. This was secured by a change in the number of active poles from twelve at starting to eight, six and four at top speed. Regeneration and braking, he said, could take place only if power was given to the motor. This was provided partly by the locomotive itself and partly by the train pushing it on a down grade. As this meant that the train was braked in front only, railway engineers had raised the objection that such a method was contrary to the accepted rules for safe operation, which require that even on a down grade all the couplings should remain in tension, namely, that each car must be independently braked. Here again practice had proved the theoretical objections to be without foundation. It was no doubt objectionable to brake a train in front only if the braking action was a jerky one, but with automatically controlled liquid rheostats the braking was so gradual and even throughout that it had been practicable to permit a higher down-grade speed with regeneration than with ordinary braking The regulations of the Italian State Railways permit on heavy down grades a speed of 18.6 m.p.h. for steam trains, but the electric freight trains are permitted to run at 27.9 m.p.h. This concession had not yet been extended to passenger trains, but nevertheless the economic gain was considerable. Thus regeneration saved 17 per cent on the coal bill, an amount which was sufficient to provide for interest and sinking fund on the electrical plant at the generating station. Steam trains on the Giovi line, consisting of 300 metric tons of cars and 202 tons of locomotive (one in front and the other in back), had been replaced by three-phase trains consisting of 380 tons of rolling stock and two locomotives each weighing 60 tons (also placed front and rear). Thus, there had been a saving in total weight of 12 tons and at the same time an increase in useful weight hauled of 70 tons. The average grade of this line, which carried the whole traffic between the port of Genoa and the plain of Lombardy, was 2.7 per cent, and the maximum was 3.5 per cent. The traffic was now handled with forty 60-ton electric locomotives. Each engine had five driving wheels connected to two eight-pole motors by gear wheels and rods. The pressure on each driving axle was 12 tons. Each locomotive developed 2000 hp at the hourly rating. Therefore 1 hp was obtained for each 66 lb. of engine weight.

TABLE I—ITALIAN STATE RAILWAYS ELECTRIFIED ON THE THREE-PHASE SYSTEM

Location of Line	IN SERVICE: Lecco-Colico-Sondrio-Chiavenna	IN SERVICE: Campasso-Ponte-derimo-Busalla	IN SERVICE: Busso-leno-Bardo-necchia-Modone	IN CONSTRUCTION: Savona-San Giuseppe-Ceva	IN CONSTRUCTION: Lecco-Monza	IN CONSTRUCTION: Genova-Sampier-darena-Ronco
Length, in km.	107	19	58	45	38	28
Heaviest grade per mille	22	35	30	25	12	17
Number of transforming stations	10	4	7	4	4	2
Transmission voltage	20,000	13,000	59,000	62,000	25,000	57,000
Trolley voltage	3,000	3,000	3,300	3,300	3,300	3,300
Frequency (cycles per second)	15	15	16⅔	16⅔	16⅔	15
Source of power	Water	Steam	Water	Water (steam reserve)	Water (steam reserve)	Water (steam reserve)
Number of electromotives	14	20	15	61 for the three lines		
Number of motor cars	10	.....	.....	.....	.....	.....
Weight of trains, minimum, metric tons	150	190	.....	Not given		
Weight of trains, maximum, metric tons	370	380	220	Not given		

TABLE II—THREE-PHASE ELECTROMOTIVES ON THE ITALIAN STATE RAILWAYS

	TYPE AND MAKER: 034, Ganz	036, Ganz	038, Ganz	050, Westinghouse	030, Westinghouse
Number in service	2	3	4	40	..
Number building	..	..	..	45	16
Total weight, tons	45	62	62	60	66
Weight on drivers	45	43.5	43.5	60	48
Number of driving axles	4	3	3	5	3
Total number of axles	4	5	5	5	5
Weight on drivers, tons	11.3	14.5	14.5	12	16
Diam. of drivers, in.	56	64	64	43	65
Frequency (cycles per second)	15	15	15	15	16⅔
Method of transmitting torque of motor to driving axles	Quill and flexible coupling	Cranks and connecting rods			
Speed, m.p.h.	18.6	19.8-39.7	13.6-27.9-39.1	14.0-27.9	23.3-31.-46.5-62
Method of speed regulation	..	Cascade	Cascade	Cascade	Cascade and pole-changing

Prof. Kapp then described Dick, Kerr & Company's 3500-volt d.c. trolley and 1750-volt d.c. motor system which, after two years' experimenting, was being installed on a short section of the Lancashire & Yorkshire Railway. The current was collected by pantograph from an overhead wire with catenary suspension. The train consisted of a motor car weighing 62 tons with four 300-hp motors, while the

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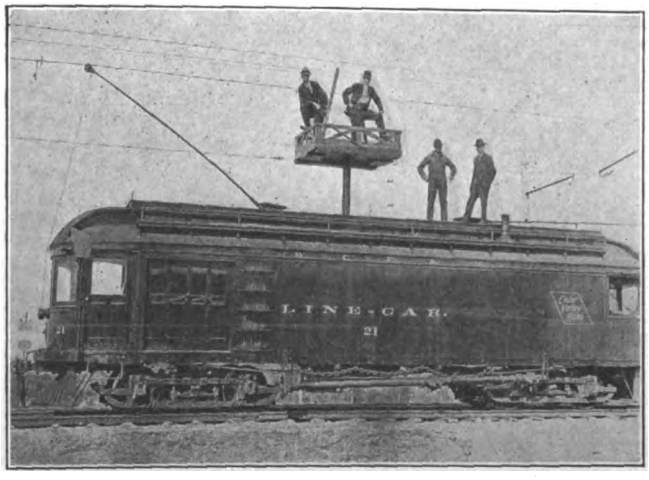
two trailers weighed 26 tons each. The makers had also informed him that they estimated the useful lift for a set of carbon brushes at 50,000 miles. The motors of this car drove the car axles through single reduction gearing and were controlled by contactors operated from a master controller. The current for operating these contactors, for driving the compressor motor and for lighting and heating was obtained from a 3500/210-volt motor-generator set. All motors had commutating poles. The weight of the motor car per horse-power was only 114.4 lb., much below the weight of an equivalent single-phase motor car. It was apparent from these figures that when employed for motor cars the d.c. system was lighter than the single-phase system, but main-line traction, including freight trains, was not going to be handled with motor cars. When locomotives of 2000 hp to 3000 hp were reached, the advantage in weight was likely to vanish. No high-voltage d.c. locomotive had yet been built for such a power, and it was therefore not possible to make a direct comparison, but if one could judge from the largest engines yet built for moderate voltage direct current there was little probability that the high-voltage d.c. system could beat the single-phase system and none whatever that it could beat the three-phase system.

The speaker then discussed the Lötschberg electrification, which was described in the ELECTRIC RAILWAY JOURNAL for Sept. 6. In conclusion, he referred to the proposed electrification of the Gotthard line, the main link of commerce between Germany and Italy. The part to be electrified first is that between Erstfeld and Bellinzona, a total length of 68.4 miles, of which about 29 per cent is in tunnel. The accompanying tables of three-phase electrification and locomotives in Italy were also presented by Professor Kapp.

LINE CAR WITH NOVEL FEATURES

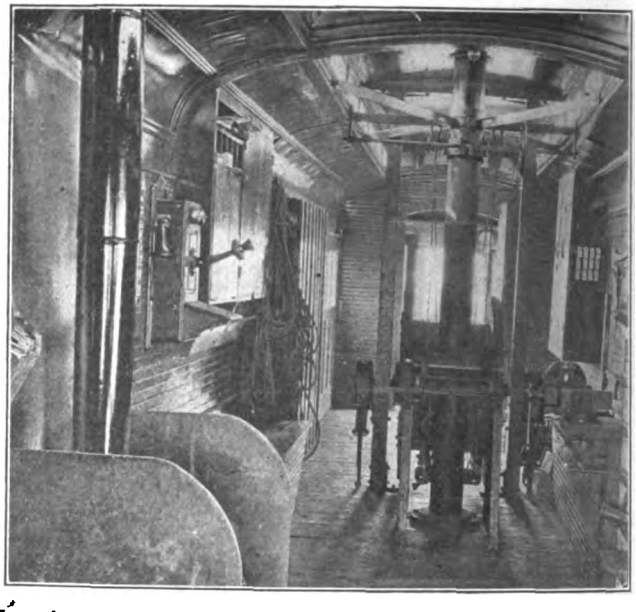
To facilitate the repairs and construction of overhead lines on the Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia., the novel line car shown in the two accompanying halftones has been constructed from an old four-motor, double-end passenger car, 40 ft. 6 in. over all. The method of supporting and elevating the adjustable platform on the roof of this car is of particular interest.

The platform is approximately 6 ft. square and is fitted with a folding hand rail on all sides. It is centered on a



Line Car for Waterloo, Cedar Falls & Northern Railway

7-in. pipe which extends down into the body of the car. The lower end of this supporting pipe is inserted in an 8-in. pipe mounted in a casting on the car floor, and the entire vertical structure is braced at the top with struts extending in four directions to the deck rail, as illustrated. The inner pipe has bar-iron lugs which extend through slots in the surrounding pipe. Light cables attached to these lugs pass over pulleys supported on the braces near the roof of the car, thence to a winch bolted to the car floor beside the pipe platform supports. The slots in the exterior pipe are long enough to permit a 5-ft. lift to the platform. To relieve the strain coming to the elevator cables when the platform is in use by repairmen, two other slots near the top of the exterior pipe are fitted with small iron blocks



Interior of Line Car for Waterloo, Cedar Falls & Northern Railway

which may be clamped against the interior pipe by means of an ordinary strap-iron pipe clamp. In order to facilitate clamping and releasing of the adjustable platform in any position, this clamp is fitted with a hand wheel which is accessible from the car-floor level.

Another feature of this line car equipment is the permanent reel rack mounted in the center of the car body near the elevated platform standard. The rack bearings are substantially supported on two wooden posts bolted to the floor and roof of the car body. The axle on which the reels are mounted in this permanent rack is fitted with self-centering castings, and 12-in. pulleys at each end permit the application of friction band brakes. Braking is obtained by way of turnbuckles attached to either end of the bands and to the floor.

The standard practice in overhead line construction on this road is to string the trolley and messenger wires with current on the line. In order to accomplish this with the new line car, two 12-in. sheaves have been set in the roof near the reel rack. Trolley or messenger wire is fed through this set of sheaves, which must be in the front end of the car when doing this work, thence over the elevated platform where the linemen may tie the wire in at each pole.

Other equipment in the car includes an ordinary laundry stove for heating or cooking, a complete installation of shelving, bins and tool racks, and a Johnson's first-aid cabinet. A large cupboard for storing wire and a set of lockers for linemen's tools and clothing also form part of the interior fittings. The remaining floor space in the car interior is sufficient to permit 5 miles of trolley or messenger wire on reels to be carried at one time. Two 5-ft. sliding doors, one at each end of the car just back of the bulkhead, facilitate the handling of line material from an elevated platform into the car body.

In addition to the adjustable platform on the line-car roof, a 24-in. runway provided with a low pipe guard rail extends the full length of the car body on both sides of the monitor deck. A set of two chains and hooks attached to the side of the car body near the bottom of the underframing, one at each end of the car, is so arranged that two poles may be fastened and transported over the road.

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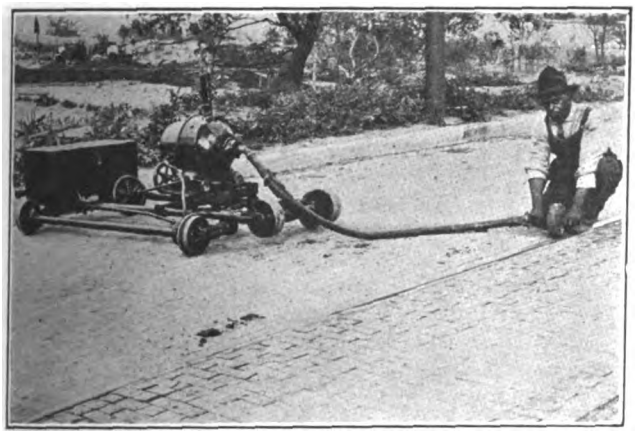
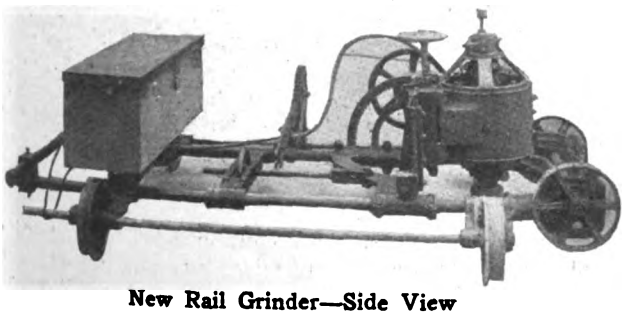
NEW PORTABLE RAIL GRINDER

The construction department of the Cincinnati Traction Company has recently developed the novel portable rail grinder shown in the three accompanying illustrations. The grinder was designed primarily to obtain a uniform surface at rail joints on new track and to remove cups in the ball of the rail near joints on old track. As originally built it included a starting box and motor mounted on opposite sides of a small truck. Two rods on which the motor is mounted between the truck side frames extend beyond the gage line on the motor side and support a pair of wheels set at right angles to the grinder truck wheels. These wheels are slightly elevated above the top rail, and a handle on the opposite side of the truck makes it possible for two men to raise the grinder to the inclined position which transfers the weight to the two extra wheels, so that removal from the track is the work of a few seconds.



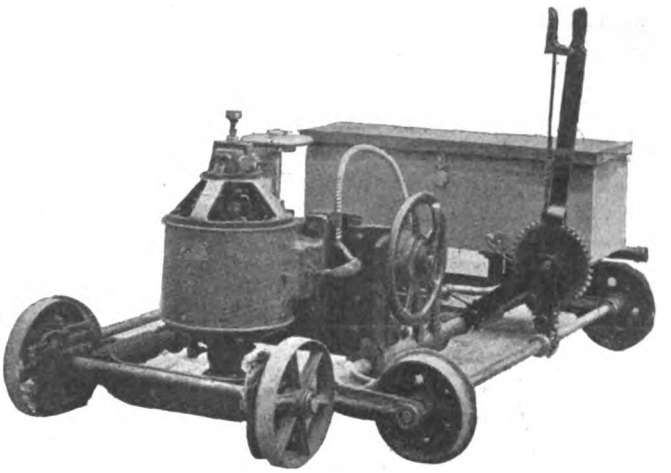
New Rail Grinder—In Position for Hand Grinding

The new principles involved in the design of this machine are found in the cupped carborundum wheel, which is attached to the armature shaft, and in the manner of supporting the motor on the grinder truck. The motor is bolted to a hinged casting, which in turn is supported on two rods extending across the truck side frames. In the operating position the armature is vertical; transverse horizontal movement may be obtained by means of a hand wheel and screw. Vertical movement may be had by turning a hand wheel near the motor which operates a worm gear and slide mechanism on the motor and hinged casting. The angle of the armature shaft to the work may be varied by turning a handwheel on a rod which connects the hinged motor casting to the opposite side of the truck. A small set screw at the top end of the armature shaft provides an adjustment to eliminate chattering in the grinding wheel. If hand grinding is desired, the motor may be dropped on its hinged mounting to a horizontal position and the cupped grinding wheel removed. In this position a flexible shaft and an ordinary disk grinding wheel may be attached to the armature shaft as shown in one of the illustrations.



New Rail Grinder—Side View

Since the original machine was built the inventor, F. J. Venning, construction engineer Cincinnati Traction Company, has found use for it in removing rail corrugations. In order to accomplish this purpose effectively he has added a lever and ratchet and an arched rack and pinion mechanism to permit a 36-in. horizontal reciprocating movement when the connecting lever is moved away from the operator. A link attached to this lever may be passed over it and the ratchet handle which fixes the latter in the released position, thereby making it possible to transport the machine over the tracks when required.



New Rail Grinder—End View

The inventor claims that the cupped carborundum wheel is superior to the ordinary disk wheel, where the grinding is done on the periphery, because of absolute assurance that the minutest corrugations will be removed. If the angle of the armature shaft to the work is changed, the ball of the rail may be ground to its original contour. Again, if the cupped grinding wheel is replaced with an ordinary disk wheel, the vertical surfaces of the rail head may be ground to a perfect gage line. Two metal bands have been passed around the periphery of the cupped carborundum wheel to avoid the possibility of breakage at high speeds. Energy for operating the grinding machine is obtained from the trolley wire by the use of a flexible cable with a hook connection, attached to a wooden pole. A water can and pipe leading to a point near the grinding wheel provide for wet grinding when rapid cutting is desired. The total weight of the machine is approximately 1000 lb., and since the motor is mounted on the same side of the truck as the wheels for transporting the machine from the track, it is possible for two men to remove and replace the grinder in ten seconds. This rail grinder has been patented by the inventor, and the manufacture and sales rights have been assigned to the Indianapolis Switch & Frog Company, Springfield, Ohio.

At the No. 3 plant of the Aluminum Company of America at Niagara Falls, N. Y., the problem of conserving real estate has been solved in one instance by resorting to a novel type of overhead-line construction. The motor-service wires reach the mill over a pole line and from the corner of the low concrete building which adjoints the main factory are carried by concrete poles integral with the building. Reinforcing for the building wall is continued to a point near the top of the pole. Braces of reinforced concrete are set on three sides of the poles at an angle of about 45 deg. The poles extend about 10 ft. above the roof, giving ample clearance between the wires on the lower cross-arm and the roof. This arrangement has the advantage of allowing the spur track beside the wall to be placed closer to the factory than would have been possible if wooden poles had been set in the earth near the building. Thus in loading and unloading cars the distance between the car door and the sill of the factory entrance is reduced to a few inches.

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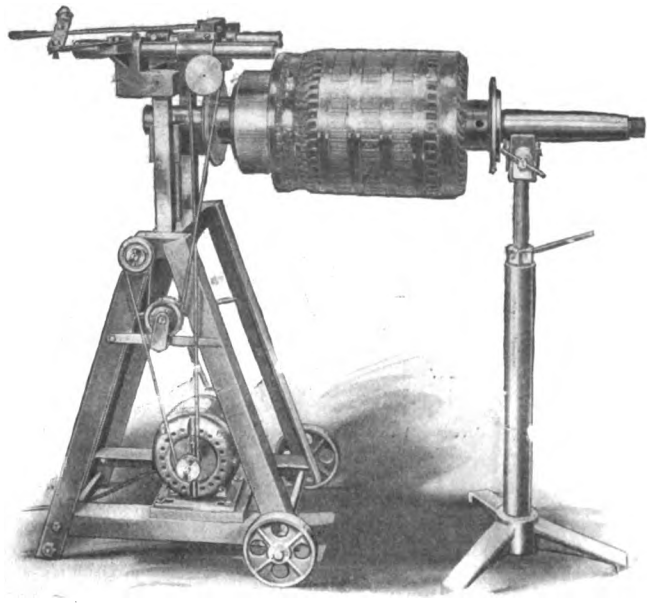
PORTABLE COMMUTATOR SLOTTER

The new commutator slotter shown in the accompanying illustration is being sold by the Electric Service Supplies Company to meet the demand for a portable machine. The illustration shows the slotter complete with an armature mounted in position. It is adjustable for railway motor armatures of varying lengths and diameters, beginning with the smallest air compressor.

As this machine is easily handled and transported, it is frequently more advantageous to take the slotter to the armature rather than the reverse.



Portable Commutator Slotter

The commutator end of the armature shaft is supported in a V-bearing, which is adjustable in height to suit the diameter of the commutator so as to bring the cutting saw to the proper depth. This saw is clamped by a nut to the spindle, which runs in a long bearing bolted to the sliding head. The bearing is removable and is cheaply replaced when worn. The sliding head is carried by two shafts projecting over the commutator and is moved over the slots by the lever, as shown in the illustration. The pivot positions of the operating lever can be changed and adjusted to suit the size of the commutator. The lever is placed at a height convenient for the average operator. The other end of the armature shaft is supported by a special stand which may be adjusted in height according to the diameter of the commutator and to bring it level with the cutter. A valuable feature of the stand is that it is adjustable crosswise so as to bring the travel of the saw always in line with the mica slots. This adjustment is of great importance because the mica frequently does not run true with the shaft.

This portable slotter requires a ⅛-hp motor for independent operation but when used as a stationary tool it may be belted direct to the counter or line shaft. The weight of the machine proper without the motor is 148 lb. The weight of the rear support is 35 lb.

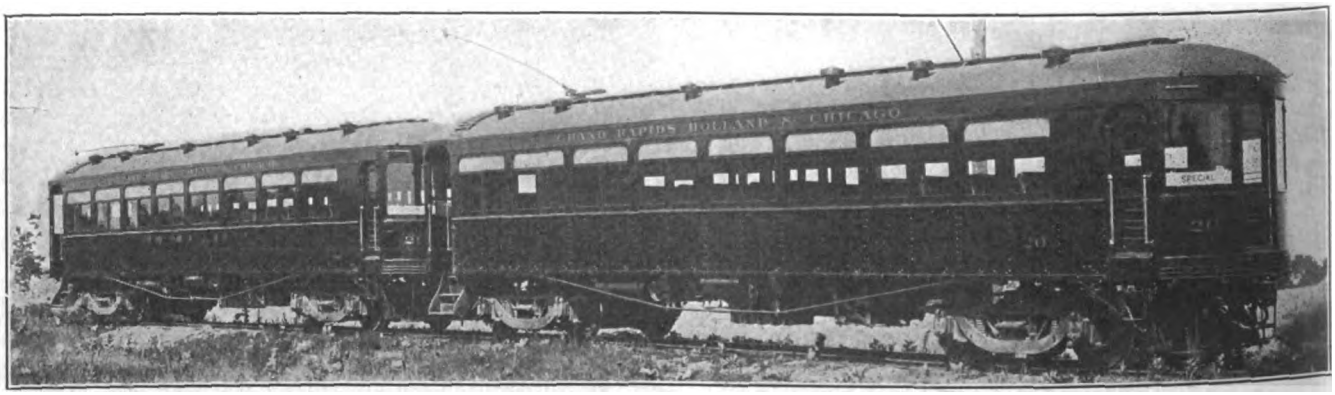
NEW INTERURBAN CARS FOR THE GRAND RAPIDS, HOLLAND & CHICAGO RAILWAY

The Grand Rapids, Holland & Chicago Railway has recently purchased additional rolling stock from the Jewett Car Company, consisting of two straight passenger cars and two baggage and passenger cars. Each car also has a smoking compartment. The over-all dimensions are the same, 55 ft. 10½ in. long and 9 ft. wide. The difference between the two passenger and baggage cars is in the length of the baggage compartment. The cars are of the arched-roof design.

The bottom frame is of structural steel, the principal members comprising 8-in. channel side sills, two 8-in. I-beam center sills, 5-in. channel transverse members and a 6-in. I-beam on each side between the center sill and side sill to reinforce the front end of the car.

The side framing consists of angle posts faced with wood-side sheathing, which is 3/16-in. steel plate, from bottom of side sill to sash stool and riveted to all posts. A cab for the motorman was built in each car. As it was best for the strength of the car that the baggage door should be at its extreme end, the cab was specially designed with the back partition to fold against its side wall, it being securely held in both open and closed positions by means of Stearns locks. The baggage seats are hinged.

The cars are finished in inlaid mahogany with the Jewett Car Company's standard Gothic side finish. The outside Gothic lights are of pressed prism plate glass and the inside lights are of leaded art glass of a color in harmony with the mahogany finish. The cars are equipped throughout with plate-glass storm sashes and are arranged to be easily removable. The saloons are finished in white enamel and equipped with water coolers and Duner flush hoppers.



General View of Grand Rapids, Holland & Chicago Straight Passenger Cars

Where the lavatory was originally intended to be placed a cupboard containing six card tables was built instead. The wainscoting throughout the car is arranged with brackets to receive these tables. The baggage compartments are finished in ash stained mahogany color.

The cars are equipped with Westinghouse control for 1500-volt operation. Other car equipment includes Edwards' steel trap doors, Globe ventilators in the roof, Peacock brakes, Symington center bearings, roller side bearings, air sanders, Blount door checks, heavy brass cuspidors, M. C. B. radial couplers, etc.

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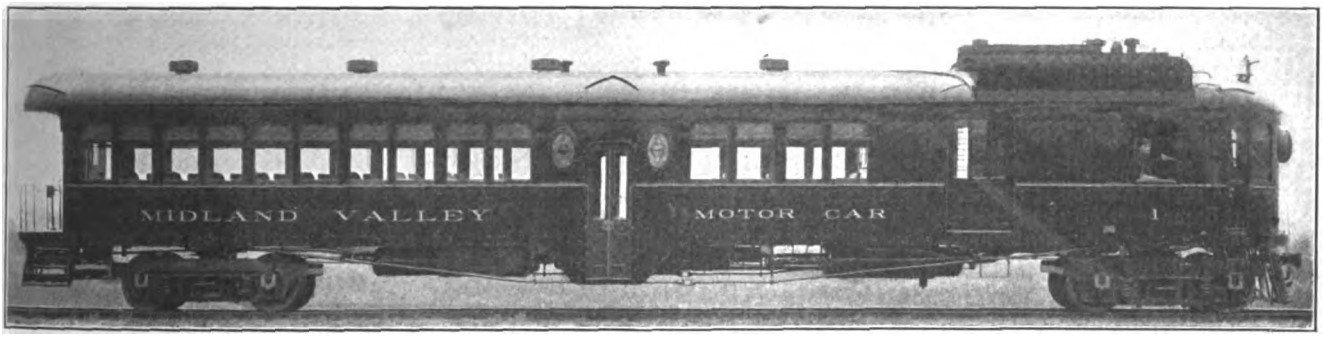
GAS-ELECTRIC MOTOR CAR ON THE MIDLAND VALLEY RAILROAD

The Midland Valley Railroad has recently placed a gas-electric motor car in operation for supplementary service on the main-line section of the road between Wichita and Arkansas City, Kan. Very moderate service is required of the new gas-electric motor car. It makes one round trip a day over the northern division of the road, traversing 102 miles, the running time one way being two hours and forty-five minutes and the scheduled speed 18.5 m.p.h. There are seven regular stations and six flag stops along the route, the average distance between stations being 3.9 miles.

The car is of the General Electric Company's combination passenger, smoking and baggage compartment type. It measures 71 ft. 8 in. long over bumpers, 10 ft. 5 in. wide, weighs approximately 52 tons and has a total seating capacity for eighty-six people. The cab in front containing the power plant apparatus is 11 ft. 11 in. long; next is the baggage room, 11 ft. long; then the smoking section, 12 ft. 5 in. long, and finally the passenger compartment, 27 ft. 11 in. long. A center vestibule with side entrances runs crosswise between the passenger and smoking compartments. There is also a rear platform entrance leading into the passenger compartment. The smoking section provides for twenty-five and the passenger compartment for sixty-one of the total seating capacity.



Gas-Electric Motor Car for Midland Valley Railroad

The usual standard all-steel construction, except in the case of the interior finish, prevails throughout the car. The frame consists of steel I-beams and channels, strongly cross-braced, and steel plates form the outside sheathing. The underfloor of the car is of wood, while between this and the floor proper a heavy felt lining is inserted, and the car sides are also interlined with felt. The interior trim is of mahogany, highly finished, and the ceiling is sheathed with composite board. The seats are made long enough to accommodate three persons and are covered with friezette plush in the passenger compartment and with genuine Spanish leather in the smoking room.

The generating unit consists of the standard eight-cylinder, four-cycle gas engine of the "V" type, direct-connected to a 600-volt, commutating-pole electric generator designed to meet the special conditions the service demands Starting the engine is effected by compressed air. The engine can rotate at normal speed, irrespective of the speed of the car, and deliver its maximum power, a feature of great advantage on grades or in the event of emergencies. An auxiliary equipment is also provided, consisting of a two-cylinder, four-cycle gas engine direct-connected to a single-cylinder air compressor and lighting generator. The function of this set is to supply an initial charge of air for starting the main engine and to deliver power for lighting the car. The set is started by hand.

The method of control is similar to that of any standard trolley car. The car is equipped with motors of 200 hp capacity. Mounted on the axles of the forward truck are two GE-205 600-volt box-frame, oil-lubricated, commutating-pole railway motors of 100 hp each. By means of the controller they are placed progressively in series and parallel connection. Two extra points are provided for governing the motors by shunting the fields in obtaining the desired final speed acceleration in parallel. The resultant higher armature speeds permit the use of smaller pinions, and full utilization of the power input is secured through the entire speed range, from start to full speed.

The trucks are of the swing bolster type with elliptic bolster and coil equalizer springs. The bearings, treads, wheel flanges and axles conform to M.C.B. standards. The brake equipment includes hand brakes in addition to the combined straight and automatic air brakes. A high power Mazda incandescent headlamp and reflector, an air whistle and a pneumatic gong are furnished and a hot-water heater is installed for heating the car. To prevent freezing in cold weather when the car is lying idle, the heater circulation may be connected to the engine-cooling system. The radiators are located on the roof and the circulation for cooling the engines is maintained by the thermo-syphon method. A 150-gal. gasoline tank is suspended underneath the car.

AN ALL-STEEL SWITCH BROOM

The Worcester (Mass.) Brush & Scraper Company is manufacturing the "Royal Worcester" switch broom in which all fibers are discarded in favor of well-tempered galvanized wire, thus preventing rust or other injury from dampness and salt. The broom is of strong construction, the ends of heavy pressed steel and the center square rod being held firm by check nuts. The top block brace is also of pressed steel instead of light tin. The top ferrule which holds the chisel is made of pressed steel, and this and the handle are securely fastened by rivets so that it is absolutely impossible for any of the parts to work loose. The hard wood which is used in the handle and block measures 4 ft. 4 in. over all, irrespective of the 5-in. chisel. All parts are treated with a rust preventive. An economical feature of this broom is the detachability of its parts. It is so constructed that the broom and handle are quickly and securely fastened by one operation. As the broom or the handle with the chisel may be purchased separately, most renewals are confined to the broom part itself.

Concrete resistors for lightning arrester service are in general use in the 11,000-volt and 22,000-volt systems of a Georgia central-station company. Into a solid concrete block measuring approximately 4 ft. long and 1 ft. on a side are cast two squares of bronze or copper mesh, one near eoch enr. The block is then stood upright at the point of installation, being set a few inches into the earth to insure it against accidental overturning. The upper square of copper-mesh is connected to the double horn-gap, the lower square being connected to a couple of 8-ft. ground pipes or ground rods driven deep into the soil.

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ELECTRIC RAILWAY LEGAL DECISIONS

CHARTERS, ORDINANCES, FRANCHISES

Alabama.—Eminent Domain—Streets—Use—Double Tracks.

The laying of a second track by the street railway company in a city street 34 ft. wide, so as to afford double-track facilities, is not such unwarranted use of the street as entitles an abutting owner to enjoin the laying of such track, and it does not constitute such an additional burden or servitude as entitles him to compensation, though his use of the street in loading and unloading goods at a curbing may be thereby rendered inconvenient. (Birmingham Ry., Light & Power Co. v. Smyer, Smyer v. Birmingham Ry., Light & Power Co., 61 Southern Rep., 354.)

Colorado.—Eminent Domain—Damage to Property—Road.

Const., Art. 15, Sec. 11, inhibits the construction of a street railroad in any city without the consent of the local street authorities. Rev. St. 1908, Sec. 5420, provide that the consent of the city to the construction of a street railroad shall not protect such road against any claim "for damages to private property which otherwise, without such consent, might be lawfully maintained against" the present constructing road, and Const., Art. 2, Sec. 15, prohibits private property from being taken or damaged for public or private use without just compensation. Held, that the liability of a street railroad company to a property owner for actual damage from the construction of its road was merely that which the city would have incurred if it had built and maintained the road. (Harrison v. Denver City Tramway Co., 131 Pac. Rep., 409.)

Georgia.—Railroad Crossing on Dedicated Street.

If a commercial railroad company owning the land in fee on which its tracks were laid dedicated to a city in which the land was located a street crossing on the railroad tracks, and if thereafter, by permission of the city authorities, an electric street railway company proceeded to construct, along the street, tracks for the operation of street cars, the commercial railroad company would not be entitled to an injunction against the laying of the street car tracks on such crossing, on the ground that it interfered with the property of the railroad company and the use of its tracks and rendered the crossing dangerous. (Southern Ry. Co. v. Rome Ry. & Light Co., 77 Southeastern Rep., 1126.)

Indiana.—Interference by Induction of Telephone Circuits by Railway Wires.

Where a telephone company and an electric railway company operating under city franchises place their poles and wires upon the street and there is interference with the telephone circuits from the higher voltage railway wires the railway company is not liable for damages to the telephone company unless it has exceeded its rights, been negligent in its construction, used faulty or improper appliances, or in some way unnecessarily caused injury, even though it might have built its railway elsewhere. (Citizens' Tele. Co. v. Ft. Wayne & S. Ry. Co., 100 N. E. Rep., 309.)

Iowa.—Grant of Rights in Street—Effect of Invalid Grant.

Prior to the enactment of Code 1873, Sec. 464, empowering cities to authorize the location of street railways on their streets, the city of Des Moines had no power to grant a franchise to a street railway company, and an attempt to do so would be nothing more than a license until the ordinance granting the franchise was re-enacted after the adoption of Sec. 464.

The Legislature, in the act creating a corporation or by special grant, may confer upon any person or corporation a franchise to use and occupy the streets and public places of a city without other limitations than those found in the act itself or in the state constitution; and it may therefore grant exclusive, as well as permanent and perpetual, franchises if not limited by the constitution.

Under Code 1873, Sec. 464, granting the power to a city council to authorize or forbid the location and laying down of tracks for street railroads, a city council cannot grant a perpetual franchise, and may not do indirectly what it could not do directly. Therefore a perpetual franchise would not result from estoppel of the city to forfeit a franchise. (State ex. rel. County Atty. et. al. v. Des Moines City Ry., 140 N. W. Rep., 437.)

Kansas.—Damages to Abutting Owner When Deprived of Access to Property.

An abutting owner is entitled to recover damages from a company which maintains a railroad track in the street in such manner as to cut off his access to his property—his ingress thereto and egress therefrom—notwithstanding that it is constructed in accordance with permission given by the public authorities. (Stephenson v. Atchison Ry., Light & Power Co., 129 Pac. Rep., 1188.

New York.—Effect of Consolidation Upon Fares and Transfers.

A street railroad corporation formed by the consolidation of three street railroad companies is within railroad law (Laws 1892, Chap. 676, Sec. 104) requiring contracting corporations to carry passengers for one fare and to give transfers for a continuous passage. Lowenstein v. International Ry. Co., 140 N. Y. Sup. Rep., 159.)

New York.—Street Railway Construction—Conditions Precedent.

A street railway before constructing its road over a public highway must obtain (1) the certificate of convenience and necessity from the Public Service Commission required by railroad law (Consol. Laws 1910, Chap. 49), Sec. 9, or the consent of the commission pursuant to Public Service Commission law (Consol. Laws 1910, Chap. 48), Sec. 53, or both; (2) the consent of the local authorities under Const., Art. 3, Sec. 18, and railroad law, Sec. 171, and (3) the consent of abutting owners, or the determination of commissioners in favor of construction of the road, under the constitutional section cited and railroad law (Consol. Laws 1910, Chap. 49), Sec. 171 and 174. (Manhattan Bridge Three-Cent Line v. Brooklyn Heights R. Co. et al., 139 N. Y. Sup. Rep., 216.)

New York.—Unlawful Railway Competition Not a Public Nuisance.

The competition resulting from the unlawful operation of a street railroad is not such special injury as will authorize another railroad company to maintain a suit to abate it as a nuisance, since the injury to the other company arises from the operation of the road and not from its unlawful character. (Manhattan Bridge Three-Cent Line v. Third Avenue Ry. Co. et. al., 139 N. Y. Sup. Rep., 434.)

Texas.—Injunction Against Abandonment of Railway Operation—Enjoining Abandonment.

In consideration of the dedication of certain streets, an electric railway company agreed to construct and continuously operate thereon an electric road and thereafter did construct and for a time operated such road. Held, that a landowner could enforce the contract by an injunction restraining the abandonment of the line on such streets and was not limited to an action for damages for its breach where it did not appear that the operation of such line would prevent the company performing its duties to the public. (Houston Electric Co. v. Glen Park Co., 155 S. W. Rep., 965.)

Virginia.—Maintenance of Streets—"Good Order."

Where the franchise of a street railway company obligated it to keep so much of the street as lay between the rails and 2 ft. outside in good order and repair, the street railway was obliged not only to keep the street in good repair but to repave with the same kind of material as the city uses for the rest of the street, when the municipality decides that, in the interests of progress, a new pavement is necessary, for not only is a franchise to be strictly construed, but "in good repair" does not mean "in good order," the latter being equivalent to "good condition." (City of Danville v. Danville Ry. & Electric Co., 76 S. E. Rep., 913.)

Washington.—Charter Amendment—Street Railroad Franchise.

Laws 1903, Chap. 175, as amended by Laws 1907, Chap. 99, giving a city having control of any public street the power to grant authority for the construction of street railways thereon and to prescribe the terms and conditions thereof, rendered invalid Seattle City Charter, Art. 4, Sec. 20, providing that every grant of a franchise for the use of the streets shall provide for the purchase of the property placed in the streets by the grantee at a proper valuation, exclusive of the franchise, which was not revived by the

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Laws of 1911, Chap. 17, relating to the form of organization of cities of the first class and providing that such cities may adopt a charter providing for the initiative, referendum and recall. (Dolan et ux. v. Puget Sound Traction, Light & Power Co., City of Seattle, intervener, 130 Pac. Rep., 353.)

Wisconsin.—Street Pavement—"Repair"—"Repave."

Milwaukee City Ordinance June 6, 1887, Sec. 4, granted certain rights and privileges to the Milwaukee City Railway Company, defendant's predecessor in interest, and obligated it to maintain in good and thorough repair during the charter term all portions of W Street between the outside rails and 1 ft. therefrom toward the curb, of the same material as that of which the street should be composed when such repairs should be necessary. Held, that while the word "repair" does not mean "repave," yet the section requires the company to keep the street in repair, and when a given pavement becomes defective the company must renew that portion of the pavement within its zone, using the same material as that which the city uses on the remainder of the street.

That a city required a railway company to make street repairs under a later ordinance after the passage thereof did not estop it from claiming that defendant was bound to repair a particular street under a prior ordinance containing broader requirements. (State ex rel. City of Milwaukee v. Milwaukee Electric Ry. & Light Co., 139 N. W. Rep., 396.)

LIABILITY FOR NEGLIGENCE

Alabama.—Carrier's Servant—Profane and Insulting Language—Damages.

Damages for mental suffering, independent of other personal injury, may be recovered from a railway company by a female passenger for fright and shock due to profane, abusive and insulting language used in her presence and hearing by an employee of the railway company. (Birmingham Ry., Light & Power Co. v. Glenn, 60 Southern Rep., 111.)

California.—Premature Start.

It is negligence to start a street car prematurely after it has stopped for passengers to alight, whether it is started violently or not. (Franklin et al. v. Visalia Electric R. Co., 131 Pacific Rep., 776.)

Connecticut.—Negligence of Infants—Presumptions.

In an action against a street railway for the killing of a boy of the age of eleven years it cannot be presumed that he was incapable of contributory negligence, where it appeared that he was bright for his years, and, consequently, if no evidence is offered upon this subject judgment must go against the plaintiff. (Jollimore v. Connecticut Co., 85 Atlantic Rep., 373.)

Connecticut.—Negligence on Other and Similar Occurrences—Regular Stopping Points—Carriers—Injuries to Passenger—Evidence—Rules.

One's negligence on a particular occasion cannot be proved by showing negligence on another occasion, nor can his freedom from negligence on one occasion be shown by proof of his due care on other occasions.

On an issue as to whether defendant's car, on which plaintiff claimed to have been injured, stopped at a particular point where he claimed he attempted to board it, evidence of defendant's rules, providing that the regular stopping place was on the opposite side of the street from that where plaintiff claimed the car stopped, was admissible in support of the testimony of the operatives that it did not stop at the place claimed. (Moffitt v. Connecticut Co., 86 Atlantic Rep., 16.)

Colorado.—Fender Not Dropped in Emergency.

Where a woman stepped in front of a moving street car only a few feet away and was struck almost the instant that she was on the track, it was not negligence for the motorman to fail to drop the fender, for the human mind is not held to such a high degree of diligence in the face of unforeseen contingencies. (Liutz v. Denver City Tramway Co., 131 Pacific Rep., 258.)

Florida.—Accident to Unregistered Automobile—Liability to Occupants.

The mere fact that no license had been procured for an automobile does not relieve from liability one whose negligence injured a passenger while riding in the automobile on the public highways of the State.

The negligence of a chauffeur in driving an automobile is not in general imputable to a person who is riding in the automobile but has no authority or control over the machine or the driver. (Porter v. Jacksonville Electric Co., 60 Southern Rep., 188.)

Georgia.—Alighting from Slowly Moving Car.

It was not negligence per se for a passenger to attempt to alight from a slowly moving street car, although he may have been an old and infirm man. Whether his act was so obviously dangerous as to prevent a recovery for an injury received in attempting to alight must be determined by the jury, from all the facts of the case. (Savannah Electric Co. v. Johnson, 16 Southeastern Rep., 1059.)

Indiana.—Trespasser on Interurban Tracks.

A traveler who negligently enters on an interurban railroad company's track is not excused from exercising care for his own safety after that time and before collision with a street car, and where he has an opportunity to leave the track and avoid injury he must do so, and where his negligence continues to the very time of injury and concurs with the negligence of the railway company the doctrine of last clear chance is inapplicable. (Terre Haute, I. & E. Traction Co. v. Latham, 101 Northeastern Rep., 746.)

Iowa.—Injuries in Alighting.

Where the car was started while a crippled passenger was alighting in the conductor's presence and view, the company would be liable for resulting injuries, though such passenger had already been allowed a reasonable time to alight. (Mitchell v. Des Moines City Ry. Co., 141 Northwestern Rep., 43.)

Kansas.—Intending Passenger Asleep on Track.

One who carelessly sits down upon the ties of an interurban electric railway track to await the arrival of a car is not continuously and concurrently negligent by reason of becoming unconscious from sleep or coma and thereby unable to avoid injury from a car wantonly run upon him. (Tempfer v. Joplin & P. Ry. Co., 131 Pacific Rep., 593.)

Kentucky.—Injury to Passenger Standing on Steps.

A street car passenger is not chargeable with contributory negligence in remaining on the steps from which he is thrown by the negligent operation of the car, where he is compelled by the crowded condition of the car either to ride there or shove his way to the crowded platform. (South Covington & C. St. Ry. Co. v. Hardy, 153 Southwestern Rep., 474.)

New Jersey.—Collision with Fire Apparatus—Effect of Ordinance.

The driver of a fire apparatus, on the way to a fire, approached a street upon which he knew cars were running at frequent intervals, and his management of the team of horses drawing the apparatus was such that he was guilty of contributory negligence in colliding with a trolley car, unless a city ordinance which made it a misdemeanor for any one in or upon or owning any vehicle to refuse the right-of-way or in any way obstruct any fire apparatus abrogated the rule relating to contributory negligence and thus excused him from the application of the rule. Held, that such an ordinance, which simply imposes a liability for the non-observance of its terms, does not abrogate the rule relating to contributory negligence. (Woods v. Public Service Co., 85 Atlantic Rep., 1016.)

South Carolina.—Ejection by Fellow Passenger—Liability of Railway Company.

A passenger sued for injuries from being ejected from an electric car by a fellow passenger, and the evidence showed that the conductor saw plaintiff thrown off, if he did not assist in doing it, and afterward saw him following the car for some distance but did not attempt to stop to let him on again. Held, that the court did not err in refusing to modify plaintiff's request of instruction that a common carrier may be held for damages unless it exercises the highest degree of care to protect its passengers from the violence of other passengers by adding thereto that the rule stated applies only when the carrier knows of the danger or of facts from which the danger may be reasonably anticipated. (Dennis v. Columbia Electric St. Ry., Light & Power Co., 76 S. W. Rep., 711.)

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News of Electric Railways

Western Society Discusses Chicago Subway Plans

Some time ago the Western Society of Engineers appointed a committee to collect copies of the various reports on the subject of subways for Chicago, abstract them and present them in the form of a bulletin at the first regular meeting held Sept. 8, 1913. At the conclusion of this committee's report at the date named a number of engineers discussed the various lines and routings. The subject will be brought before the society again at a later date for the discussion of the engineering problems which will be involved in the construction.

Alderman Block, chairman of the local transportation committee of the Chicago City Council, addressed the engineers. He stated that there was little doubt that rapid transportation was needed for Chicago, but urged careful consideration of the problem. He did not believe in a partial subway system to relieve either the surface or the elevated railway congestion in the loop district. He favored through routes from east to west. To build subways for surface cars would not relieve transportation congestion except where short sections of subway were required to permit the surface cars to pass under the river or under steam railroads. The surface lines should serve as feeders to the subway system, the stations of which should be a half mile to a mile apart. The general opinion was that most of the reports tended to increase or concentrate congestion in the loop district and that the proper way to solve the problem was to build the subways through the loop or around it.

Extent of Damage to Utilities in Fire at Hot Springs

The public utilities of Hot Springs, Ark., suffered severely in the fire on Friday, Sept. 5. The power plant of the Citizens' Electric Company was destroyed soon after the fire started. As a consequence the city was thrown into darkness and the electric railway service had to be suspended.

The power plant was in flames two hours after the fire started. Stephen E. Dillon, general manager, and his assistants managed to save the records of the company, which were in the general office adjoining the power plant proper. What records were not brought out before the fire reached the building were placed in the vaults and remained intact. The power house engineers remained in the power plant until the fire reached the building. This they did to handle the electric service for the pumps pumping the water supply from the distant reservoir. The auxiliary steam pumps at the water works, 2 miles distant, had been put into service in the meantime and there was no delay in supplying the fire lines with water.

As soon as the fire chief at Hot Springs saw that the blaze was beyond control, a hurry call was sent to Little Rock, 55 miles distant, for aid, and fire engines, hose carts and chemical engines were hurried to Hot Springs. Shortly before midnight the firemen succeeded in heading the fire toward the mountain side, with the result that it finally burned itself out.

A hurried survey of the power house when the fire had cooled down showed that the 1250-kw turbine could be rewound, but that the 450-kw and 500-kw units would probably be a total loss. The motor-generator set and rotary converter will have to be replaced by new equipment. One condenser will soon be put into operating condition, but the other will be a loss. Most of the piping was destroyed. Two of the Stirling boilers can be repaired, but it is not thought that the rest of the battery of boilers can be used again.

Traction service was resumed at once with two gasoline motor buses, and mules were hitched to the lighter street cars.

The executive, engineering and purchasing departments of the Federal Light & Traction Company, New York, began immediate preparations to rush equipment to Hot Springs. Telegrams were sent to all parts of the country tracing turbines and other equipment, either new or second-hand, to replace the equipment which was destroyed.

The city is without electricity and there is only a partial telephone service. It is thought that a new central station will be built on another site a mile from the location of the old plant, which was in the business section.

C. C. Chappelle, vice-president and general manager of the Federal Light & Traction Company, has personal charge of the rebuilding of the power plant, etc. W. A. Haller, chief engineer and general superintendent, is in charge at the scene of the disaster. George J. Gauthier, general construction superintendent, as assistant is in active charge of the two score of linemen and others engaged in the work of rebuilding the company's property.

The Federal Light & Traction Company, New York, acquired the Citizens' Electric Company, the Consumers' Gas Company, the Hot Springs Street Railway and the Hot Springs Water Company in March, 1913.

Pittsburgh Subway Discussion Reopened

The City Council of Pittsburgh, Pa., in its conference on Sept. 4 with Mayor Magee, members of the law department, and A. O. Fording, of the Pittsburgh Subway Company, decided that the new subway ordinance will be considered as a whole, carrying the name of the Pittsburgh Subway Company. A proposal to consider the bill in blank, with the name to be inserted later, was defeated. As it stands the bill presented was taken up section by section. The law department will now consider the bill, and the Chamber of Commerce will be asked to pass on its merits. The main idea now is to redraft the ordinance so as to include terms that can be agreed upon by the subway company, the Council and the Mayor, each of which had varying views on the ordinance that was passed by Council, vetoed by the Mayor and killed because there was not the two-thirds majority necessary to repass it over the Mayor's objections. Some objection was raised on Sept. 4 to the fixing of a 5-cent fare limit. Mr. Garland's motion to make a 5-cent limit prevailed and was finally agreed to.

J. D. Mortimer on Interurban Development

James D. Mortimer, president and general manager of The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., is quoted by the Milwaukee *Wisconsin* as follows:

"The decrease in development of interurban electric railway systems during the last few years, as shown by statistical reports of growth of electric railway mileage, has caused inquiries in various quarters as to the reasons for this lack of development. Relatively little new interurban mileage has been constructed in Wisconsin in the last three years. There has likewise been relatively little increase during recent years in Ohio, Indiana, Iowa and Michigan. Inquiry at the office of the Railroad Commission of Wisconsin tends to show that none of the interurban lines in the State of Wisconsin are what might be called paying investments.

"It is true that very few interurban electric railways have proved either paying or profitable investments. A recent analysis of the interurban lines operated by The Milwaukee Electric Railway & Light Company and Milwaukee Light, Heat & Traction Company indicates startling figures. After providing a fair allowance for operating expenses and depreciation, the earnings of the Milwaukee-Watertown line are about 3.6 per cent return on the tangible property, excluding any allowances for the development of the business or accrued deficits in operation, and using the valuation of the physical property as determined by the engineering staff of the railroad commission. Under the same conditions the earnings of the Milwaukee-Racine-Kenosha line have not exceeded 3 per cent upon construction cost. The Milwaukee-St. Martins-East Troy line has not earned operating expenses and depreciation. These conditions are typical of many others throughout the country. They show clearly why it is most difficult to obtain the capital required for the construction of interurban railways when there are so many other investments yielding

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very much higher rates of return and not possessing the hazard that is inherent in this business. Few men would embark in an industrial enterprise expecting to make much less than 10 per cent per annum on their money. With many opportunities for such investments it is not unnatural that capital does not flow into the electric railway business.

"For our own part we are not planning to make any extensions to our interurban lines unless conditions change so as to allow the capital which we have already invested to earn something more than government bond interest. This situation is brought about by the insufficiency of patronage and fares. The expenses of such lines are fixed to a large degree. Under state and local laws taxes and other obligations are set and must be met, and under franchise conditions and decisions interpreting them other items of expense are imposed, and labor and material follows the market which has steadily climbed upward for many years. That fixes the expenses. They can be met only by earnings.

"In order to bring the properties into the earning class there must be a more equitable condition of affairs. This condition can only be approximated by the readjustment of passenger fares so they will bear a more just relation to the cost and value of the service rendered. Another improvement in conditions could come through a better use of the lines by the community. As it is now there are thousands of acres of good market gardening and dairy land about Milwaukee that are not served by transportation lines, and as a consequence lie fallow waiting the real estate man, or are devoted to general farming. With the electric lines carrying produce to the city markets that land could be developed and the city people could obtain their produce at lower prices than now obtain."

Strike in Dublin

At 10 o'clock on Aug. 26, the first day of the horse show, many of the motormen and conductors of the Dublin (Ireland) United Tramways deserted the cars in the vicinity of the Nelson Pillar, Sackville Street, which is the starting point for a large number of the lines. Others waited until they had brought their cars to the depots. Altogether about 140 motormen and conductors struck, together with about forty other employees, chiefly men at the company's shops. A large force of Dublin police and constabulary took up positions at important points in the city's thoroughfares. Mounted police patrolled the main line of traffic to the show grounds. Twenty-five drivers and conductors were immediately arrested for leaving their cars on the line, and later were remanded for a week on bail. The company brought up reserve men, and after an hour or two maintained a nearly normal service, but no cars were run after dark.

On Aug. 27 conductors and motormen left the company's service on the Kingsbridge route and, assembling at the terminus of the electric railway at the Great Southern & Western Railway Station, evinced a spirit of intimidation toward the men who continued to remain on duty. The service was consequently restricted.

Early on the morning of Aug. 28 James Larkin, secretary of the Irish Transport Workers' Union, and four other Irish labor leaders were arrested and charged with seditious libel and conspiracy. The senior divisional magistrate sent the case forward for trial, the defendants being released on bail after making an agreement not to make inflammatory speeches meanwhile. Larkin nevertheless advised his followers to hold a meeting on Aug. 31. That was the beginning of trouble, which culminated in wild rioting by the mob and baton charges by the police. Ambulances were called and soon every hospital bed in the city was occupied. More than 400 people were treated, and several cases had to be turned away. Two men died in the hospital of fractured skulls.

The strike meeting was proclaimed by the police on Aug. 29, but Larkin publicly burned the proclamation that night and declared he would appear in Sackville Street, dead or alive. He drove up to the Imperial Hotel in disguise and made a dramatic appearance on the balcony. A score of constables entered the hotel. Larkin was arrested and after that the rioting continued all day.

James Keir Hardie, socialist and labor member of Parliament, was in Dublin on Sept. 2 in connection with the strike and the conflicts between the strikers and the police. He is reported to have said:

"I regard what has happened as the most serious event the trades union movement has had to face for at least a century. The action of the authorities against the strike leader James Larkin and others sweeps aside the whole of the trades union legislation and restores us to the exact position in which the trades unions were before they were legalized."

In both London and Dublin demonstrations were held on Sept. 8 to protest against the conduct of the police on the occasion of the strike riots in Dublin. Trafalgar Square, London, held an orderly crowd, perhaps 8000 strong, and a parliamentary inquiry was demanded. A more impressive assembly gathered in Sackville Street, Dublin, where 50,000 persons congregated.

President Elliott on New Haven Policies

In a statement which he made on Sept. 6 in regard to the policies of the New York, New Haven & Hartford Railroad, Howard Elliott, the president, said in referring to the application of the company to the Massachusetts authorities to issue bonds and to the relations of Mr. Mellen with the company:

"The company is now asking permission from the public authorities to issue certain debenture bonds, for the purpose of financing itself, and it hopes to obtain that permission, and in that way receive $67,552,000, which will be used to pay off notes and bonds falling due within the next few months of $46,023,750, leaving the balance of $21,528,250 for the class of expenditures mentioned. If it cannot get the money it cannot do the work, so that it would appear to be to the interest of the public as much as to the interest of the railroad to have the proposed plan go through promptly, even if some disagree on the question of what is the best way to raise the money. That is a question of judgment, and the directors in making up their plan did what they thought was safest and wisest at the time to protect the present and future of the property.

"Morris McDonald is president of the Boston & Maine and Maine Central railroads; he and his organization will devote their entire time and attention to managing, operating and developing those properties. When the by-laws of the New Haven road are changed, Vice-president Hustis will become president of that property. He and his staff will devote their entire time and attention to that property. I have recommended to the board of directors of the New York, Ontario & Western Railroad that they select a man for president of that road, so that he and his staff may devote their entire time and attention to that property. As chairman, I shall do all I can to help, by suggestion, consultation, personal inspection and co-operation with the officers and men. The important point, however, is that each organization will have only its own affairs to look after, will be accessible to the public, will spend considerable time on the road, and will be able to decide nearly all questions promptly, and, in consequence, can give closer supervision to all details, get closer to the men, and thus gradually give better and safer service to the public, and help to build up the business of the country, and consequently of the railroad. Later on, when the subject can be reached, the question of handling other properties in which the New Haven road may be interested will be taken up, but the most important matter now is the New Haven, and to that Mr. Hustis will devote all of his time, and I will give the major portion of mine for the present.

"There seems to be a slight misunderstanding as to the relations that Mr. Mellen has to the present management. When I went to the Northern Pacific Railroad Mr. Mellen very kindly told me that he would be glad at any time to give me any information that he had concerning that property, and once or twice I called upon him. When I came here he very kindly made the same offer, but he has retired from office and from the board and has no connection, directly or indirectly, with the present and future policy or the management of the New York, New Haven & Hartford Railroad or of any of its various properties, or in the selection and direction of any officers working for any of these properties.'

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The Boston Arbitration Hearings

After a short suspension over the Labor Day holiday, the arbitration hearings in the Boston Elevated Railway labor investigation were resumed on Sept. 2. The week ended Sept. 6 was almost entirely occupied by witnesses from the ranks of the company's employees. The striking development of the week was the admission for publication by the company under request of counsel for employees and by ruling of the board of arbitrators of the salaries of all its officers. The list included fifty-one persons. The list of official salaries totals $279,620, and the statement issued by the company shows that this represents an increase of about $40,000 in the last four or five years.

The testimony presented during the week by employees dealt mainly with conditions experienced and wages obtained by individuals in the company's service, explanations of the use of the working lists in carhouse lobbies, detailed accounts of conductors' duties on runs, and an exposition of the work of ticket sellers, presentation of operating rules, outline of employees' training in the pronunciation of streets, and the typical filling out of accident reports. These matters were presented with the object of showing that the responsibilities and duties of the individual have increased within the past few years. The company's minimum wage guarantee of $12 was criticised on the ground that it interfered with individual maximum earning power. It was brought out that the company has about 300 women ticket sellers in its employ, of whom about forty are extras. One of the former testified that her daily receipts are from $200 to $300 and that her weekly wage is $9.72, of which 60 cents is carfare allowance. Tickets are sold from reels holding 5000 each, and a girl can sell about 1000 in an hour, maximum. All transfers are now stamped with the conductor's number to facilitate tracing mistakes. Evidence was presented to show the care taken by the company to insure courtesy by conductors.

It is anticipated that another week will be required to finish the presentation of the employees' side in the hearings, which have now been under way for substantially a month. The board was occupied in the week beginning Sept. 8 with the testimony of individual employees regarding wages and working conditions, as in the preceding week. Evidence was offered to the effect that a motorman's responsibility is greater than formerly. Each motorman on the surface lines is obliged to be posted on 124 rules, sixteen police regulations, sixteen statutes, three Board of Health regulations and six city ordinances, in addition to forty-nine general orders posted in 1913 to date and almost daily bulletins. Numerous details were presented as to the itemized bill-of-fare maintained in a representative employee's household, and much cumulative testimony was offered to demonstrate the limited resources of car-service employees, ticket sellers and porters in a pecuniary way as generally prevailing. Several witnesses expressed a preference for a minimum guarantee of a daily rather than a weekly wage. The difficulty of assigning acceptable amounts of work from the extra list was also set forth.

An itemized tabulation presented for the first eight months of the current year by a surface line conductor showed that this employee had worked 234 days, taken in $6,579 in cash and 17,957 transfers, and had received for this service $608. He had registered 149,542 passengers. A comparison of his work in twenty-one days of August, 1907, with that accomplished in the first fifteen days of August, 1913, showed that in the former period he had handled $489 in cash and 496 transfers as against $498 in cash and 1472 transfers in the latter time. Evidence was offered by the men to the effect that the present schedules do not allow adequate time for loading surface cars at the Dudley Street terminal. It was charged that the Boston public is growing more negligent in notifying motormen before boarding cars. The oiling of streets was also cited as an added difficulty from the motorman's standpoint. The contention was advanced by several witnesses that time spent in the lobby on call of the company should be compensated for by a guarantee of at least seven hours' daily pay. Regarding the number of daily brake applications, one motorman with a fifty-minute run and making about 100 regular stops estimated that in the course of a full day's work he was obliged to make 900 dead stops and to apply the brakes 1500 times, including slow-downs.

Testimony was presented by an extra man who has been employed fifteen months by the company to show that two or three extra men are assigned to a carhouse for a 5 a. m. report daily; that several more report at 6 a. m., and all the rest at 7 a. m. The extra man assigned to report early holds his privilege of getting the first work given out. At 7 a. m. he falls into his regular rating, according to seniority, so that in many cases a man reporting at the later hour may obtain work ahead of one reporting earlier, according to conditions. The extra man who fails to get work at 7 a. m. is obliged to remain in the lobby until 9.15 a. m., when the general roll-call is held. Most of the men excused after the roll-call are required to report again at 11.45 a. m., when the early report men may be excused an hour for dinner. Other roll-calls are held at 3 p. m. and 6 p. m. Men obtaining no work at the last are then excused for the day. Many extra men average the $12 minimum wage per week guaranteed by the company.

J. Henry Neal, general auditor of the company, presented a statement at one of the later hearings showing the actual earnings of 3733 representative blue-uniformed men, classified as follows:

Cents per Hour	No. of Men	Total Wages Four Weeks Ended Jan. 31, 1913	Average Earnings per Week
28.9	610	$42,315.81	$17.34
28.2	357	24,292.51	17.01
27.5	577	37,525.64	16.25
26.8	673	39,461.19	14.62
26.2	539	28,971.85	13.43
25.6	977	47,591.56	12.17
Totals.....	3733	$220,158.56	Avg....$14.76

Regarding this tabulation Mr. Neal said that it had been prepared for the information of President Bancroft, and that it did not include the records of men absent two days or more per week, but included overtime, extra trips and instructors' time. Last year the company paid $70,000 on account of the guaranteed minimum wage, which was not earned by platform labor. About 40 per cent of the blue-uniformed employees are extra men.

Removing the Historic Astor House

One of the oldest landmarks in New York City is to be removed soon to allow the construction of the new Broadway subway. This is the old Astor House, which stands on the west side of Broadway between Vesey Street and Barclay Street and which dates from 1836. It is a massive stone building six stories in height. It is owned one-half by William Waldorf Astor and one-half by the estate of John Jacob Astor, now controlled by Vincent Astor. The route of the proposed subway which is to be operated by the New York Municipal Railway Corporation, after running down Broadway from Forty-second Street, turns to the west between Barclay and Vesey Streets and curves under the southern half of the Astor House, crosses Vesey Street, passes under a corner of St. Paul's Churchyard and continues south through Church Street and Trinity Place. This deflection was necessary to avoid building the new subway below the existing subway which occupies that part of Broadway. It was decided that the southern half of the Astor House must come down and the city accordingly entered into an agreement with the John Jacob Astor estate for the necessary easement. Under this agreement the city pays the estate for the rights needed and agrees to construct caisson retaining walls upon the Broadway and Vesey Street fronts of the plot, so that the subway will be protected and the erection of a modern building upon the site will be possible. The commission has awarded the contract to remove the southern half of the Astor House to a company, which agrees to tear down the building and remove the débris within fifty-five days and to pay the city $3,833 for the privilege.

Meeting of the Illinois Electric Railways Association

The members of the Illinois Electric Railways Association will meet at Starved Rock, Ill., on Sept. 19. A special train will be run from Joliet to Starved Rock over the Chicago, Ottawa & Peoria Railway. Starved Rock is in the "Illinois Valley Wonderland."

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Damages for Intangible Losses in Jersey City Not Allowed

On Sept. 5 the verdict of $43,300 damages to Wells Fargo & Company against Jersey City for damages sustained by the express company during the Jersey City strike in 1910 was reduced by Judge Rellstab in the United States District Court to $300. A digest of the briefs submitted to the court and a history of the previous jury decision on May 10, 1913, were published in the ELECTRIC RAILWAY JOURNAL of Aug. 2, 1913.

The original award was $300 for damages to the tangible property of the company and $43,000 for damages to the intangible property or business. The gist of the present decision is that the business of the express company was not properly within the provisions of the act to prevent routs, riots and tumultuous assemblies. In other words, the court held that the act imposing liability upon cities for damages during riots included only tangible property.

At the original trial the question of the city's liability for loss of business was left open, the jury being directed to return a verdict upon the assumption of full liability on the part of the city, but so to divide the verdict that the loss to physical property and to business might be clearly differentiated.

In fixing the total liability of the city at $300, covering only physical damages, the court points out that the riot act invoked by the express company imposes upon municipalities a liability unknown at common law. Therefore, in spite of claims by the company and an exhaustive citation of cases to show that the act is remedial in character and hence to be liberally construed, the court insists that the strictest construction must be placed upon the act in order that no liability may attach to the municipality further than that clearly prescribed and intended by the Legislature. Construing the language of the act in this light, the court holds that the word "property" was not used in its most general sense, but was meant to include only the physical, tangible property located within the municipality in which the rioting might occur.

Hearing on Application for Extension in Toronto

The hearing of the city of Toronto's application for extensions of the lines of the Toronto Railway will be resumed by the Ontario Railway & Municipal Board on Sept. 18. The municipality contends that the company is not giving the best possible service by reason of the lay-out of its tracks. It desires the company to extend the tracks on Bloor Street westward to the northern entrance of High Park and build a line on Pape Avenue and one on Christie or Dufferin Street. The city's evidence has all been presented. The lawyers for the railway, it is said, expect that the presentation of their case will occupy about nine days.

Mayor Hocken, on Sept. 5, received a letter from R. A. Ross, Montreal, who was engaged to value the franchise and assets of the Toronto Electric Light Company, stating that his report would not be ready for two or three weeks. The Mayor immediately urged the engineer to hasten the work "as the matter must be submitted before January." The Mayor stated that the report on the street railway valuation would be ready in a week. He would like to have both reports at the same time.

Comptroller Church has failed in an effort to have the Toronto Board of Control resolve that "the by-law (if any) for the purchase of the property of the Toronto Railway and Toronto Electric Light Company be submitted to the ratepayers on Jan. 1 next." Mr. Church said that date was the proper time and the only legal time to vote on the by-law. Mayor Hocken said the issue would become involved with the civic election. He suggested that the point of law raised be referred to the city solicitor. Mr. Church, however, insisted on a division on his motion, which was lost.

Formal Opening of Oakland, Antioch & Eastern Railway

The formal opening of the Oakland, Antioch & Eastern Railway was celebrated on Sept. 3 with an elaborate program. On that day the schedule of eight trains daily between Sacramento and San Francisco became effective.

On Aug. 30 a two-car train, "The Stockholders' Special," was run through from San Francisco to Sacramento, a distance of 91 miles. The trip was made in three hours and ten minutes, the running time being less than that on any of the steam lines between these points. The J. G. White Companies were well represented on this trip by the members of the San Francisco office.

The Shepard Pass tunnel, built for this road, and located about 5 miles from Oakland, is nearly two-thirds of a mile long, the longest thus far constructed in this country for an interurban electric railway. The new road is equipped with electric locomotives and steel cars, including Pullman and observation cars.

The distribution system from the railway substations is 1200 volt d. c., with overhead catenary construction. The power is supplied by one of the large hydroelectric companies whose lines intersect the railway.

New Texas Road Opened.—The Texas City (Tex.) Street Railway has completed the construction of its line in Texas City and the road has been placed in operation. The line is a short one and power is supplied from the plant of the Texas City Transportation Company.

Electrification Vote at London, Ont.—Mayor C. M. R. Graham, London, Ont., announced that the vote on the plan of Adam Beck, of the Hydroelectric Power Commission, for the rehabilitation and electrification of the London & Port Stanley Railway will be taken before Oct. 15.

New Route Between New York and Boston.—The Shore Line Electric Railway has completed and placed in operation the extension of its line from Saybrook to New London, Conn. The completion of the line makes it possible to travel all the way by electric railway between New York and Boston via New Haven and New London. The one route by trolley heretofore between Boston and New York has been via Hartford, Springfield and Worcester.

Abolishing the Commerce Court.—The House of Representatives on Sept. 9 passed the Bartlett amendment abolishing the five additional circuit judgeships created at the time of the passage of the Commerce Court act, thereby legislating out of office, so far as the House could do so, the five judges appointed under that act. It is stated that this is the first time the office of a judge has been abolished since the legislation growing out of the "midnight appointments" in the administration of John Adams. The amendment adopted on Sept. 9 is in the general deficiency appropriation bill and must be agreed to by the Senate.

Bill for Municipal Ownership in the District of Columbia.—A bill providing for the municipal ownership and municipal operation of all street railways in the District of Columbia has been introduced in the House by Representative Crosser of Ohio, a member of the District committee. The bill provides a way for the District Commissioners to buy all the street railways in the city and to turn them over to the Public Utilities Commission to operate. Immediately upon the enactment of the bill the commissioners would be directed to negotiate with the street railways for the purpose of arriving at an agreement as to the price to be paid, the funds for the purchase to be raised by the issue of thirty-year 3½ per cent bonds.

Dragging the Railroad Question Into Politics in Massachusetts.—In a statement which he issued on Sept. 6 announcing his platform as a candidate for the Democratic nomination for Governor, Lieut. Gov. David I. Walsh declares the railroad question the overshadowing problem of the hour in Massachusetts and the rest of New England. As a remedy, he urges that the State should exercise its reserve power under the charter of the Boston Railroad Holding Company, by which it may take over the assets of that corporation, which are the controlling shares of stock in the Boston & Maine. He said: "The Democracy of Massachusetts should notify the New Haven Railroad that if it accepts the authority recently so unfortunately given it to acquire any more street railways in this Commonwealth it will be inviting more trouble than those electric railways can ever be worth to it, and if it still blindly persists we should immediately revoke the so-called electric railway merger act."

California Cities to Aid Traction Lines.—At a meeting held on Aug. 27, at the office of the Mayor of Oakland, Cal., officials of Oakland, Alameda, Richmond, San Leandro and

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Hayward decided that they would not press the San Francisco-Oakland Terminal Railways for extensions of lines, changes of schedule or maintenance of pavement between the tracks until the company has been refinanced. John S. Drum, president of the Savings Union Bank & Trust Company, San Francisco, a member of the Smith advisory committee; W. R. Alberger, general manager of the company, and Gavin McNab, attorney for the United Properties Company, the holding company of the San Francisco-Oakland Terminal Railways, asked for time on the basis of all that the traction company had accomplished for the bay cities. The Mayors of Berkeley and Piedmont declined to join with the other executives in assurances that their cities would be as reasonable as possible in their demands. They were in favor of compelling immediate action on penalty of the road losing its franchises.

Proposed Extension of Corona Rapid Transit Line.—Edward E. McCall, chairman of the Public Service Commission for the First District of New York, has written to Theodore P. Shonts, president of the Interborough Rapid Transit Company, asking him to inform the commission whether his company, as lessee under the dual system contracts, will accept and operate as part of the new subway system the proposed extension of the Corona rapid transit line from Sycamore Avenue, Corona, to Main Street, Flushing. This extension was decided upon after the dual system contracts were signed. Under those contracts the Corona route ends at Sycamore Avenue, but the extension provides for a continuation of it across Flushing Creek and through Flushing. Now the commission is willing to have the city construct this extension as far as Main Street, Flushing, and in accordance with the contract terms gives the Interborough Rapid Transit Company the right to say whether it will include such extension for permanent operation, under the terms of the contract.

Inquiry Into Indifference of New Haven Company Toward Commission Order.—The Public Service Commission of the First District of New York has demanded of the New York, New Haven & Hartford Railroad to know why the company has not complied with an order of the commission served upon it in April last. The order was general to all electrical companies and companies using electricity. It prescribed general rules "to insure safety of employees of electrical plants." All railroads and public utility companies have complied with this order and submitted a code of rules to be followed except the New York, New Haven & Hartford Railroad. This company, it is alleged, has ignored the order. An inquiry instituted by the Public Service Commission in this connection has been adjourned until Sept. 15, at the request of the Public Service Commission of the Second District of New York. The members of the Public Utilities Commission of Connecticut have been invited by the members of the New York commissions to be present at the inquiry.

Advance Registration Cards for A. E. R. A. Convention.—The American Electric Railway Association is sending to the executive officials of member companies a supply of cards covering advance registration on account of the convention to be held in Atlantic City, Oct. 13 to 17. The association desires to have the cards filled out for such representatives of the company which is addressed as will attend the meeting and to have the cards returned to the association office. It is explained that prompt attention to this matter will facilitate greatly the registration at the convention and save the time of the delegates when they arrive in Atlantic City. The card should set forth the particular association with which the representatives desire to register, the memorandum on the back of the card serving as a general guide to the establishment of the delegate's proper affiliation. It is not intended, however, that the division of officials between the associations as shown shall be inflexible, the member companies, of course, reserving the right to have their representatives register with such affiliated association as they may elect.

Reorganization of County Traction Company.—The Evanston Traction Company, recently incorporated, to which was granted a new twenty-year franchise by the city of Evanston, Ill., has reorganized the operating department of the County Traction Company, of which it was a part. Mention was made in the ELECTRIC RAILWAY JOURNAL of Aug. 23 of the terms of the franchise of the company. This grant is similar to the Chicago settlement ordinance of 1907, in that it provides two supervising engineers, one representing the company and the other the city of Evanston. Clement C. Smith, Milwaukee, Wis., is president and general manager of the new company, and R. E. Belknap, representative of the Pennsylvania Steel Company in the Western territory, is vice-president. George Allison is secretary and treasurer and L. A. Gilbert has been made superintendent in charge of operation with J. J. Lewis as auditor. Michael Kreds has been appointed superintendent of construction and supervising engineer representing the company, and J. Moore has been appointed supervising engineer for the city of Evanston. Considerable track rehabilitation work is under way. All the joints will be raised and electrically welded. The rehabilitation work will be continued more extensively next year. Plans and specifications are being prepared for ten double-truck, double-end, pay-as-you-enter cars. Up to the present time the new company has rented its rolling stock from the Chicago Railways and power is furnished by the Northwestern Elevated Railroad.

Important Steps in Connection with New York Rapid Transit Work.—A public hearing has been set by the Public Service Commission of the First District of New York for Sept. 26 on the form of construction contract to be used for the building of Section 1 of the Whitehall Street-Montague Street route of the Brooklyn Rapid Transit Company. This will connect the southern end of the Broadway subway at Trinity Place and Morris Street with the Manhattan end of the Brookiyn Rapid Transit tunnel to be run under the East River to Brooklyn. The plans for the tunnel itself are not yet ready, but the engineers of the commission have been at work on them for several weeks. The commission has adopted a form of contract and will begin to advertise for bids on Section 2 of the Seventh Avenue line of the Interborough Rapid Transit Company. The Seventh Avenue line will leave Times Square at about Forty-third Street and run down Seventh Avenue and Varick Street to West Broadway. At Park Place it will send off a two-track line, which will go by Beekman Street and William Street to Old Slip, whence it will join a tunnel under the East River. The section which it is proposed to begin constructing immediately begins at the intersection of Greenwich Street and West Broadway, and extends up West Broadway, and Varick Street nearly to Beach Street. Moreover, it will take in the beginning of the Park Place line. Bids on this section are to be opened on Oct. 1. The plans for the northern end of the Seventh Avenue line, where it joins the present Subway in Times Square, are not yet ready.

John R. Graham as Host.—A party of twenty-three Boston men, several of whom were members of the rapid transit committee of the Massachusetts Legislature of 1893, were the guests recently of John R. Graham, Bangor, who served on the rapid transit committee while a member of the House from Quincy. Mr. Graham is now president and general manager of the Bangor Railway & Electric Company, Bangor, Me., and an officer of a number of other utilities. A dinner was held at which brief addresses, some of a reminiscent vein and others in relation to the electric railway development of Maine and New England, were made by Governor Haines, Mayor Newbert, Mr. Graham of Bangor, Jeremiah J. McCarthy, formerly surveyor of the port of Boston; ex-State Treasurer Edward P. Shaw of Massachusetts and John Quinn, sheriff of Suffolk County. Ex-Representative Frank P. Bennett of Saugus was toastmaster. Of the members of the rapid transit committee of the session of 1893 two have died and two others, ex-Senator Frank W. Kittredge and ex-Senator Edward J. Leary, city messenger of Boston, were unable to be present. The members of the committee present were ex-Senator Charles H. Baker, of Lynn, and ex-Representative Frank P. Bennett, of Saugus, who was the House chairman of the committee; Salem D. Charles, of Boston, chairman of the street commission of that city; Fred W. Bliss, of Boston; George H. Garfield, of Brockton; John Quinn, of Boston; John B. Newhall, of Lynn; Arthur H. Nutting, of Northampton; Charles H. Varnum, of Lowell; Jeremiah J. McCarthy, of Boston, and John R. Graham, of Bangor, formerly of Quincy. Others in the party were R. S. Goff, vice-president and general manager of the Bay State Street Railway, and E. C. Foster.

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Financial and Corporate

Stock and Money Markets

Sept. 10, 1913.

The price movement on the New York stock market was upward in the early hours of trading to-day. Around midday there were a number of recessions, but a strong tone developed again in the afternoon. The copper stocks continued an exception and failed to record any advance. The final tone was strong. Rates in the money market to-day were: Call, 2½ @ 3 per cent; sixty days, 4 @ 4¼ per cent; ninety days, 4½ @ 5 per cent; four and five months, 5 @ 5½ per cent; six months, 5 per cent.

The Philadelphia market was very quiet and without special feature to-day. Steel was the only issue that was dealt in to any extent.

The trading in Chicago to-day was narrow and the volume of transactions was small.

In the Boston market to-day trading was broad and the volume of transactions was moderately large.

The sales of stocks in the Baltimore market to-day were confined to five issues, the dealings totaling only 540 shares. The demand for bonds was excellent. The transactions were in twelve issues for a total of $71,600.

Quotations of traction and manufacturing securities as compared with last week follow:

	Sept. 3	Sept. 10
American Brake Shoe & Foundry (common)	91	91⅞
American Brake Shoe & Foundry (preferred)	132¼	132⅛
American Cities Company (common)	33¼	36
American Cities Company (preferred)	63½	63
American Light & Traction Company (common)	350	345
American Light & Traction Company (preferred)	104	105
American Railways Company	38⅜	38⅜
Aurora, Elgin & Chicago Railroad (common)	41	41½
Aurora, Elgin & Chicago Railroad (preferred)	a83	82
Boston Elevated Railway	89	87
Boston Suburban Electric Companies (common)	7	7
Boston Suburban Electric Companies (preferred)	56½	56½
Boston & Worcester Electric Companies (common)	a10	a10
Boston & Worcester Electric Companies (preferred)	40	42
Brooklyn Rapid Transit Company	89⅜	88¾
Capital Traction Company, Washington	115½	116½
Chicago City Railway	*170	160
Chicago Elevated Railways (common)	*25	25
Chicago Elevated Railways (preferred)	*70	75
Chicago Railways, ptcptg., ctf. 1	95	90½
Chicago Railways, ptcptg., ctf. 2	32	31
Chicago Railways, ptcptg., ctf. 3	8¾	8½
Chicago Railways, ptcptg., ctf. 4	3	2¾
Cincinnati Street Railway	a110	a110
Cleveland Railway	103¾	103¾
Cleveland Southwestern & Columbus Ry. (common)	*5½	5½
Cleveland, Southwestern & Columbus Ry. (preferred)	*30	28¼
Columbus Railway & Light Company	18	18
Columbus Railway (common)	a69½	a69½
Columbus Railway (preferred)	88	88
Denver & Northwestern Railway	*104	104
Detroit United Railway	a80	70
General Electric Company	145	144
Georgia Railway & Electric Company (common)	114⅝	116½
Georgia Railway & Electric Company (preferred)	83	83½
Interborough Metropolitan Company (common)	15⅞	15⅞
Interborough Metropolitan Company (preferred)	62	62½
International Traction Company (common)	*30	30
International Traction Company (preferred)	*95	a95
Kansas City Railway & Light Company (common)	*18	20
Kansas City Railway & Light Company (preferred)	*37	30
Lake Shore Electric Railway (common)	*5	5
Lake Shore Electric Railway (1st preferred)	*92	89
Lake Shore Electric Railway (2d preferred)	*26	24
Manhattan Railway	131	130
Massachusetts Electric Companies (common)	14	14
Massachusetts Electric Companies (preferred)	70	69
Milwaukee Electric Railway & Light Co. (preferred)	*95	95
Norfolk Railway & Light Company	25	27½
North American Company	71½	72¾
Northern Ohio Light & Traction Company (common)	60¾	63
Northern Ohio Light & Traction Company (preferred)	100	100
Philadelphia Company, Pittsburgh (common)	43½	44
Philadelphia Company, Pittsburgh (preferred)	40	40
Philadelphia Rapid Transit Company	22½	23
Portland Railway, Light & Power Company	55	55
Public Service Corporation	109	109
Third Avenue Railway, New York	37	38⅝
Toledo Traction, Light & Power Company (common)	a30	a30
Toledo Traction, Light & Power Company (preferred)	a89	a80
Twin City Rapid Transit Co., Minneapolis (common)	106	107
Union Traction Company of Indiana (common)	*5	5
Union Traction Company of Indiana (1st preferred)	*80	80
Union Traction Company of Indiana (2d preferred)	*20	20
United Rys. & Electric Company (Baltimore)	27	26⅞
United Rys. Inv. Company (common)	21	22
United Rys. Inv. Company (preferred)	41	40
Virginia Railway & Power Company (common)	52	52
Virginia Railway & Power Company (preferred)	92	92
Washington Ry. & Electric Company (common)	89½	89½
Washington Ry. & Electric Company (preferred)	87⅞	87¾
West End Street Railway, Boston (common)	72	72
West End Street Railway, Boston (preferred)	88	88
Westinghouse Elec. & Mfg. Company	71½	72½
Westinghouse Elec. & Mfg. Company (1st preferred)	114	114

*Last sale. a Asked.

ANNUAL REPORTS

Interborough Rapid Transit Company

According to the report submitted to the stockholders of the Interborough Rapid Transit Company, New York, N. Y., by the board of directors, the comparative income, profit and loss statement of the company for the fiscal year ended June 30, 1913, is as follows:

	1913	1912
Revenue from transportation	$31,723,838	$30,371,834
Other street railway operating revenue	774,032	874,558
Gross operating revenue	$32,497,870	$31,246,392
Operating expenses:		
Maintenance of way and structures	$1,697,958	$1,685,653
Maintenance of equipment	2,803,286	2,773,395
Traffic	452	587
Transportation expenses	7,409,942	7,342,703
General expenses	1,349,105	1,245,464
Total operating expenses	$13,260,743	$13,047,802
Net operating revenue	$19,237,127	$18,198,590
Taxes	2,116,880	1,979,431
Income from operation	$17,120,247	$16,219,159
Non-operating income	487,490	†1,305,200
Gross income	$17,607,737	$17,524,359
Interest and sinking fund on city bonds	$2,339,483	$2,312,943
Interest on Interborough Rapid Transit Company first mortgage 5 per cent forty-five year gold bonds	1,692,061	1,617,034
Sinking fund on Interborough Rapid Transit Company first mortgage 5 per cent forty-five year gold bonds	336,291	329,692
Interest on Interborough Rapid Transit Company first and refunding mortgage 5 per cent gold bonds	162,587	.....
Interest on Manhattan Railway consolidated mortgage 4 per cent bonds	1,591,080	1,591,080
Interest on New York Elevated Railroad 5 per cent debenture bonds	50,000	50,000
Manhattan Railway rental (organization)	17,500	10,000
Guaranteed dividend—7 per cent on Manhattan Railway capital stock	4,200,000	4,200,000
Amortization of debt discount and expense	31,758	97,087
Interest on unfunded debt	643,333	786,181
Other rent deductions	6,576	6,576
Total income deductions	$11,070,669	$11,000,593
Net corporate income	$6,537,068	†$6,523,766
Surplus June 30, 1912, and June 30, 1911	8,531,261	6,990,348
Tax refunds and other credits, including in 1913 interest on advances to trustees of New York & Long Island Railroad	2,326,542	796,889
Total	$17,394,871	$14,311,003
Appropriated for:		
Taxes prior years, amortization, capital retirements and other charges	$121,915	$529,742
Dividends	4,200,000	5,250,000
Total appropriations	$4,321,915	$5,779,742
Profit and loss surplus	$13,072,956	$8,531,261

†Including first dividend, 15 per cent, $900,000, on capital stock of Rapid Transit Subway Construction Company.

The gross operating revenue for the year was $32,497,870, an increase of $1,251,478, or 4.01 per cent. The gain on the subway division was $1,114,047, or 7.10 per cent, and on the Manhattan Railway division, $137,430, or 0.88 per cent. The net corporate income for the year was $6,537,068, equivalent to 18.68 per cent on the capital stock of the company as against 16.07 per cent for the preceding year and 14.68 per cent for the year previous to that. After the payment of all charges and dividends aggregating 10 per cent upon the capital stock, the net surplus from operations for the year was $3,037,068. By excluding from last year's earnings the $900,000 received from a special dividend on the capital stock of the Rapid Transit Subway Construction Company the surplus from the operations of this year shows an increase of $913,301 over the previous year.

The operating expenses for the year were $13,260,743, an increase of $212,941, or 1.63 per cent, as against an increase in operating revenue of 4.01 per cent. The increase on the subway division was $126,537, or 1.94 per cent, and on the Manhattan division $86,404, or 1.32 per cent. Included in operating expenses this year is an item of increase in labor cost approximating $200,000, due to an increase in rate of pay awarded employees of the company as of May 12, 1912. In addition to this there was absorbed in operating expenses and credited to "depreciation reserve" $184,999 in excess of the amount so set aside in the operations of the previous year. By eliminating, for the purpose of determining the operating efficiency of the two years, the total of these two items of arbitrary increase, operating expenses show an actual decrease of approximately $172,000. Net

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operating revenue was $19,237,127 as compared with $18,198,590 last year, an increase of $1,038,537, or 5.71 per cent, the result of a gain on the subway division of $987,510, or 10.76 per cent, and a gain on the Manhattan Railway division of $51,027, or 0.56 per cent.

Theodore P. Shonts, president of the company, says in part:

"The directors declared an extra dividend of 2 per cent during the year, payable out of surplus. Notwithstanding this payment there was an increase of $4,541,695 in the profit and loss surplus during the year, of which $2,057,033 represents the interest from July 1, 1909, to March 19, 1913, upon the advances made by the company to the trustees of the New York & Long Island Railroad to provide means for the construction of the Belmont Tunnel and recognized by the Public Service Commission as part of the cost of the construction of the tunnel.

"The total number of passengers carried during the year was 634,316,516, an increase of 27,071,819, or 4.46 per cent, a gain on the subway division of 24,497,654, or 8.08 per cent, and on the Mantattan Railway division of 2,574,165, or 0.84 per cent, the greatest increases being shown at the Grand Central station, with an increase of 2,000,000 in the number of tickets sold, and at the Atlantic Avenue (Brooklyn) station, with an increase of 2,300,000 in the number of tickets sold. The larger gain on the subway division is due primarily to the express service. This service will be inaugurated on all the divisions of the Manhattan Railway as soon as the third tracks recently authorized can be completed.

"The total amount of taxes was $2,116,880, as compared with $1,979,431 last year, an increase of $137,449, or 6.94 per cent, the result of an increase on the subway division of $25,602, or 7.04 per cent, and on the Manhattan Railway division of $111,847, or 6.92 per cent. The increase in taxes is principally due to an increase in the special franchise tax. The payment of this tax was made in full, subject to refund in case of a favorable decision of pending litigation.

"The income from operation was $17,120,247, as compared with $16,219,159 last year, an increase of $901,088, or 5.55 per cent, the result of a gain on the subway division of $961,908, or 10.91 per cent, and a loss on the Manhattan Railway division of $60,820, or 0.82 per cent.

"The non-operating income was $487,490, as against $1,305,200 last year, a decrease of $817,710, the result of a decrease on the subway division of $813,384 due to the special dividend of $900,000 on Rapid Transit Subway Construction Company stock which was received during the previous year, and a decrease on the Manhattan Railway division of $4,326.

"The gross income was $17,607,738, as compared with $17,524,359 last year, an increase of $83,378, or 0.47 per cent, the result of a gain on the subway division of $148,523, or 1.47 per cent, and a loss on the Manhattan Railway division of $65,145, or 0.87 per cent.

"The total income deductions were $11,070,669, as compared with $11,000,593 last year, an increase of $70,076, or 0.64 per cent, the result of an increase on the subway division of $62,576, or 1.21 per cent, and on the Manhattan Railway division of $7,500, or 0.13 per cent.

"The net corporate income was $6,537,068, as compared with $6,523,766 last year, an increase of $13,302, or 0.2 per cent, the result of a gain on the subway division of $85,947, or 1.74 per cent, and a loss on the Manhattan Railway division of $72,645, or 4.54 per cent.

"The surplus over dividends of 12 per cent (including an extra dividend of 2 per cent) on the capital stock was $2,337,068. On the basis of 10 per cent dividends for each year and excluding the $900,000 received during the previous year from a special dividend on the capital stock of the Rapid Transit Subway Construction Company, the surplus for 1913 would be $3,037,068, as compared with $2,123,766, leaving $913,302 as a gain in surplus from operations over the previous year.

"The percentage of operating expenses to gross operating revenue was 40.80 per cent, as compared with 41.76 per cent last year, a decrease of 0.96 per cent, the result of a decrease on the subway division of 2 per cent and an increase on the Manhattan Railway division of 0.19 per cent.

"The balance of the issue of fifteen-year gold mortgage 5 per cent bonds dated Nov. 1, 1907, due Nov. 1, 1952, have been called for redemption and will be paid on Nov. 1, 1913, at the rate of 105 per cent of their face value and accrued interest, upon presentation of said bonds and unmatured coupons to the Guaranty Trust Company of New York. After that date interest on the bonds will cease.

"On Nov. 1, 1912, the company made the third annual payment required under the provisions of the sinking fund clause of the $55,000,000 mortgage and deed of trust dated Nov. 1, 1907, viz., $339,590, and, in accordance with the provisions of the mortgage, the trustee purchased for the sinking fund $352,000 of the first mortgage 5 per cent bonds costing $371,870, making a total of the 5 per cent bonds purchased for the sinking fund $939,000, at a cost of $985,261."

The report then takes up the question of maintenance of structures, power plant and equipment and of additions, betterments and improvements and gives in detail the work done by the company during the year. The report continues:

"During the past year your company has sustained less fire loss than in any year since the electrification of the elevated and subway lines. There has been no fire loss whatever among the fixed properties, including the carhouses, repair shops, paint shops, oil houses, yards and terminals, which are ordinarily considered to present many special fire hazards. The fire loss on rolling stock has been less than 0.05 per cent of the insured value on both wooden and metal equipment.

"Net income from rented properties has increased this year over last, in spite of unusual expenses for improvements made necessary by the removal of sidewalk encroachments ordered by the city. It is the endeavor of your company to convert into income-producing property all frontages of land that are now in use for storage of material, etc., utilizing the less valuable part or parcels of land for the company's purposes or, where practicable, contracting for cheaper property.

"In accordance with the terms of contract No. 3 requiring this company to produce an assignment to the city of New York for the New York & Long Island Railroad (Belmont Tunnel), preliminary steps have been taken by your company whereby the constructed portion of the tunnel, together with all surviving franchises, consents, permits and property connected therewith, vested in or held by the trustees, will be assigned to the Interborough Rapid Transit Company. The latter company will thereupon, in accordance with the provisions of contract No. 3, execute an assignment to the city, excluding real estate and other property not necessary to the construction, equipment, maintenance and operation of the railway.

"It is proposed, as soon as permission can be obtained from the public authorities to do the necessary work, to place the tunnel in operation so as to give the people of Long Island City better transit facilities and the benefit of a 5-cent fare to and from all points in Manhattan reached by the subway, at the earliest possible date. The equipment for the tunnel has already been constructed and is now in use on other lines, so that there will be no delay in commencing operations as soon as the construction is completed.

"During the year the company voluntarily settled 3063 claims for $191,950 before any suit was brought, and compromised 385 suits before trial for $149,836, an increase of 845 claims settled and 132 suits compromised over last year. Notwithstanding this expenditure, however, 703 actions for personal injuries were brought, an increase of 101 actions. The total judgments paid during the year aggregated only $20,557. The disbursements for claims, suits and damages amounted to 1.11 per cent of the gross operating revenue, and the expenses incident thereto were 0.47 per cent, making an aggregate for the year of 1.58 per cent, an increase of 0.27 per cent of the gross, or $106,262.

"The second proceeding to determine the question as to whether the company is subject to the state franchise tax on its corporate existence with respect to its operation of the subway has been finally passed upon by the state courts and decided adversely to the company. A writ of error to review this decision has been issued out of the United States Supreme Court, and the extent of the statutory exemption from taxation granted by the rapid transit act will then be finally determined. In the meantime the company

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is preserving its right to secure the benefit of any possible cancellation of the assessments by the court of last resort. The taxes as assessed have been paid.

"It is not improbable that a recent decision of the United States Supreme Court involving the liability of leased corporations for the payment of the excise taxes now levied by the United States government, under the act of Congress approved Aug. 5, 1909, will serve to relieve the Manhattan Railway from that obligation and will result in a refund to this company of approximately $83,000 paid for 1909 and 1910. The matter is now before the United States Commissioner of Internal Revenue.

"The test case brought in the federal courts to reopen on constitutional grounds the claims for damages of owners of property abutting upon the elevated lines, barred by limitation in our State courts, has been decided favorably to this company by the United States District Court. The claims thus barred aggregated several millions of dollars."

The report contains complete details regarding the new subway and elevated improvements which are to be made during the next four years. It states that work on the subway extensions, which was inaugurated on Sept. 20, 1911, and the construction of the Lexington Avenue branch is approximately 31 per cent completed. Work is now progressing favorably in Queens and the Bronx and contracts and specifications on the Seventh Avenue and other branches are now in process of preparation.

The balance sheet of June 30, 1913, show cash on hand amounting to $1,249,069; subway contribution cash, $14,844,231; current assets, $13,883,130; current liabilities, $5,633,127, and total assets and liabilities, $123,584,857.

Trenton, Bristol & Philadelphia Street Railway

The statement of income, profit and loss of the Trenton, Bristol & Philadelphia Street Railway, Philadelphia, Pa., for the year ended June 30, 1913, as compared with that for the year ended June 30, 1912, is as follows:

	1913	1912
Gross earnings	$84,503	$72,599
Operating expenses	63,435	70,495
Net earnings	$21,068	$2,104
Taxes	900	900
Operating income	$20,168	$1,204
Interest on funded debt	6,766	...
	$13,402	$1,204
Interest on bills payable	11,738	17,500
	$1,664	$16,296
Miscellaneous interest (discounts)	335	...
Surplus, 1913; deficit, 1912	$1,329	$16,296

Cape Town Consolidated Tramways & Land Company, Ltd.

According to a report of the directors of the Cape Town (S. A.) Consolidated Tramways & Land Company, Ltd., for the year ending Dec. 31, 1912, after charging London administration expenses, trustees' fees and interest charges, and after crediting interest and transfer fees, a balance of £1,678 is shown to the debit of profit and loss account, which, added to the balance brought forward from 1911 of £4,628, makes a total debit to profit and loss account of £6,306 to be carried forward to next year. No dividends were declared by the subsidiary companies during the year.

The operation of the Camps Bay Tramways during the year under review resulted in a profit of £2,973, against a profit of £1,274 for the year 1911, the number of passengers carried being 139,354 more than in the preceding year.

There is no alteration in the financial position of the company, the directors not having thought it advisable to carry out the proposal made last year for an issue of £50,000 prior lien bonds, nor has there been any necessity to make any further addition to the loan of £10,000 obtained from certain debenture holders against a pledge of £20,000 of this security. The report states that the Cape provincial government has taken the initiative in formulating a scheme for the unification of the municipalities of the Cape Peninsula; such unification will, in all probability, embrace Camps Bay, but during the negotations the shareholders may rely on the vigilance of the directors that the rights of the company will be protected.

Chicago Traction Merger Question Up Again

As a result of a resolution passed by the Chicago City Council before vacation time, ordering the sub-committee of the transportation committee to try to bring about negotiations between the surface electric railways for a merger, the sub-committee at its first meeting on Sept. 3 took up this question again.

Prior to the adjournment for the summer the sub-committee discussed the matter with L. A. Busby, of the Chicago City Railway, and W. W. Gurley, of the Chicago Railways, and the two railroad representatives declared they would be ready to report in September. Now it is expected that on Sept. 17 Mr. Busby will submit a new plan of joint operation. It is not believed that this plan will provide for a corporate merger between the Chicago City Railway and the Chicago Railways, but merely for operation under a single management, with a 5-cent fare and transfers.

Last May the transportation committee had under consideration a similar proposal, but this was rejected because of the insistence of the companies that if in any year under joint operation the earnings of the companies should be less than under separate operation the deficiency should be made good out of the earnings of future years. The plan to be submitted Sept. 17 will embrace new features which may obviate the objections made against the first proposals.

The Chicago Elevated Railways has, because of the dropping of merger negotiations, been obliged to carry out singly some of the intended merger plans. Should developments arise suggesting the advisability of all the lines and the city working in harmony for the building of subways, there might result consideration of general unification plans.

Financing the Northern Electric Railway

E. R. Lilienthal, president of the Northern Electric Railway, who is now in San Francisco, expects to complete negotiations in New York in October for the permanent financing of that system. All the preliminary arrangements are said to have been made during conferences with New York bankers held by Mr. Lilienthal during his Eastern trip this summer. The Northern Electric Railway has $10,000,000 of preferred stock and $15,000,000 of common stock outstanding. There is an authorized bond issue of $25,000,000, of which $5,275,000 is outstanding, with $3,784,000 reserved to retire prior liens and $15,941,000 reserved for future corporate purposes. The company was organized in 1907 to take over the Northern Electric Railway, the Chico Street Railway, the Redding & Red Bluff Railroad, the Marysville & Yuba Street Railway and the Shasta Southern Railway. The Marysville & Colusa and the Sacramento & Woodland Railways have since been acquired and construction of a branch line from Vacaville to Suisun is nearing completion. The bonded indebtedness of the Sacramento & Woodland Railway is $750,000.

Chicago (Ill.) Elevated Railways.—The Northwestern Elevated Railroad and the Metropolitan West Side Elevated Railway have obtained reductions in their tax assessments because the amount of cash on hand is less than last year. The Board of Review can lay an assessment against the personal property of the railroads consisting only of office furniture and cash. The company's rolling stock is assessed by the State Board of Utilization. The schedules and reviewed assessments are as follows: Northwestern Elevated Railroad, assessor's bond, $339,092, and reviewer's bond, $272,171; Metropolitan West Side Elevated Railway, assessor's bond, $510,325, and reviewer's bond, $313,869. The assessor's schedules of $250,054 against the South Side Elevated and $131,434 against the Chicago & Oak Park Elevated were confirmed by the reviewers.

Chicago, Ottawa & Peoria Railway, Ottawa, Ill.—Bodell & Company, Providence, R. I., are offering at 98½ and interest a small amount of Illinois Valley Railway (closed) first mortgage 5 per cent thirty-year sinking fund gold bonds of 1905, guaranteed principal and interest by indorsement by the Western Railways & Light Company. This issue has already been reduced from $1,500,000 to $1,304,000 by a cumulative sinking fund that should retire practically the entire issue at maturity. These bonds are

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a prior lien to $3,723,000 of Chicago, Ottawa & Peoria Railway first and refunding mortgage 5's.

Greenville, Spartanburg & Anderson Railroad, Greenville, S. C.—The directors of the Greenville, Spartanburg & Anderson Railway have voted to increase the capital stock of the company from $5,000,000 to $7,000,000.

Jamestown, Chautauqua & Lake Erie Railroad, Jamestown, N. Y.—A contract is reported to have been entered into for the purchase of the property of the Jamestown, Chautauqua & Lake Erie Railroad by S. B. Broadhead and A. N. Broadhead, officers of the Chautauqua Traction Company and the Jamestown (N. Y.) Street Railway. The sale price is said to be $457,500. The sale includes all property of the Chautauqua Steamboat Company, including thirteen steamers which ply on Lake Chautauqua.

Lewiston, Augusta & Waterville Street Railway, Lewiston, Me.—On Aug. 19 the property of the Brunswick & Yarmouth Street Railway, Freeport, Me., and the Freeport Electric Light, Heat & Power Company was sold to the Lewiston, Augusta & Waterville Street Railway, which has controlled the two companies through ownership of their stock for more than a year.

Mexico, Santa Fé & Perry Traction Company, Mexico, Mo.—Operations have been suspended by the Mexico, Santa Fé & Perry Traction Company, an interurban line running from Mexico 10 miles north to Molino. This line was recently put in the hands of a receiver and sold at auction, as noted in the ELECTRIC RAILWAY JOURNAL of May 31, 1913. The present suspension of operations will continue until the owners, W. W. Botts and T. C. Botts, Mexico; J. W Mundy and J. P. Cauthorn, Molino, and J. H. Botts and J. A. Botts, Santa Fé, Mo., complete the forming of a new corporation. Papers have already been filed with the Secretary of State for the formation of a corporation to be known as the Mexico Investment & Construction Company, with a capital stock of $60,000.

Mid-Crosstown Railway, New York, N. Y.—The Mid-Crosstown Railway has petitioned the Public Service Commission for the First District of New York for permission to issue such stock and bonds as the commission may deem proper, and the Third Avenue Railway has filed a petition asking for permission to purchase and hold such stock and bonds when issued and to issue its own bonds in the sum of $500,000 to pay for the same. A hearing on both petitions was set for Sept. 1 before Commissioner Milo R. Maltbie. The Mid-Crosstown Railway was organized to take over the property of the Twenty-eighth and Twenty-ninth Streets Crosstown Railroad, which in 1912 was sold under mortgage foreclosure and bought in by a committee of bondholders. That committee last year submitted to the commission a plan of reorganization calling for the issue by the Mid-Crosstown Railway of $500,000 in capital stock and $500,000 in bonds, but this was disapproved by the commission on the ground that there was no necessity for the organization of a new company to effect the contemplated sale of the foreclosed property to the Third Avenue Railway and also because the proposed security issues were in excess of the actual value of the property. Now the Mid-Crosstown Railway asks the commission to decide the proper amount of stocks and bonds to be issued.

New York (N. Y.) Railways.—The report of the New York Railways for the fiscal year ended June 30, 1913, has been made public. Compared with the previous year, six months of which were under receivers' operation, there was an increase in gross income of $490,715. Net earnings amounted to $4,749,010. The balance available for interest on the company's bonds was $2,463,485. The amount paid on the income bonds for the first six months of the calendar year 1912 was 0.771 per cent. For the second six months the amount paid was 2.25 per cent, making a total of 3.02 per cent for the year. For the year ended June 30, 1913, 3.88 per cent was paid. The principal feature of this year's report is the large expenditures for improvements made and authorized during the year, approximately $2,500,000.

New York, Westchester & Boston Railway, New York, N. Y.—The New York, New Haven & Hartford Railroad has filed with the Public Service Commission of the Second District of New York the operating income of the New York, Westchester & Boston Railway for the year ended June 30, 1913. The report shows the following items: Gross revenue, $289,027; total operating expenses, $468,946; net operating deficit, $179,914; taxes, $105,605; operating deficit, $285,519; non-operating revenues, $9,536; gross deficit, $275,983; total deductions, $1,130,016; corporate deficit, $1,405,999. The balance sheet as of June 30 shows cash in the amount of $32,585 and total assets and liabilities of $33,607,172.

Pittsburgh (Pa.) Railways.—In addition to the $20,000,000 of 5 per cent forty-year gold bonds, which are covered by a general mortgage recently given by the Pittsburgh Railways as noted in the ELECTRIC RAILWAY JOURNAL of Aug. 23, 1913, the company has made another issue consisting of $10,000,000 of income bonds. These have been delivered also to the Philadelphia Company, representing advances and loans made in the past to the Pittsburgh Railways. These bonds are not a part of the general mortgage issue but subordinate securities.

Dividends Declared

Brazilian Traction, Light & Power Company, Ltd., Toronto, Can., quarterly, 1½ per cent.

Chippewa Valley Railway, Light & Power Company, Eau Claire, Wis., quarterly, 1¾ per cent., preferred.

Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y., quarterly, 1½ per cent., preferred.

Galveston-Houston Electric Company, Galveston, Tex., 3 per cent., preferred, 3 per cent., common.

Manila Electric Railroad & Lighting Corporation, Manila, P. I., quarterly, 1¾ per cent.

St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., quarterly, 1¼ per cent., preferred.

Second & Third Streets Passenger Railway, Philadelphia, Pa., quarterly, $3.

United Traction & Electric Company, Providence, R. I., quarterly, 1¼ per cent.

ELECTRIC RAILWAY MONTHLY EARNINGS

BANGOR (ME.) RAILWAY & ELECTRIC COMPANY.

Period			Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m.,	July,	'13	$72,093	*$31,548	$40,542	$17,292	$23,250
1 "	"	'12	64,300	*28,833	35,467	16,558	18,909
12 "	"	'13	743,480	*337,535	405,945	205,601	200,344
12 "	"	'12	664,244	*300,193	364,051	181,082	105,000

CHATTANOOGA (TENN.) RAILWAY & LIGHT COMPANY.

1m.,	July,	'13	$95,521	*$57,360	$38,161	$24,878	$13,283
1 "	"	'12	94,055	*57,519	36,536	22,246	14,290
12 "	"	'13	1,162,587	*694,091	468,496	283,734	184,762
12 "	"	'12	1,005,956	*599,396	406,560	253,874	152,686

CUMBERLAND COUNTY POWER & LIGHT COMPANY, PORTLAND, MAINE

1m.,	July,	'13	$235,247	*$115,514	$119,733	$58,675	$61,058
1 "	"	'12	216,795	*113,540	103,255	53,399	49,856
12 "	"	'13	2,232,200	*1,227,524	1,004,676	680,575	324,101
12 "	"	'12	2,084,840	*1,242,089	842,751	613,882	228,869

EAST ST. LOUIS & SUBURBAN COMPANY, EAST ST. LOUIS, ILL.

1m.,	July,	'13	$230,716	*$142,040	$88,676	$49,603	$39,073
1 "	"	'12	197,978	*113,269	84,709	48,175	36,534
12 "	"	'13	2,597,892	*1,455,862	1,142,030	585,860	556,170
12 "	"	'12	2,338,573	*1,302,456	1,036,117	566,132	469,985

PADUCAH TRACTION & LIGHT COMPANY, PADUCAH, KY.

1m.,	June,	'13	$23,760	*$15,447	$8,314	$7,540	$774
1 "	"	'12	21,817	*13,843	7,973	7,156	817
12 "	"	'13	287,204	*190,440	96,763	87,953	8,810
12 "	"	'12	276,952	*181,398	95,554	84,452	11,102

PENSACOLA (FLA.) ELECTRIC COMPANY

1m.,	June,	'13	$24,051	*$15,338	$8,712	$6,604	$2,108
1 "	"	'12	23,946	*14,007	9,939	6,377	3,562
12 "	"	'13	285,832	*180,583	105,250	76,752	28,498
12 "	"	'12	286,030	*180,204	105,827	69,636	36,191

PUGET SOUND TRACTION, LIGHT & POWER COMPANY, SEATTLE, WASH.

1m.,	June,	'13	$683,957	*$402,563	$281,394	$171,961	$109,433
1 "	"	'12	660,647	*386,890	273,757	164,305	109,452
12 "	"	'13	8,377,565	*4,901,471	3,476,094	2,025,894	1,450,200
12 "	"	'12	.....	.....	.....	.....	.....

SAVANNAH (GA.) ELECTRIC COMPANY

1m.,	June,	'13	$69,391	*$45,772	$23,618	$22,577	$1,041
1 "	"	'12	65,016	*48,978	16,038	16,035	3
12 "	"	'13	787,029	*558,880	228,149	224,549	3,600
12 "	"	'12	729,425	*540,362	189,063	188,028	1,035

TAMPA (FLA.) ELECTRIC COMPANY

1m.,	June,	'13	$69,774	*$41,201	$28,572	$4,529	$24,043
1 "	"	'12	61,874	*31,891	29,984	4,365	25,619
12 "	"	'13	779,435	*413,389	366,046	55,141	310,905
12 "	"	'12	726,639	*388,443	338,196	55,606	282,590

*Includes taxes.

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Traffic and Transportation

Moving Picture Instruction for Public and Employees

The safety bureau of the Chicago (Ill.) Railways, under the direction of the safety inspector, recently gave its first exhibition of "Safety First" moving picture films. Prior to advertising these public exhibitions, the park commissioners were asked permission to use space in the parks for this purpose. Owing to the fact that the exhibition was free and of an educational nature, the request was granted. Posters giving information as to where and when the exhibit would be held reading, "See the 'Safety First' pictures, free moving-picture exhibition given by safety bureau of Chicago Railways Company," were swung from the ceilings of all cars of the company. The space allotted on the posters for displaying the time and place of the various exhibitions was filled with new stickers from time to time as the locations and the dates were changed.

The first exhibition was held on the evening of Aug. 16, in one of the Lincoln Park baseball fields. A screen, 12 ft. x 15 ft. in size, stretched on a frame 20 ft. above the ground, was placed on the edge of the field. At the opposite end of the field a platform 5 ft. above the ground and approximately 90 ft. from the screen was erected to support the projecting machine. The exhibition was opened with a brief announcement by the safety inspector, who explained its object, namely, that it was to teach the people of Chicago, especially the children, how to avoid accidents. Several thousand people witnessed the exhibition.

The safety bureau of the Chicago Railways has obtained three reels and part of a fourth of these "Safety First" films. Three reels have about twenty-five scenes each, which show accidents that occur on a large street railway system. The fourth reel has sixteen scenes which depict the right and wrong way to alight from a car and the right and wrong way to cross the street. One of the reels is used exclusively to instruct employees. It contains a number of scenes which show carelessness on the part of the employees. In addition to the moving-picture films fifty instructive slides also were shown at the exhibition. In order to carry on the "safety first" campaign continuously the safety bureau of the Chicago Railways has purchased an Edison projecting machine with a metal safety booth for housing.

Record Traffic at Buffalo During Perry Celebration.—The International Railway, Buffalo, N. Y., handled the heavy traffic during the New York State Perry Victory Centennial Celebration with ease. Cars of all the East and West Side lines made through trips between the East and West Sides of the city on several nights during the celebration. Street railway traffic during the week broke all previous records.

New York Subway Flooded by Storm.—Three and thirty-eight one-hundredths inches of rain, falling at the rate of more than an inch an hour, overflowed the gutters, flooded the subway and paralyzed underground traffic in New York between 1:30 and 7:30 a. m. on Sept. 5. It was perhaps the worst tie-up in the subway's history, and the schedule was so upset that trains could not begin to handle the regular morning crowds. From the Times Square station almost to Columbus Circle the water covered local and express tracks. Before the flood had reached its height the Interborough Rapid Transit Company began pumping it out at Forty-sixth Street. A. L. Merritt, superintendent of transportation, pressed into service two flat cars equipped with electric pumps and long coils of hose to pump out the water between Forty-second and Fiftieth Streets. According to Frank Hedley, vice-president and general manager of the Interborough Rapid Transit Company, the water did not cause much damage outside of short-circuiting the third-rail.

Metropolitan Service Investigation at Boston.—The Massachusetts Public Service Commission and the Boston Transit Commission, sitting as a joint board by order of the last Legislature, opened a series of hearings at Boston on Sept. 4 upon street railway service conditions in the Boston metropolitan district. Chairman McLeod of the former board presided. The principal matter discussed was the proposed establishment of service at a 6-cent fare between Boston and Revere Beach by the Boston Elevated Railway. The plan would necessitate operating the company's cars over 1⅛ miles of track between Orient Heights and Revere Beach now controlled by the Bay State Street Railway. At present an 8-cent fare is in effect between Boston and Revere Beach via Chelsea. The proposed service would utilize the East Boston tunnel and would provide quick connections between terminals. By the terms of the resolve the board is authorized to spend not more than $5,000 upon the investigation of transit conditions within the metropolitan park district.

Plan to Prevent People Crossing Street in Middle of Block.—A law to prohibit persons crossing streets except at intersections and the establishment of a public safety committee are suggested by Coroner Hoffman, of Chicago, to stop the increase in automobile, street car and vehicle accidents in that city. The coroner is having compiled figures to show the number of accidents which occur away from the street intersections. He is quoted as follows: "I am sure from my investigation so far that more persons are killed trying to cross the streets in the middle of the block than at the intersections. I am going to have the exact figures in a few days, and then I will take up the matter with the city authorities and see if an ordinance cannot be passed making it a misdemeanor for a person to cross the street except at a street intersection. I think the City Council has authority to pass such a law, and I believe our courts would uphold it. A law of that kind would expedite traffic, because the drivers of automobiles and vehicles and the motormen would not have to be constantly on the lookout for persons dodging out into the street in the middle of the block."

Illinois Traction System Abandons Registry System on Interurban Lines.—The Illinois Traction System has abandoned the registry system of collecting fares on interurban trains and adopted the cash fare duplex and the ticket collection system in use on steam railroad passenger trains. The percentage of cash fares collected is quite small when compared with the total daily collections of each conductor, consequently there has been little or no delay since the new system of collecting fares was adopted. The cash fare duplex which is used is manufactured and sold by the McDonald Cash Fare & Ticket Company, Cleveland, Ohio. It consists of a small metal box or holder containing approximately 100 cash fare duplexes. When a conductor receives a cash fare the amount is shown on the duplex by setting the pointers on the closed portion of the box and the duplex is torn in two. One portion is given to the passenger and the stub falls back into the inclosed box or holder, which is turned in to the terminal ticket agent. The stubs are forwarded to the auditor, and the holder is refilled with another pad and locked by the agent, who is the only person authorized to open it. These holders are approximately 6 in. long by 1½ in. wide and can be carried conveniently in the pocket.

Cincinnati Interurban Line Operated at Loss.—The Interurban Railway & Terminal Company, Cincinnati, Ohio, is operated at an annual loss of $40,000, according to a statement made by Attorney Frank Dinsmore, representing that corporation, at a conference called by Acting Service Director Michael J. Keefe, of Cincinnati, on Aug. 26, 1913, to take up the matter of improved railway facilities to Pleasant Ridge. Among those present at the gathering were Mayor Hunt, City Solicitor Bettman, Attorney Dinsmore, General Superintendent F. H. Talbot of the Interurban Railway & Terminal Company, Assistant General Manager Fitzgerald of the Cincinnati Traction Company, and J. C. Marshall and A. C. Mundew of the Pleasant Ridge Welfare Association. It was in answer to a complaint of poor service that Attorney Dinsmore made the reference to the annual loss of the company. He further said that the company was anxious to sell its tracks from Harris Avenue, in Norwood, to the north limits of Kennedy Heights, and that he, representing George Worthington, Cleveland, principal owner of the company, would immediately take up the matter with President Schoepf, of the Cincinnati Traction Company. If the sale is made, the interurban company will lease trackage from the city company within the city limits and will not handle local passengers.

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Personal Mention

Mr. J. J. Lewis has been appointed auditor of the Evanston (Ill.) Traction Company.

Mr. W. H. Given has been appointed assistant general manager of the Waterloo, Cedar Falls & Northern Railway, with office at Waterloo, Ia.

Mr. W. A. Cattell, consulting engineer of San Francisco, Cal., has been appointed consulting engineer of the San Francisco-Oakland Terminal Railways.

Mr. T. W. Ralph, associated with the Canadian Northern Railway, has been appointed auditor of the Chatham, Wallaceburg & Lake Erie Railway, Chatham, Ont.

Mr. T. J. Day has been appointed assistant to the traffic manager of the Pacific Electric Railway, with headquarters in the Pacific Electric Building, Los Angeles, Cal.

Mr. H. R. Parker has been appointed special agent of the Waterloo, Cedar Falls & Northern Railway, with office at Waterloo, Ia., vice Mr. Maurice A. Welsh, promoted.

Mr. Maurice A. Welsh has been appointed chief special agent of the Waterloo, Cedar Falls & Northern Railway, with office at Waterloo, Ia. His jurisdiction will extend to the claim and special agent's departments.

Mr. L. E. Pritchett has been transferred from the Handley shops of the Northern Texas Traction Company, Fort Worth, Tex., to assume the duties of master mechanic for the Beaumont (Tex.) Traction Company.

Mr. E. P. Doyle, who for the past eight years has been master mechanic of the Aurora, Elgin & Chicago Railroad, Wheaton, Ill., has resigned to take charge of the shops of the Peter Smith Heater Company, Detroit, Mich.

Mr. O. A. Voepel has resigned as master mechanic of the St. Francois County Railroad, Farmington, Mo., to become connected in a similar capacity with a new road under construction between Kansas City and Bonner Springs.

Mr. Harry O'Brien has been appointed superintendent of overhead of the Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., to succeed Mr. J. J. Brennan, who formerly had charge of the department in addition to the roadway.

Mr. B. T. Longino, superintendent of transportation of the Tacoma Railway & Power Company, Tacoma, Wash., for the past three years, is leaving the Stone & Webster organization to engage in the machinery and supply business in Tacoma.

Mr. Gaston de Pellerin de la Touche, engineer and director of the North and South Underground Railway, Paris, France, is in the United States as a member of the French commission which is to arrange for France to be represented at the Panama-Pacific Exposition.

Mr. H. D. Norford has been appointed superintendent of maintenance of way of the Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., to succeed Mr. J. J. Brennan, who has been appointed superintendent of transportation of the company, as mentioned elsewhere in this column.

Mr. T. F. Marsh, of the transportation department of the Seattle (Wash.) Electric Company, has been appointed superintendent of transportation of the Tacoma Railway & Power Company, Tacoma, Wash., to succeed Mr. B. T. Longino, whose resignation from the company is referred to elsewhere in this column.

Mr. F. C. Chambers, formerly general superintendent and purchasing agent of the County Traction Company, Chicago, Ill., has been appointed superintendent of power of the Des Moines (Ia.) City Railway and the Interurban Railway, Des Moines, vice Mr. R. A. Foresman, who resigned to accept a position with the Eastern Pennsylvania Power Company, Easton, Pa.

Mr. William B. McKinley, president of the Illinois Traction System, Peoria, Ill., had a farewell dinner tendered him at the Country Club at Peoria recently by Mr. Frederick H. Smith and Mr. H. E. Chubbuck, vice-president executive of the Illinois Traction System. Mr. Smith acted as toastmaster. Mr. E. F. Baldwin, Mr. Chubbuck and Mr. McKinley were the prominent speakers. Mr. McKinley expects within a few days to sail from Seattle for Japan on a tour of the world originally planned two years ago.

Mr. L. A. Gilbert, formerly superintendent of transportation of the County Traction Company, Chicago, Ill., has been appointed superintendent of operation of the Evanston (Ill.) Traction Company. He has been connected with the North Chicago Street Railroad and the Chicago Consolidated Traction Company for the past twenty-two years. At the time these companies were consolidated as the Chicago Railways he was made superintendent of transportation of the County Traction Company, which was recently reorganized.

Mr. J. F. Collins, vice-president and general manager of the Michigan United Traction Company, Jackson, Mich., who was hurt in the automobile accident near Detroit on the evening of Aug. 9, 1913, is progressing toward recovery, and it is expected that he will be back in Jackson about the first week in October. At present he is at St. Vincent's Hospital, Toledo. In order to set Mr. Collins' limb properly it was necessary to operate. This operation was performed on Aug. 20 and his condition has steadily improved since that time.

Mr. E. E. Eckert has been appointed contracting freight agent by the Akron, Canton & Youngstown Railway, with offices at Akron, Ohio. Mr. Eckert was at Coshocton for fourteen years as freight and passenger agent for the Wheeling & Lake Erie Railroad. The position to which Mr. Eckert has been appointed is a new one, and an officer of the company is quoted as follows: "Akron will be our main point, and it will constitute a big shipping point for us. We are organizing a complete railroad headquarters force as rapidly as conditions will allow, and look forward to a large amount of business."

Mr. J. J. Brennan, formerly superintendent of roadway and overhead of the Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., has been made superintendent of transportation to succeed Mr. C. E. Palmer, whose resignation was mentioned in the ELECTRIC RAILWAY JOURNAL of Aug. 9, 1913. Prior to Mr. Brennan's becoming connected with this company he was with the Merchants' Heat & Light Company, Indianapolis, Ind. In 1904 he was made foreman of overhead and construction of the Fort Wayne & Northern Indiana Traction Company, and continued in that position until Aug. 1, this year, when he was appointed superintendent of transportation.

Mr. J. W. Hancock, general manager of the Roanoke Railway & Electric Company, Roanoke, Va., has had his jurisdiction extended to include the property of the Lynchburg Traction & Light Company, Lynchburg, Va., as stated in the ELECTRIC RAILWAY JOURNAL of Sept. 6, 1913. Mr. Hancock retains his connection with the Roanoke Railway & Electric Company and will manage both properties, dividing his time between them. Mr. Hancock was born in Franklin County, Virginia, and has lived in Roanoke since 1890. He entered the service of the Roanoke Street Railway in April, 1895, and was appointed general manager when the company was reorganized early in 1900. He is president of the Public Service Association of Virginia, the Mill Mountain Incline, Inc., Roanoke, and the Little Tunnel Water Power Company, a vice-president of the Roanoke Chamber of Commerce, a member of the American Institute of Electrical Engineers and the Shenandoah Club, Roanoke, and a director of the Roanoke Fair Association. The system in Roanoke includes 30 miles of track and forty cars; that in Lynchburg 14 miles of track and forty cars.

OBITUARY

Charles A. Sterling, who was a vice-president of the Public Service Corporation of New Jersey, Newark, N. J., from 1903 until the time of his retirement from active business five years ago, is dead. Mr. Sterling was president of the National Storage Company, a subsidiary of the Standard Oil Company, for thirty years. He became connected with the Public Service Corporation following the absorption of the Orange & Passaic Valley Electric Railway by that company. He had been for some time previous president of the Orange & Passaic Valley Electric Railway. Mr. Sterling was also interested in the Jersey City, Hoboken & Paterson Street Railway. He was seventy years old.

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Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Mexico Investment & Construction Company, Mexico, Mo.**—Application for a charter has been made by this company in Missouri to take over the Mexico, Santa Fé & Perry Railway, which was incorporated to build an electric line to connect Boone, Callaway, Audrain, Monroe, and Ralls Counties, a distance of 13 miles. Capital stock, $60,000. Incorporators: W. W. Botts and T. C. Botts, Mexico; J. W. Mundy and J. P. Cauthorn, Molino, Mo.; J. D. Botts and J. A. Botts, Santa Fé, Mo.

***Farrell (Pa.) Railways.**—Application for a charter will be made by this company in Pennsylvania to build an electric railway on Haywood Street and Indiana Avenue in Farrell to Sharon, forming a loop and returning to Haywood Street in Farrell.

FRANCHISES

Santa Ana, Cal.—The Pacific Electric Railway has received a franchise from the Council to extend its tracks east on Fourth Street to the city limits of Santa Ana.

Macon, Ga.—The Macon Railway & Light Company has received a franchise from the Council to double-track Spring Street from Ocmulgee Street to Spring Street bridge in Macon.

Peoria, Ill.—The Peoria, Canton & Galesburg Railway has received a forty-year franchise from the Council in Peoria. This 52-mile line will connect Peoria, Canton and Galesburg. Horace Clark, president. [E. R. J., June 28, '13.]

Rockford, Ill.—The Rockford City Traction Company has asked the Council for a new twenty-year franchise in Rockford.

Portland, Maine.—The Portland Railroad has asked the Council for a franchise to lay tracks in Portland to accommodate the Portland, Gray & Lewiston Railway, which will soon operate in Portland.

Detroit, Mich.—The Detroit United Railway has received a franchise from the Council for a north and south cross-town line on the West Side and extensions on Kercheval Avenue in Detroit.

New York, N. Y.—The New York, Westchester & Boston Railway has applied to the Public Service Commission, First District, for permission to abandon its franchise on lines extending to Clason Point and Throg's Neck, in the Bronx.

Toronto, Ont.—The Forest Hill Electric Railway, Toronto, has received a franchise over Eglinton Avenue, Forest Hill Road, Bathurst Street and Dufferin Street in Toronto.

***Farrell, Pa.**—The Farrell Railways will ask the Council for a franchise to build a line in Haywood Street and Indiana Avenue to Sharon, forming a loop, returning to Haywood Street in Farrell.

Sharon, Pa.—The Sharon-Farrell Railways has asked the Council for a franchise in Sharon. This is part of a plan to build an electric line between Sharon and Farrell. [E. R. J., Aug. 16, 1913.]

Sharon, Pa.—The Youngstown & Sharon Railway & Light Company has asked the Council for a franchise to build extensions in the east and west districts of Sharon.

San Antonio, Tex.—The San Antonio Traction Company will ask the Council for a franchise on that portion of West Commerce Street between Alamo Plaza and Military Plaza.

Denton, Tex.—E. P. Turner, representing the Dallas Northwestern Traction Company, has received a franchise from the Council in Denton. This is part of a plan to build a line between Denton, Dallas and Krum. [E. R. J., July 26, '13.]

TRACK AND ROADWAY.

British Columbia Electric Railway, Vancouver, B. C.—The laying of a second track on the line along the Westminster Road in South Vancouver has been completed by this company. An extension of the line in the Queensboro section of New Westminster is to be built at once along Canal Street to a junction with the Canadian Northern Pacific Railway tracks at Ewen Avenue.

Vancouver Island Hydroelectric & Tramway Company, Victoria, B. C.—This company plans to construct an electric railway between Ladysmith and Nanoose Bay, B. C., with extensions. The two points named are 50 miles apart, and it is said that the necessary surveys have been made and that the Minister of Railways for the Province has approved the route. M. Yates, Victoria, B. C., is the principal promoter.

Fresno, Hanford & Summit Lake Railroad, Fresno, Cal.—Plans are being considered by this company for a 2-mile extension from its main line in Fresno to Calwa.

Fresno (Cal.) Traction Company.—This company has been asked to extend the Tulare Street line in Fresno into Arlington Heights.

Pacific Electric Railway, Los Angeles, Cal.—Work has been begun by this company laying rails on Rialto Avenue west from F Street in San Bernardino. Grading has been begun on the Magnolia extension in Arlington. The company plans to build an extension from the present terminus on East Fourth Street east on East Fourth Street to the city limits of Santa Ana.

Big Four Electric Railway, Tulare, Cal.—About 21 miles of grading has been completed by this company, and it is about to lay ties and rails, which have been purchased. The line will soon be completed from Tulare to Visalia and Woodville. The last stretch of grading is now being completed toward Porterville, and the company plans to have this section of its line in operation about the first of the year. [E. R. J., Sept. 6, '13.]

Bristol & Plainville Tramway, Bristol, Conn.—An order has been placed by this company for new 90-lb rails to be laid from the end of the line at Maple Street to a point easterly on East Street, 1½ miles.

New Britain, Kensington & Meriden Tramway Company, New Britain, Conn.—This company, which plans to build an electric railway from the end of the Arch Street line in New Britain through to Meriden, and a line to extend from Upson's Corner past the American Paper Goods Company's factory and on through Meriden, organized recently by electing the following officers: E. Allen Moore, president; Charles F. Lewis, treasurer, and Frank F. Hanford, secretary. Several years ago a charter was granted this company which provided that it could build if an earlier charter granted to C. J. Danaher, Meriden, was not used.

Shore Line Electric Railway, Norwich, Conn.—The extension of this company's line from Saybrook to New London has been placed in operation.

Carolina & Georgia Railway, Augusta, Ga.—It has been decided that this railway, which will be built between Augusta and Columbia, a distance of 75 miles, shall, after leaving Graniteville in Aiken County, go by way of Trenton and Johnston, instead of via Eureka, and that Johnston shall be a junction point, the main line going on to Augusta and the branch leading out from Johnston going to Greenwood. James U. Jackson, Augusta, president. [E. R. J., May 3, '13.]

Southern Illinois Railway & Power Company, Chicago, Ill.—This company has placed in operation its new line between Harrisburg and Eldorado. It will eventually be extended to Carrier Mills, 8 miles south. A survey is being made between Harrisburg and Marion.

Southern Traction Company of Illinois, East St. Louis, Ill.—This company, which has a franchise over the St. Louis Municipal Bridge, has begun to lay its tracks from the city limits of East St. Louis on Tudor Avenue to Twenty-first Street in East St. Louis. The work is being done by the Lorimer-Gallagher Construction Company. This is part of the plan to build a line between East St. Louis and Belleville.

Evanston (Ill.) Traction Company.—This company, the incorporation of which was noted in the ELECTRIC RAILWAY JOURNAL of Aug. 9, 1913, has purchased the portion of the County Traction Company's lines in the city of Evanston. The officers of the new company are: Clement C. Smith, Milwaukee, Wis., president and general manager; R. E. Belknap, vice-president; George Allison, secretary and treasurer; L. A. Gilbert, superintendent; Michael Kreds, super-

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intendent of construction and supervising engineer, and J. Moore, supervising engineer for the city of Evanston.

Hillsboro Electric Light & Power Company, Hillsboro, Ill.—This company has agreed to double-track the Hillsboro Street bridge, and the line will be so changed that both of these tracks will be straight.

Galesburg & Kewanee Electric Railway, Kewanee, Ill.—This company plans to extend its line to Galesburg in the near future.

Chicago, Peoria & Quincy Traction Company, Quincy, Ill.—Funds are being raised by this company in Quincy and Lewiston for the construction of its line between Quincy and Peoria. E. A. Van Ness, secretary. [E. R. J., Aug. 30, '13.]

Fort Wayne & Northwestern Railroad, Fort Wayne, Ind.—A large sum is being spent by this company on improvements. It is changing from alternating to direct current and plans are being considered to build a 30-mile extension to Goshen. It is stated that Rome City will ask the company to build a branch from Kendallville to Rome City, and if the company does not look favorably upon the plan the Commercial Club will build the branch and later endeavor to sell it to the company.

Richmond & Eastern Indiana Traction Company, Richmond, Ind.—Interest has been revived in the plans for the construction of this line, which will extend from the northern to the southern boundary of the State of Indiana. The section between Richmond and Portland will be built first. The Richmond Commercial Club is interested. [E. R. J., March 16, '12.]

Cedar Rapids & Marion City Railway, Cedar Rapids, Ia.—Work has been begun by this company laying ties and rails on its Grand Avenue line, and track work will soon be begun on the new Third Avenue bridge in Cedar Rapids.

Davenport-Muscatine Railway, Davenport, Ia.—The Mulberry Avenue line in Muscatine will be extended to Wier Street and the Geneva Golf and Country Club by this company in the near future.

Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia.—Construction has been begun by this company on a new line in Waterloo. Considerable double-tracking is being done.

Kentucky Traction & Terminal Company, Lexington, Ky.—Owing to the fact that in conjunction with the city of Lexington, Ky., and the Louisville & Nashville Railroad it is arranging for the construction of a viaduct on West Main Street, the Kentucky Traction & Terminal Company, operating in Lexington, is re-routing the car lines which have used Main Street heretofore.

Madisonville, Ky.—M. K. Gordon, James R. Rash and others interested in the construction of an electric line from Madisonville to Nortonville, Ky., a distance of 12 miles, have engaged Clarence Nisbet as engineer and a survey is now being made. The Hopkins County Commercial Club, Madisonville, is also interested in the project. [E. R. J., March 22, '13.]

Boston, Mass.—Bids will be received by the Boston Transit Commissioners (B. Leighton Beal, secretary) until Sept. 23, for building Section J of the East Boston tunnel extension in Cambridge Street, from Staniford Street to North Russell Street, about 580 lin. ft.

Seymour, Mo.—W. K. Loba, Chicago, says that the electric railway which he and his associates are promoting will probably extend from Seymour, 28 miles south of Springfield, to Cotter, 80 miles distant. Bonuses to the amount of more than $250,000 are said to have been pledged by the towns through which the line will run. The company which will be organized to build the line will be capitalized at $3,000,000.

Missoula (Mont.) Street Railway.—Work has been begun by this company on the extension north from the Northern Pacific viaduct in Missoula.

St. John (N. B.) Suburban Railway.—Surveys have been made by this company for a line from St. John to Loch Lomond, 14 miles, and for a portion of the line from St. John to Rothesay. It is proposed in addition to build a line from St. John to Westfield and Milledgeville, N. B.

Brooklyn (N. Y.) Rapid Transit Company.—This company is asked to consider plans to extend its Metropolitan Avenue line from the Lutheran Cemetery to Jamaica.

International Railway, Buffalo, N. Y.—Track improvements costing upward of $750,000 are being made in various parts of Buffalo by this company. Among the improvements will be the relaying of new steel rails in Military Road from the Buffalo city line to the New York Central & Hudson River Railroad crossing.

Interborough Rapid Transit Company, New York, N. Y.—Chairman McCall of the Public Service Commission has asked this company if it will accept, under the present existing contract, an additional extension to the Long Island Rapid Transit system. The contract of the Interborough company requires it to construct the rapid transit system as far as Corona, L. I.

New York, N. Y.—Bids will be received by the Public Service Commissioners for the First District, 154 Nassau Street, New York, until Oct. 1, for constructing Section 2 of Routes 4 and 38, Seventh Avenue-Lexington Avenue, Rapid Transit Railroad. This is a four-track subsurface railroad under Greenwich Street, West Broadway and Varick Street, Manhattan, between a point in Greenwich Street about 70 ft. south of Vesey Street and a point in Varick Street about 100 ft. south of Beach Street.

Dayton, Middletown & Cincinnati Railway, Middletown, Ohio.—Plans are being considered by this company to build an electric line from Dayton to Cincinnati, via Middletown. Headquarters, Middletown. E. H. McKnight, general manager.

Poland Street Railway, Youngstown, Ohio.—Grading has been completed and the laying of rails will be begun at once by this company on its line between Poland and Youngstown. George E. Rose is interested. [E. R. J., May 3, '13.]

***Oklahoma, Okla.**—It is reported that plans are being considered by capitalists of Tulsa, Okla. and Bartlesville and Coffeyville, Kan., to establish a through electric line from Kansas City, Mo., south to Tulsa, about 275 miles. The plans include the consolidation of existing railways in Coffeyville, Independence, Cherryvale, Iola, Ottawa and Olathe, in Kansas, and in Bartlesville, Dewey and Tulsa in Oklahoma. The Kansas City-Olathe line, the Coffeyville-Cherryvale line and the short line from Bartlesville to Dewey are to form links in the proposed railway. Harry F. Sinclair, Tulsa, is in charge of the financial arrangements.

Rapid Transit Interurban Company, Tecumseh, Okla.—Surveys have been completed by this company between Tecumseh and Sulphur, a distance of 58 miles. The line will connect Shawnee, Tecumseh, Asher, Chism, Stratford and Sulphur. J. J. Cissna, Tecumseh, secretary. [E. R. J., Feb. 1, '13.]

Morrisburg & Ottawa Electric Railway, Ottawa, Ont.—The contract for the construction of 12 miles of this company's line between Ottawa and Greely has been awarded to R. J. Tierney & Company, Ottawa. This 47-mile line will connect Ottawa and Morrisburg, via Leitrim, South Gloucester, Ormond, Winchester, Greely, Metcalfe, Williamsburg and Glen Becker. J. G. Kilt, Citizens' Building, Ottawa, president. [E. R. J., May 24, '13.]

Portland Railway, Light & Power Company, Portland, Ore.—This company is asked to consider plans to build an extension to Sandy, connecting either with the Estacada line at Boring or with the Mount Hood Railway at Cottrell. The distance from either place would be the same, 7 miles.

Shippensburg, Newburg & Western Railway, Shippensburg, Pa.—Work has been begun by this company on its 16-mile line to connect Shippensburg, Newburg, Cold Spring, Roxbury and McConnellsburg. The company was recently organized and the following officers elected: J. C. McGraw, president; B. Frank Patterson, vice-president and general manager; Paul Noftsker, secretary; George B. Watson, Newburg, treasurer, and T. L. Essick, chief engineer. [E. R. J., Aug. 30, '13.]

Middle Tennessee Traction Company, Franklin, Tenn.—It is stated that part of the grades and stone abutments have been constructed by this company on its 70-mile line between Franklin, Eagleville, Shelbyville and Fayetteville. P. E. Cox, general manager. [E. R. J., Aug. 16, '13.]

building new turn-outs in Manchester.

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Jefferson County Traction Company, Beaumont, Tex.—This company has completed its line between Beaumont and Port Arthur. [E. R. J., Aug. 30, '13.]

Marshall (Tex.) Traction Company.—An extension to Turney Park in Marshall will be built by this company.

Southwestern Traction Company, Temple, Tex.—Surveys have been completed by this company on its line between Temple and Waco and from Temple to Austin.

Ohio Valley Electric Railway, Huntington, W. Va.—The city commissioners of Huntington, W. Va., have insisted on the paving between the tracks of this company's line in Huntington being laid on a concrete base. The company desired to lay it on a stone base.

Wisconsin Electric Railway, Oshkosh, Wis.—Right-of-way is being secured by this company between Oshkosh and Neenah, via Lake Shore Road and Winnebago.

SHOPS AND BUILDINGS

Edmonton (Alta.) Interurban Railway.—Plans are being made by this company to build new carhouses on Algonquin Avenue in Edmonton. One structure will be one-story, 34 ft. x 64 ft., and of frame construction, and the other will be 200 ft. x 100 ft., one-story, and of brick and frame construction.

East St. Louis, Columbus & Waterloo Railway, East St. Louis, Ill.—Plans are being made by this company to build a new freight depot in East St. Louis.

Nipissing Central Railway, Cobalt, Ont.—This company has awarded a contract to the Sutcliffe & Needlands Company, Liskeard, to build its new carhouses at North Cobalt.

Portland Railway, Light & Power Company, Portland, Ore.—This company has been asked to consider plans to build a new interurban terminal station on the east side of the Willamette River at East Water Street and East Morrison Street in Portland.

Southern Traction Company, Dallas, Tex.—Work will be begun at once by this company on its new freight station in Dallas. The structure will be one-story, 100 ft. x 200 ft., and of brick construction. In addition there will be several baggage sheds.

POWER HOUSES AND SUBSTATIONS

Fort Wayne & Northwestern Railroad, Fort Wayne, Ind.—A new power house and substations are being built by this company in Fort Wayne. The cost is estimated to be about $200,000.

Detroit (Mich.) United Railway.—This company is installing a 10,000-hp steam turbine at Station B, at Riopelle Street and Atwater Street, to add to the power capacity of its plants in use in Detroit.

City Light & Traction Company of Sedalia, Sedalia, Mo.—Work has been begun by this company on an addition to the Broadway power house in Sedalia, which will contain a new 400-hp boiler.

International Railway, Buffalo, N. Y.—Plans are under way for the construction of an addition to this company's Fillmore Avenue power station in Buffalo. A 1000-kw rotary converter will be installed in the addition.

Columbus Railway & Light Company, Columbus, Ohio.—This company will add to its substation equipment a 200-kw motor-generator set. The order has been placed with the General Electric Company.

Portland, Eugene & Eastern Railway, Portland, Ore.—The Oregon Power Company, a subsidiary of the Northern Idaho & Montana Power Company, has closed contracts with the Portland, Eugene & Eastern Railway to furnish all the power for the lines of that company between Eugene and Salem. The power will be supplied from the Springfield plant, and a 33,000-volt line will be run to Albany.

Nashville Railway & Light Company, Nashville, Tenn.—An order has been placed by this company with the General Electric Company for three 6500-kw Curtis turbo-generators with switchboard and accessories.

Charleston-Dunbar Traction Company, Charleston, W. Va.—This company will add to its substation equipment a 200-kw rotary converter, two 100-kva transformers and switchboard recently purchased from the General Electric Company.

Manufactures and Supplies

ROLLING STOCK

Kansas City, Lawrence & Topeka Railway, Kansas City, Mo., is in the market for some new cars for a recent extension of its lines.

Manhattan & Queens Traction Corporation, New York, N. Y., expects to purchase one snow plow. It has ordered one sweeper from the Smith-Wallace Company.

Trenton, Bristol & Philadelphia Street Railway, Philadelphia, Pa., is reported to have purchased two second-hand cars from the Philadelphia Rapid Transit Company.

Evanston (Ill.) Traction Company, the successor to the County Traction Company, is preparing plans and specifications for ten double-truck, double-end, pay-as-you-enter cars of the latest design.

Southern Pacific Company, San Francisco, Cal., noted in the ELECTRIC RAILWAY JOURNAL of Aug. 30, 1913, as being in the market for sixteen cars, expects to use these cars on its subsidiary, the Portland, Eugene & Eastern Railway.

Chicago (Ill.) City Railway is preparing plans and specifications for new cars. It is contemplated that this order will include at least twenty-five cars and the plans and specifications will be ready for manufacturers about Sept. 20.

Chicago (Ill.) Elevated Railways is equipping twenty standard trail cars with motors, control and air-brake apparatus. The equipment for each car will include two Westinghouse 302-B2 interpole field control motors. These will be used in connection with Westinghouse multiple unit control and complete universal air-brake equipment.

Montreal (Que.) Tramways, reported in the ELECTRIC RAILWAY JOURNAL of Aug. 6 as having ordered twenty-five motor cars from The J. G. Brill Company, has specified the following details for this equipment:

Seating capacity.....48	Couplers .....Tomlinson
Bolster centers, length..21 ft.	Curtain fixtures,
Length of body..32 ft. 3 in.	National L. W. Co.
Length over vestibule,	Curtain material...Pantasote
44 ft. 3 in.	Destination signs..Keystone
Width over sills. 8 ft. 3 in.	Gears and pinions,
Width over all... 8 ft. 4¾ in.	Westinghouse
Height, rail to sills,	Gongs .....Dedenda
2 ft. 3 13/16 in.	Hand brakes....Brill ratchet
Sill to trolley base,	Motors...Westinghouse 337-C
8 ft. 10⅞ in.	Motors .....inside-hung
Body..wood, steel sheathing	Paint .....Murphy
Interior trim.....cherry	Sanders .....Dumpit
Headlining .....Agasote	Sash fixtures,
Roof.....plain arch	National L. W. Co.
Underframe .....steel	Seats .....Winner
Bumpers,	Seating material.....rattan
Brill; Hedley anti-climbers	Step treads.....Mason
Cables .....Westinghouse	Trolley retrievers....Wilson
Car trimmings.....Brill	Trucks.....Brill No. 27-GE
Conduits and junction	Varnish .....Murphy
boxes .....Westinghouse	Ventilators .....Garland
Control .....Westinghouse	

TRADE NOTES

D. C. & Wm. B. Jackson, Boston, Mass., engineers, have appointed Edward L. Moreland manager of their Boston office.

Atlas Preservative Company, New York, N. Y., has received an order for its Atlas A weed killer from the United Railways of Havana.

Hale & Kilburn, Philadelphia, Pa., at a meeting of directors on Sept. 11, passed the dividend on the common stock. The last disbursement on the issue was 1 per cent on June 30.

Alexander Brown & Sons, Baltimore, Md., have published for the use of their clients a very complete thirty-eight page pamphlet describing the property and securities of the United Railways & Electric Company, Baltimore.

C. N. Repogle, Johnstown, Pa., has resigned as assistant superintendent of the steel car department of the Cambria Steel Company in order to accept the position of general manager for the Ralston Car Company, Columbus, Ohio.

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Warner International & Overseas Engineering Company, Ltd., London, England, has received the fourth order from Colombo for its non-parallel M. G. trucks. The wheel-base is 9 ft.; length over body, 18 ft. 8 in.; length over all, 28 ft.; gage, 3 ft. 6 in.

Curtain Supply Company, Chicago, Ill., has received an order to equip the twenty new cars which are being built by the Cincinnati Car Company for the Virginia Railway & Power Company with curtains using ring No. 89 fixtures and Rex all-metal rollers.

Esterline Company, Indianapolis, Ind., has moved from Lafayette, Ind., to Indianapolis in order to secure increased manufacturing facilities for producing its lighting systems for street railways, locomotives, etc. The company has appointed W. McK. White its sales manager.

Edward F. Wickwire, sales manager of the Ohio Brass Company, Mansfield, Ohio, who was injured in an automobile accident near Detroit, Mich., on Aug. 9, is convalescing at his home in Mansfield and expects to be able to return to work by the latter part of this month.

Pittsburgh High-Voltage Insulator Company, Derry, Pa., has issued Catalog No. 3, illustrating and listing its high potential, clay body, mahogany glaze porcelain insulators and special pieces for electrical requirements, and describing its testing department for making potential, design and mechanical tests.

Pittsburgh Crucible Steel Company, Midland, Pa., has decided on an underground system of electrical distribution in the new steel plant it is constructing. The company will use for this installation 100,000 ft. of J-M fiber conduit, a product of the H. W. Johns-Manville Company, which is made from a specially treated fiber or wood pulp molded under hydraulic pressure.

Westinghouse Lamp Company, Bloomfield, N. J., has appointed H. S. Black manager of works, to succeed R. H. Henderson, resigned. Mr. Black has had considerable experience in the engineering and manufacturing departments of the National Quality Lamp Division of the General Electric Company and for the last three years has been directing the work of the St. Louis factory of this company.

A. L. Havens, for the last five years manager of the Los Angeles office of Pierson, Roeding & Company, San Francisco, Cal., has resigned and R. H. Husbands has been appointed his successor. Mr. Havens finds it necessary to devote his entire time to his private interests in the Southwest. Mr. Husbands, who assumes the position as manager, was for six years manager of Pierson, Roeding & Company's Seattle office.

Guy E. Tripp, chairman of the board of directors of the Westinghouse Electric & Manufacturing Company, sailed on Sept. 11 on the Cedric from Liverpool, and will arrive in New York about Sept. 18. Mr. Tripp has spent above five weeks in Europe, looking over the condition of the foreign subsidiaries of the Westinghouse company. The directors of the Westinghouse Electric & Manufacturing Company will meet the latter part of this month for dividend action.

Ohio Brass Company, Mansfield, Ohio, is now manufacturing all-wire rail bonds with pin-driven terminals. All types of bonds which this company has been furnishing with compressed terminals are now furnished in addition with the pin-driven terminals. The new bonds have embodied in them the same features which have characterized the older types, namely, terminals and body made of the same strands and the strands protected by thin copper sleeves at the point where they are welded together to form the terminals.

Graphite Lubricating Company, Bound Brook, N. J., has erected a two-story stucco-finish office building on the John and Main Streets corner of its property. The office force moved into the new building last week. The former office building on the Church Street side of the company's plant has been remodeled for manufacturing purposes, and a complete line of new machinery has been installed in it in order to meet the growing demand for the company's sole product—oilless bearings. A twelve-station Western Electric interphone system has been put in, and other extensive improvements to the equipment made throughout the entire plant.

Pyrene Manufacturing Company, New York, N. Y., has made arrangements for the Western Electric Company to act as a distributer of its various products, including Pyrene fire extinguishers, liquid and brackets, through the latter's twenty-five branches in this country. The Pyrene Manufacturing Company has received new orders from the Schenectady Railway and the Milford & Uxbridge Street Railway and repeat orders from the International Railway, the Interborough Rapid Transit Company, the Hudson & Manhattan Railroad, the Syracuse, Lake Shore & Northern Railroad, the Northwestern Pennsylvania Railways, the Rochester Railway, the Tonawanda Power Company and the Consolidated Car Heating Company.

Titanium Alloy Manufacturing Company, Niagara Falls, N. Y., has issued Rail Report Bulletin No. 2, giving results of chemical and physical tests and microscopic views of plain and titanium-treated open-hearth rails. The report contains measurements made by R. W. Hunt & Company of the wear of both kinds of open-hearth rails on a curve with 100-ft. radius on the Boston Elevated Railway, where the headway is frequently less than one minute. In 214 days the average wear of the plain rail was 0.755 cu. in. and of the titanium-treated rail only 0.537 cu. in. Records are given also of tests for wear and strength, made by testing machines. To one interested in photo-micrographs the photographs taken from different parts of different types of rail will prove most interesting.

Union Switch & Signal Company, Swissvale, Pa., has fitted up in its power house an exhibition room in which the operation of the various devices made by the company can be demonstrated for the benefit of visitors. A miniature railway track is laid out which is divided nto sections by insulated joints. Full-size signals of various types are stationed at intervals and connected up with automatic train stops. A miniature locomotive is made to draw a train over the track in perfect obedience to the signals. As the train proceeds it shunts the various track circuits as it passes over them, thereby setting the signals and operating the electric locking on the levers of the machines, as well as causing the lever light, annunciators, block indicators, etc., to display the proper indications in the same manner as would be the case on a railway in actual service operation.

ADVERTISING LITERATURE

Murphy Iron Works, Detroit, Mich., have issued two catalogs describing and illustrating their automatic smokeless furnaces.

Lord Manufacturing Company, Brooklyn, N. Y., has issued a post-card folder describing its Multi Vapo Gap lightning arrester.

J. H. Parker & Son, Chelsea, Mass., have issued a catalog describing and listing their various porcelain insulations for both wet and dry use.

Allgemeine Elektricitäts-Gesellschaft, Berlin, Germany, has issued a pamphlet describing its section insulators and other overhead line switching devices and fittings.

L. B. Stilwell, New York, N. Y., consulting engineer, has issued a catalog entitled "Twenty Years' Progress," describing and illustrating important engineering works designed and supervised during the past twenty years by engineers associated with this firm.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., has issued Folder No. 4187, describing its type KB section insulator. The iron parts of this device are sherardized, and wearing parts are renewable. Leaflet No. 3569 describes and illustrates the shipment of transformers in tanks with oil.

Canton Culvert Company, Canton, Ohio, has published a pamphlet describing the remarkable results obtained with its "Duro" perforated corrugated metal railway drains, which are made of double-galvanized anti-corrosive metal. A drain of this type installed in 1909 near the Pennsylvania Railroad main line tracks under a heavily traveled paved street in Pittsburgh, Pa., was recently examined by a track supervisor and one of the manufacturer's representatives. It was found to be in perfect condition after more than three years' service, in spite of the fact that the ground at this point is full of cinders and that there is much seepage of acid water from the washing of cars and drippings of side-tracked engines.

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TRAFFIC LAWS AND MOTOR CARS

The recent appointment of a traffic and public safety committee by the International Travel Club, as announced in the Sept. 6 issue of this journal, marks the inauguration of a very necessary task, namely, the formulation of an effective and uniform code to regulate street traffic in the larger cities of this country. As the personnel of the committee embraces such traffic experts as Howard Elliott, president of the New Haven system, and Edward G. Connette, president International Railway, Buffalo, there is ample reason to feel that the work will be conducted in the most efficient way. It is obvious that the electric railway operator must take a most aggressive interest in this problem, for it is connected with the very existence of his business. In many English cities where the omnibus is well-nigh ubiquitous, the tramways have found that safe operation has become almost impossible owing to the autocar driver's pernicious habit of cutting in between the tracks and the curb just when a person is preparing to board or leave a car. This evil is not confined to England by any means. Whoever has tried to board a car in the business districts of large American cities can appreciate how this practice of taxicab and other chauffeurs is hazardous to the life of the citizen and to the treasury of the railway. No electric railway would dare to place an untrained man in charge of even its slowest car, yet our laws with regard to automobiles are so loosely drawn and so badly enforced that the most ignorant and reckless minors may be seen running amuck with trackless, high-powered vehicles at express train speeds. Certainly the city highways of to-day were never intended for this kind of traffic. Since lanes of travel for different classes of vehicles are practically impossible, the speed regulations should be as stringent with regard to the automobile as they have long been with regard to the trolley car.

BY TROLLEY TO THE CONVENTION

At a meeting of electric railway men of New England it has been proposed that the trip to the approaching annual electric railway convention at Atlantic City be made by trolley and boat, as outlined elsewhere in this issue. Although such a method of transporting delegates to a convention has often been employed by the Central Electric Railway Association and other bodies in the Central and Middle Western States, it is so far as the East is concerned a distinctly novel idea. It is possible to go all the way from Waterville, Me., to the convention city, a distance of say 600 miles, by trolley, and it is expected that some of the delegates will make the complete trip. The majority, however, will travel by radial trolley lines at least as far as New London. Some changes in equipment will be necessary in order that cars sent out with their different parties on different roads may go through without change, but these matters can readily be adjusted. It seems quite fitting that electric railway men should use this means of transportation to the convention. Beyond the evidence that it gives of the increasing nationalization of the trolley line, the trip is of intrinsic value to the delegate himself in broadening his vision and in putting him face to face with other conditions, problems and methods. It will give him a better idea of what the trolley transportation privilege and service means to the territory traversed, and no matter how traveled a man he may be, he can derive some value therefrom. Of course the element of time enters into the question, but each company will find that the time needed by the delegate will be a profitable investment.

SABOTAGE AND GOOD WILL

Accident prevention has been discussed from so many angles that a new expression on this subject is perhaps impossible, yet there are occasions when a particular phase deserves to be brought into more than usual prominence. This is the case with the remarks on accident prevention made by W. B. Rockwell, general manager Eastern Pennsylvania Railways, at the Sept. 16 meeting of the Keystone Railway Club. Good equipment and good maintenance practice were such obvious preventives of accidents, he said, that it was needless to offer arguments in their favor. It was vain, however, to hope that accidents could be reduced to a minimum unless the men were inspired with a feeling of loyalty to their company. If they were disgruntled, they could work much harm without showing any apparent animus. Mr. Rockwell's emphasis on this aspect of accident prevention is indeed a timely one, for a certain breed of agitators is now swarming over the land with a new slogan for winning labor demands, namely, sabotage. Sabotage may range from mere indifference to the interests of the employer to the delib-

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erate destruction of his property. How many managers realize that the antitoxine for this poisonous doctrine lies in plain fair-dealing? The motorman who is treated like an automaton by his employer cares little whether or not his freshly varnished car is grazed by a wagonload of hay nor is his companion on the rear platform likely to show much concern when some idle passenger whittles at the seating. Such indifference, which is hardly open to detection and punishment, may cost the company as much in the long run as what are usually termed accidents. Let it be borne in mind, however, that where this spirit prevails the cause is due far more to "mechanical" ideas in management than to the rate of wages.

MEDICAL INSPECTION BUREAU FOR EMPLOYEES

The medical inspection bureau of the Brooklyn Rapid Transit System is a good example of welfare work which is carried on at the employer's expense for the benefit of the employees, yet which, if properly conducted, redounds greatly to the benefit of the employer. The free medical attention to the operating employees of the system, the compulsory medical inspection before the granting of sick excuses, the installation of local inspection offices, the use also of visiting physicians and the discipline administered in cases of feigned illness—these are but details of a general plan that in a six months' trial has proved both simple and efficacious. One result of the work of the bureau is the fact that all decisions concerning sick leave have been taken from the operating officials and placed in the hands of those who are peculiarly competent to judge such requests. The varied methods of dealing with sick excuses, as found in the several depots and terminals, have also been eliminated, and now through the work of the specialized inspection bureau absolute unanimity of action is brought about on this point. A more concrete result of the work of the bureau, however, may be found in the direct saving during the past six months of 23 per cent of the days lost for sickness as compared with the same period in the preceding year. This has been highly beneficial not only to the employees themselves but also to the company, for from the viewpoint of the men every day's sickness saved represents a gain in health and comfort as well as a gain in earning capacity, and to the company it means a more consistent and efficient operation of its lines. And it cannot be said that the public has been unaffected by this saving, for the general standard of health among the employees is intimately associated with the satisfactory operation of the lines. The continued and fullest success of the bureau depends, of course, on the sincere co-operation of the employees, and while here as in any company there may exist a certain malingering type of mind that counts a day stolen from the company under the excuse of sickness a thing of which to be proud, yet the great majority of the employees are sincere in their appreciation of the efforts of the bureau. The plans of the company to extend the service of the bureau to instructing men at the operating centers in first-aid work and to following up systematically minor ailments that men may have when they enter the employment of the company are meritorious, and it is to be hoped that the bureau in its now permanent organization will prove even more useful than during its time of probation.

PROJECTED ELECTRIC INTERURBAN RAILWAYS

With this issue the series of articles on the subject of the probable operating results and probable cost of construction of an electric interurban railway is brought to a close. As we look reflectively over the entire field, it seems to us that, although the work is a pioneer on a very complex subject, yet it has promulgated principles that will bear up under the test of actual use. Mr. Fischer's first article dealt authoritatively with the problems connected with the operating revenue of electric interurban lines, and from the experience of existing lines it was found that definite rules might be obtained as a result of an analysis of the terminal and intermediate town and village population and the probable traffic involved that would serve as a basis for fairly accurate estimates of the revenue to be derived from the operation of the proposed line.

In the treatment of the operating expense and cost of construction of a projected line the author has been equally explicit. Several points are brought out in a study of existing lines that should be of value not only to promoters but also to operators. For example, the author calls attention to the difference in the expenditures for maintenance of way and structures per mile of track between the average electric interurban railway and the steam road. While the lighter equipment and reduced car-mile movements of the electric line may account for some of this discrepancy, still, in view of the short average age at present of the electric line, it is undoubtedly true that a sufficiently high standard of maintenance of way and structures has not yet been adopted on the average electric railway, rather than that the steam railroad expenditures for this item are excessive. Then, again, the statistics show that the average interurban road is not yet employing sufficiently extensive organizations for the purpose of developing traffic, a point which will be altered as the electric interurban railway develops into the commercial electric railway in accordance with the demands of local conditions. These conclusions are some of the reasons which induced the author to specify allowances for operating expense higher than is the practice at present.

No less instructive were the figures for the probable cost of construction of normal electric interurban lines. While it is obvious that no fixed rule may be laid down for the amount of money to be expended for construction, yet the study has resulted in maximum and minimum estimates which certainly approximate the limits of outlay for a proposed line under average conditions. While some roads may cost less, owing to subsidies of money, right-of-way and the like, still, we believe that the conclusions reached hold true for average cases to such an extent that they should dispel any delusion that an electric interurban railway can be constructed for an insignificant amount. It should be borne in mind, however, that, as in the case of operating revenue and operating expense, the figures quoted are averages only, and that in any particular case a study of the surrounding conditions is necessary before the principles deduced by Mr. Fischer in the case of normal roads should be applied. This is pre-eminently the field of the expert because both experience and judgment are

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necessary for one who wishes to distinguish properly all abnormal conditions and to make allowances therefor. The hypothetical cases used in the articles, it is true, clear up the general subject and cover the average variations of population and territory, but even at that the hazard of applying these results to all cases is great, and unless a projected line is readily seen by an intelligent layman to be within the limit set in the articles, it would better be left unconstructed unless expert judgment is called in and countenances it.

The conditions under which electric railways have been built in the past have been entirely altered during the last ten years, and it is no longer possible in most states for an ambitious and enthusiastic promoter to build a road on the bonds and take the stock for his services. Such a change is desirable for the electric railway interests as well as for those of the community at large, but it does not remove the necessity of a careful preliminary study of the possible traffic which a proposed line will secure before money is invested in its construction. Such a study is possible on the part of the investor, and if the plan was more generally practised more capital would be available for legitimate enterprises because less would be lost in undertakings doomed to failure from the start.

RUNNING SUBSTATIONS AT LOW COST

So long as direct-current motors are popular in railway work the substation, although an expensive feature of the electrical supply system, will be with us. In the two important items of fixed charges and labor costs will be found the largest opportunity to study economies; but, in addition, there are interesting methods of saving money along mechanical lines which deserve consideration. There is nothing new in the point that every dollar which can be saved in the first cost of a substation without sacrifice of safe and reliable service exerts a powerful influence in cutting down the yearly interest, depreciation, insurance and taxation charges, but it would be well if more study should be given throughout the engineering circles of the street railway industry to the problem of securing ideal designs.

Thus, we do not as yet know enough about the question of space required for a given capacity in transformers, rotaries and switching apparatus in installations designed to convert energy at different high voltages into energy suitable for trolley operation. The problem of substation fire protection at the lowest expense consistent with bedrock insurance rates opens up another line of thought; and, again, the possibilities of the outdoor switching and transformer installation, even under the climatic conditions of the East, are not fully appreciated. The same sort of study that has given railway men a broad knowledge of the best ideas in carhouse design could with no small profit be applied to substations.

As for labor cost, the possibilities of economy appear to be chiefly in the direction of combining other duties with that of attendance in every reasonable instance, along the well-known lines of ticket selling, freight and express clerical work and light repairing of such apparatus as circuit-breakers, master controllers, headlights, car heaters, contactors and other small equipment which can be easily assembled and transported at nominal cost on the company's own cars. There is room also for careful investigation of the relative yearly cost of locating a substation at a local repair shop and carhouse and of making up for the distribution losses by heavier feeders on certain sections of the line, and also of putting down the converting plant nearer the electrical load center. There is such a thing as too much centralization of light equipment repairs, and in cases where shop and substation must be separated the "working load-factor" of the substation attendant can easily be increased if he is encouraged to do such maintenance in his spare time. The cost of fitting up a small shop with suitable tungsten lighting and perhaps a few light tools driven by one or two motors is not large, and it releases space in the main shops often of value for other purposes, besides giving the substation force interesting and broadening tasks. In many small installations two daily shifts are enough, say of nine hours each, the rotaries being off the line at night except in the larger installations. A surprisingly good night service can be given over great distances from a single substation if the schedule is cut enough by the demands of a very thin traffic. Certainly it would seem possible to care for emergency conditions at most substations, even on a large system, by one or two specialized troublemen equipped with gasoline-driven track motorcycles.

Where water-cooled transformers are in service, the home-made cooling tower offers an attractive means of reducing expenses, either in pumping or in the direct purchase of water from municipal mains. Sometimes in the operating rooms of large substations heated in part by steam the fuel bill can be materially cut down by the simple but effective expedient of providing within the room a metal compartment perhaps 8 ft. square and 7 ft. high, with an insulated flooring and adjustable windows facing the switchboard and more important machinery. This would house the men doing desk work and they could do their telephoning in it, and the necessary warmth could be supplied by an electric heater or two at nominal cost in comparison with the expense of coal heating in the main building. In some installations hand-operated oil or water pumps which are seldom used for any length of time may be provided in the interest of economy, and in other cases the investment of good money in elaborate hoisting systems which may not be needed more than once in five years is of doubtful wisdom. The estimated value of the service to the company and to the community, taking into account the size and business activities of the latter, should be the criterion.

While it is true that local conditions will always determine the best course to follow in such work, substation practice is becoming more routine in its character and there is room for a much greater standardization of equipment and arrangement. The extension of the "knock-down" principle of design and assembly of substations from the central station into the railway field and the more extended use of portable substations are logical developments which will doubtless accomplish much in the near future toward paring down expenditures in this important but auxiliary branch of railway practice.

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New Carhouse and Shops at Dayton, Ohio

A Combined Carhouse and Shop with Brick Walls and Reinforced Concrete Columns, Floor and Roof, Designed for a Maximum of Monitor Lighting—Operating Features Include an Inclosed Ladder Entrance Track and Unique Pit Construction

Immediately after a fire which destroyed its carhouse and shops in February, 1912, the Oakwood Street Railway Company of Dayton, Ohio, began the preparation of plans for a new thoroughly fireproof structure. At the same time other desired facilities were included in the design, namely, more economical location of building from an operating standpoint, increased shop efficiency to be gained by a proper arrangement of departments and machine tools, and improved departmental interrelations by housing the entire operating organization in a single building. The new combination carhouse, shops and office building, recently completed, was built in a residential district. Consequently the architectural treatment has been along artistic lines, and a modified type of Spanish mission style of architecture was employed. The various departments of car maintenance and repairs are so located relative to each other as to reduce lost motion to a minimum. Facilities for employees' welfare work, as well as spacious well-lighted office rooms, were also provided for the complete operating organization.

Dayton Carhouse and Shops—General View Showing Office in Front and Entrance for Cars at Side

LOCATION

Two factors controlled the decision as to location—first, the desirability of reducing non-revenue mileage and, second, a steam railroad connection. Both of these requirements were lacking in the old location and had materially affected the cost of operation. To obtain a reduction in dead car mileage, the new carhouse site was selected as near the plant of the National Cash Register Company as possible, because traffic to and from this plant created the peak loads. As traffic to and from this plant moved largely from the business center of Dayton, it also was important that the site be at a point beyond the plant, thus making it unnecessary to turn the cars at some distant loop in the outlying district. Consequently the building was constructed within two blocks of the National Cash Register Company's plant, and on property adjoining the right-of-way of the Dayton, Lebanon & Cincinnati Railroad. This permitted a steam railroad connection for the receipt of construction materials, fuel and current supplies. Future expansion in shop and car storage facilities was provided by the purchase of a site more than ample for the present building and track layout. A portion of the property on the east also has been reserved for a future generating station, and the storage and shop bays may be enlarged by extensions to the south.

A peculiar condition in Dayton, Ohio, which is not found in many cities elsewhere in this country is that a number of competitive street railway companies operate within the city. These include the City Railway, Dayton Street Railway, People's Railway and the Oakwood Street Railway. In addition, two interurban companies, the Dayton, Springfield & Xenia Southern Railway and the Ohio Electric Railway, operate a street railway service over their lines entering the city. The latter company is a competitor of the Oakwood Street Railway for the National Cash Register Company's traffic; consequently each must maintain accurate schedules and have sufficient rolling stock close at hand to handle about 5000 people to and from the plant each day. This business requires that the rolling stock in regular service on the Oakwood Street Railway be doubled at the rush hours to permit the company to handle its proportion. Under average conditions fifteen cars are necessary to fill the regular schedules, and this number is increased to thirty cars in the morning and evening, when this company carries more than 2500 people to and from the cash register plant alone.

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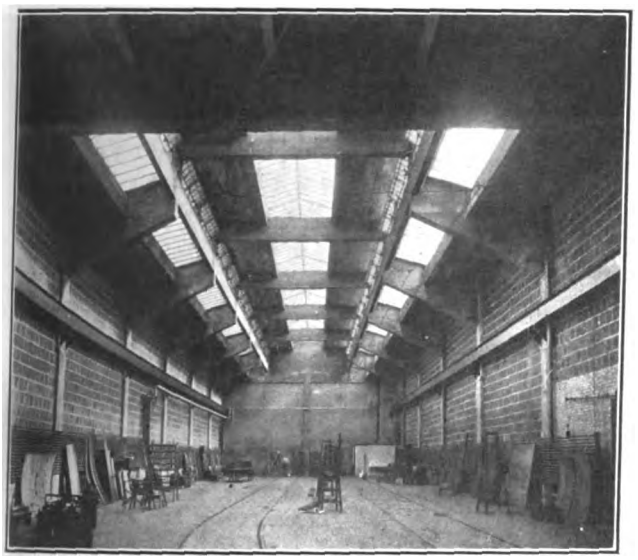
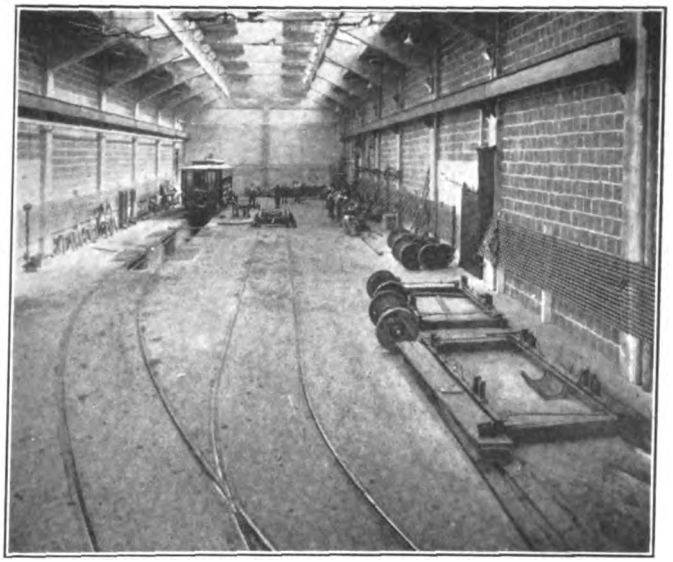
In the new shops the Oakwood Street Railway is building its own car bodies and making all the general repairs necessary. As this street railway is controlled by the same interests that own the Dayton & Troy Electric Railway, a 50-mile interurban line extending to the north of Dayton, considerable repair work to interurban cars will also be done at the new shops. For the present the site of the shops which were destroyed by fire in the spring of 1912 will be used as a car storage yard.



Dayton Carhouse and Shops—Paint Shop Bay



Dayton Carhouse and Shops—Machine Shop Bay

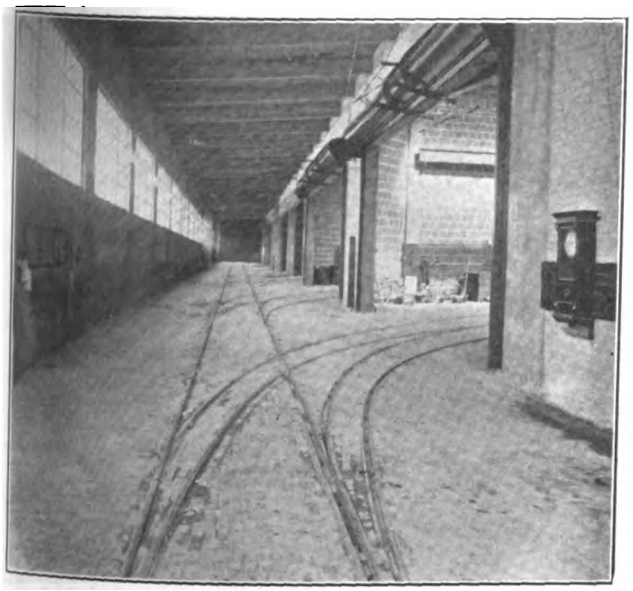
GENERAL LAYOUT OF THE BUILDING

In general outline the new carhouse conforms to the shape of the property, and it occupies that portion fronting on South Brown Street and the steam road right-of-way. The entrance is from South Brown Street by means of a single-track Y which leads into a ladder track within the building so as to avoid the necessity of cleaning around the special work during periods of heavy snow and ice. Two tracks lead from this ladder aisle to each of the eight storage and shop bays. Standard A. S. C. E. 70-lb. rail, with built-up special work, including tongues and mates designed for MCB wheels, was used in the entire track layout. The ladder aisle is paved with brick, and the storage bays, as well as the washroom, are paved with concrete.

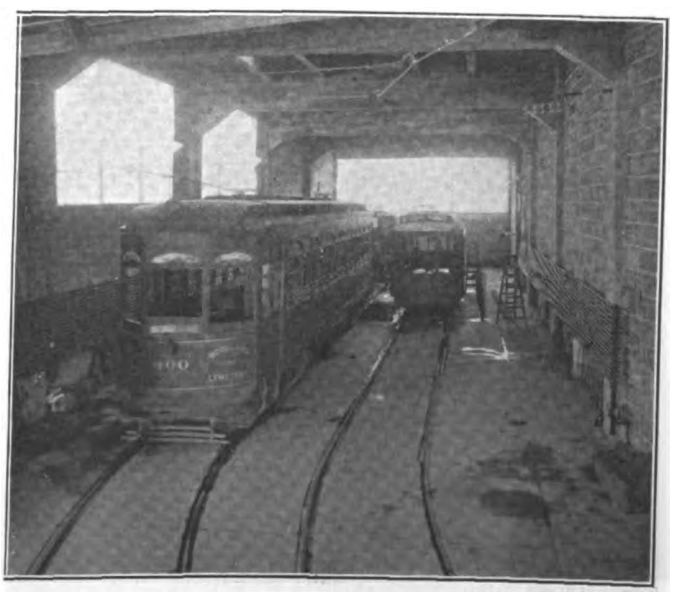
The South Brown Street section of the building is used as quarters for the general office force and trainmen's club room and waiting room. This section is two stories in height, the front portion being used for office quarters and club rooms and the rear portion as a mill room on the first floor and a cabinet shop on the second floor. The body or carpenter shop adjoins this bay, and next in order are the machine shop, paint shop and five car storage bays. The bay at the extreme east end of the building is used both as a car storage and a car washing room. The floor is provided with a drainage system leading to sumps which connect with the sewer system. It also contains steam heat, so that it is warm in winter.

CONSTRUCTION DETAILS

A basement has been provided under the two-story section of the building, extending under the sidewalk on South Brown Street. A portion of this basement space is utilized for the heating plant and the remainder for general storage purposes. A tunnel, 5 ft. x 7 ft. in section, extends along the outer foundation wall of the ladder aisle and connects the basement with the various shop and storage bays. The pipes which return condensation to the heating plant have been laid in this tunnel, and are thus easily accessible in case repairs are required. All return pipe lines under the concrete floors are installed in vitrified pipe, which is laid on a grade so it will drain into the tunnel, which in turn is drained to the sewer system.



Dayton Carhouse and Shops—Ladder Aisle



Dayton Carhouse and Shops—Car Washing Bay

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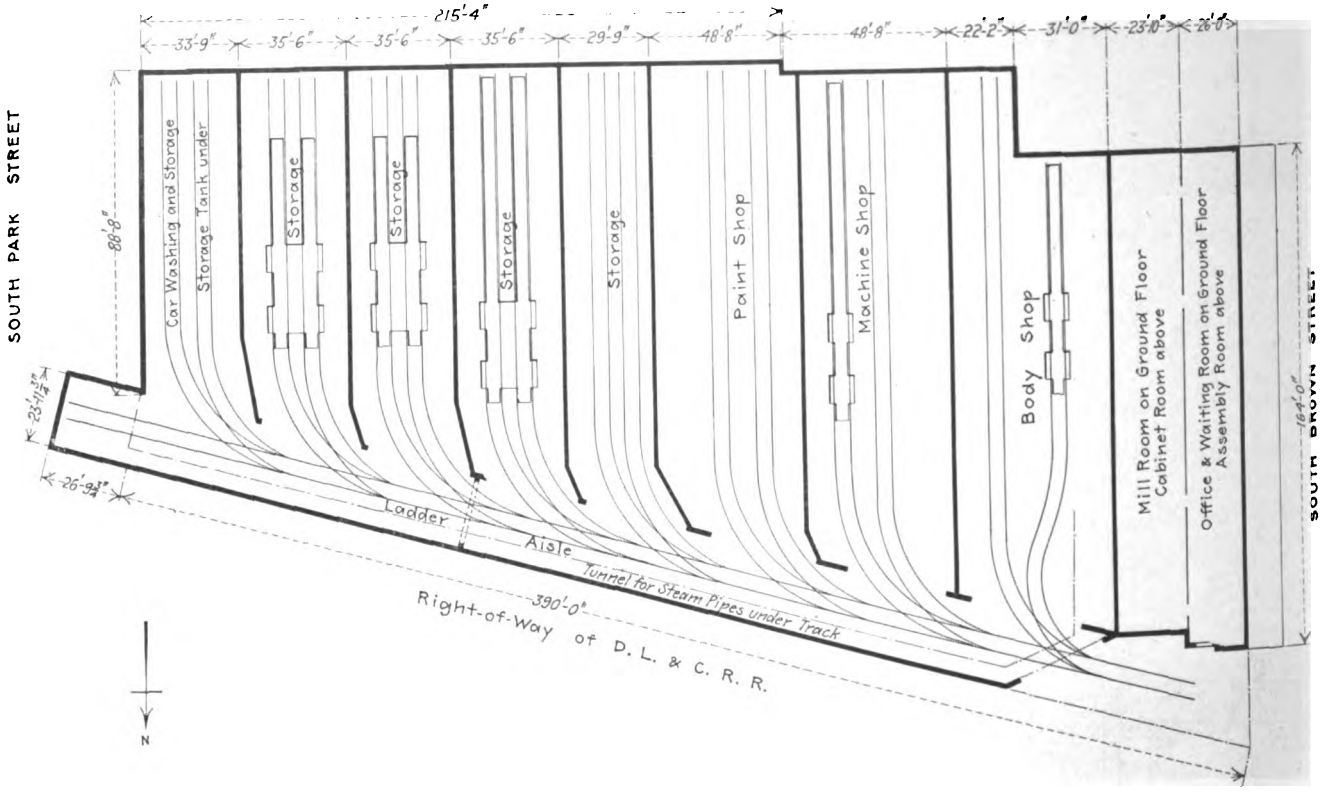
The entire building frame, floors and roof were constructed of reinforced concrete. The column schedule specifies rectangular sections 20 in. by 20 in. square in all but special cases, with a variation in the vertical core reinforcement, dependent upon the loads they are to carry. Those columns supporting the roof over the body shop, machine shop and paint shop are of special design. They are built with structural steel cores composed of angles and battens. This type of construction was used not only to provide sufficient stiffness to carry the double cantilever beams supporting the roof but also to supply a means of fastening the brackets which support the crane runway beams and rails. These brackets are riveted to the structural-steel cores of the reinforced concrete columns and are made up of plates and angles. The two rows of columns between the body shop and machine shop and between the machine shop and paint shop are provided with brackets of this character on both sides. Those columns with ⅜-in. round bars spaced at 6-ft. centers. All water sheds, including ridges and valleys, are built of cinder concrete deposited on top of the reinforced concrete roof slabs and drain to the down-spout sumps. Over this cinder concrete a five-ply, Barret specification, tar and gravel roof coating has been laid. The roof over the two-story section of the building is of mansard design with a concrete slab and skylight well area forming the flat portion of the roof. Similar roof construction, namely flat slabs, beams and skylight wells, was employed over the storage bays.

The construction of the roof over the shop bays is such as to provide an especially large amount of natural illumination, owing to the size and number of glass areas. Two heavy cantilever beams, anchored to a concrete-cased structural-steel column, project 12 ft. 2 in. from the walls on either side of each bay. In general outline, these cantilever beams are in the form of a letter Z. The lower portions support a roof slab on concrete purlins between



Dayton Carhouse and Shops—General Plan of Building Showing Arrangements of Different Departments

in the walls opposite these two in the paint shop and body shop contain brackets only on one side. Details of this structural-steel core, as well as of the character of reinforcing in the cantilever beams which support the roof over the shop bays, are shown in one of the illustrations.

Simple reinforced concrete beams and girders support the floors and roof in the two-story section of the building and the roof over the five-car storage bays. Essentially, the second-floor construction consists of 3-in. x 10-in. beams, spaced at 15-in. centers and surmounted by a 2-in. reinforced concrete slab, all of which were cast as a monolith. A 3½-in. layer of cinder concrete, containing longitudinal and transverse beveled nailing strips, was deposited on the 2-in. floor slab, and a ⅞-in. white maple or quartered oak floor is laid on this slab. This kind of floor construction assures a thoroughly fireproof barrier between the different floor levels.

The roof construction is quite unusual throughout, and generally speaking is of a monitor type supported on reinforced concrete beams with slab watersheds between the skylight areas. These slabs are 3½ in. thick, reinforced them and a skylight 4½ ft. wide, and the vertical portion supports the monitor roof construction over the center of the bay on simple reinforced concrete beams, which rest on and were cast with two of these cantilever beams projecting from opposite walls. These vertical arms of the cantilever support skylights between them 3 ft. 2 in. in width, and the entire roof of the monitor, which is 8 ft. 6 in. wide, is also composed of glass.

This type of construction was necessary in order to provide the large glass areas in the roof, as the limited space on which the carhouse and shop building was constructed made it impossible to include any windows in the side or end walls of the shop and storage bays. A glance at the half-tone illustrations indicates how efficiently this natural illumination problem has been handled. In a similar way ventilation is obtained through the pivoted vertical sashes, which are manipulated by continuous operating mechanisms. In the views shown no white cold-water paint has been applied to the concrete beam and slab construction in the roof, yet the natural illumination appears ample. The company expects later to apply white cold-water paint

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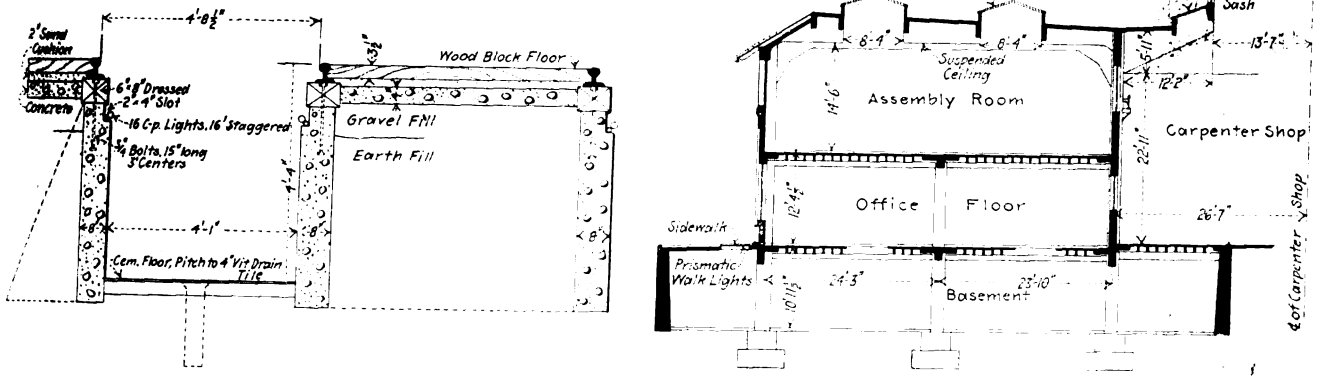
to all of these parts, as well as to the walls of each shop bay, to intensify the natural as well as the artificial illumination.

The reinforced concrete columns, floors and roof were built independent of the walls, the latter serving merely as curtain walls to inclose the whole. To give the effect of a solid brick structure, the exterior walls of the office bay were built with brick pilasters inclosing the reinforced



Dayton Carhouse and Shops—Section of Pit—Cross-Section of Front End of Building

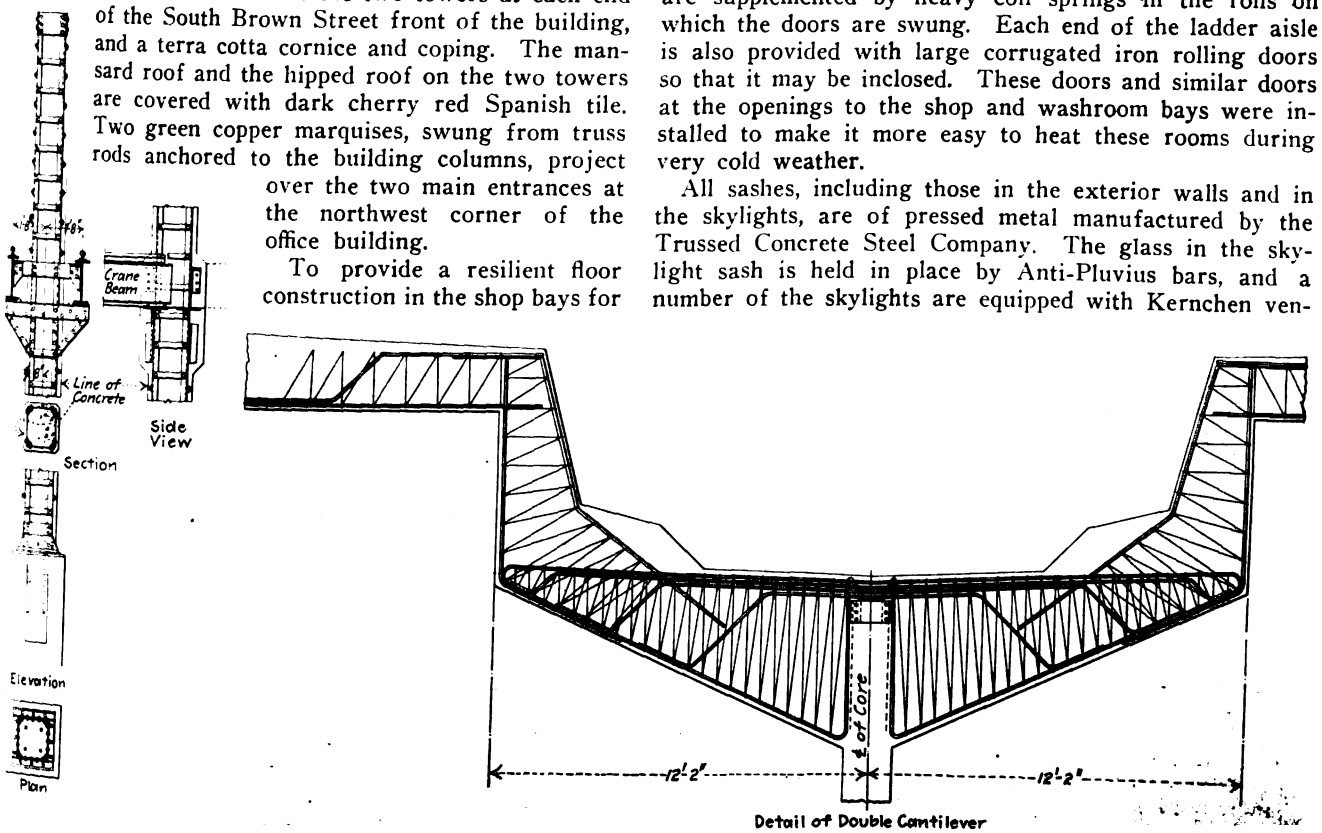
concrete columns, but the exterior walls of the rest of the structure are, strictly speaking, curtain walls with the concrete columns exposed. All interior partition walls are built of 4-in. and 6-in. fireproof hollow tile, laid between the building columns. The hollow tile partitions not only are fireproof but are so light as to make foundations other than the floor slabs unnecessary.

All exterior walls are faced with a gray wire-cut brick with wide racked joints. The trim in these walls includes a limestone base 2 ft. 3 in. in height, terra cotta panels outlining the four blaconies in the two towers at each end of the South Brown Street front of the building, and a terra cotta cornice and coping. The mansard roof and the hipped roof on the two towers are covered with dark cherry red Spanish tile. Two green copper marquises, swung from truss rods anchored to the building columns, project over the two main entrances at the northwest corner of the office building.

To provide a resilient floor construction in the shop bays for machine shop and carpenter shop where concrete jack blocks were installed at regular intervals along each side. The floors in the storage bays were paved with old brick.

The three shop bays and the car washing bay are provided with large corrugated iron rolling doors of the Kinnear type which separate them from the ladder aisle. The largest of these doors is 37 ft. 2 in. wide by 16 ft. high, which is an unusually large size for doors of this kind. To facilitate the work of raising these doors the usual chains and sprockets provided at each side of the opening are supplemented by heavy coil springs in the rolls on which the doors are swung. Each end of the ladder aisle is also provided with large corrugated iron rolling doors so that it may be inclosed. These doors and similar doors at the openings to the shop and washroom bays were installed to make it more easy to heat these rooms during very cold weather.

All sashes, including those in the exterior walls and in the skylights, are of pressed metal manufactured by the Trussed Concrete Steel Company. The glass in the skylight sash is held in place by Anti-Pluvius bars, and a number of the skylights are equipped with Kernchen ventilators. The operating mechanisms in connection with the pivoted sashes in the monitors, as well as the dampers in each ventilator, are arranged to be operated with cords from the floor level.



Dayton Carhouse and Shops—Section of Column and Double Cantilever Roof Beams

Appliances included in the design of the repair shop the comfort of workmen, maple flooring has been laid over a concrete sub-floor. This sub-floor consists of a 4-in. concrete slab, over which a 4-in. layer of cinder concrete with wood grounds or bevel strips has been spread and tamped compactly in place. Before the wooden flooring

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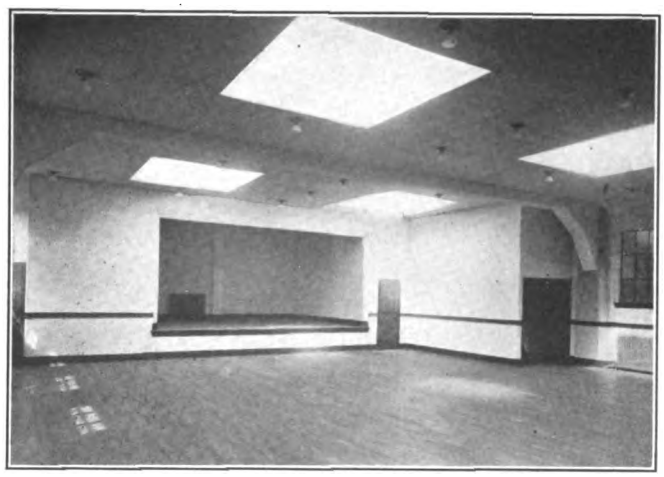
bays to facilitate the handling of material are a pair of 18-in., 48½-lb. crane runway beams in each of the shop bays. Bridge cranes will be installed on these runways as soon as necessity warrants their purchase. An electric freight elevator has also been placed in the corner of the mill room adjacent to the partition between it and the



Dayton Carhouse and Shops—Assembly Room

carpenter shop. This elevator is arranged to be operated between the basement and the second floor and is used to facilitate the handling of materials between the various floors from the stockroom and cabinet shop, respectively above and below the mill room.

Inspection and repair pits were installed under each track in three of the car-storage bays, and there is one pit long enough for two cars in both the carpenter and machine shop bays. Unusual features in the design of these pits include an 8-in. pit foundation wall under each track rail, designed with 8-in. buttressed walls which project 2 ft. at the bottom and are spaced at 9 ft. 10-in. intervals. Each pit is provided with two cross-pit connections, 9 ft. 10 in. in width, arranged with removable rail sections so that wheels or trucks may be dropped from under a car. The track rails over the pit are 70-lb. A. S. C. E. section, spiked to a 6-in. x 8-in. dressed yellow pine stringer, which in turn is anchored to the pit walls by ¾-in. x 15-in. bolts, spaced at 3-ft. centers. A 2-in. x 4-in. slot in the concrete walls just below the track stringer provides a recess for the electric wire conduit leading to the 16-cp lamps staggered on each side at 16-ft. centers. In addition to the general illumination which is provided with this location and spacing of lamps, an intense light is directed to the trucks where it is most desired. A cross-section through these pits is shown on page 453.

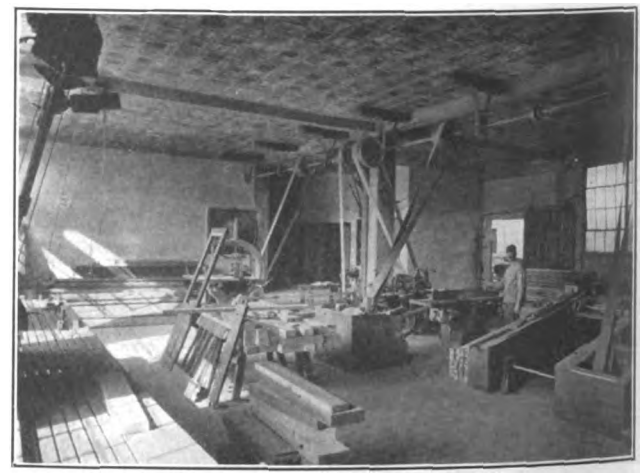
HEATING AND PLUMBING

The offices, shops and washroom sections of the building are equipped with a direct-radiation heating system. The plant includes two 100-hp horizontal-return tubular boilers installed in a pit at the rear of the basement under the mill room. These boilers are served by a steel stack 40 in. in diameter and 90 ft. high. Essentially, the piping includes a complete system of steam supply and condensation return with drips and air connections to and from the boilers. All live steam and return pipes are incased in 1-in. magnesia pipe insulation. In the offices and clubrooms standard cast-iron radiators were installed, while in the shops built-up coils were used and are supported on the building walls on brackets or swung from the ceilings on expansion hangers. Each shop bay contains lavatories and toilets. The trainmen's quarters on the first floor of the office section of the building are equipped with a number of shower baths. Each shower is inclosed in slat partitions, and the concrete floor is sloped to drains at the center of the inclosure.

In addition to the trainmen's waiting and locker room, there is a large assembly room on the second floor of the office bay used for social gatherings of employees. This auditorium is to be equipped with a moving picture machine to be used by the company in instructing the trainmen in regard to the elimination of accidents. In connection with its welfare work the Oakwood Street Railway has organized the Oakwood Aid Association, to which all employees are invited to belong. The purpose of this association is to offer a means whereby employees may assist themselves when in need and also to promote *esprit de corps*.

Artificial illumination in the offices and shops is obtained by a liberal installation of tungsten lamps. The lamps in the office are equipped with Opalux shades, and those in the shop departments have Abolite shades. There is yet some question as to the manner in which the lamps will be permanently installed in the shop bays, and experiments are being conducted to solve this problem. In one of these tests one row of lamps has been swung from drop cords about 8 ft. out from the partition walls, and in the other special reflectors have been set at an angle on the building columns just above the crane runway. The purpose of these tests is to determine the location and spacing of lamps so that the most efficient lighting may be obtained in each department.

All wiring in the shop and storage bays is being done by the company's own forces. The trolley wire entrances to the various shop and storage bays are attached by span construction to eye-bolts embedded in the concrete building frame. The trolley wire installation at the rolling door is of the usual form, with an overhead connection to the trolley wires which are dead-ended on each side of the opening. Sheet metal V-shaped clips attached to the bottom flange of each rolling door close the gaps in the



Dayton Carhouse and Shops—Mill Room

insulated section between the dead ends of the trolley wire when the door is open.

The building described was designed by Pretzenger & Musselman, architects, Dayton, Ohio, under the general direction of C. B. Clegg, president; H. P. Clegg, vice-president, and Henry Gebhart, general manager, Oakwood Street Railway Company.

Following out a plan for the beautifying of its stations along its lines in Virginia, the Washington Utilities Company has had the grounds at the Arlington Junction station graded and covered with sod, and a bed of flowers has been placed in front of the station. It is said to be the intention of the company to improve the stations and grounds at the important points along the lines of the Falls Church and Fairfax divisions, as well as on the line between Washington and Alexandria and Mount Vernon.

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Newark-Trenton High-Speed Line

The Public Service Railway Has Recently Inaugurated a High-Speed Service Between Newark and Trenton, N. J., by the Construction of Long Sections on Right-of-Way in Place of Former Highway Routes

At a meeting of the Public Service Railway's section of the American Electric Railway Association, held at Newark, N. J., on Thursday, Sept. 18, D. C. MacDougall, division engineer, and J. W. Brown, assistant general superintendent of the company, described respectively the engineering and operating features of the new high-speed line between Newark and Trenton. Their talk was illustrated by lantern slides which included every step in the operation of a train from terminal to terminal. The following is an abstract of the data presented at this meeting, including a map and views of the line.

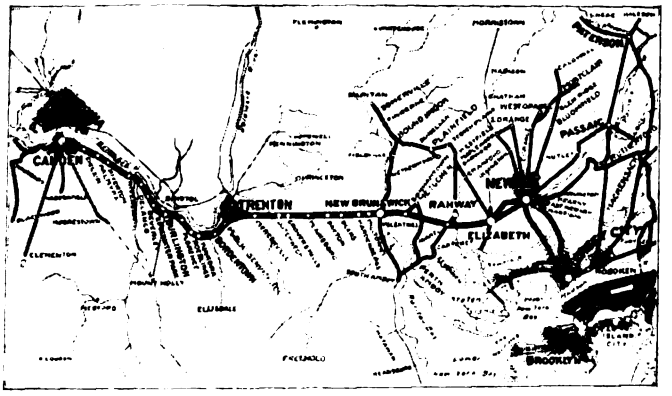
THE ROUTE

For a number of years there has been a call for a high-speed trolley line between the two principal cities of New Jersey, Newark and Trenton. In 1902 the Trenton-New Brunswick Railroad built and operated a line between Milltown and Fair Grounds, near Trenton. In the following year the same company extended the line to connnect with the Trenton Terminal Railroad, a road less than ½ mile long, operating from the end of the Camden & Trenton Railroad, which in turn operated on Liberty Street, Trenton, from what was then known as New York Junction to the Trenton city line. Hence, in 1903, by operating over the Public Service Railway's tracks from Milltown to New Brunswick, a continuous service was secured between New Brunswick and Trenton, a distance of 27½ miles, of which 23 miles were on private right-of-way.

The original project was to build a line between Trenton and Elizabeth to connect with the existing lines to Newark. To that end the New Jersey Short Line Company was incorporated to continue the line from Milltown to Elizabeth. During 1904 and 1905 a right-of-way was laid out between Milltown Junction, Middlesex County, and Bayway, Elizabeth, a distance of 19 miles, which this company partly graded and furnished with bridges between Bonhamtown, near New Brunswick, and Bayway, Elizabeth.

In 1904 the Public Service Railway operated cars between Jersey City and Trenton over the circuitous route of the main line through Bound Brook and New Brunswick, then to Milltown Junction; from there over the private right-of-way to Trenton. This route was 72 miles long. However, this latter project was abandoned after a short trial, so that the only way, except by steam railroads, left open was by the long route of the main line through Bound Brook, and this necessitated two changes of cars.

On March 1, 1908, the New Jersey Short Line Railroad went into the hands of a receiver. In 1912 the Trenton-New Brunswick Railroad and the New Jersey Short Line were purchased by the Public Service Corporation, and on Aug. 12, 1912, under the name of the Trenton Terminal Railroad, construction was started at what is known as Woodbridge Junction, which was the point about midway of the section then under construction.



Newark-Trenton Line—Map of Route, Including Camden

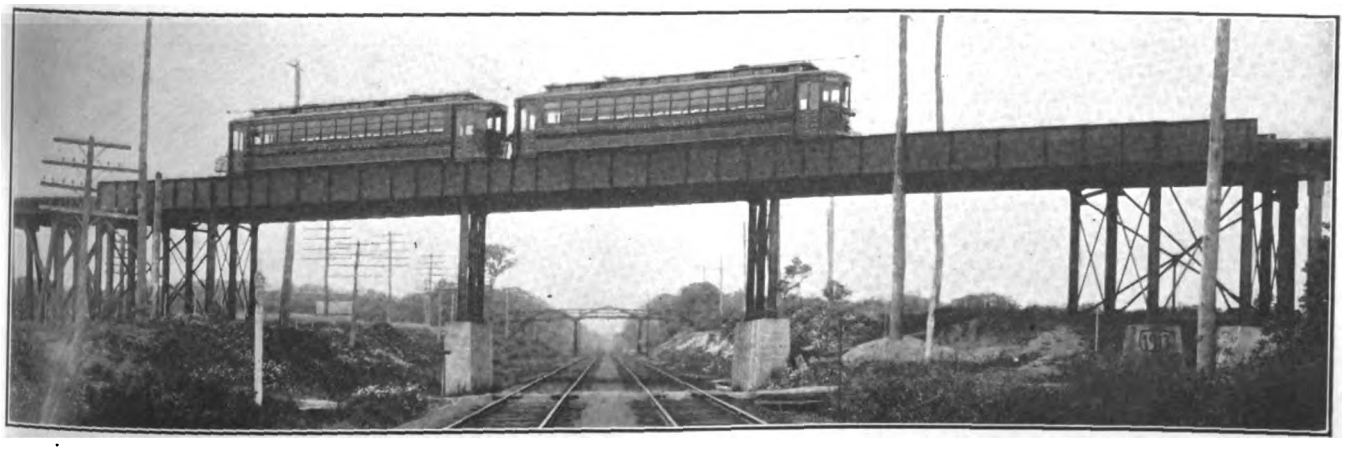
RIGHT-OF-WAY, GRADING AND BRIDGES

The right-of-way between Elizabeth and Bonhamtown is 12 miles long. Throughout its length it is generally 100 ft. wide, thus allowing ample room for the future construction of a double track. Some of the cuts and fills along the line are from 15 ft. to 20 ft.

Shortly after leaving Bayway there is a stretch of meadow land about 2 miles long. The bottom was found to be of a soft, spongy mass on which it was very difficult to hold the track to line and grade. To obviate this difficulty, a heavy layer of cinder ballast was placed about 4 ft. deep. This has proved to be very effective in that it has formed a compact mass.

Rock excavation was comparatively small and consisted of a red shale which, while very difficult to dig into, could be crumbled in the hand soon after exposure.

Of the fifteen bridges on the line, three are undergrade crossing bridges. Many of them were constructed by the New Jersey Short Line. One was the Strauss bascule drawbridge over the Rahway River, as illustrated. This bridge is of the "jack-knife" type, constructed for double



Newark-Trenton Line—Bridge Over Lehigh Valley Railroad Near Metuchen

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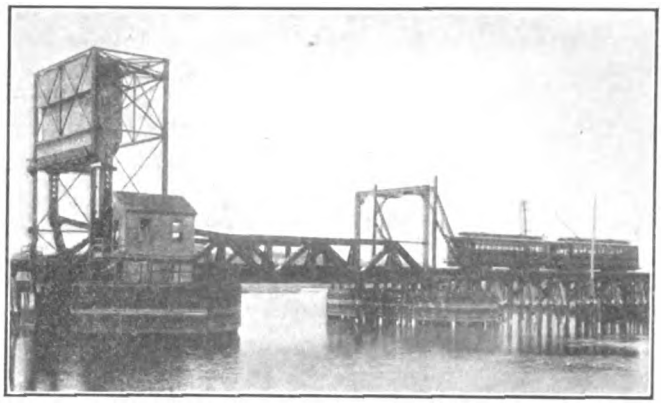
track and weighted with a hollow concrete counterweight, filled with pig iron. It is rapid in operation, taking but fifty seconds for opening or closing, while its motor uses only 16 amp at 575 volts. The clear span is 84 ft.

The bridges over the smaller creeks are of the wooden pile bent construction, built for double track, and were in



Newark-Trenton Line—Bascule Drawbridge Over Rahway River

a very favorable state of preservation. The bridge over the Port Reading Railroad has three steel spans of 30½ ft., 73 ft., and 30½ ft. The middle span is of the half through-plate girder type and the others are of the deck I-beam construction. The bridge weighs 194,000 lb. Work was begun from below—that is, the derrick car was placed on the Port Reading tracks and from there the girders were raised to their positions on the steel towers. The first girder was placed without a mishap, but while attempting to raise the second one to its position, the steel boom of the derrick failed and bent in the shape of a bow. As this method was not reliable, a "gin pole" was erected, namely, a steel boom was placed in an upright position, the tackle fixed to its upper end and the hoisting engine installed on the tracks above. The other girders were raised and placed in their positions on the steel towers. This method, while successful, was very lengthy and tedious, as it necessitated the erection and lowering of the "gin pole" before and after the placing of each girder.

The bridge over the Lehigh Valley Railroad is constructed for double track. There are five steel spans of the half through-plate girder type, three of which have 42-ft. spans and two have 16-ft. spans. The timber approaches to this bridge are 106 ft. long on the easterly side and 770 ft. long on the westerly side. A small bridge was constructed over a stream at what is known as Station 534. This is of the deck I-beam construction with concrete abutments. The other bridges were in such a good state of preservation that very little repairing had to be done. Of the three undergrade crossing bridges, the one at the Amboy Branch of the Pennsylvania Railroad was constructed by the New Jersey Short Line.

The New Jersey Terminal Railroad, at Station 230, was on a solid cinder fill and in order to get under it and hasten the construction of the road a temporary bridge with timber bents was erected for use until such time as the steel for the permanent bridge arrived. This bridge is of the half through-plate girder type with the latest improved water-tight concrete floor system and a span of 50 ft. A temporary bridge at the westerly city line of Elizabeth is being replaced by a half through-plate girder type, having a solid concrete floor system and concrete abutment walls.

TRACK

The rails are 80-lb. T-section with a 10-in. copper concealed bond and a short bond brazed to the outside of the head of the rail.

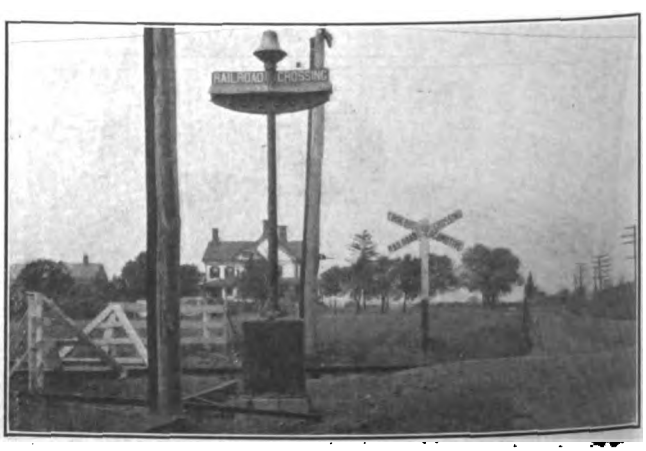
The 12 miles of new construction do not include 3 miles of sidings. The longest are Woodbridge siding, 1 mile long; Drummond's, 2641 ft.; Lehigh, 2895 ft.; Drawbridge, 2687 ft.; Tremly, 522 ft., and Port Reading, 1084 ft. They are so located that they will allow fifteen-minute headway if desired. The distance between track centers is 13 ft., as in steam railroad construction. All sidings have 76-ft. leads, spring split switches and No. 9 spring frogs. The switches are protected by ground stands with standard target and signal lamps. In general the road is almost a tangent. It has only two curves of 2 deg. and the most severe grade is but 2 per cent. It was decided to use cinder ballast, and to that end efforts were made to secure the cinders near by, but owing to an exceptional amount of steam railroad work in the vicinity it was necessary to ship it at first from Philadelphia and Reading, Pa., but later supplies were obtained from Bayonne and Jersey City. The company used 1341 cars of cinders, equivalent to about 26,000 tons, or about 50,000 cu. yd. The ballast is crowned in the center of the track and then is sloped off to a point 2 ft. beyond the end of the ties, so that there is a 2-in. clearance directly under the rail. A shoulder 1 ft. wide was made and then sloped off 1½ to 1 to terminate in a ditch 3 ft. wide.

POWER GENERATION

The direct current for the section between Bayway and Bonhamtown is furnished from Elizabeth, Metuchen and the new 1000-kw substation at Avenel. The current for the section between Milltown and Trenton is furnished from Milltown power house and Plainsboro substation. The distribution line is carried on chestnut poles 35 ft. long, set at intervals of 100 ft. and 21 ft. on either side of the center line of the right-of-way except between Bayway, Elizabeth, and Woodbridge Junction, Woodbridge Township, where chestnut poles, 50 ft. high, for a high-tension line were erected opposite the poles for the distribution line. At the Rahway River, a navigable stream, two steel towers 150 ft. high were erected to carry the high-tension line over the river. Where high-tension poles were erected no distribution line poles were set on that side. The trolley wire is No. 0000, suspended by span wires from the distribution and high-tension poles.

SIGNALS AND CROSSING SIGNS

The new road is equipped with the Union Switch & Signal Company's continuous track-circuit signals. At each end of the single-track sections home signals are located and about 1000 ft. in advance of these the intermediate



Newark-Trenton Line—Automatic Flagman Type of Crossing Signal

signals are placed. The home signals are of the semaphore type, giving day indications by the position of the blade and their night indication by colored lights. The blade operates in the upper left-hand quadrant to afford the motorman a clearer vision of the position of the blade by

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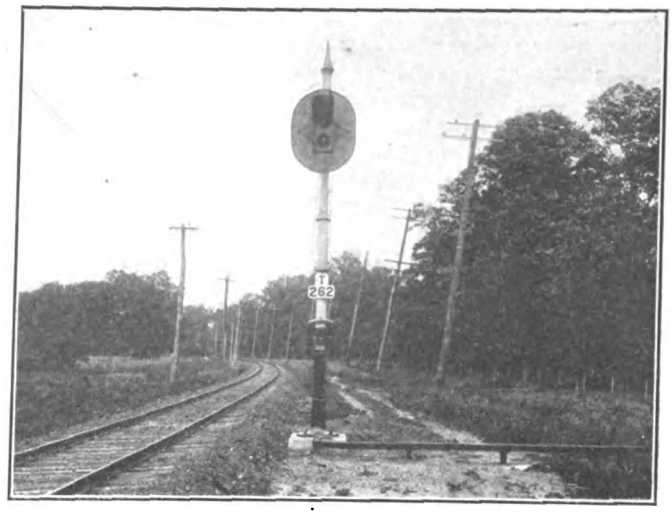
making the sky the background. In the intermediate signals the indications are by lights both day and night. The lights shine through powerful lenses and are shaded so that the sun cannot shine directly on the lenses.

The signals are operated by sixty-cycle alternating current which is transmitted along the line from the Avenel substation at 2200 volts. At the middle of each signal block is placed a transformer which reduces the voltage to about 8 volts and feeds to the rails. When there is no train in the block the current flows along the rail in both directions and through relays at the two home signals. As long as both these relays are energized the blade is held in its upper or clear position and the green lights are lit.

The home or semaphore signals are controlled by the relays at both ends of the block. As long as there is a train anywhere within the block, the track current passes through the wheels and axles of the train instead of through one or the other of the relays, so causing the blades on the home signals at both ends of the block to remain at "stop." Each intermediate signal is controlled by the relay at the far end of the block only. The signal mechanism and lights are operated by current at 110 volts supplied through transformers from the 2200-volt line.

A standard highway crossing sign has been erected on each side of every road crossing. This is a chestnut pole 7 ft. high with a cross in the form of an "X" with the legend "Railroad Crossing—Look Out for the Locomotive." These have been erected at all road crossings, but to supplement these and to give more protection to those using the highways, the Brach "automatic flagmen" have been installed at those road crossings which are more frequently used. This signal, in addition to a large locomotive bell, gives a visual warning by a series of eight red lights, electrically operated, set in the form of a crescent at the top of a 12-ft. iron pole. When the train arrives at a point about 1000 ft. from the road crossing, it passes over a contact instrument that starts the bell ringing, causing the lights to operate intermittently and successively to give the appearance of a person swinging a red lantern to and fro. This continues until the train passes over the road crossing.

Newark-Trenton Line—Semaphore Track Circuit Signals at a Siding



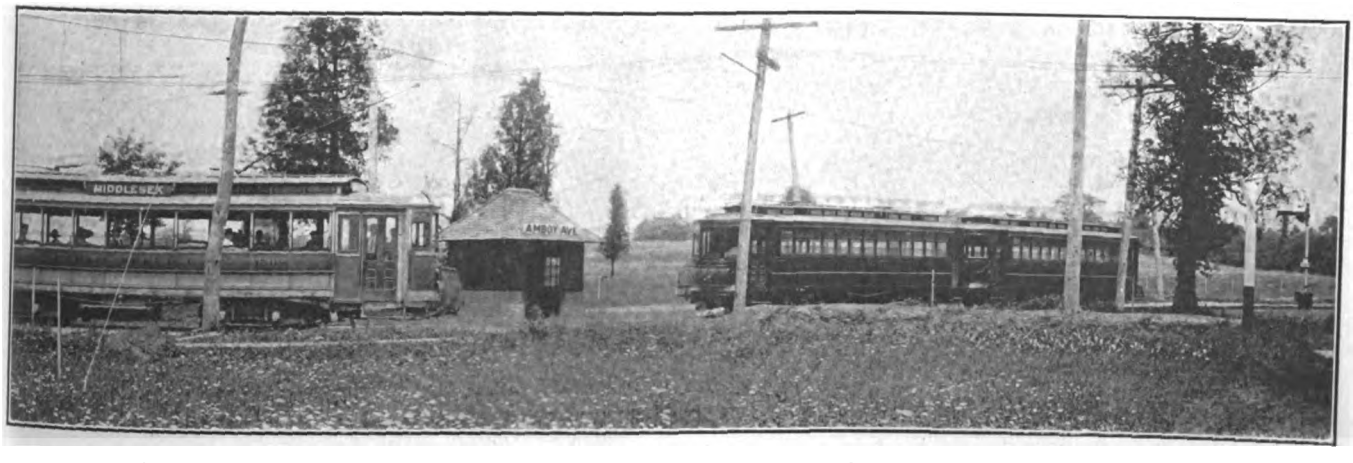
Newark-Trenton Line—Type of Intermediate Signal on the New Right-of-Way Division

Safety signals are located at both ends of the Rahway River drawbridge to give warning that the draw is open. As soon as the draw starts to open a large red semaphore drops automatically over the track at such a height as to come directly in front of the motorman, thereby making it impossible to pass without either breaking the board or the front of the train.

On the section between Milltown and Trenton the old hand-throw signals were removed and the United States trolley contact signals were installed. These are dependent upon the lights to give warning both day and night.

FENCES AND CATTLE GUARDS

Concrete fence posts were not adopted owing to the great initial cost of making the posts, consequently, it was decided to use a galvanized iron post 6½ ft. to 9½ ft. long, with notches cut in to receive the wire. These posts were driven with mauls into the ground, and at intervals strain posts were set to take the strain of the wire. The corner posts were also set in concrete. All the farm crossings,



Newark-Trenton Line—Junction of Middlesex Line, Showing Character of Waiting Room

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namely, crossings other than highway, were equipped with a 12-ft. swinging gate made to conform with the fence. The fence wire was the American Steel & Wire Company's perfect fencing 49 in. high, made of No. 7 galvanized wire.

The cattle guards are constructed of steel angle irons, 7 ft. long, set with one side upright, riveted to steel channels. These are placed between the rails and at the sides of all the crossings. The guard includes a wooden guard fence with the faces set at an angle of 45 deg. to the perpendicular and with the sides sloped from 7 ft., the width of the guard, to a point; back of this there is a five-barred board fence which returns and meets with the wire right-of-way fence.

ROLLING STOCK

Ten cars were built for this line and ten more are now under construction. These cars are 44 ft. long and are equipped with the Westinghouse H. L multiple unit control with field switch for weakening the field to increase speed. Each car carries four No. 310 C-2 60-hp motors, geared 21:66 for a maximum speed of 45 m.p.h. The motors are carried on two M. C. B. trucks with 33-in. steel wheels, 3-in. tread and a CP-27 compressor with General Electric straight-air brake apparatus with train and emergency features. The Tomlinson coupler with air-brake connections is standard. For warning purposes the cars have the Public Service standard interurban whistles in addition to the regular foot gong. They have nineteen rattan-covered cross seats with a seating capacity of fifty. The weight of each car complete is 53,000 lb. A toilet has been installed for the convenience of passengers, as well as a tank for drinking water with sanitary cups in a separate rack. Each car is lighted with thirty 64-watt tungsten lamps and carries a General Electric lens luminous arc light. A standard buzzer system is provided for the use of passengers to signal the motorman. The heaters have thermostatic control.

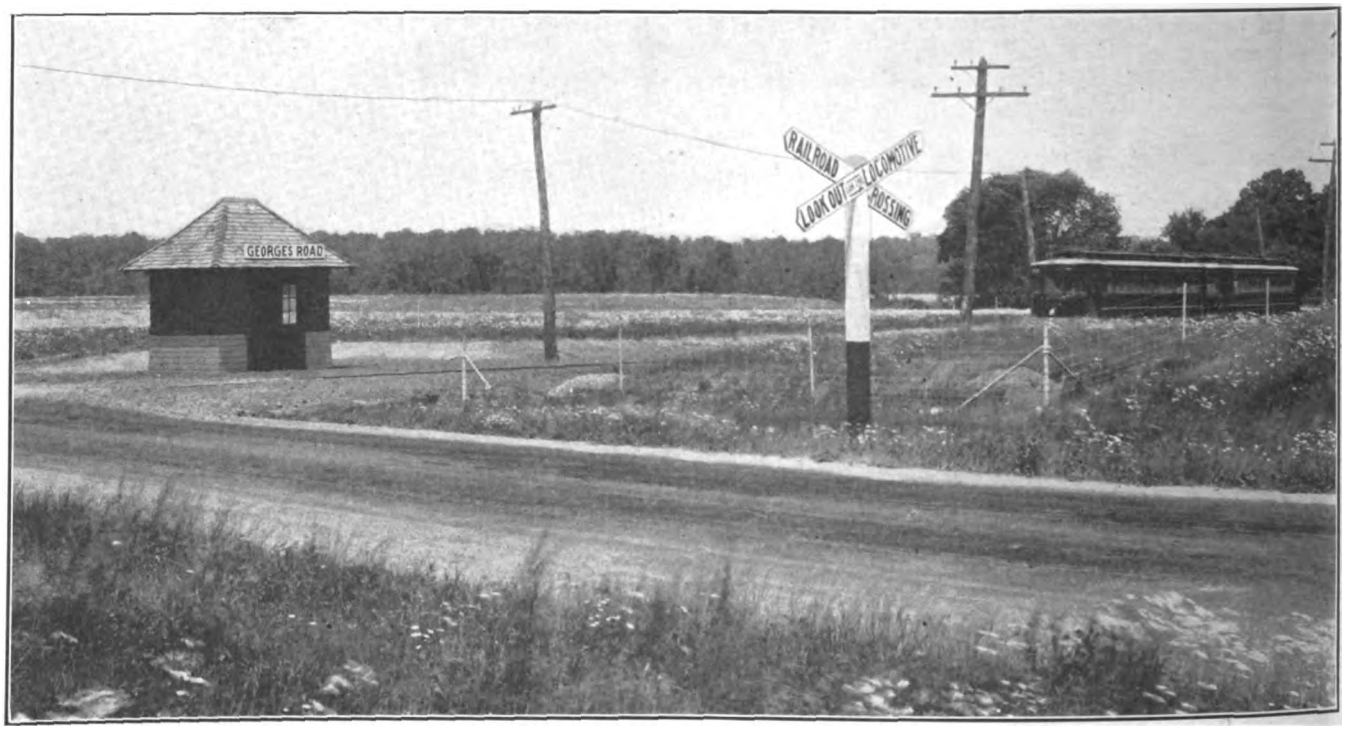
ORGANIZATION

The construction of the line was in charge of a resident engineer, who reported to the division engineer, who in turn was responsible to the engineer of maintenance of way. The J. F. Shanley Company, Newark, was the contractor for the grading, building of bridges and track construction. The Union Switch & Signal Company was the contractor for the automatic signals. The distribution pole line and all the distribution system were installed under the supervision of the Public Service Railway distribution department. The high-tension system was installed under the direction of the Public Service Electric Company.

The construction work was completed in ten and one-half months. The greatest amount of track laid in any one day was 925 ft. and the largest force of laborers employed was 220 men. During the progress of the work a daily record was kept of the amount of work done each day and the number of men engaged; also a complete card index of the material received and used.

OPERATION OF THE LINE

Operation of this route is conducted strictly in line with the latest interurban code of the American Electric Railway Association, according to which both the motorman and conductor are required to take orders from the dispatcher. The latter is located at New Brunswick, the center of the line. The several forms used, including the train sheets, are all of standard type. The trainmen were drawn directly from the ranks, but before receiving any instructions they were subjected to a second physical examination, particularly with regard to color discrimination.



Newark-Trenton Line—Station at George's Road

This examination was followed by two weeks of instruction in interurban operation, including signals and rules, just previous to the public opening of the line. Of this period ten days were spent in actual operation from terminal to terminal. At the end of the instruction time, all candidates were required to pass a strict written examination before entering the service.

As the route is a mixture of city, highway and right-of-way sections, speed conditions and signal equipment vary accordingly. On the 12 miles of most recent construction, where trains are operated at a schedule speed of 30 m.p.h. with one stop about every 2 miles, the company has installed the track-circuit signals of the absolute type previously described. The "absolute" feature, of course, does not permit more than one train in a block, but it was felt that any possible delays due to this feature would be more than offset by its greater safety. The sidings are located to permit much shorter headways than the present hourly service, but as multiple unit equipment is used it will be feasible to handle increased business with longer trains in

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preference to reducing the headway below standard interurban practice.

The new route was opened to the public on July 1. It has cut down the running time between Newark and Camden from approximately eight hours to four hours and eight minutes and the number of car changes from three to one. This single transfer is being made temporarily on the southeast side of Trenton at a place called Public Service Junction, but a gauntlet rail is now being added to the 5-ft. gage at the Camden division so that it will be possible to operate the cars of 4-ft. 8½-in. gage on the high-speed line to a new transfer point in the heart of Trenton. The fare for the 90 miles between Newark and Camden is $1.45. A city cash fare is collected first, but for the rest of the trip a duplex ticket is issued.

HEARING CONCERNING PROTECTION OF EMPLOYEES ON NEW HAVEN

Commissioner James E. Sague, of the Public Service Commission for the Second District of New York, and Commissioner John E. Eustis, of the Commission for the First District, presided on Sept. 15 at a joint hearing in an inquiry relative to the failure of the New York, New Haven & Hartford Railroad to comply with the terms of an order adopted by the Commission for the First District last April, requiring all electrical companies and railroads using electricity to formulate and enforce rules to insure the safety of employees wherever electricity is used. The New York, New Haven & Hartford Railroad was the only company which failed to submit a code of regulations satisfactory to the experts for the commission. The three members of the Public Utilities Commission for Connecticut, Messrs. Higgins, Hale and Ford, were present at the hearing by invitation.

John Fitzgibbons, legislative representative of the Brotherhood of Railroad Trainmen, testified that rule No. 100 of the company, which forbade trainmen getting on the top of cars, was contradicted by the time cards of the company, superseding former rules and requiring men to get on top of the cars at certain times. He admitted that under certain circumstances it appeared to be necessary for men to get on the roof of cars, for instance, to give signals to engineers when the train is backing, but he declared that conditions were unsafe since the road had abandoned the "tell-tales" and bridge-guards within the electric zone. He urged the commissions jointly to establish a rule that the railroad should neither command nor allow trainmen to go on the top of cars while at rest or in motion.

Clifton W. Wilder, electrical engineer to the Commission for the First District, testified that no adequate substitute had been devised by the New Haven to take the place of the old "tell-tales," which gave men warning of the proximity of a low bridge and which had to be removed because of the overhead construction used by the New Haven. Mr. Wilder thought that some adequate substitute might possibly be devised, but he did not offer any concrete constructive suggestions. C. R. Vanneman, chief of the transportation division of the Commission for the Second District, also testified that in his opinion some method of giving warning might be devised. He suggested the extension of the use of a red board at the side of the track to give warning of low clearance, such as is already used in the Westchester yard, and he thought that an articulated stick danger signal might further prevent some accidents.

William S. Murray, who had charge of the work of electrification on the road, testified that in his opinion overhead construction, such as is used by the New Haven, is safer than the third-rail system used by the New York Central. Special circumstances, however, rendered the use of the third-rail system desirable by the latter road. He said that the number of accidents under electrical operation is not so great as under steam operation, and he also said that it is almost impracticable to devise a system of "tell-tales" that will be effective in a gridiron system of tracks.

C. L. Bardo, general manager of the road, testified that rule No. 100 had been issued before his connection with the company, and he said it was absolutely impracticable to operate without having men get on the roofs of cars, and that, in fact, they are safer there than on the ground in a crowded yard. He also maintained that a man would not be any more likely to see a warning sign alongside the track than he would to see the bridge itself, and he did not apparently believe that it was practicable to devise a proper warning system. In reply to the criticism that the employees on steam locomotives are in danger from the overhead wires while at the water stations, Mr. Bardo said that within less than a year the company hoped to do away with all steam freight operation on the electrified zones, but that to obviate the alleged danger at present either the water stations would be moved to points of sufficient clearance or else cut-out switches would be installed to eliminate the current from that section while water was being taken.

Before bringing the hearing to a close, Commissioner Sague said that the commissioners are inclined to think that some kind of a warning sign should be used, especially for the benefit of green men, and he suggested that the company's officials consider the matter and consult with the experts for the two commissions. Counsel for the railroad stated that a tentative order would be drawn up and submitted for the approval of the commissions.

BY TROLLEY AND BOAT FROM NEW ENGLAND TO ATLANTIC CITY CONVENTION

A meeting of the prominent electric railway men of New England was held at the Engineers' Club, Boston, on Sept. 17, to consider plans for attending the annual convention of the American Electric Railway Association at Atlantic City, Oct. 13-17. It was deemed advisable to go a considerable portion of the distance by trolley. It is possible to go all the way from Waterville, Me., to the convention city by trolley, but the question of time consumed enters into the proposition. Cars with the passengers who are going to the convention will come from all over New England and concentrate at New London. They will leave so as to arrive at New London on Sunday night, Oct. 12. After spending the night at New London a boat will be taken to Sag Harbor, Long Island, and the trip continued by train. The members of the party are due to arrive in Atlantic City on the night of Oct. 13. It is expected that some of the delegates will travel by trolley from Waterville, Me., to New London, a distance of approximately 355 miles. This is the first time that anything of the kind has been attempted in the East. It is expected that from seven to fifteen special cars will make the trip leaving from various points and meeting in New London. The names of the chairmen of the various committees in charge follow: General executive committee, Charles S. Clark; equipment, E. W. Holst; publicity, H. A. Faulkner; baggage, Henry C. Page; refreshments, M. C. Brush; ladies, Franklin Woodman; to get business, R. E. Hamilton; transportation, W. W. Sargent; hotel accommodations at New London, Conn., C. S. Hawley.

Friday morning, Sept. 19, a specially equipped car from the Bay State Street Railway was to take a party over the line from Boston to New London and back by way of Worcester to inspect the various lines.

Arthur Twining Hadley, president of Yale, and James H. Hustis have been elected directors of the New York, New Haven & Hartford Railroad.

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Hypothetical Electric Interurban Railways

A Theoretical Application of the Principles Governing the Operating Revenue, Operating Expense and Cost of Construction of Proposed Electric Interurban Railways

BY LOUIS E. FISCHER, CONSULTING ENGINEER, ST. LOUIS, MO.

In articles published in the ELECTRIC RAILWAY JOURNAL of Aug. 23, 1913, and of Sept. 6, 1913, the subjects of the determination of the probable operating revenue, operating expense and cost of construction for a proposed electric interurban railway were discussed in all their details, and from the experience of typical existing lines statistics were carefully compiled in regard to these points that should prove of material assistance to the promoter and the investor. It is the purpose of the present and concluding article by means of a general review to give a bird's-eye view of these factors all combined.

At the present time the prevailing rates of interest demanded by the investing public on the securities of electric interurban railways range from 6 per cent to 7 per cent. These high rates have been largely brought about by the construction of many unprofitable roads through ignorance of the fundamentally essential elements entering into the undertaking, such as we have outlined in the two preceding articles. It may be said that to borrow from the investing public the necessary funds with which to construct an interurban railway the project must show an ability to earn a net revenue, after paying operating expenses and taxes, of from one and a half to two times the amount of the interest on the cost of construction, to be computed on a basis of from 6 per cent to 7 per cent. This being the case, it will be well to trace out the interrelations of operating revenue, operating expense and cost of construction in order to show the conditions under which such a net revenue can be obtained. The best way to obtain this result is by means of hypothetical cases, giving average variations of population and territorial conditions.

POPULATION AND TERRITORY SERVED

It will be recalled that the first article of this series contained an analysis of the population served by an electric interurban railway into its characteristic components. It was stated that, with the tributary farming population eliminated, the population served by such a line may be "divided into three general classes, as follows: primary terminal population, secondary terminal population, and intermediate town and village population. The primary terminal population consists of the population of the principal city into which the railway operates—in other words, the population of that city which is of the greatest commercial importance in the sense that it is a metropolis for the greater portion of the system served. The secondary terminal population is the population of the other important terminal or terminals, exclusive of the principal terminal, which are also of such commercial importance as to attract business from a considerable portion of the territory served but not to the same extent as the principal terminal. The intermediate town and village population is made up of the population of cities, towns and villages served by the line, beyond and between (when there are both primary and secondary terminals), but not including the primary and secondary terminals."

It was further stated in the first article that "the traffic created by the population of an electric interurban railway is consequent to the following general movements:

"Source I:

"(a) The intercommunication of the population of the primary terminal and the intermediate population served.

"(b) The intercommunication of the population of the intermediate centers only.

"Source II:

"(c) The intercommunication of the population of the secondary terminals and the intermediate population served.

"(d) The intercommunication of the population of the primary terminal and the population of the secondary terminals.

"(e) The intercommunication of the population of the secondary terminals alone (if more than one)."

In the hypothetical cases which follow, variations of Source I, the traffic for which is consequent to the existence of a primary terminal and an intermediate population, and of Source II, which presupposes also the existence of a secondary terminal, will be made, so as to bring within the range of cases different normal electric interurban lines that might be built.

CASE I

Under Case 1 it is proposed to construct a normal road from a primary terminal city of 50,000 population through a normal territory to a town of 5000 population 10 miles distant, thence to another town of the same population also 10 miles distant, and thence to a third similar town 10 miles distant. This line will be 30 miles long and will have an intermediate town and village population of 15,000, with no secondary terminal. Under such conditions, as determined in the first article, the earnings from Source I are approximately $10 per capita of intermediate town and village population, or a total of $150,000 per annum.

On the basis of the conclusions reached in the second article, because this hypothetical road is short, we estimate the operating expense at the minimum determined for normal roads, or $3,100 per mile of track per year, which aggregates $93,000 per year. The taxes will be approximately the minimum of $250 per mile of track, or $7,500 per year. The cost of construction will also be approximately the minimum of the limits heretofore determined, or $26,550 per mile, which is a total of $801,600.

The surplus earnings, after deducting the operating expenses and taxes, will be $49,500. The interest on the cost of construction, at 6½ per cent per annum, will amount to $52,104. This road will therefore fail to earn its interest by $2,604 and will fall short of making its securities negotiable by approximately $50,000. The project, therefore, fails as an economic success.

SUMMARY FOR CASE I

The following summary may be of value in showing in statement form how the deficit in Case 1 is arrived at:

TABLE I—SHOWING APPLICATION OF PRINCIPLES HERETOFORE DEDUCED TO HYPOTHETICAL CASE 1

Operating revenue—15,000 intermediate town and village population, at $10 per capita	$150,000
Operating expense—30 miles, at $3,100 per mile per year	93,000
Net revenue	$57,000
Taxes—30 miles, at $250 per mile	7,500
Surplus applicable to fixed charges	$49,500
Interest on $801,600, at 6½ per cent	52,104
Deficit	$2,604

MODIFICATION OF CASE I

If we estimate that the total intermediate town and village population is 18,000 instead of 15,000. the results for Case 1 will be modified as indicated in Table II on the following page.

It will be observed that the surplus earnings, after

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deductions for operating expense and taxes, will approximately equal one and one-half times the interest charges computed on the basis of 6½ per cent of the cost of construction. The intermediate town and village population of this hypothetical road is 600 per mile of track. It may therefore be concluded, in a general way, that such a projected road, serving a primary terminal and intermediate town and village population only, should have not less than an average of 600 of intermediate town and village population per mile of track.

Inasmuch, however, as the above operating expense and cost of construction were computed at the minimum of the deductions heretofore made, it is apparent that should the elements of construction or operation indicate costs higher than the minimum, a proportionately greater intermediate town and village population per mile of track must prevail to make such a road a financial success.

TABLE II—SHOWING APPLICATION OF PRINCIPLES HERETOFORE DEDUCED TO HYPOTHETICAL CASE 1 AS MODIFIED

Operating revenue—18,000 intermediate town and village population, at $10 per capita	$180,000
Operating expense—30 miles, at $3,100 per mile per annum	93,000
Net revenue	$87,000
Taxes—30 miles, at $250 per mile	7,500
Surplus applicable to fixed charges	$79,500
Interest on $801,600, at 6½ per cent	52,104
Surplus applicable to dividends	$27,396

CASE 2

In Case 1 we had a normal road 30 miles long serving only a primary terminal of 50,000 population and an intermediate town and village population of from 15,000 to 18,000. In this case, however, the road will be extended 10 miles farther to a city with a population of 20,000, qualifying as a secondary terminal (Source II). The intermediate town and village population (Source I) will be 15,000. The total miles of track will be 40 and the distance between terminals 40 miles.

As in the preceding case, the revenue from Source I will be $10 per capita of intermediate town and village population, or $150,000 per annum. In obtaining the revenue from Source II, the character of the terminals may be taken into consideration, for the conditions conducive to intercommunication between the primary and secondary terminals will have a bearing on the revenue. It is here estimated that the primary terminal is the capital of a state and the secondary terminal is the county seat of the adjacent county. In this instance there is the average cause for intercommunication, and the average earnings under these conditions can be properly estimated, viz., $8 per capita of secondary terminal population, which gives a total from Source II of $160,000.

SUMMARY OF CASE 2

The complete compilation of operating results for Case 2 is as follows:

TABLE III—SHOWING APPLICATION OF PRINCIPLES HERETOFORE DEDUCED TO HYPOTHETICAL CASE 2

Revenue from Source I— 15,000 intermediate town and village population, at $10 per capita	$150,000
Revenue from Source II— 20,000 secondary terminal population, at $8 per capita	160,000
Total gross revenue	$310,000
Operating expenses— 40 miles, at $4,350 per mile	174,000
Net earnings	$136,000
Taxes—40 miles, at $250 per mile	10,000
Net earnings applicable to fixed charges	$126,000
Interest on construction cost, $1,440,000, at 6½ per cent	86,400
Surplus earnings applicable to dividends	$39,600

The conditions of service in the above instance entailed a greater number of car movements than in Case 1, and the operating expenses were approximately the maximum of those deduced in the preceding article in the issue of Sept. 6, viz., $4,350 per mile of track, or a total of $174,000 per annum. The construction cost in this case would also be higher than in Case 1 and was estimated at $35,000 per mile, or $1,440,000 for 40 miles.

This road would fall a little short of producing such economical results as would qualify it as a commercially feasible project, but if the population of the secondary terminal were 22,000 it would just about so qualify.

MODIFICATIONS OF CASE 2

If the primary terminal were merely the county seat of one county and the secondary terminal the county seat of the adjacent county, it is not believed that the revenue from Source II could be safely estimated as high as $8 per capita. If, on the other hand, the primary terminal were a city of 1,000,000 population and therefore exercised a predominating commercial influence over the secondary terminal, the estimate of earnings due to Source II might be increased to $15, and in the extreme cases to $20, per capita of secondary terminal population. Again, if the secondary terminal population were removed a greater distance from the primary terminal, the intercommunication would be reduced, and a reduction of the revenues from Source II should be made to the extent of approximately $1 per capita for every 10 miles of increased distance between the terminals.

CASE 3

In the preceding case there was a 40-mile normal electric interurban railway with a primary terminal of 50,000 population, an intermediate town and village population of 15,000 and a secondary terminal population of 20,000. In Case 3 these conditions will still obtain, with the exception that there will be a further 10-mile extension of the line to a town of 5000 population and another 10-mile extension to a city of 20,000 population of sufficient importance to be classed as an additional secondary terminal, and the intermediate town and village population will be increased to 20,000. The primary terminal is 40 miles distant from the first secondary terminal and 60 miles from the second primary terminal, and the secondary terminals are 20 miles distant from each other.

TABLE IV—SHOWING APPLICATION OF PRINCIPLES HERETOFORE DEDUCED TO HYPOTHETICAL CASE 3

Revenue from Source I— 20,000 population, at $10 per capita	$200,000
Revenue from Source II— First, the population of the first secondary terminal, viz., 20,000, at $8 per capita	160,000
Second, the population of the second secondary terminal, viz., 20,000, at $7 per capita	140,000
Total gross revenue	$500,000
Operating expenses— 60 miles, at $4,350 per mile	261,000
Net earnings applicable to taxes and fixed charges	$239,000
Taxes—60 miles, at $250 per mile	15,000
Net earnings applicable to fixed charges	$224,000
Interest on construction, $35,000 per mile, or $2,100,000, at 6½ per cent	136,500
Surplus earnings applicable to dividends	$87,500

The revenue from Source I, on the $10 per capita of intermediate town and village population basis heretofore used, will be $200,000 per annum.

As to the revenue from Source II, we have the following items: First, the return from the population of the first secondary terminal, viz., 20,000, at $8 per capita, or a total of $160,000; second, the return from the population of the second secondary terminal. This latter terminal, being 60 miles from the primary terminal, will be entitled to an estimate of approximately $6 per capita from the viewpoint of its relations with the primary terminal; and being 20 miles from the first secondary terminal, it will be entitled to an estimate of $8 per capita, an average of $7 per capita for the 20,000 population, or a total of $140,000.

The operating expenses are on the basis of $4,350 for each of the 60 miles of track. The cost of construction is $35,000 per mile, as in the previous instance, or a total of $2,100,000.

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The résumé for Case 3 as given in Table IV on the preceding page shows surplus earnings applicable to dividends of $87,500, which indicates that this hypothetical road is a financially feasible project.

MODIFICATION OF CASE 3

The judgment of the expert must be carefully exercised in determining the intercommunication between the primary and secondary terminals and between the two secondary terminals. The same general reasoning should be followed as in the modification of Case 2. If the second secondary terminal is a city of 40,000 inhabitants, then it will be far less dependent on the primary terminal, and the intercommunication between these terminals will be greatly reduced, while, on the other hand, the intercommunication between the two secondary terminals will be increased. In such a case, the value of the first secondary terminal for revenue from Source II should be increased to perhaps $10 per capita of its population, and the value of the second secondary terminal should be decreased to perhaps $4 per capita in estimating the revenues from Source II.

Where the above conditions exist, in addition to the revenue changes the cost of construction will also undergo modification. Because of the importance of the second secondary terminal and its influence on the cost of construction of the road by entering a larger city, the estimate for this case will be $40,000 per mile of track, or $2,400,000 for the 60 miles. The complete summary under Case 3 as modified is as follows:

TABLE V—SHOWING APPLICATION OF PRINCIPLES HERETOFORE DEDUCED TO HYPOTHETICAL CASE 3 AS MODIFIED

Revenue from Source I—	
20,000 population, at $10 per capita	$200,000
Revenue from Source II—	
First, 20,000 population of first secondary terminal, at $10 per capita	200,000
Second, 40,000 population of second secondary terminal, at $4 per capita	160,000
Total gross revenue	$560,000
Operating expense	261,000
Net earnings applicable to taxes and fixed charges	$299,000
Taxes	15,000
Net earnings applicable to fixed charges	$284,000
Interest on construction, $40,000 per mile, or $2,400,000, at 6½ per cent	156,000
Surplus applicable to dividends	$128,000

This third hypothetical case represents ideal conditions for an electric interurban project. It indicates in a general way the territory necessary to the production of satisfactory economic results.

CONCLUSION

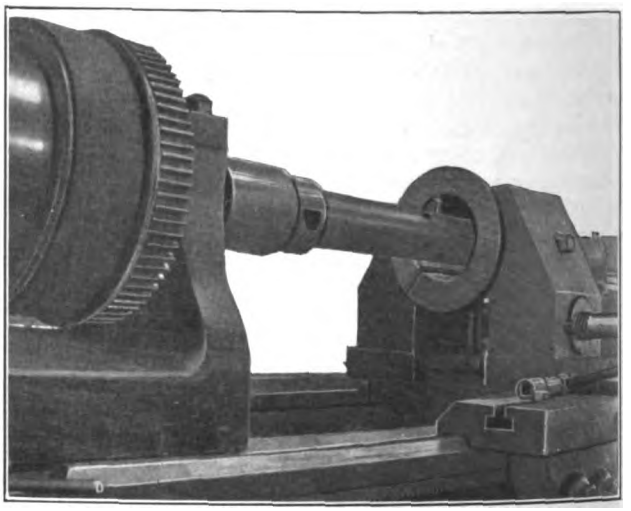
The foregoing discussion and tables should enable the promoter and investor to see more clearly the economic relations between the operating and construction statistics that we have compiled in the previous articles, and they should have a better conception of the factors that are necessary for the success of projected electric interurban railways.

This article completes the discussion of electric interurban lines. We have outlined and discussed the general principles governing operating revenue, operating expense and cost of construction as deduced from existing lines and as applicable to proposed lines. While the fundamental elements necessary to an economically feasible road have been determined within approximate limits for simply normal roads operating in normal territory, it is believed that the hazard of indiscriminately applying these limits to all cases will be fully realized, and that the necessity of employing expert talent, with mature discriminating judgment, to estimate the probable performances of a projected road is fully appreciated. It is also believed that projected electric interurban railways that to the intelligent layman do not qualify as economically feasible propositions, under the limits we have set forth, would better be left unconstructed.

From the statements made in this and the preceding articles the conclusion may be drawn that a great number of the electric interurban railways now in operation are not the commercial successes they are generally considered to be, and in this conclusion the writer fully concurs. This does not mean that there are not many profitable electric interurban railways, for there are many such; but this only serves to emphasize the fact that it is suicidal to rush into electric interurban construction unless a proper study is made of existing conditions and the factors underlying success. At the present time there are territories susceptible of developing profitable electric interurban railways. As the town and village population continues to increase, there will be many more such, and the promoter and investor who use the principles obtained from experience in a scientific study of a projected line will most surely and most quickly be rewarded by financial success.

LATHE-BEARING BORING ATTACHMENT

To reduce to a minimum the time required to center rebabbitted bearings in the lathe, C. W. Day, master mechanic Oklahoma Railway Company, of Oklahoma City, has designed and built a self-centering bearing boring attachment of which an illustration is shown. This is made up of two jaw castings mounted on the lathe carriage and permanently connected by a right and left screw. They are



Lathe Attachment for Boring Motor Bearings

kept in line with the lathe centers by a fork screwed into the exact center of the carriage, the two prongs of this fork engaging with a groove cut at the center of the right and left screw shaft. An extension of the right and left screw through the jaw casting on the operator's side of the lathe permits the jaws to be opened or clamped firmly on the bearing to be bored by turning a hand wheel.

In combination with the self-centering bearing boring attachment a special boring bar has been provided which is set in position between the headstock and tailstock. The end of the boring bar mounted on the headstock has been tapped out so as to take the place of the lathe chuck and the cutting tool is wedged in a slot in the bar. The length of the bar permits the use of two cutting tools, one for the roughing out and the other for the finishing out, making the boring of a bearing complete with one operation. The complete attachment cost approximately $40 and has more than paid for itself by improved workmanship in the bearings bored.

An application has been filed in Russia for permission to form a company with the object of constructing and operating an electric railway 35 miles long, from Moscow to Voznyesyensk. The cost is estimated at $3,417,143.

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MEETING OF KEYSTONE RAILWAY CLUB

The regular quarterly meeting of the Keystone Railway Club was held in the pavilion on Mount Penn, Reading, Pa., on Sept. 16. The business program consisted of two papers, discussion of the question box and proposed consolidation with the Pennsylvania Street Railway Association and other public utilities bodies of the State. The entertainment comprised a chicken and waffle dinner, with music and outdoor baseball played with indoor equipment by the "Young Eagles" versus the "Red Ravens." As the weather was perfect, the trip up and down the mountain, with its panorama of the city of Reading, was also a most enjoyable feature.

PROPOSED CONSOLIDATION

The first order of business was general welfare. W. B. Rockwell, general manager Eastern Pennsylvania Railway, addressed the meeting on the desirability of combining the Keystone Railway Club and the Pennsylvania Street Railway Association. Furthermore, he said, it was a great burden on the individual members of the club to attend meetings every three months at their own expense. He recommended a consolidation of the two bodies, and suggested a two-day or three-day annual meeting with specialized and joint sessions, thereby following the convention practices of the American Electric Railway Association and its affiliated organizations. It might also be desirable to have a midyear meeting for committee work. The co-operation of the executive, operating and engineering departments of the electric railway interests of the State would be of the greatest value in presenting matters before the new Public Service Commission. Upon motion, President Gould appointed W. B. Rockwell, chairman; C. M. Paxton, Thomas Cooper, W. A. Heindle and F. M. Davis as a committee to confer with the Pennsylvania Street Railway Association on the question of consolidation. This committee was also authorized to report on the advisability of consolidating with other Pennsylvania public utilities, such as lighting and power companies.

AIR-BRAKE MAINTENANCE

W. G. Kaylor, Westinghouse Traction Brake Company, then read a paper on "Air-Brake Maintenance." Mr. Kaylor confined himself, however, to a discussion of how depreciation of straight-air-brake equipments could be decreased through the use of special appliances and improvements in construction. Great progress had been made in suction protectors. In the latest form oil was used to absorb the dirt taken in with the air. The air on its way to the pump did not pass through the oil, but was broken up by perforations or baffle plates which directed the incoming air toward the oil. The dirt was then entrained by the adhesiveness of the oil and settled to the bottom of the strainer, while the clean air passed on to the pump. Compared with the curled hair strainer, its efficiency was as 98 per cent to 50 per cent, and for this reason it could be attached directly to the head of the compressor, so obviating the necessity of piping the suction to the roof. The crankcase vent, through which dirt was also liable to enter, was now either fitted with a separate strainer or was connected to the suction by a pipe or cored passage. The proper protection of the intake and crank case vent would make it possible to operate a compressor in normal service for ten years or more before bushing the cylinders or renewing the bearings.

Deterioration due to corrosion, oxidation, etc., could be postponed indefinitely by enameling the reservoir both inside and out. To guard against explosions from excessive pressure, all reservoirs should be protected by a safety valve set at 10 lb. above the maximum working pressure. The safety valve, in turn, should be inspected regularly to prevent it from freezing shut on account of corrosion. When ordering motorman's brake valves the purchaser should specify types which were provided with renewable bushings. As to brake cylinders, the best grade leather should be used for packing, the expander ring should have a flat surface which distributed its pressure over a greater area than the ordinary round expander ring, and the lubricant should be a compound which would fill the pores of the leather to make it absolutely air-tight. The speaker also recommended the wider use of brake slack adjusters and of case-hardened pins and bushings for the brake rigging.

ACCIDENT PREVENTION

Mr. Rockwell then read his paper entitled "How to Prevent Accidents." He said the term "prevention" was a misnomer if understood literally, because of the frailty of human nature; the problem really was: How could accidents be reduced to a minimum? Good car and road equipment should be a matter of course, but it was of paramount importance that no car should ever leave the carhouse until the maintenance force knew that it was in perfect condition. He was strongly opposed to the open car with running boards and would change it to a center-aisle car at once.

The next important point was the character of the men on the cars. A motorman was not made in a month, but rather in two or three years, for he would learn many things long after the days of formal instruction. Thus, one thing that could not be taught, but was learned by experience, was how to handle a car on a slippery rail. No conductor should be kept on a route where he was physically unable to handle the business in schedule time with due attention to fare collection, prompt signals and the like. But the most important means of reducing accidents was to treat the men so fairly that they would feel that they were handling their own property. The motorman who was indifferent to his employer's interest would cause much loss without any tangible evidence of carelessness on his part. For example, a side wipe which ruined the varnish on one side of a car might readily have been avoided by a conscientious operator. The manager should, therefore, get next to the hearts of his men as well as to their pocketbooks.

OTHER BUSINESS

After resolutions of thanks had been tendered to Messrs. Kaylor and Rockwell for their papers, the question box was thrown open. The discussion on the merits of lined versus solid bearings for city service was particularly active. W. O. Stieff, Galena Signal Oil Company, quoted from his own experience and from data published by the American Electric Railway Engineering Association as to the necessity for larger journals and the conditions for which each style of bearing appeared to be best adapted. As the result of this discussion, W. B. Rockwell, W. O. Stieff and N. M. Lentz were appointed a committee to carry out a series of tests with a large variety of bearings on a car to be furnished by Mr. Rockwell's company. Additional members for this committee will be appointed later.

The meeting was then adjourned for luncheon and the baseball game.

Two English engineers have arrived at Bagdad to survey three different lines for an electric railway from Moazzem, 5 miles north of Bagdad, to Garara, 6 miles south of Bagdad. It was reported in May, 1912, that a concession to build this line had been granted to Mahmoud Shabander, Bagdad, and that Mr. Shabander had left for Europe to contract for engineers and materials. It is now reported that Mr. Shabander has sold his concession in whole or in part to an English firm, and that construction will begin in the near future. The engineers are surveying two lines through the city of Bagdad and a third line just along the east border of the city. A fourth line will be surveyed along the west bank of the Tigris through west Bagdad.

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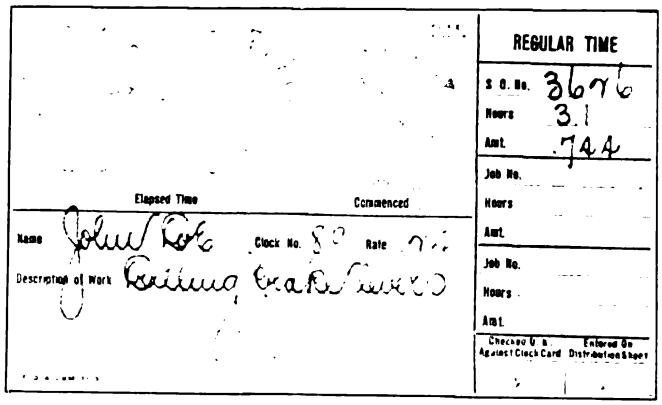
NEW METHODS OF DISTRIBUTING TIME IN THE SHOPS OF THE INDIANAPOLIS TRACTION & TERMINAL COMPANY

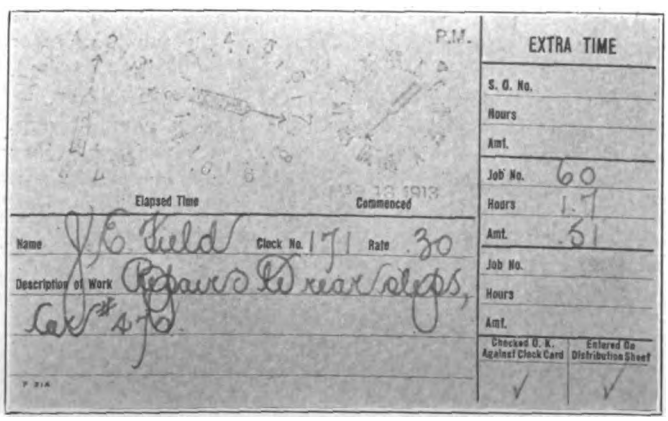
Accurate distribution of employees' time against various jobs in a general repair shop is essential if value is to be attached to maintenance cost records. To depend on the



Calculagraph Record Card for Regular Time

men to distribute their own time means, in most cases, inaccuracy, as it is not done until the close of the day's work, and with a large force the total time consumed in this way represents a considerable proportion of the total shop cost. At the shops of the Indianapolis Traction & Terminal Company, however, it is estimated that each employee consumes only between ten and fifteen minutes in making his distribution each day.

After giving this subject of lost time careful consideration, L. M. Clark, master mechanic, decided to purchase some type of time-recording device that would not only reduce the amount of time wasted by employees in computing distribution but would be accurate. The device selected took the form of a time clock and stamp which would automatically record the time of commencing a particular job on a card and when the work was completed would stamp a record of the time elapsed on the same card. In other words, this clock and card system displaces the old distribution cards which were filled out by each workman at the close of his day's work. The recording clock is known as a "calculagraph" and is manufactured by the Calculagraph Company, New York.



Calculagraph Record Card for Extra Time

In combination with the calculagraph a pigeonhole cabinet to receive the working cards has been installed. As shown in the illustration, this cabinet is arranged with two pigeonholes for each workman's number, one for jobs to be done and the other for jobs completed. At the present time three calculagraphs have been installed, one in the general repair department, one in the paint shop and the third in the carpenter shop. The accuracy of the clock movement is checked with a master clock twice each day, at 7 a. m. and 1230 p. m. Two of the clocks and cabinets have been placed so that the paint and carpenter department storekeepers may operate them and do their regular work, thus making it unnecessary to employ a clerk especially for this purpose. In the general repair shop, however, it is necessary to employ an extra clerk to operate the job card system and clock. All his time is not required for this particular work, and he is kept busy with other duties, such as writing storeroom requisitions and doing light office work.

At the close of each day's work the calculagraph cards for jobs completed and under way are turned over to the general timekeeper, who takes off the labor distribution. Employees continue to ring in and out on a time clock, and these cards furnish a check on the total time recorded against any workman on the calculagraph cards. All cards in this new system of recording time distribution are filled in by the two storekeepers and one clerk. Each of these operators is furnished with a complete list of current order numbers so that he may know to what each job is chargeable. The workman simply reports the completion or commencement of the different jobs to the operator, giving a

View of Calculagraph and Cabinet

brief description of the work done, and with the aid of the list of order numbers the proper one is written on the card. These calculagraph cards have not displaced the shop order blanks but form an accurate record of time chargeable against each order.

Essentially, the calculagraph is a clock with three time-recording elements in the form of dies which revolve with the hands of the clock. The dial which prints the time of the day remains fixed, and the hand revolves. The other two dials, one for recording elapsed time in hours and the other in tenths of hours, revolve continuously. The marker of each elapsed-time dial is secured rotatively to its respective dial but has a vertical printing movement independent of it. In beginning a calculagraph record, a card is placed face down at the right end of the slot provided for this purpose beside the clock face. The right lever is pushed away from the operator and this movement prints the time of day on the card. Without releasing the lever or moving the card the man pulls the lever back as far as it will go, which prints the two elapsed-time dials in the proper relative position to the dial showing the time of day. To close the record when a job is complete the record card

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again is inserted in the slot, and the left operating lever is pulled toward the operator as far as it will go. This prints the two hands which indicate the hours and tenths elapsed time in the proper dials.

Since both parts of the elapsed-time printing dies have been revolving during the interval between the two printings and since the printed record on the card has not been revolved, the complete record on the card will show that the arrows have rotated forward and will not point toward the zero mark where they stand in the die. The figures toward which the arrows point represent in hours and tenths the arc of their rotation during the interval of the working period. As the above mechanism permits the location on each record of a new zero, or a starting point for a new record, it is possible for one calculagraph to make elapsed-time records for any number of workmen without having its printing dies reset.

Reproductions of two of these card records in the illustrations on page 464 show the changed position of the elapsed-time dials as well as the other information deduced from this automatic distribution record. To distinguish between the regular and extra time worked, as there is a difference in the rate paid, cards of two colors are employed for the calculagraph record.

COST OF BURNING WEEDS IN OKLAHOMA

The Oklahoma Railway Company, Oklahoma, Okla., has designed and built a weed burner with which it is obtaining satisfactory results. In general, the weed burner comprises a discarded single truck equipped with two Westinghouse 12-A motors, on which has been constructed an 18-ft. platform. Two Westinghouse "D" air compressors, mounted on the car floor, maintain a pressure of 100 lb. in four 16-in. x 42-in. reservoirs removed from an old car burner moved over the track at approximately 50 ft. per minute. The cantilever arms supporting the burners and apron are adjustable, permitting the burners to be lowered to the working position or elevated for transporting over the road.

The motor controller is mounted at the center of the car floor so that the motorman may observe the quantity of weeds to be burned and adjust his speed accordingly. When the weed burner is in operation the controller usually is set at the second point, and the speed is varied by a hand-brake lever installed beside the controller.

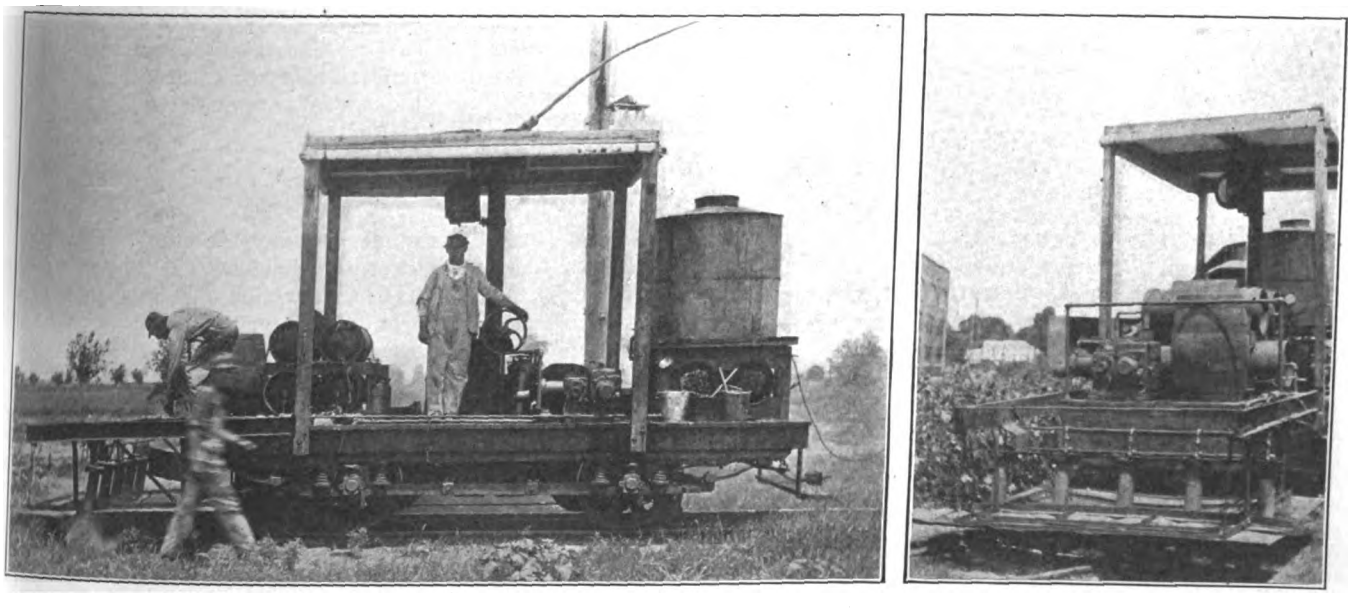
One of the difficulties experienced by other companies in the operation of a weed burner is that a great many ties are set afire, thus requiring a small gang to follow the burner at all times to extinguish them. In operating its burner the Oklahoma Railway Company has eliminated much of this trouble by attempting not to destroy the weeds totally as it moves over a section of track, but to burn them so that they will dry and blow away in a few days. Experience has developed the fact that intense heat applied for a short time cooks weeds, and although they do not differ much in appearance from that before burning, twenty-four hours later they will dry up and blow away. In some instances where the weeds are very thick badly decayed ties do catch fire, and one man accompanies the burner to extinguish these. He accomplishes his work with a bucket of water and a wet mop.

After more than a year's experience with this particular weed burner it has been found by the company that three men can operate it successfully, namely, a motorman, a burner operator and a helper who keeps the fire from spreading. The company has compiled the accompanying record, which includes the entire expense of burning weeds over the system.

COST OF BURNING WEEDS ON OKLAHOMA RAILWAY, BURNER OPERATED AUG. 15 TO SEPT. 7, 1912

Miles actually burned	56.92
Dead mileage going to and from work and switching out of way of regular cars	472.38
Total miles traveled	529.30
1292 gal. of crude oil used at 2½ cents per gal.	$32.30
Total labor cost	126.80
Cost of energy used to run car 529.3 miles at 3 kw-hr. per car mile, 1¼ cents per kw-hr	19.84
Total cost of burning weeds on system	$178.94
Cost per miles of track	$3.14
Cost per mile to remove weeds by hand	18.00
Cost to remove weeds by hand on 56.92 miles of track	1024.56

Which shows a net saving by using the weed burner of 82.5 per cent.



Oklahoma Railway Company's Weed Burner, Side and End Views

Supported at one end of the car on cantilever arms are five burners and a sheet-metal apron which deflects the heat to the ground. On the opposite end of the car a 300-gal. oil tank is installed. Two small tanks are set under the large oil storage tank to serve as reservoirs for the oil under 35-lb. pressure.

The quantity of air and oil supplied to all five burners is controlled through two valves in the main air and oil lines leading from their respective reservoirs. By forcing the oil and compressed air into a mixing chamber just above each burner and directing the flame with the sheet-metal hood, intense heat is obtained at the ground level. Best results were obtained where the weeds were thick when the

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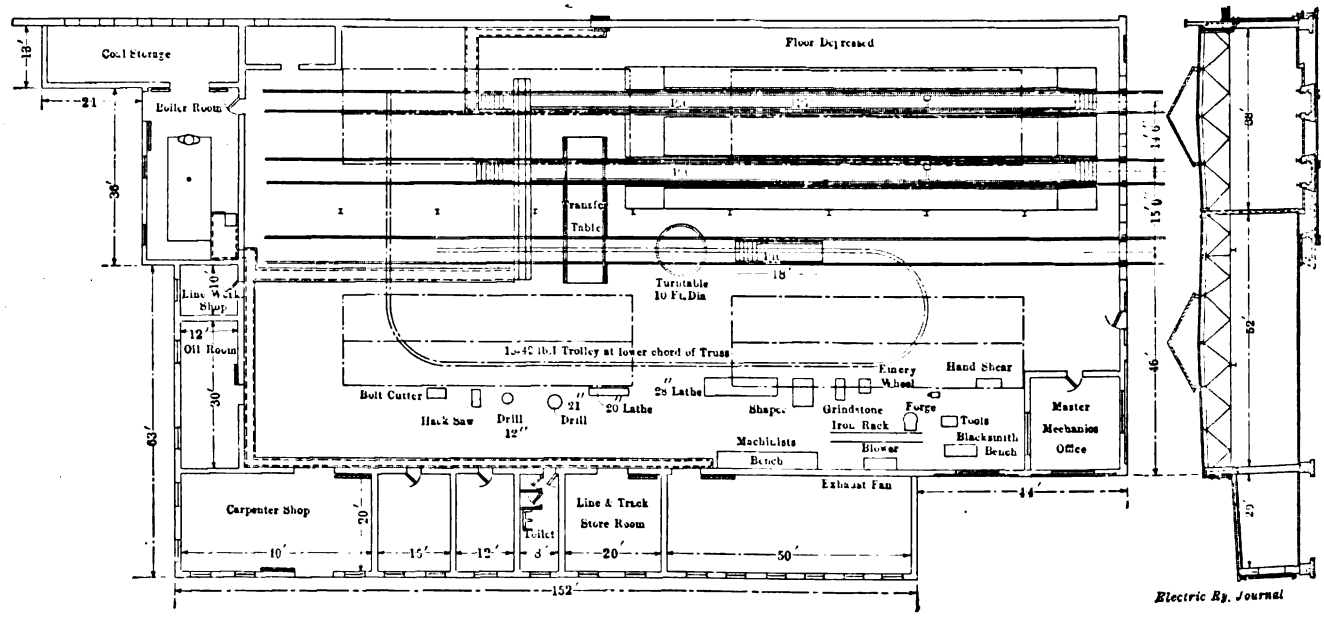
NEW SHOPS FOR THE ROCHESTER, SYRACUSE & EASTERN RAILROAD

The new shops at Newark, N. Y., which have recently been erected by the Rochester, Syracuse & Eastern Railroad, occupy the site of some shops which were burned down on April 1, 1912. The lay-out of the new building is shown in the accompanying drawings and, as these show the shops in considerable detail, attention need be called to but a few important features. The plan is based on the experience of the company with its Lakeland shops, located in a suburb of Syracuse. These have been used for several years, or long enough to demonstrate their strong and weak points.

The new building consists of two main divisions, the carhouse, 240 ft. by 82 2/3 ft., and the shops, of irregular outline, approximately 204 ft. by 105 ft. The carhouse is divided into three two-track sections by brick partitions.

The machine tools, forge, etc., are ranged along the side of the main shop and are driven from an overhead line shaft operated by a 35-hp interpole motor. A trolley hoist serves these machines, the equipment consisting of two 5-ton Yale & Towne hand-operated hoists running on a 12-in. I-beam attached to the lower chords of the roof trusses. The trolley crane is so designed that a load can be picked up from any one of the three tracks and practically from any part of the turntable track. The wood shop, armature room, store and other auxiliary rooms are in a projection from the main building.

Great stress has been laid upon the matter of ample lighting, both natural and artificial. The natural lighting is helped by the exceptionally large skylight area. The artificial lighting is furnished mainly by five-light clusters of 40-watt tungsten lamps, a total of about 200 lamps being required. The clusters are hung just below the bottoms of the trusses in accordance with an illumination plan



General Plan and Cross-Section of Repair Shop and Carhouse

In the shops are three work tracks, two with long pits and one with a short pit, these pits having floors crowned in the center with a small drainage trench on each side. On the side of every pit is a depressed floor, 18 in. below the main floor level. This depression permits a workman to carry on an inspection without stooping and greatly facilitates work on brakes and journal boxes. The floor of the building is granolithic, except in the shop, where it is of 1-in. wood laid on 4 in. of concrete, nailing strips being molded into the latter. The roof trusses over the shop are supported on the walls and upon a row of steel columns. The latter are surrounded with concrete to prevent the steel from softening in case of a car fire. All through the building a 1½-in. T-iron, supported under an inverted wood trough, is used for the contact conductor.

The three work tracks are cross-connected by a wheel pit in which the track for the jacks has been placed 10 in. off the center of the pit so that a man can squeeze by the wheels. The wheel pit is located at such a distance from the back wall of the building that there is space sufficient for a car undergoing wood-work repairs to stand on the track next the carpenter shop without interfering with the operation of the wheel pit. A transfer table for shifting trucks connects two of the tracks, one of which has a turntable for reversing the trucks. This arrangement of transfer table and tracks has been found best for removal of trucks. By means of two jacks by which one end of a car body can be raised a few inches a truck can be removed in ten minutes or less.

laid out by the Westinghouse Lamp Company. The wiring for the lighting fixtures is in conduit.

In the matter of fire protection the installation of a sprinkler system is at present under consideration. The building itself is entirely fireproof, and, as mentioned above, the columns are fireproofed to prevent softening. The only danger of fire is from cars in storage or undergoing repairs. The company has made a careful study of the causes of car fires and has taken every precaution to remove them. It is likely, however, that a sprinkler system will be installed in this as well as the other shops and carhouses of the system.

The Newark shops are conveniently located for handling the work of the central division of the Beebe lines. Newark is about midway between Rochester and Port Byron, where the Rochester, Syracuse & Eastern Railroad connects with the Auburn & Northern. At Newark the Newark & Marion Railway joins the main line. Thus the shops are within easy reach from at least a third of the trackage of the system.

An agreement as to the financing of the proposed Vienna (Austria) Electric Underground Railways and the electrification of the Vienna Metropolitan Railway has been arrived at between the Austrian group, the Austrian Siemens-Schuckert Werke, and the French group under the auspices of the Société Centrale des Banques de Province and the Compagnie Omnium Lyonnais. The capital of the construction company has been fixed at $10,000,000.

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TWIN CITY WELFARE NOTES

The relations of the management of the Twin City Rapid Transit Company with its men have always been satisfactory and the company does not hesitate to make any reasonable expenditure to promote their welfare. Fortunately for both, Minneapolis has a Young Men's Christian Association which is alive to its opportunities for usefulness. Particular attention has been given to the electric railway men by one of the secretaries, F. M. Anderson, who has the rare gift of developing the initiative of the men so that they are able to plan for themselves. The secretary gives talks in the carhouses at 10 o'clock in the morning with such good results that the motormen and conductors much prefer listening to his addresses to loafing between runs. Evening entertainments are also handled by the secretary with excellent support. On account of the past successful work of Mr. Anderson the company arranged on Aug. 1 for him to devote all of his time to its men.

Twin City Welfare Work—Lake Street Carhouse

The actual work of planning entertainments is done by committees appointed by the division superintendent. Parties are held at more or less regular intervals, three or four to a station during the winter. The usual entertainment is a card party followed by a dance and refreshments. The cost of music, refreshments, prizes and incidentals is borne by the company entirely. The company is considering the purchase of a moving-picture equipment next winter to enable the men to vary the nature of their entertainments.

All carhouses are provided with club quarters comprising reading and rest rooms. The men may also spend the night in the carhouses, as cots, blankets and towels are furnished for that purpose without charge. Pianos, shower baths, punching bags and other sources of recreation and comfort form parts of all equipment. Pool tables have recently been added and pool tournaments in and between stations were conducted last winter with great success. Individual medals and a large loving cup were presented by the company, the latter as a station trophy. The athletic apparatus has been so popular that the installation of small gymnasiums is being considered for next winter. Barber shops are provided at all stations. The company supplies the equipment but does not pay the barbers, who work independently but under an agreement as to prices to be charged the men. The convenient location and reasonable prices of these shops are effective in encouraging the men to maintain a neat appearance.

Twin City Welfare Work—Nicolet Avenue Carhouse

The company has not found it satisfactory to conduct elaborate restaurant service, but its light lunch counters, where cigars, soft drinks and fruits are sold at cost, are very popular.

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COMMUNICATION

NEW YORK BRAKE TESTS

Public Service Commission, First District
New York, Sept. 15, 1913.

To the Editors:

I wish to thank you for the way in which my article on the "New York City Brake Order" has been presented in your issue of Sept. 13. The care and accuracy with which such technical articles are published form one of the strong points of the Electric Railway Journal. I note that George L. Fowler, the consulting engineer retained by the Brooklyn Rapid Transit Company to conduct its brake test, alluded to in the article, has made certain criticism of my conclusions. I beg to say just a word in reply.

His letter apparently suggests that there is a dispute as to the facts. All the facts in the case, including the tests omitted from the article, were presented before the Supreme Court. The Brooklyn Rapid Transit Company was represented by able counsel. The decision of the court was based on the facts and was unanimous. Therefore, it seems fitting to refer to the decision of the court for a correct interpretation of the facts.

Mr. Fowler claims that the wet-rail tests and the motor-reverse tests which have been omitted from the article afforded material evidence. It is necessary to point out that such a claim appears inconsistent. The value ascribed by Mr. Fowler during the progress of the tests to those made on a wet rail is indicated by the following extracts from the minutes:

> George L. Fowler: "We tried to get our dry-rail conditions identically the same." *Q.* "Then you tried to get your wet-rail conditions the same." *A.* "But we could not because it is impossible." (Folio 704.)
>
> E. G. Connette: "For these reasons we agree with the Brooklyn Rapid Transit Company in confining the discussion to the dry-rail tests." (Folio 792.)

As regards the motor-reverse stops, apart from the fact that these are tests not of the brakes but of the motors and of the circuit-breaker adjustment, it is also a fact that all the latest tests made by Mr. Fowler on both air brakes and hand brakes omitted the reverse stop.

The results of air-brake "service" tests were not given in the article. These tests also were abandoned by Mr. Fowler long before the series was completed. These results—namely, the wet-rail stops, the motor-reverse and the air-brake "service" stops—are the only ones made by Mr. Fowler which have been omitted in the article.

All the tests were fully considered by the commission and fully presented to the court. The decision of both commission and court was based on such tests as they thought truly indicated the value of the brake.

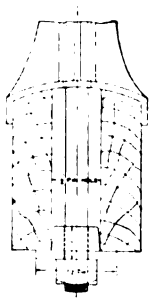
J. N. Dodd.

PURE IRON VERSUS COPPER-BEARING STEEL

Dr. A. S. Cushman, director of the Institute of Industrial Research, Washington, D. C., has just issued a bulletin discussing the merits of pure iron versus copper-bearing steel from the standpoint of resistance to rust. Dr. Cushman mentions his earlier work, issued by the Department of Agriculture, in which he urged manufacturers to eliminate the use of manganese in farm fence wire, etc., in order to produce a metal of a slow and even rusting quality. Owing to the demand for such a metal great progress was made during the years 1909 and 1910 in the manufacture of commercially pure iron in the basic open-hearth furnace. During the following year, however, other metallurgists brought forth the theory that the addition of a small quantity of copper to steel would make it rust-resistant. Dr. Cushman, in opposing this theory, points out that the favorable results reported with such alloys were made under special conditions and that it is very unlikely that the mere addition of a small quantity of copper to ordinary commercial steel would have any beneficial effect. In contrast to this he presents the history of some well-preserved ancient utensils which were found to consist of exceptionally pure wrought iron with an unimportant admixture. Further, he contends that the consumer would have difficulty in determining whether the specifications were carried out beyond that of the presence of copper. On the other hand, if an engineer or other consumer demanded a commercial iron of a given limit of purity the chemical analysis would be much more likely to insure delivery up to specification. Again, if the use of coppered steel became general in the future, the scrap which is so necessary for the proper conduct of the open-hearth furnace would become infected with copper. As this copper is not eliminated by the refining reactions of the open-hearth process a general deterioration of the best quality of iron and steel products would be sure to take place.

ADAPTER CROSS-ARM WASHER

The washer or bushing shown in the accompanying cut has been placed on the market by the Electric Service Supplies Company for use with its Keystone truss pins. When used with these pins, it readily adapts the cross-arm hole for 1½ in. so that an iron truss pin with a curved base like that shown may be used. This adapter makes it possible to replace wooden truss pins with iron pins without placing new cross-arms. It is particularly valuable when difficulties arise such as running a heavy feeder over an old line or when the need for pins of greater strength at curves arises. In neither case has it been found necessary to change the cross-arms or to bore new holes. This method is available for complete renewals of line truss pins.



Cross-Arm Washer

A NEW 6-TON CHAIN HOIST ASSEMBLY

In handling weights of more than 1 ton or 2 tons with a portable chain hoist the users have met much trouble and inconvenience in suspending the hoist. The ordinary 6-ton hoist, for example, weighs 400 lb., so that either another hoist or special scaffolding is required to put it up. To overcome this drawback, the Wright Manufacturing Company, Lisbon, Ohio, has designed a 6-ton hoist any part of which can be carried up a ladder and suspended from the track. This hoist is shown in the accompanying illustrations.

Six-Ton Hoist Arranged for Lower Capacities

To install the device the chain is run off the power part of the hoist, thereby leaving less than 150 lb. to lift. Next the idler blocks are put up and then the load chain is run back on the hoist. This design may be used as a 2-ton hoist if employed without either idler, or as a 4-ton hoist if the top idler and hook are retained.

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News of Electric Railways

Unsuccessful Attempt to Precipitate Strike in Indianapolis

Following the failure of the strike on the Indiana interurban lines, an attempt was made to organize the men on the city lines of the Indianapolis Traction & Terminal Company, Indianapolis, with a view to calling a strike during State Fair week, Sept. 8 to 13. John D. Lingenfelter was arrested on Aug. 30, following an investigation of the cutting of feed wires on the Brazil and Danville divisions of the Terre Haute, Indianapolis & Eastern Traction Company during the attempted strike on the interurban lines, and the organizers who were at work among the men on the Indianapolis city lines left the city. The leaders of organized labor in Indianapolis stated early in September that W. D. Mahon, of the Amalgamated association, had placed the work of organizing the men of the local city lines in the hands of the leaders of the Central Labor Union, Mr. Mahon informing them that they would be backed by the Amalgamated association in whatever course they thought best to pursue. Public sentiment was aroused against the attempt to induce the car men to strike during fair week. The day the fair closed, Sept. 12, organizers made another attempt to induce the men to strike.

On Sept. 8 the International Brotherhood of Electrical Workers called a strike of the linemen of the various interurban and city lines in Indiana. About nine men from three of the six divisions of the Terre Haute, Indianapolis & Eastern Traction Company, eight from the city lines of the Indianapolis Traction & Terminal Company, ten from the several divisions of the Union Traction Company of Indiana, five or six from the Indianapolis & Cincinnati Traction Company and a few men from other smaller lines in the State walked out. The places of these men were filled at once and the work of the different line departments was not interrupted.

Franchise Progress in Kansas City

As a result of conferences between the receivers of the Metropolitan Street Railway and representatives of Kansas City, Kan., and Kansas City, Mo., in regard to the franchise submitted by Mayor Jost on Aug. 13, Section 1 was agreed upon recently as follows:

"The authority is granted to operate a street railway system in streets of the cities.

"No general right to construct subways or elevated structure is granted, the intent being to prevent excessive additions to the capital of the company and to leave the cities free to grant franchises for such projects to other companies.

"The franchise must be accepted within fifteen days after its passage.

"The federal court and the receivers will cause to be deposited a sum sufficient to pay the expenses of the election.

"The company is required to take over in a prescribed manner all of the property, franchises and privileges of the old companies free from all encumbrances. Any claim then unknown, afterwards appearing, shall be met by the new company without addition to the capital value or any effect upon the interest of the cities in the property.

"The obligations to the cities are to be the first and paramount obligations of the company, prior to any other lien or right against the property or earnings.

"The company is not to be required to acquire funds held for special purposes, such as stocks, bonds, notes, accounts or claims of any kind, that the several companies may hold against each other or the Kansas City Railway & Light Company. Such accounts and claims, however, shall be surrendered and canceled when necessary to free the property acquired from all encumbrances.

"Moneys, notes and liquid assets in possession of the receivers may be used to pay liabilities of the receivership in order to free the property.

"Any surplus money or liquid assets thereafter remaining shall be charged to the capital account for operating expenses, according to the purpose for which they may be used, as determined by the board of control.

"The city gives its consent for the transfer of the properties from the old companies to the new. When that is done the city shall relieve the old companies of all obligations of the old contract.

"The receivers, with the consent of the court, are to operate the property under the terms of the new franchise, pending the transfer of the property to the new company.

"The Kansas City Railway & Light Company shall deposit bonds for $100,000 that the property, privileges and assets of the old company will be acquired by and transferred to the new company within six months."

At a conference held later the reorganization of the existing companies and the election and qualification of the directors to represent the city was provided for in the following words:

"The stock of the new company shall, pending the acquisition of the title as aforesaid, be deposited with William C. Hook, judge of the United States Circuit Court of the Eighth Circuit, to be by him or his successor in office held for the benefit of the parties entitled thereto under and pursuant to a plan of reorganization to be hereafter prepared, or in case reorganization cannot be effected, then for the benefit of those who paid for the stock.

"Such plan of reorganization must be in harmony with the provisions of this ordinance and must be so drafted that it will carry out its purposes and spirit, and must be approved by said Judge William C. Hook or his successor in office before it can be adopted and put into operation.

"It shall be organized with eleven directors. Kansas City, Mo., shall select in the manner hereinafter provided three of such directors, and Kansas City, Kan., shall have the right to select two. The number of directors shall not at any time be changed without the consent by ordinance of the city first being obtained.

"No person so designated by either city shall be eligible to serve if he, either as principal or agent, has any direct or indirect financial interest or motive in the business of the company. If at any time he has any interest his right to the office shall forthwith cease.

"The board of directors shall not have the authority to delegate its power to any executive or managing committee of the company without the unanimous consent of the city's directors as to the organization and formation of such committee.

"The city hereby designates —— and —— as the persons to be elected by the company for and in behalf of the city as directors to be elected and re-elected by the company as such directors for a period of two, four and six years respectively. Said persons shall serve as such directors until their successors have been designated, elected and qualified as hereinafter provided.

"The successors are to be chosen by the Kansas City Court of Appeals from a list of five names for each place submitted by the mayor."

Subsequent conferences were concerned principally with matters of detail. It was agreed that the franchise should be for a period of thirty years and become operative immediately after the ratification of the franchise by the people. As to street paving, grading and other physical matters the receivers practically agreed to pave between the tracks and 18 in. outside. Failure to pave or keep the pavement in repair justifies the city in having the work done and charging the cost up to the company.

For three years the company is required to spend $1,000,000 a year from the capital account in rehabilitation of the system, general improvements and the building of extensions. It must also build 2 miles of double track, or 4 miles of single track extensions and additions every year for three years, when the board of control certifies to the Council the necessity for them and certifies that the extensions or additions will net 6 per cent of the cost of operation.

Some difficulty has arisen in the conferences on account

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of differences between the two Kansas Cities. The Kansas City, Kan., officials desire immediate improvement of service and extensions of lines, instead of provisions for amortization and future financing, and have withdrawn from the conferences. This will necessitate separate negotiations with this city in due time.

The next question of importance to be decided in Kansas City, Mo., is that dealing with a board of control to have charge of the physical operations of the new company. Mayor Jost asks that he be permitted to appoint one member, the company one, the third to be appointed by the Kansas City Court of Appeals. The receivers prefer that the third member of the board be named by the Missouri Utilities Commission, and there may be a compromise by empowering the chairman of the commission to confer with the Court of Appeals in the selection.

Increase in Railway Tax Valuations in Ohio

The valuation placed on the street, suburban and interurban railways by the State Tax Commission of Ohio for this year is $143,075,690, compared with $136,137,135 for 1912. Nearly half of the increase is on the property of the Cleveland Railway. The increase on the property of the Cincinnati Traction Company was only $19,000. There was only a small increase in the valuation of the property of the Ohio Electric Railway. The valuations placed on the property of some of the principal companies compare as follows with the valuations for the previous year:

Name of Company	1912	1913
Cincinnati Traction Co.	$18,516,420	$18,535,630
Cincinnati & Columbus Traction Co.	511,580	499,760
City Railway (Dayton)	2,685,740	2,886,600
Cleveland, Painesville & Eastern R. R.	1,601,450	1,684,930
Cleveland & Eastern Traction Co.	664,130	670,400
Cleveland, Painesville & Ashtabula R. R.	471,850	475,770
Cleveland, Southwestern & Columbus Ry.	4,234,070	4,257,220
Cleveland Ry.	19,854,850	22,124,180
Columbus, Delaware & Marion R. R.	1,273,130	1,514,350
Columbus Railway & Light Co.	11,871,130	11,911,140
Dayton, Covington & Piqua Traction Co.	485,360	539,760
East Liverpool Traction & Light Co.	1,675,000	1,699,150
Interurban Railway & Terminal Co.	828,210	828,210
Lake Shore Electric Ry.	4,514,920	4,590,850
Lorain Street R. R.	790,850	824,240
Mahoning Valley Railway Co.	2,790,750	2,850,950
Mansfield Railway, Light & Power Co.	864,110	872,240
Northern Ohio Traction & Light Co.	10,959,830	12,742,760
Oakwood Street Ry.	403,320	403,320
Ohio Electric Ry.	13,316,550	13,567,440
People's Ry.	1,593,040	1,597,090
Portsmouth Street Railway & Light Co.	852,130	896,250
Scioto Valley Traction Co.	1,663,300	1,764,060
Springfield Ry.	936,220	939,020
Stark Electric R.R.	1,198,790	1,211,010
Steuben & East Liverpool Traction & Light Co.	1,243,470	1,277,710
Steuben & Wheeling Traction Co.	405,930	412,380
Toledo, Fostoria & Findlay R. R.	805,590	816,250
Toledo & Indiana R. R.	896,650	931,780
Toledo Rys. & Light Co.	8,117,950	8,617,450
Toledo & Western R. R. Co.	918,790	944,520
Toledo, Bowling Green & Southern Traction	1,515,140	1,525,430
Western Ohio R. R.	2,460,300	2,558,160
Wheeling Traction Co.	1,028,380	1,102,450
Totals	$136,137,135	$143,075,690
1913 valuation		$143,075,690
1912 valuation		136,137,135
Increase over 1912		$6,938,555

Illinois Commission Revises Overhead Power Line Crossing Rules

The Illinois Railroad & Warehouse Commission as a result of hearings on fourteen petitions, five coming from the Aurora, Elgin & Chicago Railroad and nine from the Chicago, Milwaukee & St. Paul Railway, a steam railroad, to cross other steam roads with overhead high-tension transmission lines, has decided to revise its rules governing the installation of telegraph, telephone and power lines over the right-of-way of railroad companies. The revised rules will conform to the specifications adopted by the joint committees for overhead crossings of light power lines. The Aurora, Elgin & Chicago Railroad, in filing its petitions, claimed that it had conformed to the specifications adopted by the joint committee for overhead crossings of light and power lines and had provided an overhead clearance of 30 ft. The rules of the Illinois Railroad & Warehouse Commission for overhead line crossings provide for an overhead clearance of 35 ft. On Sept. 4, the members of the commission heard the appeal of the companies and agreed to issue an order for each of the fourteen crossings if both the Aurora, Elgin & Chicago Railroad and the Chicago, Milwaukee & St. Paul Railway conformed to the joint specifications. The engineers for the Railroad & Warehouse Commission will begin at once to revise these rules, using as a basis the specifications adopted the joint committee.

The Boston Arbitration Hearings

The duties and working conditions of power station employees and substation attendants occupied a large share of the attention of the arbitration board sitting in the Boston Elevated Railway labor investigation during the week ended Sept. 20. Additional data were presented by the company upon the ruling of the board in relation to the salaries of subordinate officials. J. Henry Neal, general auditor, stated that the accounts of the company are kept according to the Interstate Commerce Commission's classification; that all salaried officials are required to sign receipts for their compensation, and that all vouchers and payrolls are kept for six years. Fred S. Freeman, superintendent of power, reviewed the working conditions in generating plants and substations. At the main 45,000-kva alternating current generating station in South Boston there are three chief operators and three switchboard operators. The latter work eight hours daily, but are allowed one day off per month without loss of pay. These men receive a vacation in the summer. Each substation on the system is in charge of a foreman who is responsible for its operation and maintenance. The usual hours of such employees are daily from 9 a. m. to 12 noon and from 1 to 6 p. m. In steam generating stations of the direct-current type the switchboard operator is in charge of the regulation of voltage and load on the different machines, putting machines on the line, withdrawing them, handling circuit-breakers, reading meters and looking after switchboard connections. The evidence presented did not indicate hardship in the working conditions of employees in electric plants, although an effort was made by the counsel for the men to show that these working conditions are unusually hazardous. In a representative substation the foreman receives $21 per week, and under him are three operators paid $18 in one case and $16 in the others. Rubber gloves are furnished men engaged in switchboard work. Mr. Freeman said that in his opinion the work at the South Boston main plant switchboard was no more difficult than at a substation, except that the responsibility was greater in the former case. Oilers are paid from $14 to $16 per week. The work of these employees was stated by Mr. Freeman to be substantially uniform at all stations. Inspections of the lubrication conditions are made in representative plants every twenty minutes upon the sound of a gong. Mr. Freeman stated that a green man should become a good fireman in six months, if at all, and that in two months a man should become a competent oiler. About 350 men are employed under the superintendent of power.

The irregular conditions accompanying the unloading of coal from vessels were described, and it was stated that when a barge arrives at a plant the unloading of fuel is continuous until the work has been completed. This usually requires eighteen to twenty hours, but sometimes thirty-six hours. Conveyor men are allowed "time-and-a-half" pay for overtime work. Bonus systems are in use for stevedores, hatchmen and tower engineers. Trimmers are paid 25 cents an hour without bonus opportunities. The rate of pay for coal-hoisting engineers is $20 a week for seven days' work, but by their own volition they usually work only six days out of seven, earning $17.10. Boiler-room repair men are paid as a rule from $12 to $14 a week. Feed-pump operators are now standardized at $14 a week. Watchmen are paid $14 a week and work eighty-four hours, while janitors and cleaners work sixty hours a week at from $10 to $13.30. The point was brought out that when the company's coal-handling force was reduced it was the result of improvements in coal-handling machinery which doubled the efficiency of the individual employee. Thus far the company has never had a serious accident in any of its power stations. In illustrating the bonus system which applies to the discharge of fuel it was stated that if a vessel of 1700 tons' capacity discharged in twenty-four hours instead of the standard allowance of thirty-six hours there would be

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a bonus of $45, of which the foreman in charge receives 20 per cent and the hatchmen and hoisting engineers divide the balance according to the number of hours each man has worked. The company retains half the bonus on any saving in cost. It was shown by Mr. Freeman that although long hours are frequently required in coal unloading, a hoisting engineer sometimes earns no less than $65 in a week through the arrival of two boats, overtime, bonuses and regular pay. The machinery operated by the hoisting engineer is mainly of the automatic type. A hoisting engineer's pay for several weeks was as follows: Worked seventy-five and a half hours, paid $47.20; worked eighty-four hours, paid $65.85; worked sixty-three hours, paid $66.04; worked seventy-two and a quarter hours, with no bonus, paid $23.89; worked fifty-four and a half hours, with bonus of $21.56, paid total of $39.26. The engineer stated on the stand that he preferred a fixed rate of pay to the bonus system.

Report of the New York Railways Association

The following statement of receipts and disbursements of the New York Railways Association for the year ended June 30, 1913, was published in the annual report of the New York Railways:

RECEIPTS	
Dues	$25,939
Initiation fees	2,809
Pool rooms	2,627
Entertainments	5,812
Interest on investments and deposits	2,273
Miscellaneous	397
Total receipts	$39,857
DISBURSEMENTS	
Sick benefits	$17,758
Death claims	13,186
Medical fees	4,649
Pool rooms	1,466
Stationery and printing	1,211
Entertainments	1,053
Miscellaneous	55
Total disbursements	$39,375
Cash on hand:	
June 30, 1913	$6,262
July 1, 1912	5,780
Excess—Cash surplus	$482
Total	$39,857

According to a statement of the lunchroom fund for the year ended June 30, 1913, the donation of rentals for the lunchroom, the equipment replacements, deposits and the interest on deposits make up total receipts of $7,057, from which disbursements were made to the extent of $500 advanced to the loan fund account on July 11, 1912, and $71 for equipment replacements, leaving a balance on hand July 1, 1913, of $6,486, the balance on hand July 1, 1912, of $3,688 being included.

The loan fund account for the year ended June 30, 1913, shows the following: The amount advanced from the lunchroom fund, $1,500; amount of unpaid loans, $927, and 226 loans made during the year to employees who, on account of disability or sickness in their families, were in temporary financial distress, $3,640. Payments on account of the above loans have been made to the extent of $3,940, leaving a balance on hand in the loan fund account of $874. Under the pension system of the company the total pensions paid during the year ended June 30, 1913, amounted to $7,473. The number of pensions granted during the year was ten and the number of pensions terminated by death during the year was two. A report of the New York Railways Association for the year ended Sept. 19, 1912, was published in the ELECTRIC RAILWAY JOURNAL of Jan. 25, 1913.

Chicago City Council Again Considers Subway

A sub-committee of the local transportation committee of the Chicago City Council again took up the question of subway systems for the city of Chicago at a meeting held on Sept. 10. At this conference members of this sub-committee and representatives from the corporation counsel's office and the elevated railways discussed the new plan presented in a communication of Mayor Harrison to the Council, in which he recommended that the question of the construction of subways be submitted to a referendum vote. The communication contained two ordinances, one for downtown subways to be leased to the elevated railways, and another for a comprehensive independent system of rapid transit subways. The purpose of the meeting of the sub-committee was to review the two ordinances and obtain a statement of terms and conditions upon which the subway could be leased by the city to the elevated railways. The representatives of the elevated railways agreed to submit terms under which a lease could be accepted from the city. The sub-committee cannot complete its work and submit the ordinances to the local transportation committee until the companies' reply has been received.

Through Routes and Interchange of Transfers in Chicago

Acceptance by the Chicago & Oak Park Elevated Railroad of the Council ordinance of July 28 was authorized in an order filed in the United States District Court at Chicago on Sept. 6 by Federal Judge Christian C. Kohlsaat. This ordinance relates to the through routing of north and south side elevated trains, and the interchange of transfers by the four elevated systems.

In his order Judge Kohlsaat directed Samuel Insull, receiver for the Chicago & Oak Park Elevated Railroad, to file with the city clerk his acceptance of the ordinance. The receiver was further authorized to do all the work that the ordinance provided should be done by the elevated road and to carry out all the provisions of the ordinance.

To meet the expense that will be incurred in the change provided by the ordinance Mr. Insull was authorized by Judge Kohlsaat to issue receiver's certificates and from the sale of these provide funds for the improvements in the road's structure.

As affecting peculiarly the Chicago & Oak Park Elevated Railroad the ordinance says a third track shall be constructed on the structure between North Crawford Avenue and North Feramie Avenue, and a third track between North Rockwell Street and North Ashland Avenue. Improvements that will affect all the elevated systems will be made as provided in the ordinance in the "loop" district, where various stations will be increased over their present length by from 6 ft. to 350 ft.

New Officers of the Massachusetts Street Railway Association

At the annual meeting of the Massachusetts Street Railway Association held at Young's Hotel, Boston, Mass., on Sept. 10, 1913, officers were elected as follows for the ensuing year: President, H. H. Crapo; first vice-president, W. W. Sargent; second vice-president, D. A. Belden; secretary, Charles S. Clark; treasurer, Frederick H. Smith; executive committee, H. H. Crapo, president of the Union Street Railway and the New Bedford & Onset Street Railway, New Bedford; W. W. Sargent, president and general manager of the Fitchburg & Leominster Street Railway, Fitchburg; D. A. Belden, president of the New Hampshire Electric Railways, Haverhill; Francis H. Dewey, president of the Worcester (Mass.) Consolidated Street Railway; Robert S. Goff, vice-president and general manager of the Bay State Street Railway, Boston; P. F. Sullivan, president of the Bay State Street Railway, Boston; J. T. Harmer, president of the New England Investment & Security Company, Springfield; J. L. Richards, president of the Middlesex & Boston Street Railway, Newtonville.

Bill to Compel Installation of Block Signals.—Representative Esch has reintroduced in the House of Representatives his bill intended to require the use of the block system by common carriers engaged in interstate commerce. A similar bill was introduced by Mr. Esch last April.

Collision Near Massillon, Ohio.—More than a score of persons were injured on the evening of Sept. 10, when two cars of the Northern Ohio Traction & Light Company, running between Massillon and Canton, Ohio, collided head-on on a curve 4 miles east of Massillon.

Decision in Paving Suit in Kentucky.—The circuit court at Winchester, Ky., has decided that the Kentucky Traction & Terminal Company, Lexington, which operates in Winchester, must pay the cost of paving the street within its tracks and 18 in. outside. The company will appeal the decision.

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Complaint in Regard to Violation of Labor Law Dismissed.—The complaint made by one of the inspectors of the Department of Labor of the State of New York against the officials of the Brooklyn Rapid Transit Company, to the effect that the company was violating the labor law, was dismissed by Magistrate Nash in the Adams Street court on Sept. 15.

Effort to Revive Plan to Build Municipal Line in Tacoma.—The construction of a municipal electric railway from the heart of the business district of Tacoma, Wash., to the manufacturing sites on the tide flats is being agitated again. Late last fall the proposition carried at the election, but the proposed bond issue to build the line was voted down. According to City Engineer Raleigh the question of issuing bonds to provide funds to construct the line will be submitted to the voters at the November election.

San Francisco Supervisors Pass Railway Bond Issue.—The Supervisors of San Francisco, Cal., have passed to print the ordinance providing for the issuance of $3,500,000 of 5 per cent bonds to provide for the extension of the municipal railway system on Van Ness and Potrero Avenues, Stockton, Eleventh, Church, California and other streets. Two accompanying resolutions were adopted, one formally declaring the result of the late bond election, the other requesting the city attorney to solicit offers from the Presidio & Ferries Railway for the sale of such of its property to the city as might be useful in the carrying out of the proposed extension plans.

Lehigh & New England Railroad Investigating Advisability of Electrification.—The report published in the daily papers to the effect that the Lehigh & New England Railroad, South Bethlehem, Pa., contemplates electrifying its lines in the anthracite region has no foundation in fact. The company has considered the subject of electrification in a general way and is investigating the advisability of electrifying some of its railroad tracks around the mines in the Panther Creek Valley, with the idea of using power to be generated at the plant of the Navigation Electric Company now in course of erection at Hauto, Pa., but nothing has definitely been decided.

Report on Earnings of Canadian Line Under Electrification.—Thomas Marshall, traffic expert of the Toronto (Ont.) Board of Trade, who was engaged by the City Council of London, Ont., to report on the probable earnings of the London & Port Stanley Railway, owned by the city, if the line were electrified, estimates that the second year after the motive power of the road has been changed from steam to electricity the gross earnings will be $202,000, as follows: passenger revenue, $80,000; freight revenue, $95,000; trackage and terminal rights, $20,000; express, mails, etc., $7,000. Last year the passenger earnings were only $32,000. The people are to vote on the question of electrification early in October.

Tunnel Plans Being Considered in Providence.—In connection with the proposed underground system for Providence, R. I., tentative plans for the construction of two new tunnels have been presented to the subway committee of the City Council by William W. Lewis, its consulting engineer. Among the exhibits was a drawing which showed a subway running east and west, with terminals at the Red Bridge and Olneyville, and a north and south tube connecting the North Burial Ground section with Trinity Square. The two bores are to cross each other in the business district. The committee has passed a resolution asking for an additional appropriation of $5,000 to carry on the preliminary studies and make surveys before a full report on the proposed tunnels is presented.

Jurisdiction of Ohio Commission Questioned.—The Northern Ohio Traction & Light Company, Akron, Ohio, in answering a petition filed with the Public Service Commission has denied that the commission has jurisdiction over its lines. Two weeks ago a petition was filed with the commission in which complaint was made against the company to the effect that passenger service which had been operated through property of the complainant near Akron had been diverted to another line and that it was impossible for the complainant to secure adequate service. It was charged that when the franchise was granted to the company it was to operate on a certain schedule through the property of the plaintiff. In its answer the company says that it has changed its route to avoid dangerous curves and to shorten the line between Akron and Cleveland.

Petition to Intervene Denied.—The Public Service Commission of the Second District of New York has denied the application of the International Railway, of Buffalo, to intervene in the matter of the complaint of Louis P. Fuhrmann, as Mayor of Buffalo, against the Cataract Power & Conduit Company, upon which complaint the commission entered an order on April 2 whereby certain rates and charges for electricity were fixed for the power company. The International Railway, in its petition, asked that it be allowed to intervene in the proceedings and make necessary proof of the facts concerning a contract existing between it and the power company and that the company be enjoined from charging or receiving from the International Railway any greater compensation for services than it charges and receives from any other consumer receiving like service.

Increase in Wages in Manchester.—The Manchester Traction, Light & Power Company, Manchester, N. H., has increased the wages of the motormen and conductors in its employ. The new scale went into effect on Sept. 15. The notice to the employees informing them of the increase is concluded with the following reference to the wags as advanced: "Regular men will receive a minimum of 26 cents and a maximum of 29⅛ cents an hour on the following scale: Eight-hour men, 29⅛ cents an hour; eight and one-fourth hour men, 28 3-11 cents an hour; eight and one-half hour men, 27 8-17 cents an hour; eight and three-fourths hour men, 26 5-7 cents an hour; nine-hour men, 26 cents an hour. Extra men will receive a minimum of 23 cents and a maximum of 26 cents an hour on the following scale: First year, 23 cents an hour; second year, 24 cents an hour; third year, 25 cents an hour; fourth year, 26 cents an hour.

Salaries of Officials No Criterion.—In its issue of Sept. 13, 1913, *Truth*, published in Boston, said in part in referring to the subject of salaries paid to the officers of the Boston (Mass.) Elevated Railway: "The question of salaries paid to the officers of the Boston Elevated Railway never should have been permitted to enter into the present wage controversy. The Boston Elevated Railway does not pay its president $30,000 a year and other officials from $4,000 to $15,000 because it wants to, but because it has to. If it wants men of ability and experience, who will keep the road up to the standard of efficiency, it must pay the price. Ability, especially executive ability, comes high. Should the officials of the Boston Elevated Railway leave their present positions, they would probably be snapped up by other railway companies at higher salaries than they are now getting. Of how many conductors or motormen would the same be true?"

More Rapid Transit Construction Bids in New York.—Bids for the construction of Section No. 2 of the Seventh Avenue subway in Manhattan will be received by the Public Service Commission for the First District at 12.15 p. m. on Oct. 1. This is the first construction contract on the Seventh Avenue extension of the existing subway to be submitted to bidders. This extension leaves the present subway at Times Square and runs down Seventh Avenue and Varick Street, West Broadway, Park Place, Beekman Street, William Street and Old Slip, to and under the East River to a connection with the present subway in Brooklyn. There will also be a two-track extension from Park Place south to the Battery. North of Park Place the road will be a four-track line. When completed the extension will be operated under the dual system contracts by the Interborough Rapid Transit Company. Section 2 is under Greenwich Street, West Broadway and Park Place.

Ruling in Regard to Free Transportation in Indiana.—On Sept. 13 the Public Utility Commission of Indiana entered an order providing that the blind may not ride free of charge on street cars in cities in Indiana hereafter. The order of the commission was entered on a petition from residents of Terre Haute calling the attention of the commission to the practice of the company in Terre Haute of allowing blind persons to ride free on the street cars. The railway tracks and crossings at grade in that city are so numerous that it is exceedingly dangerous for blind per-

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sons to travel from one part of the city to another except on the street cars. The petitioners asked that the commission interpret the public utilities act passed at the 1913 session of the Indiana Legislature. The order of the commission states that the term "blind," as used in the petition, evidently referred to a class of citizens and not to a body of inmates of any "eleemosynary or charitable institution," free transportation being allowed to the latter under the utilities act. "The blind cannot be included in the class of destitute or homeless persons," the order said in denying the petition. "The purpose of the Legislature is to prevent public utilities for any purpose from extending gratuities in the way of service or commodity at the expense of the patrons who pay for their service."

Newark Franchises Considered.—The last of the applications made by the Public Service Railway, Newark, N. J., for franchises in connection with the proposed terminal were considered by the Board of Works of Newark on Sept. 11. Seven more franchises were granted by passing the third and final reading, while six others were passed on first and second reading. The agreement between the city and the company was also put through in ordinance form on first and second reading. The franchises finally granted, which must be accepted by the company within twenty days, are for the elevated structure over Pine Street, the High and Warren Street connection, Fourth Avenue extension, Bowery Street, Chapel Street and Ferry Street connections, single track in Green Street, single track in Lafayette Street and the Wolcott Terrace "Y." It is not considered likely that final action will be taken on the other six franchises and the ordinance of agreement for two weeks. These are for the subway running from Halsey Street to Park Place, the Washington Street connection to the entrance to the subway on private property, the Mulberry Sreet connection with the elevated structure on private property, double curves at Market and Mulberry Streets, second track in High Street from Springfield Avenue north to Market Street, and the Market Street gas works extension consisting of a single track from Market Street east and west into Madison Place and Jersey Street.

PROGRAMS OF ASSOCIATION MEETINGS

Railway Signal Association

The annual meeting of the Railway Signal Association will be held at the Hotel Hermitage, Nashville, Tenn., Oct. 14-17. Reports will be presented on the following subjects: "Signaling Practice," "Mechanical Interlocking," "Power Interlocking," "Automatic Block," "Manual Block," "Standard Designs," "Subjects and Definitions," "Electric Railways and A.-C. Signaling," "Wires and Cables," "Storage Battery and Charging Equipment," "Method of Recording Signal Performance," "Special Committee of the Board of Direction," and "State of Signaling in the Northwest."

Kansas Gas, Water, Electric Light & Street Railway Association

The Kansas Gas, Water, Electric Light & Street Railway Association will hold its sixteenth annual convention at Hutchinson on Oct. 9, 10 and 11. The morning of Oct. 9 will be taken up with the registration of members. Following the address of the president, L. O. Ripley, Wichita, the following papers will be presented:

Paper, "The Cost of Distribution Versus Cost of Production," by J. R. Murphy, manager of the Hoisington Electric & Ice Company.

Paper, "The Relation of the Load-Factor to the Net Revenue of the Average Kansas Central Station," by F. F. Rossman, of the Westinghouse Electric & Manufacturing Company, Kansas City, Mo.

Paper, "Pumping Water for Municipalities," by M. Dunsworth, manager of the Emporia Railway & Light Company.

Paper, "Treatment of Poles," by F. B. Uhrig, district manager of the Western Electric Company, Kansas City, Mo.

In the evening P. Lloyd Lewis, of the Wagner Electric Manufacturing Company, Kansas City, Mo., will explain the work of the Jovian Order.

Financial and Corporate

Stock and Money Markets

Sept. 17, 1913.

In the trading on the New York Stock Exchange to-day advances were reported in a number of issues, but the general tendency was to lower levels. The tone throughout was heavy. Reading was the feature. Price movements were extremely variable, and the net result was to establish the majority of issues on fractionally lower levels. Rates in the money market to-day were: Call, 2½ @ 3¼ per cent; sixty days, 4½ @ 4¾ per cent; ninety days, 4¾ @ 5 per cent; four months, 4¾ @ 5¼ per cent; five and six months, 5 per cent.

In the Philadelphia market to-day Reading and Cambria Steel were the strong features at the opening. In general the list ruled quiet.

In the Chicago stock market to-day lower levels were established. Bonds were fairly active and steady.

After firmness in the early dealings in Boston to-day a heavy tone developed and recessions followed.

The trading in stocks on the Baltimore exchange was broader to-day, but the volume of transactions was small. The demand for bonds was good.

Quotations of traction and manufacturing securities as compared with last week follow:

	Sept. 10	Sept. 17
American Brake Shoe & Foundry (common)	91⅞	92
American Brake Shoe & Foundry (preferred)	132⅛	133⅞
American Cities Company (common)	36	37
American Cities Company (preferred)	63	65
Amberican Light & Traction Company (common)	345	354
American Light & Traction Company (preferred)	105	105
American Railways Company	384⅛	393⅛
Aurora, Elgin & Chicago Railroad (common)	41½	41¼
Aurora, Elgin & Chicago Railroad (preferred)	82	83
Boston Elevated Railway	87	88
Boston Suburban Electric Companies (common)	7	7
Boston Suburban Electric Companies (preferred)	56½	56½
Boston & Worcester Electric Companies (common)	a10	a10
Boston & Worcester Electric Companies (preferred)	42	43
Brooklyn Rapid Transit Company	88¾	89¼
Capital Traction Company, Washington	116½	a116¼
Chicago City Railway	160	160
Chicago Elevated Railways (common)	25	25
Chicago Elevated Railways (preferred)	75	75
Chicago Railways, ptcptg., ctf. 1	90½	94½
Chicago Railways, ptcptg., ctf. 2	31	29
Chicago Railways, ptcptg., ctf. 3	8½	8
Chicago Railways, ptcptg., ctf. 4	2¾	3
Cincinnati Street Railway	a110	103
Cleveland Railway	103¾	101
Cleveland, Southwestern & Columbus Ry. (common)	5½	5½
Cleveland, Southwestern & Columbus Ry. (preferred)	28¼	28¼
Columbus Railway & Light Company	18	18
Columbus Railway (common)	a69½	a69½
Columbus Railway (preferred)	88	88
Denver & Northwestern Railway	104	104
Detroit United Railway	70	69
General Electric Company	144	147
Georgia Railway & Electric Company (common)	116½	117
Georgia Railway & Electric Company (preferred)	83½	86
Interborough Metropolitan Company (common)	15⅞	15⅝
Interborough Metropolitan Company (preferred)	62½	61
International Traction Company (common)	30	30
International Traction Company (preferred)	a95	95
Kansas City Railway & Light Company (common)	20	20
Kansas City Railway & Light Company (preferred)	30	30
Lake Shore Electric Railway (common)	5	5
Lake Shore Electric Railway (1st preferred)	89	89
Lake Shore Electric Railway (2d preferred)	24	24
Manhattan Railway	130	129
Massachusetts Electric Companies (common)	14	14
Massachusetts Electric Companies (preferred)	69	68
Milwaukee Electric Railway & Light Co. (preferred)	95	95
Norfolk Railway & Light Company	27½	27½
North American Company	72¾	75
Northern Ohio Light & Traction Company (common)	63	65
Northern Ohio Light & Traction Company (preferred)	100	100
Philadelphia Company, Pittsburgh (common)	44	44
Philadelphia Company, Pittsburgh (preferred)	40	40
Philadelphia Rapid Transit Company	23	23
Portland Railway, Light & Power Company	55	55
Public Service Corporation	109	114
Third Avenue Railway, New York	38⅝	40⅜
Toledo Traction Light & Power Company (common)	a30	a30
Toledo Traction, Light & Power Company (preferred)	a80	a80
Twin City Rapid Transit Co., Minneapolis (common)	107	107½
Union Traction Company of Indiana (common)	5	*5
Union Traction Company of Indiana (1st preferred)	80	*80
Union Traction Company of Indiana (2d preferred)	20	*20
United Rys. & Electric Company (Baltimore)	26⅞	27
United Rys. Inv. Company (common)	22	19
United Rys. Inv. Company (preferred)	40	39
Virginia Railway & Power Company (common)	52	52
Virginia Railway & Power Company (preferred)	92	93
Washington Ry & Electric Company (common)	89½	89
Washington Ry. & Electric Company (preferred)	87¾	89
West End Street Railway, Boston (common)	72	72
West End Street Railway, Boston (preferred)	88	88
Westinghouse Elec. & Mfg. Company	72½	72
Westinghouse Elec. & Mfg. Company (1st preferred)	114	114

* Last sale. a Asked.

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ANNUAL REPORTS

New York Railways

The statement of income, profit and loss of the New York (N. Y.) Railways for the fiscal year ended June 30, 1913, follows:

Operating Income:		
Revenue from transportation:		
Passenger revenue		$13,605,852
Other street railway operating revenue:		
Advertising	$300,000	
Rent of equipment	8,952	
Rent of tracks and terminals	12,156	
Sale of power	133,734	
Miscellaneous revenue—rent of buildings and other property	4,464	459,306
Total revenue from street railway operations		$14,065,158
Street railway operating expenses:		
Maintenance of way and structures	$1,216,759	
Maintenance of equipment	966,564	
Horse-power—revenue car service	183,274	
Operation of power plant	748,421	
Operation of cars	3,456,387	
Injuries to persons and property—deferred	424,633	
Injuries to persons and property—expended	663,835	
General and miscellaneous expenses	486,379	
Total	$8,146,252	
Taxes assignable to street railway operations	1,169,896	9,316,148
Income from street railway operations		$4,749,010
Non-operating Income:		
Dividends on securities owned	$212,000	
Interest revenue	76,832	
Miscellaneous rent revenue (net)—real estate department	127,769	$416,601
Non-operating revenue reductions:		
Net loss from direct operation employees' stores	6,571	410,030
Gross Income		$5,159,040
Deductions from Gross Income:		
Interest on funded debt:		
On underlying mortgage bonds	$492,500	
Interest on unfunded debt:		
Real estate mortgage	$42,750	
Bills payable	35,584	
Miscellaneous	227	78,561
Rent for leased roads	1,885,152	
Rent under operating agreement	50,000	
Track and terminal privileges	53,984	
Rent of land and buildings	134,517	
Amortization of debt, discount and expense	841	2,695,555
Net income available for interest or other additional charges		$2,463,485
Deduct:		
Interest on first real estate and refunding mortgage 4 per cent gold bonds	$651,838	
Interest on adjustment mortgage 5 per cent income gold bonds	1,190,164	1,842,002
*Net Income Surplus		$621,483

*The above surplus includes the reserve imposed upon the company by the order of the Public Service Commission now in litigation.

Comparing the income statement with the corresponding period of last year (six months of which were under receivers' operation) the revenue from transportation shows an increase of $407,831; other operating revenue a decrease of $46,389, resulting in a net increase in gross earnings of $361,442. The operating expenses show a decrease of $97,345, and taxes, $21,205, resulting in an increase in income from operation of $479,992, which, with an increase in non-operating income of $116,723 and with due allowance for the variation of $106,000 of dividends not included during the receivership period (for the six months ended Dec. 31, 1911), makes a total improvement in gross income of $490,715.

There has been expended for maintenance of track and roadway, electric line, buildings and structures, etc., $1,216,759, and for the maintenance of equipment, power plant, cars, etc., $966,564. The extraordinary charges for improvements and replacements, included in the operating expenses, amount to $582,158. An amount equivalent to 8 per cent of the gross passenger revenue has been set aside for injury and damage claims and expenses of litigation.

T. P. Shonts, president of the company, says in part:

"The full amount assignable for the year's taxes has been accrued or paid. A favorable decision is anticipated on amounts in litigation, which, if received, will contribute a considerable refund to the credit of the income account.

"Considerable progress has been made during the past year in the final adjustment of receivership matters, and many intricate questions have been settled. Recently a number of further questions have been presented to the court, and when decisions are rendered the litigation should be speedily concluded. It is impossible at this time to make any accurate estimate as to what amount the company will ultimately receive from the funds in the hands of the receivers.

"A petition and order for a writ of certiorari were taken out on the question of setting up for maintenance and depreciation a reserve of 20 per cent of the gross operating revenue, and the writ was allowed on April 17, 1913. The Public Service Commission has not as yet made a return to the writ. In all probability the writ will be presented to the court and a decision received before the first of the year. In case the company is sustained, so much of the 20 per cent as the board of directors may deem to be unreasonable will be credited to net income available for interest on the company's bonds.

"The $600,000 face value of the Metropolitan Crosstown Railway first mortgage 5 per cent bonds (being the entire issue) have all been acquired and are at present carried in a loan. This debt, being part of the original cost of the property, can be extinguished either by the issue of 4 per cent bonds, the use of cash now in the hands of the trustee or from the proceeds of real estate sales.

"In order to establish a uniform rate of pay properly graduated over a period of five years, a general increase in wages was granted to all motormen, conductors, inspectors, starters, flagmen, switchmen, carhouse helpers, etc. This became effective as of Feb. 2, 1913, and increased the company's payrolls approximately $106,000 per annum.

"The company has a special cash fund of approximately $554,000 received from the joint committee on reorganization which was contributed as a part of the working capital of the company.

"The company has cash in bank amounting to approximately $1,800,000, not including cash in the hands of the trustee and bills receivable representing loans to the city of New York amounting to $1,000,000."

According to the report the amount paid on the $30,626,977 of thirty-year adjustment mortgage 5 per cent income bonds for the first six months of the calendar year 1912 was 0.771 per cent. For the second six months the amount paid was 2.25 per cent, making a total of 3.02 per cent for the year. For the fiscal year ended June 30, 1913, 3.88 per cent was paid. The payment for the first six months of the calendar year 1913 will be 1.636 per cent, an increase of 0.112 per cent over the corresponding period of 1912. The last months of this year will be compared with the last six months of last year, for which period 2.25 per cent was paid.

The following decreases were made in the capitalization of the company owing to adjustments with the reorganization committee: $4,940 of capital stock, $3,220 of thirty-year first real estate and refunding mortgage 4 per cent gold bonds, and $2,200 of the 5 per cent income bonds mentioned above. The report contains a detailed list of all the real estate, buildings and railroad leases that secure the bond issues of the company.

The $1,543,375 principal and interest which was derived from the foreclosure of $1,200,000 of first mortgage bonds of the Central Park, North & East River Railroad, not formerly included as collateral to the New York Railways mortgages, has been deposited as additional collateral with the Guaranty Trust Company, trustee of the first and refunding mortgage of the company. Under the provisions of the mortgage, however, this sum may be invested in improvements upon the property.

One of the principal features of this year's report is the large expenditure for improvements made and authorized during the year, approximating $2,500,000. According to the report, some of these, outside of track and grading improvements, are as follows:

"In various carhouses an automatic system has been installed for the purpose of cutting off the electrical current from tracks on which cars are stored, with the double object of reducing the fire hazard and of preventing waste of electrical current.

"Additional instruments have been installed and other improvements made in the private telephone system of the company in order to facilitate communication between different departments and to improve the effectiveness of the organization.

"The purchase of 815 fare boxes has been authorized for

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installation on the cars, as experience has demonstrated that these are effective devices for conserving the company's revenue.

"Vestibules and side doors have been placed on sixty-nine snow-sweeping cars for the better protection of the men engaged in the operation of this equipment.

"Vestibules have also been placed on twenty-four of the conduit scraper cars for the greater comfort of the men operating the equipment.

"A chain device has been installed on fenders which sometimes become broken through contact with obstructions on the street. The use of the chain will make it possible to hold up the fender thus disabled and prevent serious interference with operation which would otherwise result.

"Authority has been granted for the installation of seats for motormen on 556 pay-as-you-enter cars. This is in line with the general policy of the company to improve the service by taking such action as will promote the comfort and convenience of its employees.

"The test of an electric emergency wagon has demonstrated the superiority of such a vehicle over the horse-drawn wagons, and accordingly additional electric wagons of this character have been ordered and will be placed in service in the near future.

"A thorough study of the general system of trucking has been made, and it is apparent that the needs of the company in this connection can be much more satisfactorily cared for at less expense than heretofore by the use of automobile trucks in place of horse trucks. Orders for the necessary equipment have been placed and the new vehicles are nearly completed.

"Twenty-five stepless cars were authorized by the board of directors to be purchased, in addition to the 150 cars authorized prior to July 1, 1912, making a total of 175 cars now in process of construction.

"Forty-five storage battery cars are now being built and the necessary equipment for a storage battery charging plant has been ordered. It is expected that these cars will be placed in operation some time this fall.

"Additional feeders have been installed on a number of lines for the better regulation of the service, and a readjustment of the entire feeder system is now under way in order that the power may be supplied in a more economical, reliable and satisfactory manner than has heretofore been possible."

The New York Railways has unproductive real estate valued at approximately $7,000,000. It is the intention to sell and lease these properties as rapidly as it can be done to advantage, and it is anticipated that an annual income of about $300,000 will be derived from this source.

The report continues:

"Compared with the twelve months ended June 30, 1912 (six months ended Dec. 31, 1911, being operations under the receivership), the number of serious personal injuries was reduced over 4 per cent and the total number of accidents was reduced 3½ per cent. The combined cost of claims for the current year and those arising out of the operations during the receivership and liquidated during this year (which were assumed by the company as a part of the purchase price of the property) amounted to approximately 6.6 per cent of the gross passenger revenue. A few years ago the accidents took over 10 per cent of the gross revenue of the predecessor of this company, so it would seem that there has been considerable improvement.

"The controversy over universal transfers among all the lines of street surface railroads on Manhattan Island has been settled and the litigation in this matter ended. The new form of coupon transfer adopted for use upon the lines of this company on June 1, 1912, has, during the last year, given entire satisfaction in practical operation, and in a large measure solved the difficulties arising out of the extensive use of free transfers. The privileges of the passenger have not been curtailed, but the possibilities of the abuse of the privileges have been greatly limited.

"Arrangement has been made for the exchange of transfers between the longitudinal lines of the New York Railways and the line operated through Canal Street across the Manhattan Bridge over the recently granted franchise of the Brooklyn & North River Railroad.

"Negotiations are pending with the city for the establishment of a through route and joint rate between the Municipal Ferry and the cars terminating at South Ferry. The company has offered to carry passengers to and from the ferry boats on the connecting lines for a 3-cent transfer ticket, thus giving the borough of Richmond a 5-cent fare into Manhattan.

"It has been the aim of the management of this property to furnish adequate and convenient service to its patrons, and to this end a careful study has been made of transportation conditions. The schedules have been revised so as to provide for the operation of cars in a manner most beneficial to the public as a whole. On some lines too many cars were found to be in operation, with the result that the transportation facilities were actually impaired because of the slow car movement involved. The elimination of car mileage, which was both unnecessary and obstructive, has resulted in greater operating efficiency."

Interborough-Metropolitan Company

The annual financial statement of the Interborough-Metropolitan Company, New York, N. Y., for the year ended June 30, 1913, compares as follows:

	1913	1912
Receipts:		
Dividends on Interborough Rapid Transit stock..	$4,069,536	$5,426,048
Interest, etc.	359,702	327,782
Total income	$4,429,238	$5,753,830
Disbursements:		
Interest on Interborough-Metropolitan bonds....	$3,052,125	$3,052,125
Interest on 6 per cent notes	471,391	432,516
Interest on bills payable	.....	19,014
Expense account	84,321	94,995
Taxes	32,887	29,873
Total disbursements	$3,640,724	$3,628,524
Surplus	$788,514	$2,125,307
Previous surplus	2,806,807	681,500
Total surplus	$3,595,321	$2,806,807

T. P. Shonts, president of the company, says in part:

"During the fiscal year just closed the operations of the principal subsidiary properties of the Interborough-Metropolitan Company, i. e., the Interborough Rapid Transit Company and the New York Railways, have shown satisfactory progress. The surplus earnings of the Interborough Rapid Transit Company for the year ended June 30, 1913, aggregated 18.68 per cent upon the capital stock of that company (of which your company owns 339,128 shares out of 350,000 shares outstanding) as against 16.07 per cent for the fiscal year ended June 30, 1912.

"The net income of the New York Railways for the fiscal year ended June 30, 1913, after providing for the interest on the first real estate and refunding 4 per cent bonds, was $1,811,647. After deducting from this sum the amount held in reserve (including that for depreciation in conformity with the requirements of the order of the Public Service Commission, now in litigation) the remainder was equal to 3.886 per cent upon the $30,626,977 of adjustment bonds of that company outstanding."

At the annual meeting on Sept. 16 a resolution calling for the reduction in the number of directors from twenty-one to fifteen was unanimously adopted. J. A. Ritchie was elected a director to fill a vacancy.

New Security Issues of the Northern Ohio Traction & Light Company

The Canton-Akron Consolidated Railway has been authorized by the Ohio Public Utilities Commission to issue to the Northern Ohio Traction & Light Company, Akron, Ohio, its 5 per cent mortgage bonds of the total principal sum of $91,000, and the Northern Ohio Traction & Light Company has been authorized to issue its preferred capital stock of the par value of $360,000 and its 4 per cent consolidated mortgage bonds of the total principal sum of $400,000. The Northern Ohio Traction & Light Company is also authorized to borrow $1,500,000 and execute therefor its 6 per cent serial notes, maturing in the sum of $100,000 per year, beginning Nov. 1, 1914, to and including Nov. 1, 1916, and in the sum of $200,000 per year, payable in semi-annual instalments of $100,000 each, beginning May 1, 1917. The Northern Ohio Traction & Light Company is required to pledge and deposit collateral for the above securities to the amount of $2,300,000, par value. The company is ordered to obtain not less than the following prices for the

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authorized issues: the par value of the preferred capital stock; 68 per cent of the par value of the 4 per cent consolidated mortgage bonds; 97 per cent of the par value of the 6 per cent notes, and 80 per cent of the par value of the 5 per cent bonds. It is further ordered that the company must pay out of its income into its capital cash account any difference which may exist between the par value of its 6 per cent serial notes and the sum for which the same are issued and sold.

The proceeds from the sale of the securities are to be used for the following purposes, to wit: the proceeds of said notes to be applied to the payment and discharge of the balance of the collateral trust loan of May 1, 1909—any sum in excess of the principal amount of said loan, the payment of which is necessitated by reason of the discharge of the loan before the date of maturity, to be provided and paid by the Northern Ohio Traction & Light Company out of its income, $600,000; also to the payment and discharge of liabilities for improvements and betterments to the properties of the Northern Ohio Traction & Light Company other than the property composing its Canton-Akron Consolidated Division, $700,000; and the proceeds of the preferred capital stock and bonds to be applied to the payment and discharge of the balance of any liabilities on account of the improvements and betterments made to the property of the Northern Ohio Traction & Light Company other than the Canton-Akron Consolidated Division.

Buffalo & Lake Erie Traction Company, Buffalo, N. Y.—A modified plan for the reorganization of the Buffalo & Lake Erie Traction Company, its absorption of the Buffalo, Lockport & Rochester Railway and the establishment of through freight and passenger service between Erie, Pa., Buffalo, Niagara Falls, Toronto, Ont., and Rochester was hinted at in the hearing on Sept. 12 in Buffalo before the Public Service Commission of the Second District of New York. The new plan, it is said, would allow the holders of the preferred stock of the Buffalo & Lake Erie Traction Company to participate in the reorganization plan on better terms than were originally proposed. Charles S. Beekman, attorney for the committee representing the holders of 80 per cent of the bonds, and for Bertron, Griscom & Company, the banking firm interested, was not prepared to give details of the modified plan. Attorney Henry W. Killeen, representing the minority bondholders, who are protesting against the plan of reorganization, demurred against going on with his side of the case until it was definitely known what the bankers or the bondholders' committee had to offer to the holders of the preferred stock. Chairman Decker of the commission agreed with him as to the importance of this information to all concerned, including the commission. Attorney Beekman said he probably would be in possession of a definite proposition within a week; and the case was therefore adjourned until Sept. 19. Practically all the testimony taken at the hearing related to the contract between the Electrical Development Company of Ontario and the Canadian-American Power Corporation for the delivery of 46,000 hp.

Buffalo & Williamsville Electric Railway, Williamsville, N. Y.—No definite action concerning the line in Batavia, N. Y., was taken by the stockholders of the Buffalo & Williamsville Electric Railway at the recent meeting in Williamsville. Two-thirds of the stockholders were represented by proxies, which were held by Loran L. Lewis, Jr., the president, and Godfrey Morgan, the secretary, both of Buffalo, N. Y. According to the call, the purpose of the meeting was to have the stockholders ratify the intention of the directors to abandon the line in Batavia. The stockholders took no action. Before the meeting adjourned Mayor Louis Wiard of Batavia told the officers that if they wanted to sell he would organize a company of Batavia capitalists to buy the property.

Chatham, Wallaceburg & Lake Erie Railway, Chatham, Ont.—The annual meeting of the Chatham, Wallaceburg & Lake Erie Railway was held on Sept. 3, and the members of the new board chosen include D. B. Hanna, A. J. Mitchell, R. G. O. Thomson, Judge F. Phippen and Mr. Morton, Toronto; D. A. Gordon, Wallaceburg, and J. G. Kerr, Chatham. It is stated that the main office of the company will be moved from Chatham to Toronto.

Chicago (Ill.) Railways.—John A. Brown, of Chicago, as attorney for the holders of the consolidated mortgage bonds of 1907, has protested to the trustees of the various mortgages and the directors of the Chicago Railways against a further payment of dividends on the participation certificates of the company. The mortgage debt, it is said, amounts to $90,084,611, against a valuation of $77,488,461, for which the city may take over the property at any time for municipal operation within the franchise term. The latter figure, it is claimed, includes about $30,000,000, the original valuation of the properties taken over by the company and the brokerage fee of $5,905,000, leaving the present value of the property $41,493,461, an amount insufficient to discharge the liabilities. A letter signed by Wallace Heckman, Seymour Morris and Henry A. Blair has been sent to the holders of the participation certificates, Series 1, 2 and 3, urging that in their judgment the best interests of the company require that the present management should retain control for the following year. It is stated that if the protective committee should obtain control the commercial value of the participation certificates would be destroyed. The criticisms of the present management have, it is said, emanated from sources in which there is a lack of understanding of the problems confronting it and are based "either upon deliberate misrepresentations and misstatements or upon rumors spread by discharged employees and by others whose interests are inimical to those of the company." Nominations for seven directors of the Chicago Railways, in opposition to the present board headed by Henry A. Blair, have been filed with the Central Trust Company, trustee for the capital stock, by B. R. Barnes for the protective association. The opposition ticket is headed by Joseph Beifield. The annual election is to be held in New York on Oct. 23.

Dedham & Franklin Street Railway, Westwood, Mass.—Pursuant to a foreclosure decree of the Supreme Court of Massachusetts, noted in the Electric Railway Journal of Aug. 23, 1913, the property of the Dedham & Franklin Street Railway was sold at auction on Sept. 15 by Receiver Eugene H. Mather to H. M. Verrill and R. H. Johnson, acting on behalf of the bondholders, for $10,000.

Clear Lake Railroad, Lakeport, Cal.—The Clear Lake Railroad has filed an amended application with the Railroad Commission of California asking for authority to issue $500,000 of bonds and $200,000 of stock to provide funds to construct and equip a railroad from Hopland to Lakeport.

Goldsboro (N. C.) Traction Company.—The property of the Goldsboro Traction Company, consisting of the road and equipment and a sixty-acre plot, will be offered at foreclosure sale at Goldsboro on Sept. 20, under a decree of sale by Judge Conner in the United States District Court, noted in the Electric Railway Journal of Aug. 30, 1913.

Joliet & Southern Traction Company, Joliet, Ill.—It is expected that the Kane County Circuit Court will order the property of the Joliet & Southern Traction Company to be sold in November under a decree of foreclosure. The company was placed in the hands of receivers on Feb. 4, 1911.

Metropolitan Street Railway, New York, N. Y.—Special Master William L. Turner on Oct. 7 will offer at auction through Joseph P. Day as auctioneer at the County Courthouse in Manhattan all of the right, title and interest of the Metropolitan Securities Company and of William W. Ladd as receiver of the New York City Railway in and to certain real estate in the borough of Manhattan east of First Avenue, running from Ninety-fourth to Ninety-fifth Street. This action is the result of an order of the United States District Court in the matter of a petition of the receivers of the company for an order directing the receiver of the New York City Railway to deliver to them the proceeds of the sale of the property previously mentioned.

Middle West Utilities Company, Chicago, Ill.—The Middle West Utilities Company has sold a new issue of $1,500,000 of three-year 6 per cent collateral trust notes to N. W. Halsey & Company, New York. The notes are part of an authorized issue of $3,500,000, of which $2,000,000 were sold last June, as noted in the Electric Railway Journal of June 21, 1913. Arrangement has been made to deposit part of these notes with the Illinois Trust Company, and under this deposit certificates of $100 and $500 will be issued, convertible into the notes in amounts of $1,000 or multiples.

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Pacific Gas & Electric Company, San Francisco, Cal.—A special meeting of the stockholders of the Pacific Gas & Electric Company has approved the issue of $7,000,000 of one-year 6 per cent collateral trust notes. This issue was approved by the California Railroad Commission on Aug. 11, and $4,500,000 have been sold to a syndicate of New York bankers. The remaining $2,500,000 will be held in reserve and not sold unless additional money is required. The new notes are secured by $5,000,000 par value general and refunding 5 per cent bonds and $5,000,000 par value general lien 6 per cent bonds. The funds from the sale of notes are being used in completion of the Lake Spaulding hydroelectric development. The company on July 31 was serving 331,192 customers, a gain of 28,985 customers since Aug. 1, 1912. The unauthorized reports that certain construction work of the company had been stopped have been denied by A. F. Hockenbeamer, vice-president and treasurer, as follows: "These alleged statements are erroneous and misleading and could not possibly have been obtained from authoritative sources. Work on the South Yuba power development and transmission lines has proceeded without interruption and is being pushed with all possible speed. The work is progressing so satisfactorily that we feel assured of being able to deliver at our consuming centers from the new development approximately 35,000-hp before the close of this year."

Quebec Railway, Light, Heat & Power Company, Quebec, Que.—At the recent annual meeting of the Quebec Railway, Light, Heat & Power Company resolutions were adopted giving the directors wider powers than they have possessed in regard to control of the company and its subsidiaries. The number of directors was reduced from nine to six and Sir Rodolphe Forget, Lorne C. Webster, J. N. Greenshields, Robert Mackay, Paul Gilbert and D. O. L'Esperance were elected directors.

Railway & Light Securities Company, Boston, Mass.—The Railway & Light Securities Company, an investing company formed by the Stone & Webster interests, has made a report for the fiscal year ended July 31, 1913. The total earnings for the year, including dividends received and interest received and accrued, were $274,868; interest paid and accrued amounted to $85,680; taxes were $3,992 and expenses were $8,758, leaving a profit from income of $176,438. Dividends of 6 per cent were paid on the preferred and common stock. The surplus was $70,467. The total surplus at the close of the fiscal year was $471,604.

Third Avenue Railway, New York, N. Y.—The Third Avenue Railway will pay the semi-annual instalment of interest amounting to 2½ per cent, due Oct. 1, 1913, for the period of six months ended July 1, 1913, upon its adjustment mortgage fifty-year 5 per cent income gold bonds at the office of the United States Mortgage & Trust Company.

Dividends Declared.

Arkansas Valley Railway, Light & Power Company, Pueblo, Col., quarterly, 1¾ per cent, preferred.

Asheville Power & Light Company, Asheville, N. C., quarterly, 1¾ per cent, preferred.

Augusta-Aiken Railway & Electric Corporation, Augusta, Ga., quarterly, 1½ per cent, preferred.

Brockton & Plymouth Street Railway, Plymouth, Mass., 3 per cent, preferred.

Capital Traction Company, Washington, D. C., quarterly, 1½ per cent.

Carolina Power & Light Company, Raleigh, N. C., quarterly, 1¾ per cent, preferred.

Cincinnati (Ohio) Street Railway, quarterly, 1½ per cent.

Dallas (Tex.) Electric Corporation, first preferred, 3 per cent; second preferred, 2½ per cent.

Duluth-Superior Traction Company, Duluth, Minn., quarterly, 1 per cent, preferred; quarterly, 1 per cent, common.

El Paso (Tex.) Electric Company, quarterly, 2 per cent, common.

Lake Shore Electric Railway, Cleveland, Ohio, quarterly, 1½ per cent, first preferred.

Mohawk Valley Company, New York, N. Y., quarterly, 1½ per cent.

New Orleans Railway & Light Company, New Orleans, La., quarterly, 1¼ per cent, preferred.

New York State Railways, Rochester, N. Y., quarterly, 1¼ per cent, preferred; quarterly, 1½ per cent, common.

Northern Ohio Traction & Light Company, Akron, Ohio, quarterly, 1½ per cent, preferred.

Philadelphia (Pa.) Traction Company, $2.

Toronto (Ont.) Railway, quarterly, 2 per cent.

Twin City Rapid Transit Company, Minneapolis, Minn., quarterly, 1¾ per cent, preferred; quarterly, 1½ per cent, common.

United Light & Railways Company, Grand Rapids, Mich., quarterly, 1½ per cent, first preferred; quarterly, three-fourths of 1 per cent, second preferred; quarterly, 1 per cent, common.

Washington, Baltimore & Annapolis Electric Railroad, Baltimore, Md., quarterly, 1½ per cent, preferred.

Washington Railway & Electric Company, Washington, D. C., quarterly, 1¼ per cent, preferred; quarterly, 1½ per cent, common.

ELECTRIC RAILWAY MONTHLY EARNINGS

AURORA, ELGIN & CHICAGO RAILROAD, CHICAGO, ILL.

Period			Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m.,	June,	'13	$184,786	*$103,309	$81,477	$32,957	$48,520
1 "	"	'12	181,426	*97,252	84,174	32,789	51,385
12 "	"	'13	1,955,723	*1,164,856	790,867	388,245	402,622
12 "	"	'12	1,845,488	*1,083,199	762,288	380,825	381,465

ATLANTIC SHORE RAILWAY, SANFORD, MAINE

1m.,	July,	'13	$49,743	$28,943	$20,800	$672	$20,128
1 "	"	'12	47,559	27,396	20,163	478	19,685

CLEVELAND, PAINESVILLE & EASTERN RAILROAD, WILLOUGHBY, OHIO

1m.,	July,	'13	$46,002	*$23,741	$22,261	$10,396	$11,865
1 "	"	'12	44,449	*22,131	22,318	9,952	12,366
7 "	"	'13	234,541	*130,336	104,205	72,941	31,264
7 "	"	'12	220,434	*130,834	89,599	69,381	20,218

CLEVELAND, SOUTHWESTERN & COLUMBUS RAILWAY, CLEVELAND, OHIO.

1m.,	July,	'13	$120,558	$67,277	$53,280	$31,974	$21,306
1 "	"	'12	110,447	60,261	50,186	30,913	19,273
7 "	"	'13	695,716	424,612	271,104	219,521	51,583
7 "	"	'12	651,323	390,819	260,504	213,511	46,993

DETROIT (MICH.) UNITED RAILWAY

1m.,	July,	'13	$1,228,759	$805,430	$423,279	$181,443	$241,837
1 "	"	'12	1,125,055	733,613	391,442	176,302	215,140
7 "	"	'13	7,623,430	5,019,509	2,603,921	1,257,551	1,346,370
7 "	"	'12	6,615,997	4,228,611	2,387,386	1,242,328	1,145,059

EL PASO (TEX.) ELECTRIC COMPANY.

1m.,	June,	'13	$69,836	*$38,776	$31,060	$40,180	$26,880
1 "	"	'12	60,175	*32,859	27,316	6,464	20,852
12 "	"	'13	865,624	*466,086	399,538	51,547	347,991
12 "	"	'12	730,169	*408,389	321,780	82,125	239,655

FEDERAL LIGHT & TRACTION COMPANY, NEW YORK, N. Y.

1m.,	July,	'13	$184,084	$111,273	$72,811	.....	.....
1 "	"	'12	169,889	104,837	65,052	.....	.....
7 "	"	'13	1,365,617	786,409	579,208	.....	.....
7 "	"	'12	1,208,229	706,227	502,002	.....	.....

GRAND RAPIDS (MICH.) RAILWAY

1m.,	July,	'13	$117,688	*$73,005	$44,683	$15,075	$29,608
1 "	"	'12	111,191	*62,170	49,021	14,562	34,459
12 "	"	'13	1,270,319	*743,494	526,825	177,953	348,872
12 "	"	'12	1,212,028	*675,783	536,245	176,289	359,956

LAKE SHORE ELECTRIC RAILWAY, CLEVELAND, OHIO

1m.,	July,	'13	$152,721	*$77,779	$74,942	$35,395	$39,547
1 "	"	'12	137,639	*68,903	68,735	35,188	33,547
12 "	"	'13	779,223	*482,546	296,677	245,681	50,996
12 "	"	'12	724,890	*427,435	297,454	244,061	53,393

LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY, LEWISTON, MAINE

1m.,	July,	'13	$75,102	*$40,048	$35,054	$15,551	$19,503
1 "	"	'12	67,637	$34,833	32,804	14,448	18,356
12 "	"	'13	657,469	*406,447	251,022	175,236	75,786
12 "	"	'12	609,838	*383,469	226,369	143,437	52,932

NORTHERN OHIO TRACTION & LIGHT COMPANY, AKRON, OHIO

1m.,	July,	'13	$319,132	$185,186	$133,945	$60,348	$73,597
1 "	"	'12	297,235	157,996	139,239	50,292	88,947
7 "	"	'13	1,816,370	1,113,645	702,725	403,454	299,271
7 "	"	'12	1,674,571	950,826	723,744	313,217	410,527

TWIN CITY RAPID TRANSIT COMPANY, MINNEAPOLIS, MINN.

1m.,	July,	'13	$773,499	$389,533	$383,966	$150,090	$233,876
1 "	"	'12	715,129	355,232	359,896	143,079	216,817
7 "	"	'13	5,004,030	2,555,758	2,448,272	1,028,719	1,419,553
12 "	"	'12	4,641,249	2,403,838	2,237,411	998,554	1,238,857

VIRGINIA RAILWAY & POWER COMPANY, RICHMOND, VA.

1m.,	June,	'13	$426,514	$197,876	$228,636	$128,209	$100,427
1 "	"	'12	392,970	207,840	185,128	120,595	64,533
12 "	"	'13	4,950,811	2,416,988	2,533,822	1,500,501	1,033,321
12 "	"	'12	4,627,353	2,422,903	2,204,448	1,423,201	781,247

*Includes taxes.

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Traffic and Transportation

Decision in Los Angeles Fare Complaint

In the complaint of the city of Inglewood against the passenger rates of the Los Angeles Railway and the Los Angeles Railway Corporation the Railroad Commission of California, in a decision which it handed down recently, held that discrimination exists in the rates of the companies in favor of Eagle Rock as against Inglewood. The commission ordered that one-way fares between Inglewood and Los Angeles be reduced from 15 cents to 10 cents with transfer privileges and that the price of thirty-ride family commutation tickets be reduced from $3 to $1.50.

In the complaint the city of Inglewood, a municipal corporation, attacked the rates of the defendant corporations, the Los Angeles Railway and Los Angeles Railway Corporation, as being unjust, unreasonable and discriminatory in favor of other communities similarly situated, so far as distance is concerned, from the center of population of Los Angeles. The companies operate the principal street railway systems in Los Angeles and in some cases lines have been extended to points outside the corporate limits of the city. The municipal limits of Los Angeles are not at all regular, so that in many instances the service extends beyond the city limits. On account of the irregular boundary lines of the city some of the lines which run beyond the boundaries of the city are much shorter between the terminus and the center of population than are other lines operating in other directions wholly within the city. The one-way fare of the companies between Los Angeles and Eagle Rock is 10 cents, made up of a fare of 5 cents to Glassell Road and 5 cents from Glassell Road to Township Avenue. The companies maintain two family commutation rates between Los Angeles and Townsend Avenue, Eagle Rock—one thirty-ride family commutation ticket for $1.50, or 5 cents a trip, and one fifty-ride family commutation ticket for $3, or 6 cents a trip. Between Los Angeles and Inglewood the defendants maintain a one-way passenger fare of 15 cents, made up of 5 cents to Fifty-fourth Street and 10 cents from Fifty-fourth Street to Inglewood. Adult commutation rates maintained by the companies between Los Angeles and Inglewood are as follows: Ten-ride party ticket, $1; thirty-ride family ticket, $3; fifty-two-ride individual monthly commutation, $4.

The companies drew a circle of 6.2 miles from Sixth and Main Streets, Los Angeles, which latter point is claimed to be the center of population, and within this circle a fare of 5 cents is charged as a general proposition. The one exception to the rule that no fare of 5 cents extends beyond the circle drawn 6.2 miles from Sixth and Main Streets, Los Angeles, is that line operating to a point beyond the city limits of Los Angeles known as Annandale, and between this point and Los Angeles a fare of 5 cents is charged without transfer privilege, which is practically equivalent to the commutation rates between Los Angeles and Eagle Rock. According to the official transportation and city map of Los Angeles, Twelfth and Main Streets has been selected as the center of population and a circle radiating around this assumed center a distance of 8 miles therefrom goes through the city of Inglewood and across the line of the defendant at Arbor Vitæ Avenue. This same line passes through Eagle Rock a short distance beyond the terminus of the Eagle Rock line of the defendants at Townsend Avenue and Eagle Rock Road, and also a short distance beyond Buena Vista Terrace and Eagle Rock Road, Annandale.

In the opinion on which the order of the commission was based Commissioner E. O. Edgerton said in part:

"It is almost impossible to take a street car system and segregate the earnings of all of its different routes or lines so as to determine whether the rates on any particular route or line are yielding an excessive return on the capital invested. The defendants operate twenty-seven lines over various streets and along certain routes in Los Angeles, one of which operates from Eagle Rock to Hawthorne through Inglewood. They also operate a line, known as the 'Main Street Line,' to Eagle Rock Park through Annandale. From the records of earnings furnished by the defendants it would appear that the line operating from Eagle Rock to Hawthorne through Inglewood is a very much better paying line than the one operating to Eagle Rock Park through Annandale.

"On one end of the Eagle Rock-Hawthorne line, for approximately the same distance, a set of rates is charged lower than on the other end of the line for approximately the same distance, while the line through Annandale, which appears to be less either per car mile or per car hour than the through line between Eagle Rock and Hawthorne, is favored with a still lower rate. This lower rate, however, as before stated, is practically equivalent to the commutation rates in effect between Los Angeles and Eagle Rock. I believe the evidence clearly discloses the fact that discrimination exists in favor of Eagle Rock as against Inglewood. Whatever may have been the reasons moving the defendants to establish a fare of 10 cents between Los Angeles and Eagle Rock they are of little consequence. The fact remains that passengers may travel to Eagle Rock for 10 cents, including transfer privileges within Los Angeles, and for approximately the same distance to Inglewood a fare of 15 cents is exacted. It is also a fact that a person may travel from Buena Vista Avenue, Annandale, to all points in Los Angeles for 10 cents, and I am at a loss to understand how the defendants expect to maintain the present rate adjustment as against Inglewood.

"When a carrier voluntarily establishes a scale of rates between two points the presumption must be entertained that such rates are *prima facie* reasonable, and entertaining such a presumption it is clearly apparent that the rates between Los Angeles and Inglewood are excessive.

"Street railway lines such as are operated by the defendants are in a position to handicap the development of a particular section by placing lower rates in effect to one locality than to another for approximately the same distance. Under such circumstances carriers allege that the greater density of population justifies a lower rate to one section than to the other, notwithstanding the distance may be about the same; and while, to a certain extent, the density of traffic is a factor in making rates, the fact that one community is denied rates for a service almost identical with that accorded another community is frequently the reason why the population of the first community does not increase. Population usually follows the lowest transportation rates, and when one locality is denied rates equal to another for approximately the same service the result is generally the same: the community with the low rate prospers and that with the higher rate lies dormant. I find that the rates of the defendants between Los Angeles and Inglewood are excessive, unreasonable and discriminatory. I find that just and reasonable passenger fares between Los Angeles and the city of Inglewood would be as follows: one-way fare including the usual transfer privileges to points in the city of Los Angeles, 10 cents; thirty-ride family commutation ticket without transfer privileges, $1.50."

Modification of Order by Wisconsin Commission

Application was made to the Railroad Commission of Wisconsin some time ago by the Southern Wisconsin Railway, Madison, Wis., for certain modifications of the order in the case of Elver vs. Southern Wisconsin Railway. Additional testimony was offered with reference to the type of brake used, the size of cars, and the method of routing cars. Certain objections were also made to changes in routing before additional double tracking could be completed. The commission held as follows:

"The type of hand brake with which the cars of the company are at present equipped is adequate but careful maintenance is necessary.

"Conditions in Madison at the present time require frequent headway with small cars rather than larger cars operated on an infrequent headway.

"The fact that the double tracking necessary for efficient operation has not been completed is not a sufficient reason for the postponement of the five-minute schedule as previously ordered (9 W. R. C. R. 1). The use of signal devices will assist in operation. A simple hand-throw block signal device will suffice to move cars between the sidings with a minimum delay.

"The objections of the company to greater frequency of cars are not valid. The earnings are ample to provide for running the cars as ordered in the previous decision

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(9 W. R. C. R. 1). Certain modifications are made in the routing in order to facilitate a five-minute headway within the zone of heaviest riding. It is ordered that cars on the Fair Oaks-Wingra Park line be operated on a ten-minute headway similar to the schedule in force. The East Johnson-South Madison line is to be operated on a ten-minute schedule from the present east terminus of the East Johnson Street line to Mound Street on the South Madison line via State Street and Mills Street, alternate cars proceeding beyond Mound Street on a twenty-minute headway to the present terminus of the South Madison line. The cars on this line are to be operated in conjunction with the cars on the Fair Oaks-Wingra Park line on such a schedule as to give a five-minute headway between Capitol Park and University Avenue at Mills Street. Cars on the West Main-Baldwin Street line are to be operated on a ten-minute headway from the present terminus of the West Main Street line at the West Madison station of the Chicago, Milwaukee & St. Paul Railway via Jenifer Street to Baldwin Street or Dickinson Street on the present Fair Oaks-Wingra Park line, and the schedule should be so arranged that cars on the West Main-Baldwin Street line operating in conjunction with those on the Fair Oaks-Wingra Park line give a five-minute headway from Capitol Park to Baldwin Street or Dickinson Street."

Plans for Organizing Proposed Chicago Committee

Reference was made in the ELECTRIC RAILWAY JOURNAL of Sept. 13, 1913, page 441, to the suggestion of Coroner Hoffman, of Chicago, that a law be passed to prohibit persons from crossing streets at intersections and that a public safety committee be established to lessen automobile, street car and vehicle accidents in that city. The coroner has selected the twenty-five persons whom he will ask to serve on a public safety committee to lessen the number of deaths and injuries from avoidable accidents. He has sent to each of those selected a letter that reads in part as follows:

"This letter is addressed to you to invite you to become a member of a permanent organization or general public safety committee to work in conjunction with the coroner's office of Cook County for a safer Chicago and to minimize the dangers that now beset her citizens and destroy lives to an appalling degree. Your name has been suggested to me as one whose time and labor would be of great value in this worthy enterprise if you could be induced to devote a little time occasionally in becoming familiar with conditions and in helping all of us to apply remedies. Kindly let me know if you would consent to become a part of this movement and we shall be pleased to call you to a general meeting later."

A thorough investigation of the situation will first be made by the committee, for which purpose all the records in the office of the coroner will be thrown open to obtain accurate figures on the various kinds of accidents that resulted fatally. Among those to whom the coroner has addressed letters are H. B. Fleming, vice-president and chief engineer of the Chicago City Railway, and H. L. Bronnell, of the safety committee of the Chicago Railways.

Crusade Against Vehicle Drivers.—Following the killing on Sept. 7 of a five-year-old boy, who was run over by an automobile while he was alighting with his parents from a car of the Springfield (Ill.) Consolidated Railway, the police of Springfield have begun a crusade against drivers who violate the traffic ordinances.

Accidents in Greater New York in July.—Accident reports to the Public Service Commission for the First District of New York showed that during July, 1913, there were 6884 accidents on the railroads and street railroads of New York City, as against 6550 in July of last year. The number of serious accidents from which death or grave injury resulted was 226, as against 209 in July of last year. The number killed was twenty-nine, which is the same as in July last year.

Service to the Illinois State Fair.—The Chicago & Alton Railway has informed the Springfield Commercial Association that it will not furnish shuttle train service from Springfield to the Illinois State Fair Oct. 3 to 11. This leaves the traffic entirely to the Springfield Consolidated Railway and to the unorganized vehicle service. A. D. Furlong, general manager of the company, has announced that 136 cars will be placed in service over the loop, running out on Ninth Street and back on Seventh Street.

Second Wreck on San Francisco, Napa & Calistoga Railway.—Seven people were injured on the morning of Sept. 12 on the Main Street wharf at Vallejo, when a south-bound electric train of the San Francisco, Napa & Calistoga Railway, Napa, Cal., entered an open switch and collided with an empty coach which was standing on the siding. The south-bound car was loaded with passengers bound for San Francisco from Napa. In June thirteen persons were killed and more than fifty persons injured in a collision on the road.

New Safety Stations Suggested in San Francisco.—M. M. O'Shaughnessy, city engineer of San Francisco, has recommended to the Board of Supervisors that new safety stations, 100 ft. in length, to accommodate two street cars tandem, be constructed at various points along Market Street where the traffic is heaviest. The points designated are at the junctions of Drumm and California Streets, and on the south side of Market Street, west of Fourth; south side of Market, east of Fifth, and south side of Market, opposite Mason.

Revision of Transfer System Proposed in Newark.—At a recent conference with the members of the Board of Public Works of Newark, N. J., the officers of the Public Service Railway agreed to submit to the board within two months a plan for the revision of its transfer system. John L. O'Toole, representing the company, said that there was no objection on the part of the company to modifying its transfer rules and regulations provided the revision could be so devised that the company would not be embarrassed by passengers looping and otherwise abusing the privileges extended to them.

Re-routing in Philadelphia Practically Completed.—The re-routing of lines by the Philadelphia (Pa.) Rapid Transit Company is being continued. The first move under step No. 6 was put into effect on Sept. 14 and other changes under this step will be made on Sept. 20 and Sept. 27. This will complete most of the changes begun last spring under the general re-routing plan. The remaining changes and adjustment of routes to be undertaken under step No. 7 have almost altogether to do with the building of new track and must await the opening of streets, revision of grades and abolition of grade crossings.

Hearings in Tacoma Rate Case Postponed.—The taking of testimony by the Public Service Commission of Washington in connection with the investigation which it is conducting into the complaints about rates made against the American Lake line of the Pacific Traction Company and the Spanaway line of the Tacoma Railway & Power Company ended temporarily on Sept. 6, and the commission adjourned to some date between Nov. 5 and Nov. 10. Engineers of the commission are appraising the realty of both companies, and the figures obtained in the appraisal will probably be submitted in evidence when the hearings in the case are resumed.

Electricity on North Shore Division of the Long Island Railroad.—Electric service on the North Shore division of the Long Island Railroad will be begun on Oct. 21, when a new schedule will be put into effect. The road was double-tracked to Great Neck while the installation of the third-rail was being made. The running time from the Pennsylvania Railroad station at Thirty-third Street and Seventh Avenue, New York, with express trains was thirty-eight minutes, and, while the electric expresses will consume about as much time, a saving of about five minutes will be effected, owing to the elimination of the necessity of transferring, and, by the same process, local trains will save at least ten minutes.

Terminal Plans Postponed in Columbus.—The new interurban terminal station which interests associated with the Scioto Valley Traction Company have planned for Columbus, Ohio, at a cost of close to $1,000,000, will not be started this year. Frank A. Davis, president of the Scioto Valley Traction Company, has announced that financing plans for the terminal have been completed, but delays in closing

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negotiations for property in connection with the site and in securing franchise rights from the city have made it necessary to postpone construction until 1914. Contracts will be let early the coming year, and the new station and terminals are then to be completed as rapidly as possible.

Strip School Tickets in Albany.—The United Traction Company, Albany, N. Y., has placed strip school commutation tickets on sale with the approval of the Public Service Commission of the Second District of New York. A strip ticket of ten coupons, each coupon of face value 5 cents, is sold to any person under seventeen years of age attending public school at any point within the territory served by the United Traction Company and Cohoes Railway for 25 cents per strip. Such strip ticket will entitle the pupil to ten rides within the limits of any 5-cent zone going to and from school on school days between the hours of 8 a. m. and 9.30 a. m., 11.30 a. m. and 2.15 p. m. and 3.30 p. m. and 4.30 p. m., within thirty days from date of sale.

Accident Prevention Plans Considered in Toronto.—The adoption of a plan to prevent accidents in Toronto, Ont., was before the safety campaign committee, which met in the public accounts committee room at the Ontario Parliament Buildings at Toronto on Sept. 15. Notices of the meeting were sent out through the Ontario Railway & Municipal Board to the Board of Trade, the Board of Education, the Toronto Railway, the Toronto & York Radial Railway, the civic car lines, the Ontario Motor League, the Toronto Suburban Railway, the International Brotherhood of Teamsters, the Toronto Railway Employees' Union, the Canadian Manufacturers' Association, the chief factory inspector for Ontario and the secretary of the Bureau of Labor for Ontario.

Liquor Barred on Cars.—A bulletin has been issued by the Detroit (Mich.) United Railway to motormen and conductors of the interurban lines calling attention to Act 68 of the Public Acts of 1913. The bulletin reads as follows: "1. A person in an offensive state of intoxication need not be carried as a passenger. 2. Any person drinking or giving others a drink of liquor should be warned to desist. If he refuses, the bottle should be taken away and turned over to the agent at the nearest station, the passenger receiving a receipt for the liquor taken. If the person becomes offensive or boisterous, call the nearest station and ask for an officer to eject the passenger. The station agent receiving the liquor must keep the same ten days and deliver the same to the passenger upon the presentation of the conductor's receipt."

Complaint Against Pennsylvania Railroad Dismissed.—The Board of Public Utility Commissioners of New Jersey has dismissed the complaint of the Board of Works of Newark against the Pennsylvania Railroad and has refused to disturb the present rate of fare between Park Place, Newark, and Summit Avenue, Jersey City, or to order the abolition of the present practice under which refund coupons are sold. The commission holds that the rates exacted are neither unjustly discriminatory nor unreasonable, and it does not find any ground for criticism of the refund system, in view of the circumstances of the traffic. On the contrary, the board takes the view that the railroad has acted with commendable consideration of the Newark traffic and has not unnecessarily imposed any hardship upon the citizens of that community. In disposing of the controversy the board found it unnecessary to pass upon the question whether the 3-cent per mile maximum fare permissible under the general railroad act is modified or displaced by the public utility act empowering the board to fix just and reasonable fares and charges. The board also devoted a part of its opinion to consideration of the memorandum presented by the chairman of the committee on internal trade of the Newark Board of Trade, submitting that the rates between Newark and Jersey City divert a trade of large value from the merchants of Newark. The board remarked that if the Newark-Summit Avenue one-way rate were reduced from 15 cents to 12 cents it would similarly make the rate from Newark to New York 3 cents less. This, the board pointed out, might result in an increased incentive to trade in New York. Joint service is operated by the Pennsylvania Railroad and the Hudson & Manhattan Railroad between New York City and Newark.

Personal Mention

Mr. G. L. Langdon, New York, has been appointed auditor of the Kentucky Traction & Terminal Company, Lexington, Ky., to succeed C. M. Cory, who recently resigned on account of ill health.

Mr. Phillip Dawson, consulting electrical engineer of the London, Brighton & South Coast Railway, London, Eng., expects to arrive in New York on Oct. 8 for an extended trip of inspection of electric railway properties.

Mr. Frederick I. Day, superintendent of the power plant of the Louisville (Ky.) Railway, was elected vice-president of the National Association of Stationary Engineers at the recent convention of the association in Springfield, Mass.

Mr. H. H. Crapo, president of the Union Street Railway and the New Bedford & Onset Street Railway, New Bedford, Mass., has been elected president of the Massachusetts Street Railway Association to succeed Mr. Robert S. Goff.

Mr. James E. Weaver has been appointed superintendent and purchasing agent of the Huntsville Railway, Light & Power Company, Huntsville, Ala., to succeed Mr. J. V. Blackwell, who has become connected with the Alabama Power Company.

Mr. W. H. Given, whose appointment as assistant general manager of the Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia., was noted in the Electric Railway Journal of Sept. 13, entered the service of the Des Moines-Fort Dodge Railway in Iowa as a messenger in 1874. The property of the company was afterward absorbed by the Chicago, Rock Island & Pacific Railway, in whose employ Mr. Given continued without interruption until Sept. 1, 1913. He filled every position connected with the train service and afterward served in turn as traveling freight agent, trainmaster and assistant superintendent. For the last thirteen years he has been superintendent of the Missouri, Des Moines Valley and Minnesota divisions of the company.

Mr. B. C. Edgar, who was appointed assistant general superintendent of the Columbus Railway & Light Company, Columbus, Ohio, some time ago, was employed on electrical construction work by the Manhattan Railway, New York, N. Y., for four years beginning in 1900. Subsequently he was connected with W. E. Baker & Company, New York, N. Y., for four years on general investigation and construction work. He was with Latey & Slater, New York, N. Y., for two years on electrical construction work in connection with the building of the lines of the Hudson & Manhattan Railroad under the Hudson River between New York and New Jersey. For four years before accepting the position with the Columbus Railway & Light Company which he now holds Mr. Edgar was assistant electrical engineer with the Southern Pacific Company at San Francisco, Cal., and was connected with all of the electric railway properties of the company.

Mr. Everett E. Stone, Springfield, Mass., has been appointed a member of the Massachusetts Public Service Commission, succeeding Mr. George P. Lawrence, resigned. Mr. Stone is well known in engineering and political circles in the Bay State. He is a native of Leicester, Mass., and was educated at Worcester Academy and later studied architecture in the office of Stephen C. Earle and civil engineering with Wood & Rugg, Worcester. In 1887, at the age of twenty-two, he joined the engineering staff of the Boston & Albany Railroad at Springfield, later serving as assistant roadmaster and roadmaster of the division between Worcester and Springfield. In 1894 he became assistant chief engineer of the road and later was appointed chief engineer. The new Boston & Albany pier at East Boston was built under his direction. He was Mayor of Springfield for two terms in 1903-4 and is a Republican in politics. During the past few years Mr. Stone has been at the head of the New England Construction Company, Springfield. His appointment to the commission was confirmed by the Executive Council immediately after its announcement.

Mr. George A. Valentine, chief inspector, and Mr. Adam J. Oot, inspector, have been appointed division superintendents of the Syracuse lines of the New York State Railways. Mr. Valentine will have full charge of the south division,

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composed of all lines running out of the south carhouse in South Salina Street and Mr. Oot of all lines running out of the north carhouse in Wolf Street. Mr. Valentine will also have charge of the instruction of all conductors and motormen employed on the system. The appointment of the superintendents divides the responsibilities heretofore borne entirely by Mr. W. E. Holstock, superintendent of transportation, to whom the new officials will report. The lines out of the south carhouse over which Mr. Valentine will have control are the Court-Salina-Valley, Midland-Butternut, Midland-Park, one section of Rockwell Springs-Liverpool, Grape-West Genesee, and Solvay-Common Center. Running out of the north carhouse, in charge of Mr. Oot, will be the Wolf-Salina Valley, one section of Rockwell Springs-Liverpool, Dudley-East Genesee, University-Summit, Elmwood-Eastwood, Eastwood-Oak Valley and East Syracuse-Green.

Mr. C. E. Hart has been appointed superintendent of transportation of the Trenton & Mercer County Traction Corporation, Trenton, N. J. Mr. Hart is a native of Pennsylvania. He became a conductor in Trenton, N. J., in 1892, but resigned to accept a position as motorman with the Seashore Electric Railway, Asbury Park, N. J. The following year he became gripman with the Metropolitan Street Railway, New York, and remained in the employ of that company until 1912. He was promoted from time to time with the Metropolitan Street Railway, finally reaching the office of chief instructor. He resigned as chief instructor of the Metropolitan Street Railway in 1912 to accept a similar position with the Trenton Street Railway, which had been merged with several other companies as the Trenton & Mercer County Traction Corporation.

C. E. Hart

OBITUARY

Charles M. Copeland, manager of the State House Press News Service at Boston, Mass., for the last ten years and widely known in political circles in Massachusetts, died on Sept. 14 at the Boothby Hospital, Boston, following a brief illness. Mr. Copeland was about forty years of age. He was a native of Cambridge, Mass., and for some years was a correspondent of the STREET RAILWAY JOURNAL in connection with Massachusetts legislative news. He is survived by his daughter and a widow.

George Spencer Hart died at his home in Glen Ridge, N. J., on Sept. 11, 1913. Mr. Hart was born in Cornwall, Conn., on Feb. 11, 1837. In 1862 he entered the produce business in New York. In 1874 he obtained an interest in the Central Crosstown Railroad, New York, and he was president of the company from 1885 to 1897. He was also president and a director of the Second Avenue Railroad, New York, from 1887 to 1896. He secured control of the Christopher & Tenth Streets Railroad, New York, and was an officer of that company for a number of years. All three roads in which he was interested were finally merged with the Metropolitan Street Railway. Besides being president of the corporation of George S. Hart & Company, he was a director and trustee of several banks and was a member of the New York Produce Exchange, the New York Cotton Exchange and the Consolidated Stock Exchange.

The city of Springfield, Ohio (population, about 50,000), has adopted a new charter. Five commissioners elected by the people are to elect a city manager, who will be the administrative head of the city and who need not be a resident at the time of his appointment. Franchises cannot be granted for a longer period than twenty years. The city reserves the right to purchase or lease all utilities. Dayton has adopted a similar charter, but Akron has defeated the proposal.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Indianapolis, Linton & Vincennes Railroad, Indianapolis, Ind.**—Application for a charter has been made by this company in Indiana to build an interurban railway from Indianapolis through Mooresville, Tell City, Jasonville, Linton, Bicknell and Vincennes to Patoka and also from Linton to Sullivan. Capital stock, $10,000. Incorporators: Gilmer Bray, Charles Park, William Thompson, John A. Schaffer and Karl W. Behr.

New Albany & French Lick Valley Traction Company, New Albany, Ind.—Application for a charter has been made by this company in Indiana to build an electric railway from New Albany to French Lick and West Baden Springs, with a branch from Mooresville, 4 miles north of New Albany, via Georgetown and Lanesville to Corydon. Capital stock, $1,100.000. Officers: John H. Martin, Palmyra, president; Charles W. Schindler, New Albany, vice-president and general counsel; W. P. Huff, Corydon, treasurer; C. S. Hernley, Newcastle, secretary. [E. R. J., Sept. 6, '13.]

FRANCHISES

Mobile, Ala.—The Mobile Electric Company will ask the Council for a franchise along St. Louis Street to the parkway and to the property of the electric company in Mobile.

Little Rock, Ark.—The City Council has approved the action of Mayor Taylor in disapproving the ordinance granting a franchise to the Little Rock, Pine Bluff & Eastern Traction Company to use the free bridge and South Main Street to Markham in Little Rock.

Riverside, Cal.—The Pacific Electric Railway has received permission from the Railroad Commission to construct its lines over highways from its present track at Main Street and Fourteenth Street and Magnolia Avenue in Riverside to a point near the junction of Magnolia Avenue, Palm Avenue and Oregon Avenue.

San Rafael, Cal.—S. J. Norton, representing the San Rafael & San Anselmo Valley Railway, has received a forty-nine-year franchise from the Council in San Rafael. This line will connect San Rafael and San Anselmo, a distance of 6 miles. [E. R. J., Aug. 9, '13.]

Visalia, Cal.—The Big Four Electric Railway has asked the Council for a franchise in Visalia. The line will connect Visalia, Tulare, Lindsay and Porterville. [E. R. J., Sept. 13, '13.]

***Augusta, Ga.**—The Atlanta & Carolina Construction Company has received a thirty-year franchise from the Council in Augusta. This line will extend over certain streets and connect with the line of the Augusta-Aiken Railway & Electric Company on Broad Street in Augusta.

Galesburg, Ill.—The Peoria, Canton & Galesburg Railway has asked the Council for a franchise in Galesburg. Permission is asked to enter Galesburg over the tracks of the Illinois Traction System on East Main Street. This 52-mile line will connect Peoria, Canton and Galesburg. Horace Clark, president. [E. R. J., Sept. 13, '13.]

Boston, Mass.—The Boston Elevated Railway has received permission to relocate its tracks on Tremont Street, Park Street and Washington Street in Boston.

Detroit, Mich.—The Detroit United Railway has received a franchise from the Common Council for its Junction Avenue line and the Kercheval Avenue extension in Detroit.

Newark, N. J.—The last of the applications made by the Public Service Railway, Newark, N. J., for franchises in connection with the proposed terminal were considered by the Board of Works of Newark on Sept. 11. Seven more franchises were granted by passing the third and final reading, while six others were passed on first and second reading.

Buffalo, N. Y.—The International Railway has asked the Council for a franchise over Abbott Road from Cazenovia Street to the city line in Buffalo.

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Islip, N. Y.—The Suffolk Traction Company has accepted the franchise granted by the Town Board for an extension from Patchogue to Sayville.

Columbus, Ohio.—The Columbus Crosstown Railway has asked the Council for a franchise in Columbus. This 11-mile line will extend from south Columbus to northeast Columbus. George M. Williams is interested. [E. R. J., Aug. 10, '12.]

Sudbury, Ont.—The electors have voted to grant a franchise to the Sudbury-Copper Cliff Suburban Electric Railway.

***Ephrata, Wash.**—W. M. Clapp, attorney, representing Eastern capitalists, has received a franchise from the Council for a gasoline car line between Soap Lake and Ephrata.

Milwaukee, Wis.—The Mayor has signed the ordinance granting a franchise to the Milwaukee Western Electric Railway. The proposed line is to run between Milwaukee and Beaver Dam.

TRACK AND ROADWAY

Calgary (Alta.) Municipal Railway.—This company has received the approval of the Calgary City Council to build an extension through Shagannappi Park. The promoters of the extension agree to pay $20,000 for construction and guarantee the expenses of operation for four years, at the end of which time the city is to pay back the cost of construction. The signing of the agreement is being held up, pending a decision on the question of whether the agreement has to be ratified by the ratepayers or not.

Edmonton (Alta.) Interurban Electric Railway.—It is understood that the first section of this railway, which will operate between Edmonton and St. Albert, will be completed within a few weeks. Cars of the gasoline electric type will be used.

Medicine Hat (Alta.) Railway.—It is reported that work will soon be begun by this company on its line in Medicine Hat. Max Aitken, Medicine Hat, is interested. [E. R. J., May 24, '13.]

British Columbia Electric Railway, Vancouver, B. C.—This company contemplates the construction of a line between New Westminster and Bellingham via Sumas.

Fresno (Cal.) Traction Company.—Plans are being made by this company to extend its Wishon Avenue line in Fresno to the Normal School grounds.

Clear Lake Railroad, Lakeport, Cal.—Plans are being made by this company to build an extension from Hopeland to Lakeport.

Geary Street Municipal Railway, San Francisco, Cal.—Assistant City Engineer Ransom says that all plans for the new city railways for which bonds were voted recently will be completed so that contracts may be let for carhouses, track specials and all material by Jan. 1. The Van Ness Avenue and Potrero lines will be the first constructed, and the rails of the Stockton Street line laid as the tunnel work progresses. Negotiations for the transfer of the Union Street line to the city when the franchise expires in December will be opened at once by the city attorney and supervisors. The latter will take action to provide for the acquisition of the necessary rights-of-way for the carhouses, terminal sites and widening of Division Street in San Francisco.

San José (Cal.) Railway.—This company has been directed by the Railroad Commission to reconstruct as a standard-gage line its present narrow-gage section from San José to Toyon station, on the road to Alum Rock Park, a distance of 4½ miles. The company is further directed to make a connection at Toyon station with the Peninsular Railway.

Watsonville Railway & Navigation Company, Watsonville, Cal.—Plans are being considered by this company for the rehabilitation of its lines in Hollister and an extension to San Juan and Hollister.

New Britain, Kensington & Meriden Tramway Company, New Britain, Conn.—This company states that it is indefinite when construction will be begun on its line to connect New Britain, Kensington and Meriden. Capital stock authorized, $50,000. E. A. Moore, president. [E. R. J., Sept. 13, '13.]

Atlanta & Carolina Railway, Atlanta, Ga.—A second three-year extension of its charter has been granted this company. This extension was granted after the company had shown that it had acquired its right-of-way, graded a portion of its line and completed other development work. This 170-mile line is to extend in an easterly direction from Atlanta through Fulton, DeKalb, Rockdale, Gwinnett and Jackson Counties, and in a westerly direction from Atlanta through Campbell, Coweta, Meriwether and Troup Counties. The line will touch at all the principal towns in the counties named.

***Kewanee, Ill.**—A fund of $1,000 is being raised in Kewanee for the preliminary survey for an interurban line between Rock Falls and Kewanee.

Oil Belt Traction Company, Martinsville, Ill.—The directors of this company have called a meeting of the stockholders to be held Sept. 18 at Oblong, Ill., for the purpose of changing the name of the company to the Oil Belt Railway. [E. R. J., Nov. 23, '13.]

Louisville (Ky.) Railway.—Plans are being considered by this company to obtain a free right-of-way for the extension of the Orell line in Louisville to Kosmosdale.

Middlesboro, Ky.—W. Godfrey Hunter, Middlesboro, Ky., is considering plans to construct an electric railway in Middlesboro and the construction of interurban lines to connect Middlesboro with other coal centers of that section.

Winnipeg (Man.) Electric Railway.—The extension of this company's park line along the Pembina highway in Winnipeg has been practically completed as far as the new university buildings, 3 miles, and is to be extended still further to St. Norbert.

Bay State Street Railway, Boston, Mass.—Work has been begun by this company laying heavier rails on its line in Washington Square in Weymouth. The grade is to be raised 4 in. The company is relaying its tracks through Main Street in Melrose and will soon relay the tracks between the Malden line and Franklin Square in Melrose.

Detroit (Mich.) United Railway.—The reconstruction of tracks on South Saginaw Street, Flint, between Second Street and the Grand Trunk tracks, is under way. The groove rail now used will be replaced by new 7-in. girder rail. The city and the company will put in a new pavement at the same time. Construction of two pile bridges and a concrete culvert along the line of the new private right-of-way through Wayne on the Detroit, Jackson & Chicago line is under way.

Grand Rapids (Mich.) Electric Railway.—This company has been asked to consider plans for an extension from Butterworth Street in Grand Rapids to Kent Country Club.

Electric Short Line Railroad, Minneapolis, Minn.—This company announces that work on the construction of the proposed line will be begun soon. The line will extend from Minneapolis through Hutchinson, and a branch will be extended from Hutchinson which will pass through Bird Island. Right-of-way is being surveyed for the line which will extend through Clinton on its route to Big Stone Lake and thence to Browns Valley and into South Dakota. The line will extend west from Litchfield to Clinton.

Luce Electric Company, Minneapolis, Minn.—This company has raised $7,000 at Ivanhoe toward the construction of its line between Minneapolis, Ivanhoe and Redwood Falls. [E. R. J., Sept. 6, '13.]

Jefferson City Bridge & Transit Company, Jefferson City, Mo.—Plans are being made by this company to build a 1-mile extension along the Moreau Road to Berry's Springs.

Red Lodge, Mont.—About $20,000 of the $50,000 needed to construct an electric line from Red Lodge to Washoe, a distance of 5.5 miles, has been subscribed by the citizens of Red Lodge. [E. R. J., Aug. 30, '13.]

Public Service Railway, Newark, N. J.—This company has begun grading for a 9000-ft. piece of single track which will form a short cut between Port Reading, on the Newark-Trenton line, and Sewaren, on the Rahway line. This cut-off will avoid a detour of 3 miles and a transfer in reaching Perth Amboy from Newark and will permit a high-speed through service.

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Hornell (N. Y.) Traction Company.—All trouble in regard to the laying of the North Hornell extension of this company's line has been settled and work has again been resumed. The work was stopped by the city of Hornell some time ago pending an inquiry into whether or not the company has a franchise and to decide upon a kind of rail to be used. The line will now be completed.

Brooklyn Rapid Transit Company, New York, N. Y.—Approval of plans for the elevated extensions and third-tracking of some of this company's elevated lines is being held in abeyance by the Public Service Commission until the necessary consents of property owners along these lines are secured by the company, which hopes to file them with the commission before the end of the year. The Public Service Commission has authorized the company to execute a contract for completing a connection between the Fourth Avenue subway (Brooklyn) and the Culver, West End and Fifth Avenue lines by way of Thirty-eighth Street and for laying two additional tracks in the Centre Street subway. The company agrees to do this work at cost.

Chardon, Jefferson & Meadville Interurban Railroad, Cleveland, Ohio.—The surveys and estimates have been completed and the Public Service Commission will be asked for authority to issue the stock and bonds and increase the capitalization of this company, which plans to build a 30-mile line to connect Chardon, Hampton, Fontville, Rock Creek and Jefferson, Ohio, and Linesville, Pa. The company plans to use gasoline cars. Capital stock authorized, $10,000. Officers: Henry Orth, Rock Creek, vice-president; C. H. Felton, 735 Williamson Building, Cleveland, secretary; A. H. Bacon, Footville, Ohio, treasurer. [E. R. J., June 21, '13.]

Fremont, Ohio.—It is stated that no additional work is being done on the proposed electric line between Fremont and Tiffin. A. S. Close, Toledo, is interested. [E. R. J., Oct. 21, '11.]

Minster & Laramie Railway, Minster, Ohio.—This company, which has completed surveys and laid 16 miles of track between Minster and Fort Laramie, plans to resume construction in the spring of 1914. John B. Raterman, Fort Laramie, president. [E. R. J., June 11, '10.]

Ottawa & St. Lawrence Electric Railway, Toronto, Ont.—This company has awarded the contract for the construction of its line to connect Ottawa, Morrisburg, Brockville and Arnprior to a Toronto construction company of which J. A. Morden is president. It is estimated that it will take five years to build this line. The Ottawa-Arnprior and the Ottawa-Morrisburg branches will be built first. It is also understood that the contractors have taken over the bonds of the railway. The headquarters of the company will be transferred from Ottawa to Toronto. John E. Askwith, Ottawa, president. [E. R. J., July 12, '13.]

Saskatoon (Sask.) Electric Railway.—The ratepayers recently passed a by-law authorizing the expenditure of $100,000 upon extensions of electric railways in Saskatoon.

Cumberland Valley Interurban Railway, Nashville, Tenn.—Two routes are being considered by this company for its 80-mile line between Nashville and Sparta. One will extend from Nashville by way of Greenvale, Auburn, Liberty and Smithville and the other by way of Greenvale, Alexandria and Smithville. Plans for a survey of these proposed routes are now being completed. J. H. Cartwright, 410 Union Bank Building, Nashville, president. [E. R. J., Aug. 2, '13.]

Dallas (Tex.) Northwestern Traction Company.—Preliminary surveys have been completed by this company on its line between Dallas and Denton, a distance of 40 miles. John T. Witt, chief engineer. [E. R. J., Sept. 13, '13.]

Dallas (Tex.) Southwestern Traction Company.—Preliminary surveys have been completed by this company on its 80-mile line between Dallas and Glen Rose, via Cleburne. E. P. Turner, president. [E. R. J., Aug. 9, '13.]

Gainesville, Whitesboro & Sherman Railway, Dallas, Tex.—Plans are being made to secure financial backing to build this line to connect Gainesville, Whitesboro and Sherman. J. W. Blanton, Gainesville, is interested. [E. R. J., April 19, '13.]

Houston (Tex.) Electric Company.—This company has placed in operation its new 3-mile extension known as the Houston Harbor line in Houston.

SHOPS AND BUILDINGS.

Tri-City Railway Company, Davenport, Ia.—This company has awarded the contract to G. Decker French, of the Central Engineering Company, to build its new carhouse in Rock Island to replace that which was recently destroyed by fire. The structure will be 296 ft. x 150 ft. and of brick and concrete construction. The interior will be divided into four sections, each having three tracks and each section divided by a fire wall. Work on the new building will be begun at once and will be completed by Nov. 8. The cost is estimated to be about $75,000.

Kentucky Traction & Terminal Company, Lexington, Ky.—It is stated that the offices of this company on West Main Street in Lexington will be removed in order to clear the way for the erection of the new viaduct.

Ware & Brookfield Street Railway, Ware, Mass.—This company has awarded a contract to P. H. Provencal to build an addition to its carhouse in Ware. The structure will be 15 ft. x 45 ft. and will be used for housing cars and will also contain an office for the superintendent and a rest room for the employees.

Houghton (Mich.) County Traction Company.—Plans are being made by this company to build a new carhouse in Houghton. The structure will be one-story and 100 ft. x 150 ft. The cost is estimated to be about $8,500.

Buffalo, Lockport & Rochester Electric Railway, Rochester, N. Y.—After a conference between Public Service Commissioner Devoe P. Hodson and counsel representing the complaining residents and the railway company, it was agreed that a new passenger station should be built in Middleport, N. Y., by the Buffalo, Lockport & Rochester Electric Railway. The company states that land has been bought and that plans for the station will be submitted to the commission at once.

Scioto Valley Traction, Columbus, Ohio.—The new interurban terminal station which interests associated with the Scioto Valley Traction Company have planned for Columbus at a cost of $1,000,000 will not be started this year. Frank A. Davis, president of the company, has announced that financing plans for the terminal have been completed, but delays in closing negotiations for property in connection with the site and in securing franchise rights from the city have made it necessary to postpone construction until 1914.

Tacoma Railway, Light & Power Company, Tacoma, Wash.—Plans are being made by this company to move its carhouse, power house and other buildings to a site on the corner of L Street and Eleventh Street in Tacoma.

Panhandle Traction Company, Wheeling, W. Va.—This company has remodeled and painted its passenger station at North Warwood.

POWER HOUSES AND SUBSTATIONS

Albany (Ga.) Transit Company.—This company is installing new machinery in its power house in Albany.

Aurora, Elgin & Chicago Railroad, Chicago, Ill.—This company is building a larger dam across the Fox River at Batavia, Ill., to insure an adequate supply of water for the battery of eighteen boilers at its power house.

Elmira Railway, Water & Light Company, Elmira, N.Y.—This company has placed an order with the General Electric Company for 1,000-kw converters, transformers and switchboard apparatus.

Niagara, St. Catharines & Toronto Railway, St. Catharines, Ont.—A contract has been awarded by this company to Newman Brothers, St. Catharines, Ont., for the erection of a transformer station in St. Catharines.

Eastern Pennsylvania Railways, Pottsville, Pa.—This company has placed an order with the General Electric Company for substation apparatus consisting of a 700-kva two-unit three-bearing motor-generator set, three 300-kva transformers and a switchboard.

Utah Light & Railway Company, Salt Lake City, Utah.—This company will shortly place in operation in one of its substations a 1700-kva synchronous motor-generator set and switchboard. The apparatus has been ordered from the General Electric Company.

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Manufactures and Supplies

ROLLING STOCK

Ogdensburg (N. Y.) Street Railway is in the market for five 20-ft. 8-in. single-truck prepayment car bodies, about 32 ft. over all.

Frankfort, Tacony & Holmesburg Street Railway, Tacony, Pa., noted in the ELECTRIC RAILWAY JOURNAL as being in the market for two double-truck cars, has ordered these cars from The J. G. Brill Company.

Dominion Power & Transmission Company, Ltd., Hamilton, Ont., has ordered two 59-ft. motor freight cars from the Preston (Ont.) Car and Coach Company, and two from the Tillsonburg (Ont.) Electric Car Company, to replace those destroyed by fire recently.

City Light & Traction Company, Sedalia, Mo., has purchased six second-hand trailers from Lloyd J. Smith, Chicago, and three single-truck closed cars from the St. Joseph Railway, Light & Power Company, which will be placed in service in the handling of the heavy traffic during the state fair.

Montreal (Que.) Tramways, reported in the ELECTRIC RAILWAY JOURNAL of Aug. 6 as having ordered twenty-five closed trail cars from The J. G. Brill Company, has specified the following details for this equipment:

Seating capacity.....54	Control, type..Westinghouse
Bolster centers, length..21 ft.	Couplers .....Tomlinson
Length of body..32 ft. 3 in.	Curtain fixtures, National L. W. Co.
Length over vestibule .....43 ft. 3 in.	Curtain material...Pantasote
Width over sills... 8 ft. 3 in.	Destination signs...Keystone
Width over all... 8 ft. 4¾ in.	Fare boxes.....None
Height, rail to sills, 2 ft. 3 13/16 in.	Gears and pinions, Westinghouse
Height, sill to trolley base, 8 ft. 10⅞ in.	Hand brakes...Brill ratchet
Body...wood, steel sheathing	Paint .....Murphy
Interior trim.....cherry	Sanders .....Dumpit
Headlining .....Agasote	Sash fixtures, National L. W. Co.
Roof, type.....plain arch	Seats, style.....Winner
Underframe .....steel	Seating material.....rattan
Bumpers..3½ in. x 6 in. x ⅜ in.	Springs .....Brill
Car trimmings.bronze metal	Step treads.....Mason
Conduits and junction boxes .....Westinghouse	Trucks, type....Brill No. 67-F
	Ventilators .....Garland

TRADE NOTES

Perry Ventilator Company, New Bedford, Mass., has received an order to equip with ventilators the hundred new cars of the Boston Elevated Railway which are now being built by the Jewett Car Company.

Keyes Products Company, New York, N. Y., is rapidly reconstructing its finishing department at Montville, Conn., which was destroyed by fire last August, and expects to have it ready for business again within a very few weeks.

Canadian General Electric Company, Ltd., Toronto, Ont., has purchased the plant and assets of the Stratford Mill Building Company, which manufactures flour machinery. The plant will be equipped to manufacture machinery such as produced by the Allis-Chalmers Company.

General Vehicle Company, Long Island City, N. Y., noted in the ELECTRIC RAILWAY JOURNAL of April 1, 1913, as having received an order from the New York (N. Y.) Railways for a number of electric commercial vehicles, has delivered all these wagons, with the exception of the dumping trucks.

H. W. Johns-Manville Company, New York, N. Y., has opened a new office and warehouse of large proportions in Galveston, Tex., where stock will be consolidated for distribution to the different offices and throughout the firm's Texas territory. This location will make a convenient point of distribution for shipments by coastwise lines from New York and for trade with South America.

General Electric Company, Schenectady, N. Y., has received orders for four-motor car equipments from the following: Detroit (Mich.) United Railway; York (Pa.) Railway; East St. Louis & Suburban Railway, East St. Louis, Ill.; Mahoning & Shenango Railway & Light Company, Youngstown, Ohio; Norfolk & Bristol Street Railway, Foxboro, Mass. Air-brake equipments with compressors have been ordered by the Pittsburgh, Harmony, Butler & New Castle Railway.

Canada Floors, Ltd., Montreal, Que., has put its new "mastic" flooring in one of the new cars of the Ottawa (Ont.) Electric Railway. This flooring preparation somewhat resembles asphalt in appearance, and one of the claims made for it is that it is unaffected by temperatures up to 400 degrees Fahrenheit. It is put over the ordinary wood floor in practically the same way as that in which asphalt is put on the streets. The features of this new product are its ease of cleaning, its sanitary nature, its good appearance and its durability.

Beck Electrical Construction Company, Minneapolis, Minn., has been formed with V. S. Beck at the head. Mr. Beck has held various positions with several of the Stone & Webster companies in the Middle West, most recently being associated with the Mississippi River Power Company at Keokuk, Ia. The new company will do a general engineering contracting business, making a specialty of electric power plant and transmission-line work. It will also act as manufacturers' agent and has already secured the agency for several engineering concerns. The offices will be in the Andrus Building.

Joseph Dixon Crucible Company, Jersey City, N. J., has received favorable reports from the Lake Shore Electric Railway, Cleveland, Ohio, which has been successfully using its graphite cup grease No. 2 for trolley lubrication for the past four or five years. This railway manufactures its trolley wheels with an extra large chamber for the lubricant and graphite bushing for a ⅝-in. pin 2 in. long only. The lubricant is thinned slightly with oil, being made thinner in winter than in summer, and is then forced into the chambers of the wheel with a force pump. The wheel is then put into the harp attached to the trolley pole and is ready for service. This is all the lubrication that is required for the life of the wheels, which average approximately 4000 miles per year.

ADVERTISING LITERATURE

Electric Service Supplies Company, Philadelphia, Pa., has issued a series of five booklets entitled "Steel," "Tightness," "Brackets," "Fit" and "Weight," covering the details of the above subjects embodied in the manufacture of its Keystone steel gear cases.

The J. G. Brill Company, Philadelphia, Pa., prints in the September, 1913, issue of the *Brill Magazine* an illustrated biography of E. J. Cook, vice-president of the New York State Railways. Among the feature articles are the following: "Conditions Which Govern the Type of Car for City Service in Milwaukee, Wis.," "Trailer Coaches for Long Distance Interurban Service," "New Type of Stepless Car for Syracuse," "Double-Deck Cars for Southern Chile," "Two Types of Funeral Cars for Bahia, Brazil;" "Open Cars for South Africa," "Special Features on Multiple Dump Cars," "Lightweight Storage Battery Car," and "Old-Time Snow-Fighting Equipment."

NEW PUBLICATION

Public Utilities, Their Cost New and Depreciation. By Hammond V. Hayes, Ph. D. New York: D. Van Nostrand Company. 262 pages. Price, $2.

This is an excellent treatise on the general principle of valuations of public utility properties. Although the book is written by an engineer, the author quotes copiously from the decisions of the federal and state courts and from those of the state commissions to illustrate and emphasize the points made by him. He also draws clear distinctions between the values of a property for different purposes, the different elements of values, the various methods of calculating depreciation, etc. Special emphasis is laid upon the importance of the determination of the original investment in any examination into the present fair value of a property. The decisions quoted include some during the present year. In view of the comparative newness of the subject treated and its importance in the technical field, Mr. Hayes' book is a welcome addition to the library of public utility companies.

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LAND FOR CARHOUSES AND SHOPS

A failure to provide enough land adjoining carhouse and shop improvements so that future needs for expansion may be met in the same locality has been found to be a costly error in the history of a number of companies. It is an error of the kind, however, that teaches a lesson for the future. An investment in idle land naturally is one that a railway manager dislikes to make because it presents no immediate advantage. It is dead capital for a period, and he cannot foretell whether its time of usefulness is five or ten years in the future. He hesitates to take the risk that a long look forward involves. There are, however, two points bearing on this subject that should be kept in mind. The first is that as the railway is generally a permanent institution the natural development of traffic is bound to create a requirement for greater carhouse and shop facilities that must be met by the company in the future, regardless of the personnel of the management. The other is that a purchase of well-located acre property at a reasonable price in the outskirts of a growing community is an investment that has at least a fair chance of yielding a profit. While the fact that the company will need property in the future is the controlling reason for purchases of this character, the risk of the investment is lessened by the probability that the values of such land as would ordinarily be bought are more likely to increase than decrease, so that a profit is more likely than a loss, provided, of course, that the land is not acquired at a "boom" figure. Moreover, land that is within the price which a railway company can afford to pay before the surrounding country becomes settled too quickly is worth more than the company can afford to invest after acre property is subdivided into lots. In the choice of location, also, the company should have future requirements in mind because the growth of the city nearly always will change the "center of gravity" of the system.

POSTING RULES IN DARK PLACES

When the head of the car maintenance department transmits a new regulation to the several shops and carhouses he takes it for granted that it will be posted at a spot where it will be sure to be seen and read. Of course, the most logical place is the vicinity of the time clock, but in that case it is essential that the time clock itself should be in the right place. In one shop recently visited the workroom enjoys splendid natural lighting, but the hallway which leads to it is placed in the middle of a two-story office building. Even in the morning, when lighting conditions are best, the hallway is in twilight, while in the afternoon it would be absolutely dark without lamp illumination. The time clock in this hallway serves as the center of a group of important notices which are printed in every style from the faintest mimeograph copy on letter paper to the blackest scareheads on heavy cards. These notices include rules regarding fire prevention, safety packing of journal boxes, exchange of brakeshoes, holidays, etc. Furthermore, some of the notices are below and others are above the range of vision. Of course, space in proximity to a time clock seems a proper place in which to display instructions of this character, but if the clock is in a narrow hallway, not many employees are likely to linger lovingly over a statement which cannot be taken in at a glance, especially when scores of men are waiting to take their turn at the clock. Under these circumstances, it would be better to place the instructions in some well-lighted part of the shop or, if practicable, print the instructions on slips which could be inserted in each man's pay envelope from week to week. On large properties another feasible plan is that followed by the Philadelphia Rapid Transit Company. This is to print the rules in booklet form.

ELECTRIC PASSENGER SERVICE ON STEAM TRACKS

The list of installations of storage battery cars in this country shows that several are operated over steam railroad tracks. This fact suggests the thought whether electric railways are always as keen as they should be in endeavoring to lease short divisions and spurs of neighboring steam lines for the purpose of extending their service at lowest first cost. The d.c. electrifications of the New York, New Haven & Hartford Railroad are well-known examples of the advantage of converting old steam lines in preference to building new suburban and interurban extensions to the existing city systems. In these instances, however, this most efficient use of railway property was accelerated because of the control of both classes of railways by one company. Nevertheless, community of interest may be made just as potent as community of ownership. Why should an electric railway duplicate the greater part of the investment made by a steam railroad when the tracks of the latter are exploited far below the

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saturation point? Such conditions may arise in either city or interurban territory. Thus one Eastern city has spread over so great an area that it now practically engulfs a number of old steam railroad divisions. In former days these lines were of some importance as passenger routes, but now they are used only for an hour or two each day to move freight to and from local coal yards, breweries, factories, etc. If some of these lines could be leased as a part of the local street railway system, they would afford ideal short cuts for many people. Again, a certain electric railway recently expended several hundred thousand dollars to convert an interurban railway of highway type into a line with larger and faster cars by transferring part of the route to a private right-of-way. Community of interest, however, would have led to the electrification of the neighboring steam tracks for the same schedule under conditions that would have caused no interference with the through steam passenger and freight service. A decade ago most steam railroads would have scorned any offers to co-operate in this manner, but most of them have since learned to respect the superiority of electric railways in attracting passenger travel. As population increases, the highway type of interurban railway tends more and more to assume the character of a street railway, so that eventually many electric railways will be prepared to enter into agreements for conducting their through service over the adjacent steam railroads.

THE STEAM BOILER AND ITS FURNACE AS INDEPENDENT UNITS

The recent agitation in favor of replacing the out-of-date and perfectly meaningless term "boiler-horse-power" with the myriawatt brings attention to another engineering expression which has long since outlived its usefulness. This is the "ratio of grate to heating surface" of a steam boiler. It would be difficult to invent any term more misleading in the light of present-day knowledge and practice, yet the fact that it has been inherited from the historic days of the birth of steam engineering seems to permit it to hang on in spite of its moribund condition. Its origin and its early usefulness are, of course, obvious. When steam coal containing less than 13,500 b.t.u. was not even considered, when boilers were operated at ridiculously low capacities, and when from 10 lb. to 12 lb. of fuel per square foot of grate per hour was an almost universal rate of fuel consumption, the ratio of grate to heating surface at least gave an indication of the beliefs of the designer as to the advantages of forcing a boiler, and it is along these lines that the expression is most often used. In some cases an attempt has even been made to establish a single ratio as uniformly satisfactory.

Of course, to every student of the phenomena of steam generation the old-time idea that the boiler, or heating surface, and the grate were in some way interdependent is a manifest fallacy, for the heating surface, having only the inherent ability to absorb heat, cannot of necessity influence directly the furnace or grate, which by burning coal is a heat producer. The two have, indeed, diametrically opposite duties, the one taking in heat and the other giving it out.

With modern boilers, which may be installed anywhere from the Atlantic seaboard, where the highest grades of fuel are available, to the Rocky Mountain States, where lignite may be used, a fixed ratio of grate to heating surface would involve any manufacturer in a great deal of trouble; and, in like manner, a ratio satisfactory in one plant with a steady all-day load would be entirely useless in the design in another plant which was required to handle a severe two-hour peak. In the Western States a ratio of 1:30 might do very well, while in the East, especially if the load was a steady one, it would provide a magnificent chance for thin fires, full of holes, which would cut heavily into the coal pile unless the boilers were worked exceedingly hard. On the other hand, even with this ratio a lack of appreciation of draft values and resistance losses in the latter case might involve a failure on the part of the boilers to "steam."

In the end, the only satisfactory method for meeting the complex problem of steam production at the present time is to pursue the logical course of designing furnace and boiler as two entirely separate units. Neither is tied up to the other except by factors of minor importance, and neither involves a problem which cannot be completely solved before the other is approached. In fact, this procedure is now very generally followed in stoker installations, where the stokers are not only purchased separately from the boilers but in addition are likely to have an entirely different rating.

In the arrangement of a hand-fired boiler plant the same method is generally used by the most successful designers, the size of the boilers, or extent of heating surface, being determined by the expected demand for steam and in accordance with the conditions laid down by the character of the load and the cost of fuel but quite irrespective of the area of the grate. This might vary all the way from an allowance of 3 lb. of steam per square foot of heating surface, as in the case of a steady load and costly fuel, to 8 lb. of steam when the conditions were reversed.

The design of furnace would then be determined from the amount of coal of the given quality which had to be burned to produce the required amount of steam, from 60 per cent to 70 per cent of the heat units in the coal being assumed as the amount which would be absorbed by the boiler. The actual area of grate would then become a matter of judgment on the part of the designing engineer. The fuel might be of such a nature as to be most suitable for a strong draft and a high rate of combustion, in which case a high stack and small grate would be installed. But if more moderate rates were considered preferable sufficient grate might be installed to burn the required weight of coal per hour at a rate in the vicinity of 20 lb. or even 15 lb. per square foot.

When it was finally installed the area of a grate so designed would have a ratio to the heating surface somewhere between 1:80 and 1:20, but the actual figure would be quite as meaningless as that obtained by comparing the heating surface with the kilowatt capacity of the plant, and it is certainly high time that its use was completely discontinued by those steam engineers who adhere to it solely for reasons of conservatism.

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AHEAD OF THE STEAM ROADS

The statement that electric railways are in position to, and should, profit by the experience of steam roads in the development and use of signaling systems has been made so often that it is commonly accepted as a matter of fact. There is one particular, however, in which steam railways can learn something from electric roads, and that is how best to maintain signaling facilities. It is almost a universal custom among electric railways which have signals to require their maintenance to be handled by the department which looks after the overhead and power facilities. This puts the signal maintenance in the hands of men who are already handling electrical work and are familiar enough with it to be able to assimilate the added labor of caring for the applications of electricity which the signals represent. It is true that hardly any signals except such as are electrically operated are used on electric railways, but the fact remains, nevertheless, that these roads have shown a much better appreciation of the fitness of things in keeping all of their electrical facilities under the eye of an electrical department than steam roads have in trying to combine the maintenance of signals with maintenance of track. Steam roads have had for many years a department in charge of their telegraph and telephone facilities, which corresponds in a way to the overhead department on electric roads. But instead of trying to work out a combination of the telephone, telegraph and signal maintenance, which undoubtedly could have been made successful, they seem to be endeavoring to combine two kinds of labor which are distinctly incompatible.

There is hardly a signal installation made nowadays into which electricity does not enter, either for route locking, power distant signals or for the entire plant. The telegraph repairman is not purely an electrician. A great part of his duty is straight mechanical work, and it will be much easier to enlarge his field so as to include signal maintenance, or to enlarge the signal maintainer's field so as to include telegraph work, than it would be to do the same thing with track labor.

The first application of the idea of combining the signal and track maintenance forces was made on a large Western steam system and is said to have proved a success, but it will take many trials in many places to prove that such an arrangement is either more economical or more satisfactory than the present system, which requires the maintenance of signals to be handled by men who do nothing else. One steam road has tried to work out a combination of the maintenance of its electrical facilities similar to the customary electric road plan, and although this has not yet been put into practical use, it sounds much more reasonable than the proposed combination of the duties of sectionmen and signal maintainers.

Electric railways seem to have arrived first—and without straining—at the best solution of the difficult problem of how to maintain signals most economically. And in this respect, at least, steam roads have something to learn from electric railways—even though the latter may be indebted to the former for much of the pioneer work that has been done in connection with the engineering problems of signaling.

PROGRESS IN EXPRESS CAR DESIGN

The article printed elsewhere in this issue on the new express cars of the Bay State Street Railway illustrates gratifying progress in a branch of rolling stock design which has hitherto received much less attention than it deserves. In the early days of electric express service it was not thought important to utilize anything better than the ordinary box-car type of design, and to-day many thousands of such cars are doing reasonably good work along well-established lines but without that operating efficiency which the best practice is now demanding. As a rule these cars are strongly built and give little trouble in service, but they are heavy in relation to their capacity and dimensions and do not always afford the maximum carrying space inside on account of various obstructions to the storage of freight and express matter.

To save weight without any decrease of strength has been the motto of the Bay State company's equipment department for several years, and the results secured in passenger-car design are well known to our readers. In the new express cars a saving of over 4000 lb. has been secured in comparison with the company's 1911 type of rolling stock for express service, which has the same general dimensions, and a carrying capacity of 40,000 lb. has been obtained with a car body weighing only 13,595 lb. This has been accomplished by the use of an all-steel frame and by close attention to the combination of functions so far as practicable in individual features of the equipment. Thus, the wiring is carried just below the roof in iron conduit which is utilized as a part of the roof structure support; the diagonal wooden strips to which the outside sheathing is attached are installed in such a way as to carry a portion of the loading; the bumper is combined with the drawhead, and a structural revolution in design has been established by the disposition of steel members for transmitting all loads directly upon the bolsters as foci, regardless of the location of freight in the car interior.

One of the most useful features installed in these cars is the simple but effective scheme of running the bell cord through conduit to give a bigger loading space as the shipments approach the roof in height. Another, which will at once commend itself to the express traffic man, is the installation of special electric heaters beneath the floor with short ducts leading upward to openings inside the car near the doors, so that perishable freight will not suffer from the cold when the latter are left ajar purposely or inadvertently. The installation of multiple-unit control, permitting train operation, with consequent saving of motormen's wages, over certain portions of the system, and the tabulation of detailed weights given are also of much interest. It is apparent that some of these improvements are of a character that might suggest themselves to a progressive car engineer who had no special knowledge of the peculiarities of express freight transportation; but another class of improvements is due entirely to the willingness to learn practical conditions from the men who are concerned with the daily handling of freight on electric cars. The best thing about all this is that these improved cars cost no more to build than the former heavier type.

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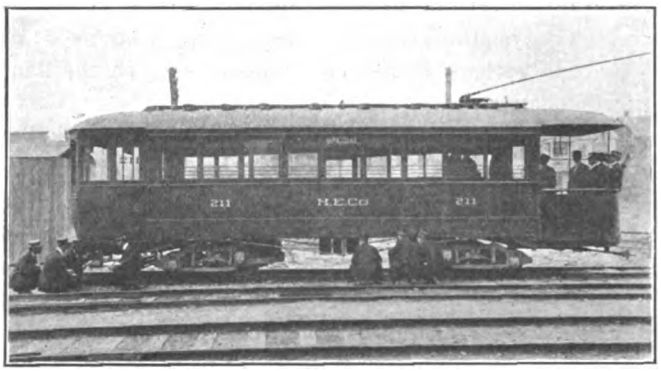
Instruction of Trainmen on the Houston Electric

This Article Describes the Schoolroom Equipment and Complete Course of Instruction to Prospective Trainmen as Conducted at Houston and Also the Method of Teaching the Instructors

The Houston Electric Company, Houston, Tex., has recently enlarged its course of instruction for new trainmen, equipped a schoolroom and employed an expert instructor to conduct the work. The rapid growth of this property required an increased number of trainmen and made a more comprehensive system of instruction necessary. The present course may be completed in about three weeks, after



Houston Instruction School—Finding Trouble on Instruction Car

which the successful applicants are placed in probationary service for a period of six months. During this time the new trainmen are required to report to the instructor at the end of the first month and also at the close of the six months' probationary period. On each of these occasions the instructor lectures them concerning their particular faults, as shown by individual records, and discusses the problems which may confront them from time to time in the service. Following the final lecture, the men are placed on their own responsibility.

The new schoolroom is situated in a new carhouse located just outside the business district of Houston. It is large and well lighted both naturally and artificially and is equipped with mechanical, electric and air-brake appliances now in use on the Houston Electric Company's cars. An additional course of instruction is given by the road instructor in an instruction car, usually one of the latest pay-as-you-enter types in use on the company's lines.

Essentially, the schoolroom equipment includes a set of controllers, air-brake equipment, overhead line switches, car-lighting switches, bell circuits, headlight circuits, heater circuits and a fare register. To illustrate the flow of electricity through the car circuits, a series of incandescent lamps representing the resistance points of the controller are arranged on a board so as to show what is meant by a motor in series, series parallel and parallel. Views of the schoolroom equipment are shown in the illustrations.

Controller equipment includes the three types installed on the company's cars, namely, GE K-36-J, K-28-B and K-10, and each is equipped with an automotoneer. The principal characteristics of the controller equipment are described to the students, and they are thoroughly instructed as to the repair of damages both permanent and temporary in case of accident while in service.

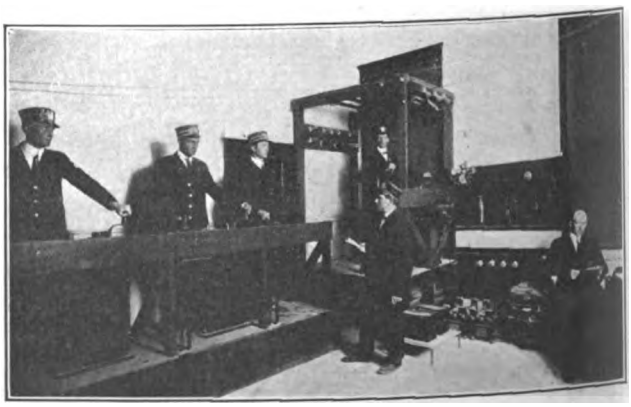
The Houston Electric Company uses five types of motors, namely, the GE-54, 67, 81, 219 and 80. The method of making repairs so far as the trainmen are concerned and the principle of motor design may be demonstrated by a single motor equipment. Accordingly, the schoolroom installation includes only one type of motor for demonstrating purposes. Each student is required to familiarize himself with the operation of this motor before he is taken on to the instruction car. He also is required to become familiar with the operation of the air-brake mechanism, various types of resistance and other electrical apparatus used on the cars, all of which are included in the schoolroom installation.

EMPLOYING AND INSTRUCTING TRAINMEN

The new method of employing and instructing trainmen now in vogue on the lines of the Houston Electric Company requires that all applicants for positions report at the office of the superintendent of transportation Monday morning of each week. After passing the physical examination conducted by a physician, they are again sent to the office of the superintendent of transportation, where they are furnished with a badge, punch and book of rules and receive an order for a uniform and cap. Experience has shown that about one-third of those who apply for a position fail to qualify because of defects which are discovered by the superintendent, who interviews all applicants.

Subsequent to the purchase of a uniform and cap the conductors report to the instruction department, or trainmen's school, at 9 o'clock each Tuesday morning. After a record of each man has been entered in the book entitled "Record of Trainmen During Probation Period" they receive a preliminary lecture for conductors. At the close of this lecture a breaking-in blank is given to each man. They are then sent to the road instructor, who places them with platform instructors on the various lines. As soon as they have received their cap and badge they are required to go to a local photographer and have their picture taken, returning a receipt to the main office.

Newly appointed motormen report at the trainmen's school at 2 o'clock Tuesday afternoon, and after a record of each man has been made they attend the preliminary lecture for motormen. At the close of this lecture they are provided with a breaking-in blank and sent to the road instructor for assignment to platform instructors on the different lines. A reproduction of the breaking-in blank is shown in one of the illustrations. On this form each motorman or conductor platform instructor is required to specify



Houston Instruction School—Class of Motormen

the number of day and night trips the student makes with him, as well as the kind of brake used on the car. The object of these requirements is to make sure that each student is entirely acquainted with all types of brake equipment and that he has made a sufficient number of night trips over each line to become thoroughly familiar with the route after dark. In addition to obtaining the approval of the platform instructors, all student motormen and conduc-

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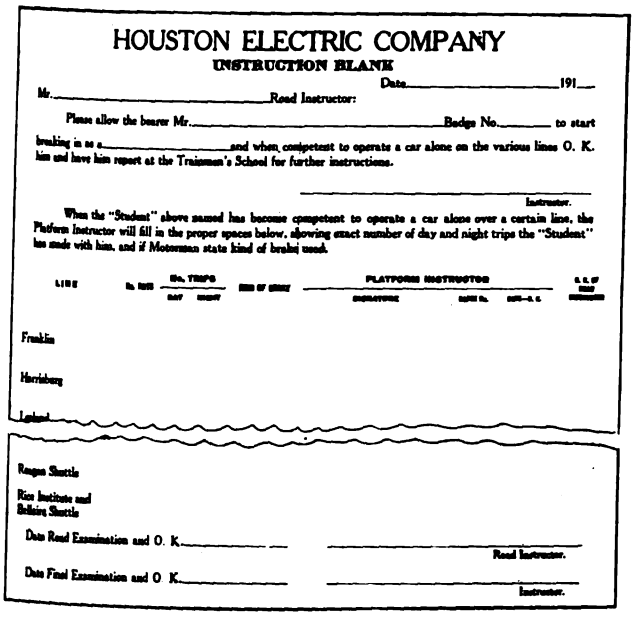
tors must be "O. K.'d" by the road instructor on each line.

After service at breaking in under the platform and road instructors, the conductors are required to report to the trainmen's school Wednesday morning for an intermediate lecture by the chief instructor, after which they are questioned regarding the book of rules and general operation. These questions cover all details and are asked partly to test the man's knowledge at that time and partly to show him what questions he will be required to answer correctly in his final examination, if he wishes to qualify as a conductor. Whenever a student fails to answer a question it is answered for him and thoroughly explained. At the close of this preliminary test the student conductors are returned to the road instructor to complete the remainder of their student work on the different lines.

Motormen who have been breaking in one week are required to report at the trainmen's school on Wednesday afternoon for an intermediate lecture by the chief instructor. At the close of this lecture they, too, are asked questions concerning the book of rules and general operation, as were the conductors, except that the questions are relative to the work about which they have received preliminary road instructions. In a similar way the motormen are again returned to the road instructor, who places them with platform instructors to complete their student work on the remainder of the lines with which they are unfamiliar.

Thoroughly to familiarize students with the different lines operated by the Houston Electric Company requires approximately three weeks. At the close of this period both conductors and motormen are examined by the road instructor to test their familiarity with the various lines and operating conditions on each. If their test proves satisfactory, they are sent to the trainmen's school for a final lecture and qualifying examination. If the student fails to pass this examination and the road instructor believes there is a possibility of making a good trainman of him, he receives further road instruction. On the following Thursday morning all student conductors and on the following Thursday afternoon all student motormen who have qualified after the three weeks' road instruction attend the final lecture and qualifying examination. While the rating of conductors is determined by their proficiency in answering the questions on general rules and special rules for conductors, they are also required to familiarize themselves with the rules governing motormen. Likewise all motormen are required to have some knowledge of the rules governing conductors. If the rating on this examination is satisfactory, they are considered competent to operate a car and report to the office of the superintendent of transportation for duty.



HOUSTON ELECTRIC COMPANY

INSTRUCTION BLANK

Date_____191__

Mr._____Road Instructor:

Please allow the bearer Mr._____Badge No._____ to start breaking in as a_____and when competent to operate a car alone on the various lines O. K. him and have him report at the Trainmen's School for further instructions.

_____
Instructor.

When the "Student" above named has become competent to operate a car alone over a certain line, the Platform Instructor will fill in the proper spaces below, showing exact number of day and night trips the "Student" has made with him, and if Motorman state kind of brake used.

LINE | No. TRIPS DAY NIGHT | PLATFORM INSTRUCTOR SIGNATURE

Franklin

Harrisburg

Leland

Reagan Shuttle

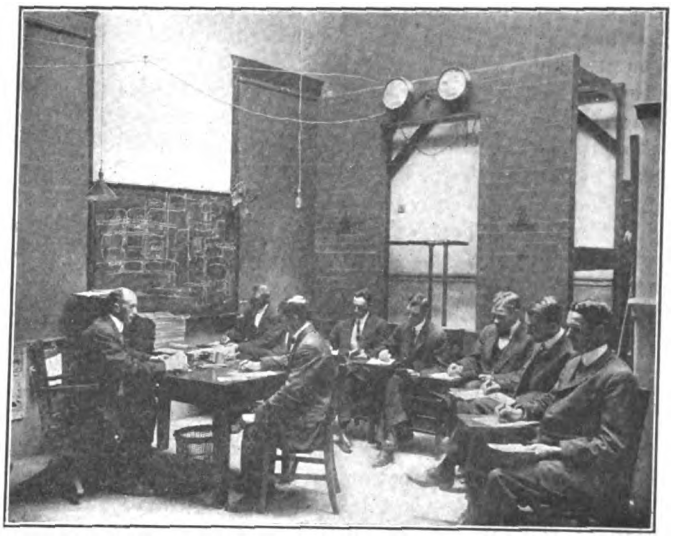
Rice Institute and Bellaire Shuttle

Date Road Examination and O. K._____ _____
Road Instructor.

Date Final Examination and O. K._____ _____
Instructor.

Houston Instruction School—Instruction Blank

Twice each week—namely, on Monday morning and Friday morning—during the period of road instruction all student conductors and motormen are required to report at a specified time and are taken out on the instruction car in charge of the road instructor. On different days cars of different types are used for this purpose, so that during the course of the student work they will become familiar with the various types of cars in regular service. On these trips different features of operation, both usual and unusual, are discussed in detail. After the car has been operated over the lines a sufficient length of time to give each student an opportunity to run it a while, it is set out on a side track. While there the car is crippled in various ways, and the student motormen are required to find and remedy the trouble. These semi-weekly trips of instruction on the car have been of great assistance in training the men. Often those who have been in service five or six months will make the trip for additional information.



Houston Instruction School—Class of Conductors

At the completion of the three weeks' course of instruction all trainmen are considered probationary, and in matters which might be considered as indicating need of further instruction they are under the supervision of the instruction department. So far as practicable, whatever discipline may be necessary during this period is in the nature of reinstruction. The chief instructor sets aside one hour each day for further instruction of probationary trainmen who may be sent to him by the superintendent of transportation. To keep the instructor advised as to each trainman's record, copies of all reports affecting it are sent to him and are added to the probation record which is on file in the office.

On each Monday morning probationary conductors, and on each Monday afternoon probationary motormen, who have been at work one month are required to report at the trainmen's school for a lecture by the chief instructor. These lectures for the two classes of men are different, but both review the work of the past month. Each trainman's record is taken up with him privately, his mistakes are discussed and suggestions for the improvement of his work are made to him.

On Friday morning probationary conductors, and on Friday afternoon probationary motormen, who have completed their six months' probationary period have a final lecture by the chief instructor in which their work for these six months is reviewed. The trainmen now having completed a probationary period are relieved of all supervision so far as the instruction department is concerned.

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TRAINING INSTRUCTORS

To assist the conductor and motormen platform instructors in the work of instructing student trainmen and at the same time clearly outline the course of instruction two eighteen-page pamphlets, one for each class, have been printed and supplied to them. The pamphlets call attention to the importance of properly instructing newly appointed men, the method of instructing them and what to expect from the students. The instructions are issued in a conversational form, which makes them easy to read and comprehend. When a student is started on the road under the platform instructor he receives a booklet giving intermediate time points for all lines. This enables him to check schedules with the regular crew and become familiar with the schedules for each run.

As an extra incentive to platform instructors not only to put forth their best efforts and use the greatest care in breaking in men but also carefully to follow up these men during the probationary period, the company, in addition to paying them an extra 15 cents a day while instructing students, gives them a bonus of $5 for each man broken in who remains in the service at the end of six months, provided, however, that he has made a satisfactory record during that period.

For the purpose of discussing matters of special interest in the courses of instruction, once each month a meeting of platform instructors is held. Methods of platform instruction as well as general operation are suggested and discussed by trainmen and others attending the meeting. The men take a very active interest in the various topics presented, and much good results. While these meetings are primarily for platform instructors, all trainmen are urged to attend and inspectors are always present and take an active part in the discussions.

In order to further the spirit of co-operation and zealous interest in the welfare of the company resulting from the monthly meetings, attractive booklets are issued from time to time, discussing such subjects as "What Houston Street Car Service Means," "Hints to Trainmen," "Courtesy as an Asset," etc.

To systematize the work of instruction and better to assure the management that the students' courses of instruction are proceeding along definite lines and that each class is receiving a uniform system of instruction, the lectures given by the chief instructor have been written out. The lectures vary in length from 2000 to 6000 words and discuss topics of especial interest to each class, depending, of course, on the length of the students' career.

To keep the general superintendent informed as to the work being done by the instruction department, a daily report is sent to him, showing the names of the students, the lines on which they have been broken in and the names of the platform instructors for each day, the names of the men who have attended lectures and examinations each day and of those sent back to the school for additional instruction, and containing a record of instruction car operation showing men out on the car, type of car used and the time out and in. The names of students "O. K.'d" for regular service as well as the names of the platform instructors are also shown on this report form.

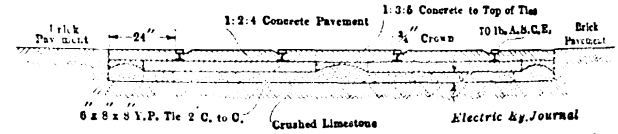
The courses of instruction were prepared and the manner in which the work is conducted was determined by H. F. Rykert, chief instructor, under the supervision of R. T. Sullivan, general superintendent, and David Daly, general manager of the Houston Electric Company.

The concession for a new electric tramway and lighting system in Pernambuco, Brazil, was granted to Dodsworth & Company, Rio de Janeiro, who have arranged with J. G. White & Company, New York and London, to do the construction work. The foundation for the power house is now being built and surveys being made for the carhouse and the track, a portion of which has already been laid.

CONCRETE PAVING AT TEXARKANA, ARK.

After investigating the results obtained by different street railway companies throughout the country, the Texarkana (Ark.) Gas & Electric Company decided to use a concrete paving surface around its double-track line on Broad Street, the principal thoroughfare in Texarkana. Two years' service since the installation of this type of paving gives some idea of what wear may be expected from it eventually. The paving shows no evidence of failure at the present time, and the depth of wear is negligible. To obtain these satisfactory results, W. L. Wood, Jr., general manager, had a rigid set of specifications drafted for the work. During the progress of the construction, both as to track foundation and paving, it was closely inspected, and every precaution taken to produce a permanent job.

Essentially the track cross-section contains 6 in. of 2½-in. crushed limestone laid in a trench 19 in. deep. This was thoroughly rolled with a heavy road roller, and then the track was laid. The latter included creosoted yellow-pine ties of standard size laid 2-ft. centers and 70-lb A. S. C. E. rail spiked in place, the whole resurfaced to the finished elevation. At this point in the progress of the work the new track was connected through and regular traffic schedules resumed. To correct the weak spots which were disclosed by the traffic, it was customary each night, after a section of new track had been laid and opened to traffic, to couple a general utility motor car to a 100,000-lb. gondola car which had been loaded with stone ballast. This equipment was then run back and forth over the new track until all possible weak points had been detected. The following day the spots in the foundation were pick-tamped to surface and again submitted to the ballast car test load before the concrete was placed.



Cross-Section of Track in Concrete Pavement at Texarkana

After the skeleton track had been brought to a permanent surface and tested, an additional quantity of crushed stone was cast between the ends of the ties in double track to the height of the top of the tie, to reduce the quantity of concrete in the finished pavement. Then the paving foundation was laid. This consisted of 1:3:5 concrete brought up to the tops of the ties. The paving surface was laid with concrete in the proportions of 1:2:4, where the aggregate consisted of 1-in. crushed stone. No wearing surface mixture was provided, but the paving material was placed comparatively dry or of a consistency which would bring moisture to the surface if tamped. After the paving surface had been accurately formed with a templet which gave a ¾-in. crown between the rails and a 1¼-in. flangeway, the surface was floated to complete the job.

Expansion and contraction were provided for by ½-in. joints spaced at 6-ft. intervals. Ordinary weather boarding, which is of a wedge section, was used as the insert at the expansion joints, and after the initial set it was replaced with an asphaltum filler. To prevent breaking down the edges of the concrete paving, particularly at street intersections where there is cross traffic, flat bar iron of ½-in. x 4-in. section was laid edgewise to form a curb. Under all track special work and at each joint the crushed stone ballast foundation was poured solid with cement grout just before placing the paving foundation. A period of ten days was allowed for the concrete to set before traffic was resumed. The question of trench drainage was carefully investigated, but this work was considered unnecessary in this particular section of track because excellent natural drainage was provided by the sandy subsoil. A cross-section of the track is shown in the accompanying drawing.

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New Light-Weight Express Cars of the Bay State Street Railway

Description of New Rolling Stock with Detailed Weights and Special Features Planned to Provide Maximum Carrying Capacity in Fast Express Service on Lines South of Boston—Car-Body Design Gives 20 Tons Capacity for Body Weight of 18,595 Lb.—Use of Wiring Conduit in Roof-Framing Structure—Special Heater Arrangement—Compression Bumper and Drawhead

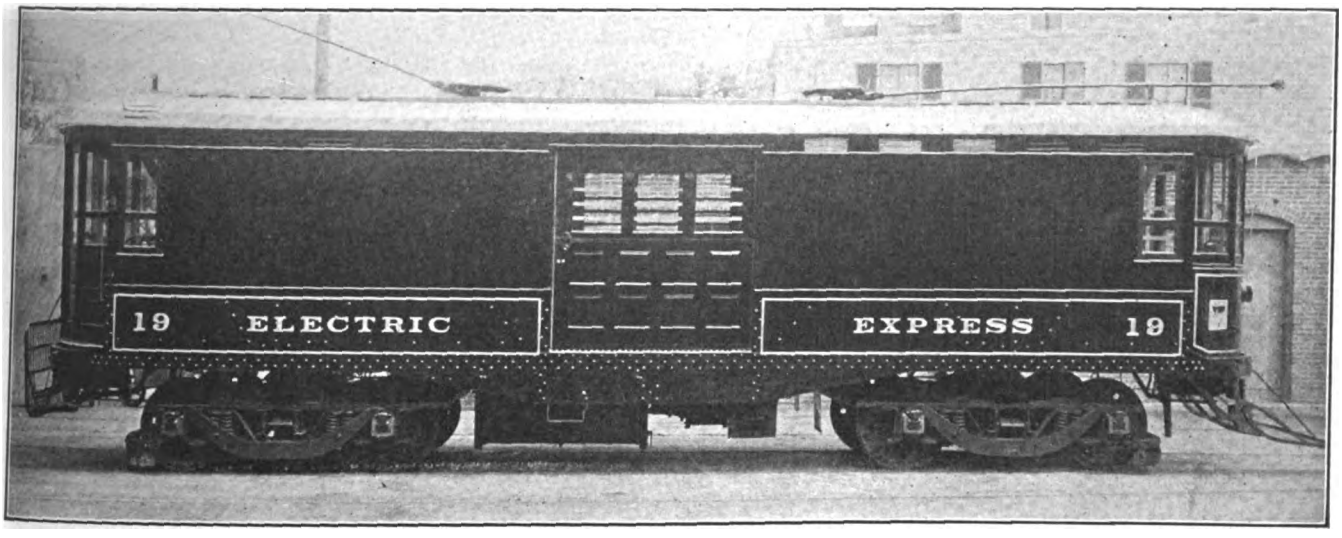
The Bay State Street Railway, of Boston, Mass., has recently placed in service three express cars of special design which will shortly be supplemented by five others of the same construction for use on the through lines of the company between its Boston freight and express terminals and points in southern Massachusetts and Rhode Island. The new cars represent a striking advance in rolling stock built for this class of service and are said to be the lightest-weight express cars of their capacity thus far developed. They were designed in detail by E. W. Holst, superintendent of equipment of the Bay State company, and were constructed under the immediate supervision of the department at the shops of the St. Louis Car Company.

The new car is of the double-truck, flush-platform type, with side and end doors, steel underframing and semi-steel body. The general dimensions are as follows:

Total length over bumpers	39 ft. 0 in.
Length between screen bulkhead partitions	30 ft. 0 in.
Width over side plate at bottom	8 ft. 0 in.
Total width over all	8 ft. 2 in.
Height from rail to top of floor	46 in.
Height from rail to top of trolley board	11 ft. 9 in.
Distance between truck centers	22 ft. 0 in.
Wheelbase of trucks	6 ft. 4 in.
Wheel diameters	34 in.

The equipment includes Baldwin "A" trucks, four GE-201 motors, 5½-in. axles, G.E. emergency air and Peacock hand brakes, multiple-unit control of the Sprague-General Electric type, Kilbourn sand boxes, Root snow scrapers, eight Consolidated car heaters, Wilson trolley catchers, Midvale steel wheels, solid forged gears with 14:70 ratio, United States headlights and folding fenders, the latter designed by the equipment department.

The dimensions of these cars are standard in the Bay State company's practice and are the same as those of the express car described in the ELECTRIC RAILWAY JOURNAL of May 20, 1911, page 872. The carrying capacity is 20 tons, and the total weight of the car equipped, but without load, is 45,800 lb. This represents a saving of more than 4000 lb. in weight in comparison with the earlier express cars mentioned.



Bay State Express Car—General Side View

The underframing and main superstructure framing are of steel throughout, a special feature being the design of the members to transmit the weight of a load concentrated at any part of the car back to the bolster. The longitudinal members of the underframe consist of two 8-in. channel-iron center sills running continuously from bumper to bumper and two 5-in. x 3½-in. x 5/16-in. angle-iron side sills reinforced in the center by a ¼-in. x 18-in. truss plate on each side. The center sills weigh 11¼ lb. per foot, and the side sills 8.7 lb. The center sills are spread apart a distance of 2 ft. 11 in. beyond the body end sills. The latter are built of 3½-in. x 2½-in. x ¼-in., 4.9-lb. angle irons, the center sills being tied at the lower edge by 3-in. x ½-in. knees. The bolsters are of M.C.B. design, 10 in. wide, the lower member being 1 in. and the upper member ¾ in. thick. The bolsters are tied to the side sills by ¼-in. gussets. The bumpers are of 7-in. channel iron tied to the corner posts and to extensions of the side plates. The needle beams are of bolster design, the top member being a 3-in. channel and the bottom member a 4-in. channel iron, tied to the side-sill angles with 3/16-in. gussets to which 4-in. x ¼-in. diagonal braces are fastened. A 3/16-in. side plate 30 in. wide is riveted between the side doors and the corner posts. A center beam of reversed bolster construction is provided in the form of a 4-in. channel iron which is tied to the truss plate below the sill angle with ¼-in. gussets.

The corner posts are of 4-in. x 4-in. x ¼-in angles braced from the bolster with 4-in. channel irons and fastened to the latter at the top with 3/16-in. gusset plates. The center door posts are in two cases built of 4-in. x 4-in. x ¼-in. angles and in two cases of 4-in. channels braced from the bolster with 4-in. channels and fastened to the body plate with gussets. The gusset at this point connects the two doorposts over the door. By reason of the use of cross-beams of inverted bolster construction a load applied in the center of the car, for example, brings the tension strains on the doorposts, which compress bar angle braces back to the

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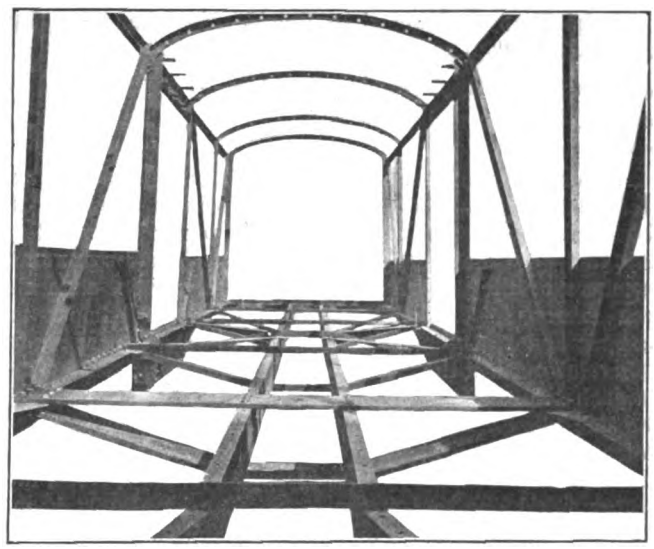
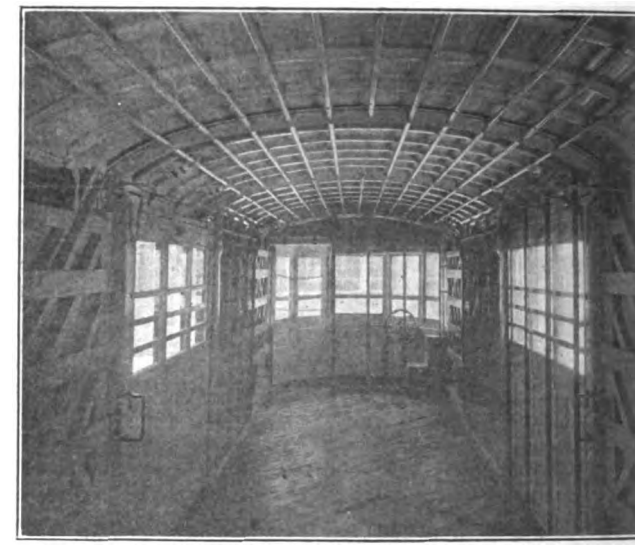
bolsters and transmit the strain directly to the latter. The diagonal braces are 4 in. x ¼ in. in section and the bolster posts are 4-in., 5¼-lb. channels. The corner post rafters are made of 2½-in. x 2½-in. x ¼-in. angle irons, laid inside the posts and fastened to them and to the gussets, forming a turtleback roof. The rafters connecting the bolsters and the center doorposts are of 2-in. x 2½-in. x 3/16-in. angle irons and form a truss roof. The body plate is of 2½-in. x 2-in. x 3/16-in. angle iron run in one length from corner post to corner post and extending 6 in. beyond the post to provide a fastening for the bonnet bow of the vestibule. Steel carlines, composed of 2-in. x 2½-in. x 3/16-in. angles, are provided at intervals along the upper belt rail, and these are drilled for ¾-in. pipe conduit, which serves the threefold purpose of carrying wires and bell cord and strengthening the roof structure. Wooden carlines are used in intermediate positions between the steel carlines. The conduit is suspended between the angle-iron rafters and is tied to the corner post rafters with nuts and bellmouths. Wooden rafters laid on top of the conduit are carried from 3/16 in. to ¼ in. above the steel rafters. All steel carlines are attached to the body plate, and the roof is installed with ½-in. poplar sheathing covered with prepared cotton duck roofing.

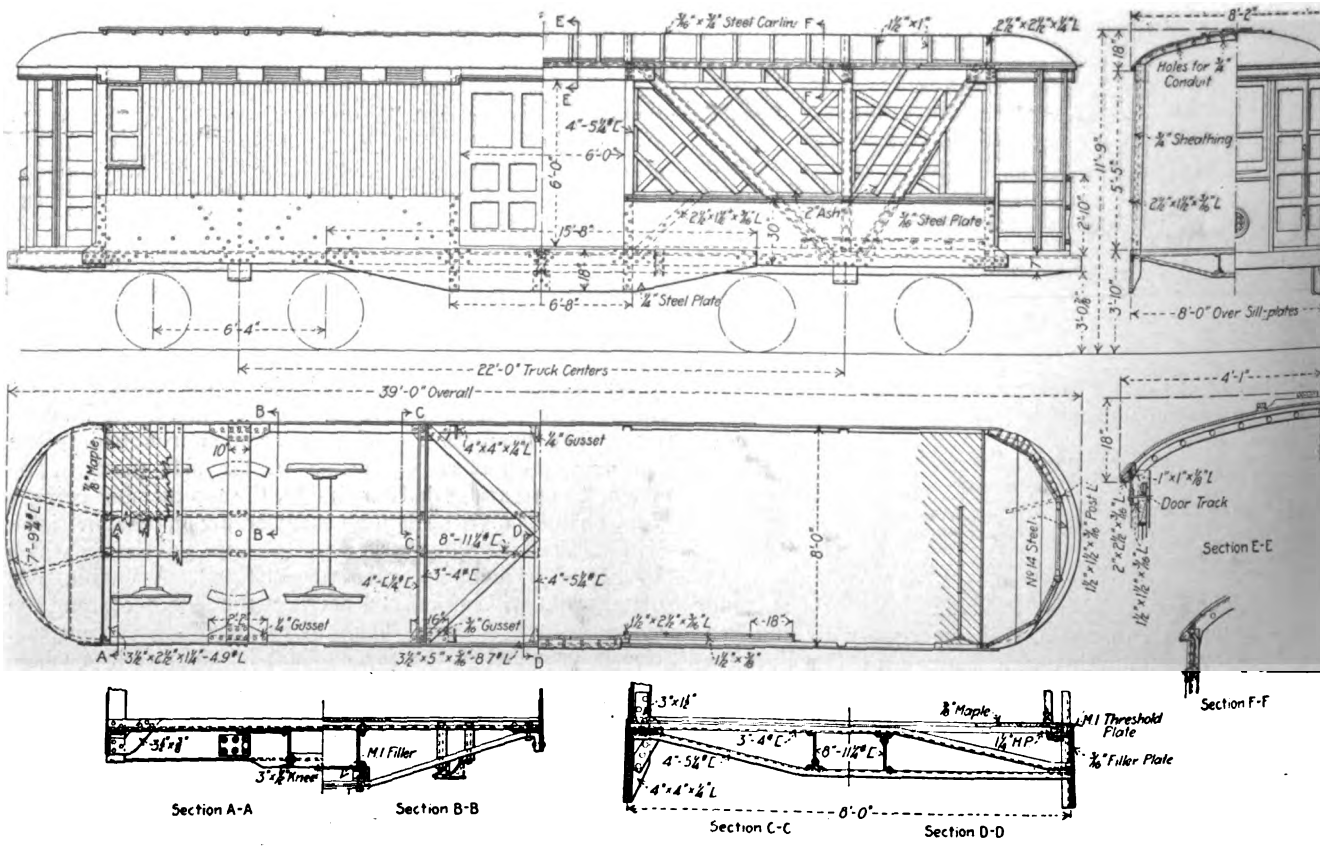


Bay State Express Car—Body Framing



Bay State Express Car—View of Interior

The side from the body sill plate to the roof is sheathed with ¾-in. tongued and grooved hard pine. Wooden sheathing was found to be lighter than steel plate on account of the additional furring necessary with the latter. On the inside the sheathing is constructed only with protection strips of ash which also serve for tying up boxes and barrels. Ten ventilators are installed on each side directly under the body plate, these being of the type described in



Bay State Express Car—Framing Plans and Elevations, Sections, Etc.

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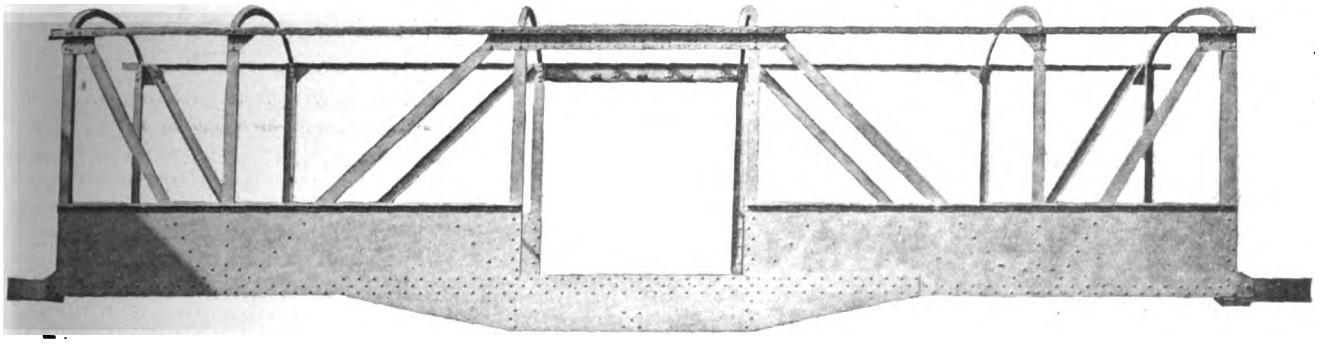
the previous article and having adjustable louvers. The side doors are 6 ft. square and are of 1¾-in. ash, with ash panels and three stationary windows in the upper portion. The body end partitions are each of 1½-in. x ⅜-in. angle-iron bar filled in between with screen sections made of No. 11 steel wire, 1-in. mesh, in a ⅞-in. grooved steel frame. The side doors are each provided with screen shields of the same mesh and wire size as for the end partitions, the former having angle-iron corners and being attached at the top to the body-plate reinforced angle. At the corners of door openings angle irons are provided and bolted at the bottom to clips extending up from the angle sill so as to form part of the doorpost construction. The floor is composed of 1¼-in. x 4-in. hard-pine pieces laid 4 in. apart and bolted to the angle-iron side sills and to the channel-iron center sills, with a wearing surface of ⅞-in. maple laid diagonally and screwed to the under flooring. The side doors are provided with four 1-in. pipes with holes cast in the threshold plate 23 in. apart on centers and 6 in. inside the car, with brackets and stop plates at the top to protect the doors when special loads are carried.

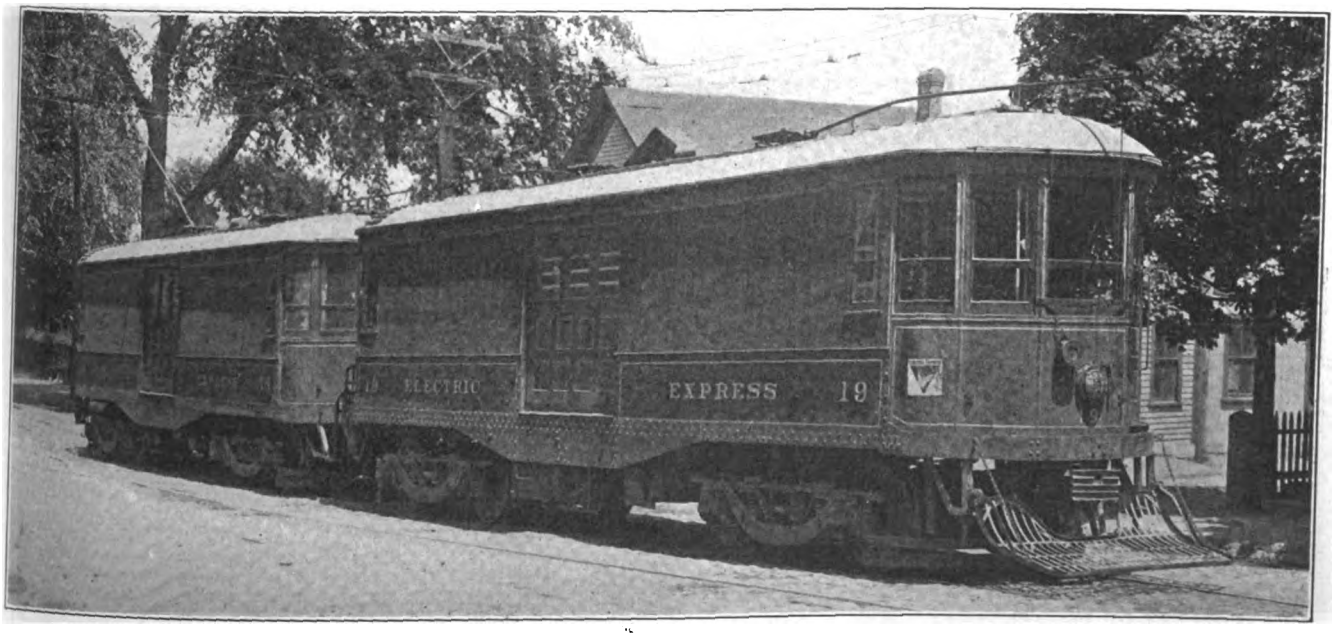


Bay State Express Car—Side View of Body Framing—Weight 6400 lb.

CONDUIT, ELECTRICAL EQUIPMENT, TRUCKS, ETC.

Eleven enameled conduits are installed in the roof to carry the main motor switch wires, control switch wires, lighting, air compressor, arc headlight and heater circuits. A double bell cord is used, with a condulet outlet in the middle of the central conduit which provides a suitable opening without danger of chafing. Each interior lamp is protected against injury by two ¾-in. x 1/16-in. metal straps 12 in. long placed around the bulb just above the lamp base. The conduits are installed 7 in. apart on centers, and their use enables the car to be more closely packed without damage to the bell cord or wiring.

The heaters are placed in the vestibules at each end and underneath the end door openings on the side of the car, inclosed in a double-lined box in the latter case, as shown in the drawing on the next page. The heater box is of sheet steel and the space between the walls is lined with asbestos. At the top of the box a short flue leads upward to an intake screen in the side of the car, so that when the doors are left slightly open in cold weather the danger of injury to perishable goods placed near the doors will be eliminated. All switches are placed inside the vestibules and nothing is left inside the car which will in any way occupy freight-carrying space. The heating grills near the doors are 4 in. high x 30 in. long. The motors are inside-hung with leads hung by leather straps from springs attached to the underframe, and the trucks were designed by the Baldwin Locomotive Works for 30,000 lb. king-pin load. It is probable, however, that a lighter truck built along the lines of the railway company's "Bay State 12" truck, which was described in the ELECTRIC RAILWAY JOURNAL of Oct. 5, 1912, will ultimately be applied to this service, since the superintendent of equipment is of the opinion that the trucks can be lightened materially with the same factor of safety if the latter design is adapted to the express cars.



Bay State Express Car—Coupled for Multiple-Unit Train Operation

The fender is the company's own design and when hinged up extends over a spring-cushioned bumper, so that it is free to swing when the car is coupled with others. The bumper is illustrated in the accompanying drawing and combines also in its construction anti-climber and draw-

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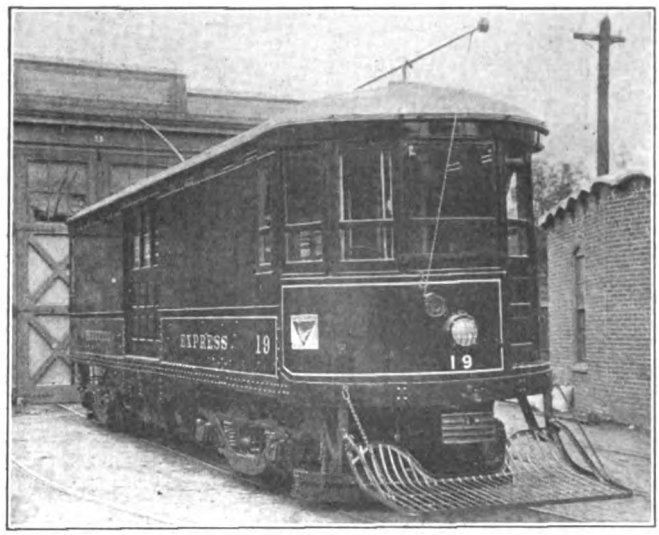
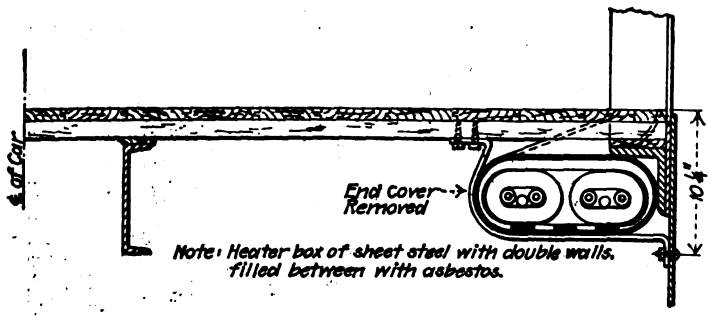
head features which are the basis of patent applications now pending. This arrangement minimizes the weight and works out very satisfactorily in practice.

The vestibules are unusually convenient in arrangement. The arc headlight switch is located within 15 in. of the air-brake handle and diagonally above the latter, a conductor's valve being set overhead to enable the emergency brake application to be made from either end. This is an important feature in the successful operation of a fast ex-



Bay State Express Car—End View

press car service, since the conductor and motorman are separated when heavy loads of bulky merchandise are carried, and thus they cannot communicate as freely as on a passenger car. On the headboard of each vestibule are mounted a motor switch, air-compressor circuit-breaker, master controller breaker, headlight switch, heater knife switches and a lighting breaker. Each vestibule carries a Badger chemical fire extinguisher, and a seat is provided for the motorman. The vestibule doors are made to lock either outside or inside by padlock attachments, the padlock being fastened through a hole and angle piece at the door, the handle and latch being combined to save weight. Grab handles are provided on the vestibule doors only, and these are installed so as to be flush or inset in relation to the sides of the car. The cars are painted green with a dark finish, being otherwise like the passenger rolling stock. By operating them in multiple-unit trains from Boston to important centers south, where a motorman can be secured



Bay State Express Car—Location of Heater Box

for further service on the single car basis, a saving of one man is possible on the platforms.

The summarized weight of the car is as follows:

	Lb.
Car body light	13,595
Motors	8,520
Trucks	16,240
Car-body details	2,164
Air brake equipment	1,199
Electrical equipment	2,528
Equipment brackets, pipes and conduit	1,505
Total	45,751
Actual weight of car on scales	45,800

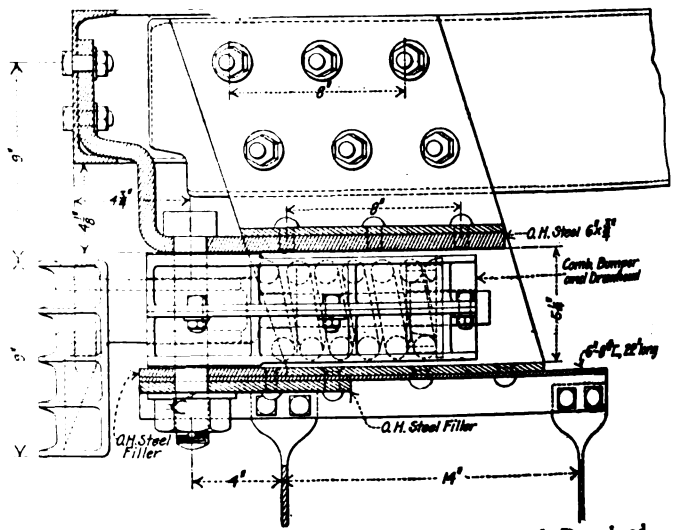
Detailed weights are given in the accompanying tables:

CAR-BODY DETAILS

	Lb.
Fenders	332
Sanding appliances	117
Body center plates	92
King pin and keys	54
Drawhead, bar and shackles	470
Snow scrapers	480
Foot gongs	24
Incandescent headlights	32
Signal bells and cord	8
Hand-brake staff and handles	138
Gearedd hand brake	138
Hand-brake cables and clamps	56
Floating levers and brake rods	109
Air-brage levers	114
Total	2164

EQUIPMENT BRACKETS, PIPES AND CONDUIT

	Lb.
Air-compressor brackets	28
Governor brackets	18
Compressor cradle	72
Emergency valve brackets	10
Brake cylinder supports	145
Reservoir hangers	52
Contactor box hangers	80
Resistance hangers	116
Heater brackets	59
Mud guards	30
Miscellaneous bolts and cleats	90
Air-brake piping	230
Wiring conduit	575
Total	1505



Bay State Express Car—Combined Bumper and Drawhead Casting

AIR-BRAKE EQUIPMENT

	Lb.
Air compressor	633
Jamb cylinder	176
Motorman's valves	40
Reservoirs	141
Air governor	82
Quick-service valves	20
Emergency valves	43
Safety valves	2
Whistles	7
Mufflers	10
Air gages	2
Air purifiers	19
Push rod and pins	18
Emergency valve strainer	6
Total	1199

ELECTRICAL EQUIPMENT

	Lb.
C-97-A controller	158
SB-52 contactor box	842
Three resistance boxes	170
Trolley stand, poles, etc.	267
Trolley hooks	7
Trolley catchers	27
MR circuit breakers	59½
MS-46 switches	20
MS-2 switches	4½
MS-14 switches	8
Roof fuse block	12
MS-16 fuse box	5
MS-13-B fuse box	17
ML lightning arrester	36
Train-line couplers	28
Bus-line couplers	29
BJ-343 connection boxes	70
Arc headlight resistances	13
Arc headlights	40
Wires	460
Heaters	240
Heater switches	15
Total	2528

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Maintenance Costs of Old and New Railway Motors

A Comparison of the Costs of Operating Old and Modern Types of Motors in City and Interurban Service, Based Upon Figures Taken from Six Roads in Operation

BY J. C. THIRLWALL, RAILWAY AND TRACTION ENGINEERING DEPARTMENT GENERAL ELECTRIC COMPANY, SCHENECTADY

In a general way every electric railway management realizes that, in the life of car equipments, a point is reached sooner or later where it is a measure of economy to replace the various parts with others of a more modern design. There are a number of factors which determine this point, including power consumption, schedule speeds, efficiency of operation as regards delays, the safety or comfort of passengers and the cost of maintenance. The values of some of these factors are indeterminate in terms of dollars and cents; those of others can be directly calculated. But railway accounting, in the case of the great majority of roads, has not reached a point where it shows automatically the relative costs of maintaining new equipments as compared with obsolescent types running on the same lines. It, therefore, very frequently happens that the executives of electric properties, simply because the facts are not clearly brought to their attention, allow certain parts to remain in service much longer than they would if they realized the savings made possible by the replacement of such equipment by that of more modern design.

Railway motors afford a striking instance of this fact, for there are thousands of motors in service in every part of this country the maintenance costs of which are so high, compared with those of a later design, that it would be a measure of financial economy if they were to be scrapped and new motors installed in their place. If these motors cannot be called obsolete, they are at least obsolescent; that is to say, they are of so inferior a design or so overloaded when used that it is impossible to obtain any great amount of mileage from them annually without an excessive number of failures and consequent heavy repair bills. During the past two years investigations have been made in a very thorough and careful manner by one of the large manufacturing companies into the cost of maintenance of each of the different designs of motors in service on six roads operating city and interurban service in different parts of this country. These roads operate in and between cities of from 25,000 to 700,000 inhabitants, and the conditions of traffic, schedules and loads and the methods of maintenance are sufficiently varied to make the figures obtained extremely representative in character. There are, of course, local differences in service and in the methods of caring for the equipment between the different roads, and these differences caused the average cost of motor maintenance on the different roads to vary slightly. But in general it was the proportional number of old motors in service as compared with the number of modern types owned that made the costs for any road high or low as the case might be. For instance, on one road 70 per cent of the mileage was made with GE-800 and GE-54 motors which had been in service for ten to twelve years. The average cost per 1000 motor miles for this road was $1.70. Another road, with an average cost of but $0.60 per 1000 motor miles, approximately one-third that of the former, was enabled to reach this figure because only 20 per cent of its mileage was made by excessively old types of motors and 40 per cent was made by motors which were designed within the past six years. In consequence, its costs of operation were strikingly low.

A summary of the figures obtained from the records of these roads for the year 1911 is published in Table I, the motors being divided into four groups, the division being made on a basis of years of service and similarity of design.

TABLE I—AVERAGE COST OF MOTOR MAINTENANCE ON SIX ROADS—MOTORS CLASSIFIED ON BASIS OF LENGTH OF SERVICE

	Class I 15 Years or More	Class II 10 to 15 Years	Class III 6 to 10 Years	Class IV 3 to 6 Years
Number of motors in service	745	3,866	2,980	1,356
Motor miles run during 1911	2,323,830	110,672,907	105,801,679	50,261,070
Miles run per motor	3,120	28,627	35,504	37,065
Motor miles run per defect	1,800	8,597	21,410	62,513
Cost of inspection per 1000 motor miles	$2.20	$0.30	$0.11	$0.03
Cost of repairs per 1000 motor miles	3.22	1.36	0.76	0.25
Total maintenance cost per 1000 motor miles	5.42	1.66	0.87	0.28

A study of these figures, which represent a total service of over 269,000,00 motor miles, shows several things. Primarily, the excessive costs of the motors in Classes I and II, as compared with those in Classes III and IV, are very prominent. Secondly, the mileage made per defect by the two first classes is very low, which means as a result frequent delays in service, numerous "pull-ins," cars held from service for repairs when needed and the resultant demoralization to the schedules, and these, in turn, mean a very large, though indeterminate, financial loss, as well as the loss of prestige and the antagonism of public sentiment. Such conditions, while not capable of being expressed directly in dollars lost, are unquestionably a heavy expense. This idea is borne out by the fact that the individual motors in the two first groups make annually but a small fraction of the mileage run by the motors in the two latter groups.

A very large proportion of these motors, of course, are mounted in service cars, sweepers, snow plows, etc., where the amount of work they are required to do is necessarily little. Others are beneath single-truck cars of ancient style which may be held as reserves and used only on days when an unusual press of traffic demands more than the ordinary number of cars. On this type of equipment, where the mileage made per year is necessarily limited by the car itself rather than by the motors, it is questionable whether the replacement of the old motors by those of a more modern design would return a reasonable percentage on the investment. But a very large proportion of these oldest motors are mounted under cars, passenger, work and supply, which operate regularly and run up a large mileage annually but at a very high cost for motor repairs. Another large proportion of motors is beneath cars which are capable of and suitable for regular service but are kept lying idle the greater part of the time owing to the unreliability of their motors. Thus they are revenue consumers instead of revenue producers.

POSSIBILITIES OF SAVING IN MOTORS OF CLASS I

Were the motors in Class I replaced by ones having costs no higher and with efficiency as great as those in Class IV and were an equal amount of mileage obtained from each annually, the saving in maintenance costs for the former type would be sufficient to wipe out the cost of replacement within two or three years. This would be equivalent to an investment yielding 30 per cent to 50 per cent annually. And with strictly modern motors, which those in

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Class IV are not, the gain in both efficiency and economy would be even more marked.

POSSIBILITY OF SAVING IN MOTORS OF CLASS II

In the case of the motors in Class II, the advantage in replacement is not so obvious. The reduction in expense in the case of most of the individual motor types which it includes, were they replaced, would be sufficient to pay a substantial interest on the capital invested in the substitution, but to many railway managers the question would occur: "Can this reduction in expense be maintained over a period of years long enough to justify the initial expenditure?" The answer to that question is emphatically "Yes."

In the first place, an analysis of the cost of motor repairs, which constitute 85 per cent of the total costs for all motors, is shown in Table II, which represents actual averages on the different roads.

Table II—Cost of Repairs per 1,000 Motor Miles

	Class I	Class II	Class III	Class IV	Difference Between II and IV
Fields	$0.43	$0.26	$0.15	$0.02	$0.24
Commutator	0.77	0.30	0.10	0.01	0.29
Armature	0.90	0.18	0.09	0.025	0.155
Brushes	0.06	0.05	0.03	0.025	0.025
Brush holders	0.19	0.15	0.10	0.005	0.145
Gear and pinions	0.14	0.13	0.10	0.055	0.075
Bearings	0.65	0.24	0.12	0.09	0.15
Miscellaneous	0.08	0.05	0.07	0.02	0.03
	$3.22	$1.36	$0.76	$0.25	$1.11
Inspection cost	2.26	0.30	0.11	0.03	0.27

When the figures for Class II and Class IV are compared, the items which show the largest reduction in cost are: field, 24 cents; armature (including commutator), 44.5 cents; brush holders, 14.5 cents; bearings, 15 cents, and inspection, 27 cents. On these five items, $1.25, or more than 90 per cent of the total saving, is effected. The chief factor entering into this reduction is not the age of the motors but their design. Modern motors cannot and will not show the heavy rate of depreciation characteristic of the older types. The reasons for this are obvious.

CHANGES IN ARMATURE DESIGN

First, in respect to armatures. The vastly improved electrical characteristics, due to changes in design and construction which have been worked out within the past few years, produce a motor which by the elimination of sparking and flashing at the brushes under all conditions of load has at one stroke wiped out the big majority of armature, brush and commutator defects. The most frequent single class of defects on this old type of motors is flash-overs. Flash-overs are the result in almost every case of a slight arcing at the brushes and these flash-overs are across a gas-filled air space to a ground either on the shell, the housing or the commutator cone. The flashes, in turn, result in short-circuited commutators, burnt hammer springs, grounded brush holders, and, in fact, they are the cause of a large proportion of coil insulation break-downs. Their elimination, therefore, means a big reduction in all electrical troubles and, as a consequence, in repair bills.

PROTECTION AGAINST OIL

A second factor making toward this same result is the much better protection against the entry of oil into the interior of the frame which is afforded on the latest designs. Oil-soaked insulation, which is a characteristic of almost every old-style motor, reduces its life and efficiency very rapidly. Oil on the commutator, on the mica band and on the brush-holder insulator means a rapid accumulation of dirt, carbon dust and iron particles from the brakeshoes on these parts, with resultant short-circuits and grounds. Numerous and enlarged oil deflectors on the shafts of the latest armatures absolutely prevent oil from the bearings creeping in and being thrown about the interior of the shell. This not only reduces the repair bills but also the cost of inspection, for the thorough cleaning of all parts when they are dry is a much simpler matter than when they are plastered with oil-soaked dirt.

COMMUTATOR CONSTRUCTION

A third factor is the under-cutting of commutators and the use of wider mica between segments. This has reduced brush wear and commutator wear and has altogether eliminated the enormous number of flat commutators that was so characteristic of the older designs. While many motors which were originally put out with smooth commutators have since had them under-cut, the fact that 32-mil mica was employed in their construction reduces the advantage gained as compared with present designs, which use 45-mil mica to reduce the chances of short-circuits between segments.

LUBRICATION

A fourth and very important factor is the improved lubricating arrangements and bearing design of the latest types. Hot armature bearings have always been a frequent source of trouble, and when one occurs with the old design of bearing, with its thick babbitt lining, the armature inevitably strikes the pole pieces. This almost invariably results in grounded coils and often in the "mushrooming" of the armature, a condition which compels a complete rewinding and heavy repairs of the core and shaft. Babbitt linings which break away from the shell and work out, owing to bad track work or rough cross-overs, are also common and frequently result in the same defects. They also compel very frequent rebabbitting of bearings, adding greatly to the cost of maintenance. With the modern bronze bearing, lined with a thin layer of tough, tin-base babbitt, in combination with an improved system of lubrication, not only are the chances of hot bearings reduced to a minimum, but should one occur, the motor can run for a long distance before the armature will strike the pole pieces. Under such circumstances the replacement of a new bearing and fresh waste is the only expense incident to the return of the motor to service. Again, the deep-flanged, felt-lined covers of the oil wells afford excellent protection against the entry of water into the oil chambers, a condition which frequently occurred on the older types, floating away the oil and causing hot bearings.

FIELD TROUBLES

Field troubles are for the most part "grounds," caused by water or oil coming into contact with the insulation, or by mechanical injury, or by short-circuits caused by overheating. The modern field, which uses an insulation of a far higher efficiency and durability than that originally employed, is also reinforced by the impregnating compound which is forced through the entire structure of the coil. Hence it is far less liable to break-downs caused by either water or overheating. Moreover, the entry of either water or oil to the interior of the shell is much better guarded against than formerly, and in the case of the box type of motor such a condition is very unusual. To guard against mechanical injury, special precautions have been taken by clamping the field coils in metal pans resting on a machined seat and held rigidly in place by sheet-steel spring flanges. Such a construction reduces the chances of defects of this kind to a minimum.

BRUSH-HOLDER DESIGN

Brush-holder design has been improved by the elimination of the old-style wooden yokes and asbestos compound insulators, which have been replaced by a porcelain and mica construction that is readily cleaned, and if these parts receive ordinary care, grounded brush holders should be unknown. The protection of the brush holders from oil spray, mentioned previously, also assists in eliminating this source of danger.

INSPECTION

The last item, that of inspection, shows a big decrease in cost for the same reasons that make fewer repairs necessary. The one essential feature governing the length of time which motors can remain in service without shop attention is the oiling arrangement. With the older types of motors, lubricated by grease cups or oil caps, daily or

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tri-weekly inspection is necessary if the motors make any considerable mileage. Otherwise dry cups, hot bearings and armatures rubbing on pole pieces may result. With the modern type of frame heads and axle caps, containing oil reservoirs and lubricated by capillary attraction, it is quite possible to extend the oiling periods to from twenty to thirty days. Therefore, not only are a far less number of annual inspections necessary, but the time devoted to each inspection is far less than with older types. The only work necessary as a rule is oiling, an inspection of brushes and trial or brush tension and gaging of armature clearance, and this is a matter of but a few minutes' work for one man. On the other hand, where flash-overs, grounded brush holders and oil spattering over the shell interior are common, a thorough cleaning up of all parts that can be reached through the commutator opening is a vital necessity at each inspection, frequent replacements of brush-holder insulators must be made, bolts must be tightened or renewed, commutators filed down or sandpapered, etc.

NECESSARY WORK AND ITS COST

In short, the improvements in design and in materials in the most recent types of motors are such that their repair costs should never approach those of the older types, and the rate of depreciation should be far slower. The only items that will require regular renewal on a time or mileage basis will be the brushes, bearings, gears and pinions. A conservative estimate of the cost of these items, including labor charges, after motors have been in service a sufficient time to make regular renewals necessary, is approximately 16 cents per 1000 motor miles. It is considered, therefore, that a total maintenance cost figure of 25 cents per 1000 miles (which includes both inspection and repairs) is reasonable and legitimate to assume for an average under ordinary service conditions throughout this country. Basing the annual amount of service which should be made by each motor upon the same conditions, we shall assume 40,000 miles as the figure, which agrees closely with the mileage actually made by thousands of cars similarly equipped. The total cost for inspection and repairs under these conditions would then be $10 a year per motor.

The savings that would result from replacement, therefore, would average, on maintenance costs alone, from $200 per motor per year in the case of the oldest motors to about $50 or $60 per year for those of the second class. Either figure would pay a liberal interest on the bond issue required to capitalize the cost of replacement with new motors.

OTHER SAVINGS

But there is still another direct economy that should result. As a general rule, the weights of motors of the present day of any given horse-power rating are considerably less than similar ones of earlier design. The reduction in weight that could be secured by replacement, therefore, would mean reduced power costs and reduced maintenance on trucks and tracks. The amount of such saving is estimated in ordinary service at from 3 to 8 cents per pound per year; perhaps 4 cents is a safe figure to use in ordinary city service. A reduction in weight of 500 lb. per car, which could in many instances be made, would therefore mean an additional $20 per year saved above the maintenance reduction.

With such incentives—namely, marked economies in operation, and greatly increased efficiency of service—it is the belief of the writer that operating companies would find it highly profitable to investigate the comparative cost of motors of different types on their lines. Where these appear excessive and the car equipments under which they are mounted are such that they can be or are used in fairly regular service, the cost of replacement should be obtained and the question as to whether the replacement is justified decided.

ILLINOIS ELECTRIC RAILWAYS ASSOCIATION OUTING

The Illinois Electric Railways Association held its regular meeting Sept. 19, 1913, at Starved Rock, Ill., with forty members in attendance. Owing to the fact that a number of members were extremely busy and could not attend the June meeting of this association, it was postponed and consolidated with this one held at Starved Rock. Most of the members assembled at Joliet, Ill., in the morning of the date of the meeting, where F. E. Fisher, general superintendent of the Chicago, Ottawa & Peoria Railway, had a special car awaiting them. On the way from Joliet to Starved Rock the special car stopped at Marseilles, Ill., where the members inspected the low-head hydroelectric plant of the Northern Illinois Light & Power Company.

President Marshall E. Sampsell presided at the meeting, which was held at the Starved Rock Hotel in the afternoon, and the business of the association was confined to reports of standing committees. John Leisenring, chairman of the signal committee, reported that he and several other members of the association had been invited to attend a meeting of the engineers of the Illinois Railroad & Warehouse Commission to revise the rules for overhead line crossings. It was stated that the commission's engineers had reached an understanding with the steam roads so far as light and power line crossings were concerned, and that the object of this meeting was to consider the question of lines other than light and power circuits crossing electric railway right-of-way. It was the sense of the association that the representatives of the signal committee should request a postponement of definite action until such time as all the members were able to formulate a set of tentative plans based on their local conditions. The signal committee then could employ this set of plans as a basis of its action on the proposed specifications for overhead line crossings.

The membership committee presented an amendment to the constitution of the association as regards its membership. This amendment did not materially affect the requirements already embodied in the existing constitution but defined the qualifications more clearly. The report of this committee was received and the secretary was instructed to submit a copy of the amendment to each of the members before the next meeting so that final action may be taken at that time.

The report of the traffic committee developed the fact that a number of the members had experienced difficulties in the operation of the interchange mileage coupon ticket. The objections and criticisms offered at this time were referred to the traffic committee, which was instructed to investigate the situation thoroughly and report recommendations at the next regular meeting of the association. Final instructions also were issued to the traffic committee in regard to a map showing electric interurban lines in the association's territory. The committee was requested to report proposals and sketches for two sizes, one to include Illinois only and the other to include a portion of Indiana and Iowa with Illinois. At the close of this meeting the members, piloted by Mr. Fisher, explored Starved Rock and the numerous canyons in the surrounding territory. The return trip from Starved Rock to Joliet was made by special car.

Representatives of twenty-five of the principal steam roads in this country met in Chicago, Sept. 22, 1913, to complete the organization of the American Railway Safety Association and outline definite work for its members. A. W. Smallen, of the Chicago, Milwaukee & St. Paul Railway, was elected temporary chairman and L. S. Shedd, general safety supervisor of the Chicago, Rock Island & Pacific Railroad Company, was elected temporary secretary. The first meeting of the association was held in Chicago, June 9, 1913, when a constitution and by-laws were adopted.

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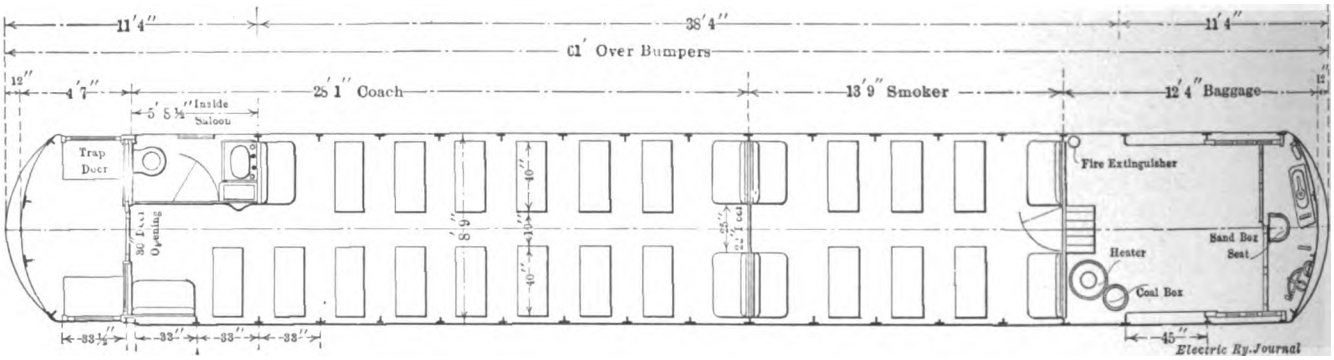
All-Steel Cars for the Union Traction Company of Indiana

A Complete Description of the All-Steel Interurban Cars Recently Ordered by the Union Traction Company of Indiana—Explains Reasons for Adoption of All-Steel Design

The Union Traction Company of Indiana has recently purchased ten all-steel interurban cars which will be used in limited train service between Indianapolis, Fort Wayne, Logansport, Peru and Muncie, Ind. Steel construction was employed not only because of the apparent safety in operation due to its strength and durability but also because of the low cost of maintenance and the fact that the walls of the car could be constructed with a minimum thickness, thus giving a maximum interior width with minimum over-all dimensions.

In the arrangement of the car body the management decided on a three-section car which included passenger, baggage and smoking compartments. The baggage space is located at the front end of the car adjoining the motorman's cab because this position affords an additional factor of safety to passengers in case of accident and because the motorman attends to loading and unloading baggage at the station stops. The smoking compartment adjoins the baggage section, and the main compartment is at the rear, available to the rear entrance.

To provide for the comfort of passengers as well as to give an unobstructed view of the right-of-way or other scenery in advance of the train, all partitions were installed with large glass areas. This arrangement permits the conductor to occupy the rear platform at all times, as he can observe the movements of the motorman and see the passengers in the car. It is considered specially desirable that the conductor should be on the rear platform when two or more cars are in a train so that careful watch may be kept over the entrance to both cars.

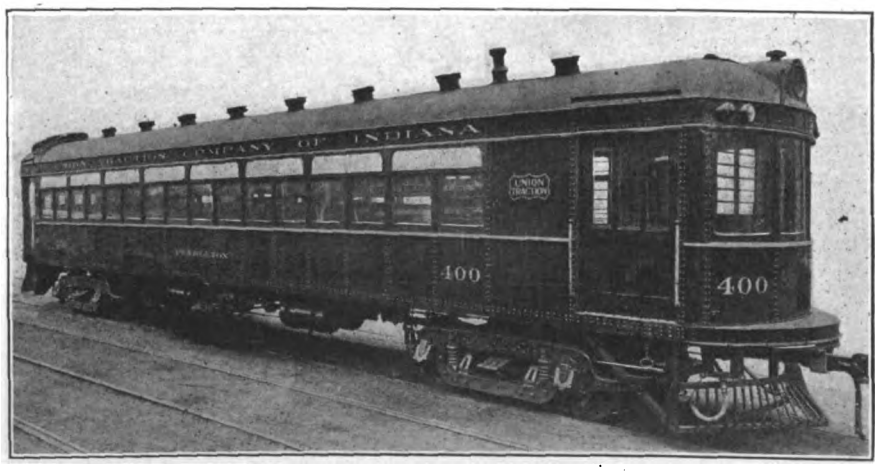


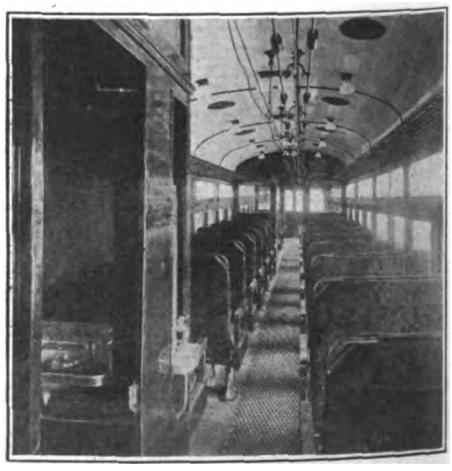
Indiana All-Steel Car—Floor Plan, Showing Arrangement of Compartments

DETAILS OF CONSTRUCTION

One of the principal objections to all-steel cars has been the difficulty of providing proper insulation against wide variations in exterior and interior car temperatures. This has been overcome in the present design by the employment of a compressed cork filler for the sides and roof. The necessity for a floor in the passenger compartments which would not only be fireproof and resist abrasive action but would also be resilient, non-conducting and resistant to the action of moisture was met by the use of Channarch steel flooring filled with Flexolith composition. Over this a wearing surface of ¼-in. Agasote was laid, the surface in the aisle being depressed to admit the installation of a wearproof mat.

The general dimensions and weights are as follows:





Indiana All-Steel Car—Exterior and Interior Views

Length over bumpers	61 ft.
Width over side plates	8 ft. ½ in.
Height from rail to bottom of sill	43 in.
Height from bottom of sill to top of roof	9 ft.
Truck centers	38 ft. 4 in.
Weight of car body with electrical and air-brake apparatus	45,200 lb.
Weight of two standard trucks complete with four motors	40,400 lb.
Weight of car body fully equipped and mounted on trucks	85,600 lb.

Standard structural steel shapes consisting largely of steel channels make up the underframe. The side framing is made of 2½-in. x 2¾-in. x 3/16-in. T-bars which form continuous posts and roof carlines extending from one

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side sill to the other. The use of a continuous post and carline was made possible by the use of an arched roof. The sides of the car are sheathed with No. 14-gage steel, and the arched roof is formed of No. 16-gage steel riveted securely to the tops of the T-bar carlines. The sheathing is covered on the outside with a 1-in. layer of compressed cork, which is securely cemented to it, and this cork in turn is covered with canvas stretched tight and bound to the letter board with half oval iron. The surface then is properly coated with a roof paint which produces a roof that is not only waterproof but weatherproof as well. The cork serves as an insulating medium, as it is a non-conductor of heat and cold as well as of electric current.

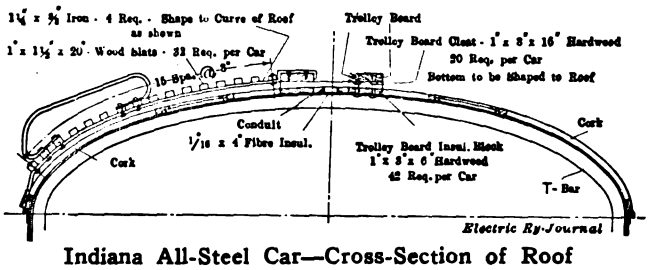
The use of Agasote for a head lining, for wainscoting below the windows and for the floor surface provides a fireproof insulating medium, and has enabled the designers to produce a car body lighter than would be obtainable if sheet steel were used throughout. The partitions between the different compartments, however, are built of steel with steel doors and moldings furnished by the Hale & Kilburn Company. The floor in the baggage compartment was built of 3/16-in. steel plate so that it could withstand rough usage, and it was insulated by a layer of compressed cork.

INTERIOR ARRANGEMENT AND EQUIPMENT

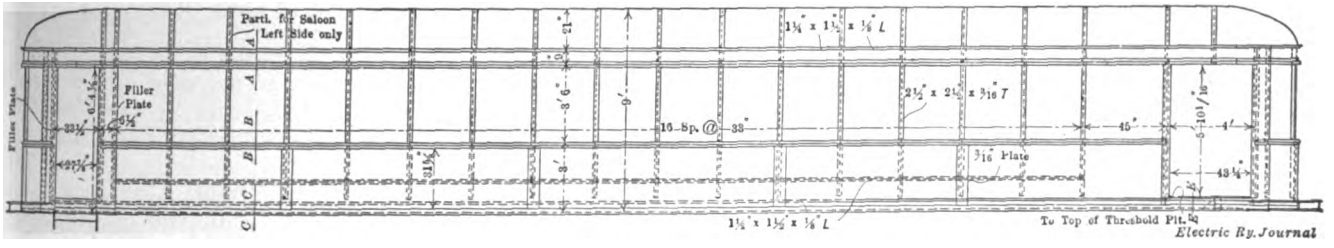
As is shown in the accompanying illustrations, each side of the car is equipped with eight twin windows. Each window is provided with double lower sash and both are arranged to raise, the outer one serving as a storm sash and being fitted with storm-sash fixtures. The inner sashes are fitted with Dayton raise-sash, locks and racks. The Gothic sash across the top of each twin window is glazed both inside and out with pressed-prism plate glass. All interior brass trimmings in the car are of oxidized bronze, and the interior finish, including both the steel and the Agasote lining, is grained to match mahogany.

Seats are provided for thirty-six passengers in the main compartment and for twenty passengers in the smoking compartment. In the main passenger compartment the seats are of the Hale & Kilburn reversible type upholstered in plush, while in the smoking compartment the seats have stationary backs and are upholstered in real leather. A saloon has been provided at the rear left-hand corner of the main passenger compartment.

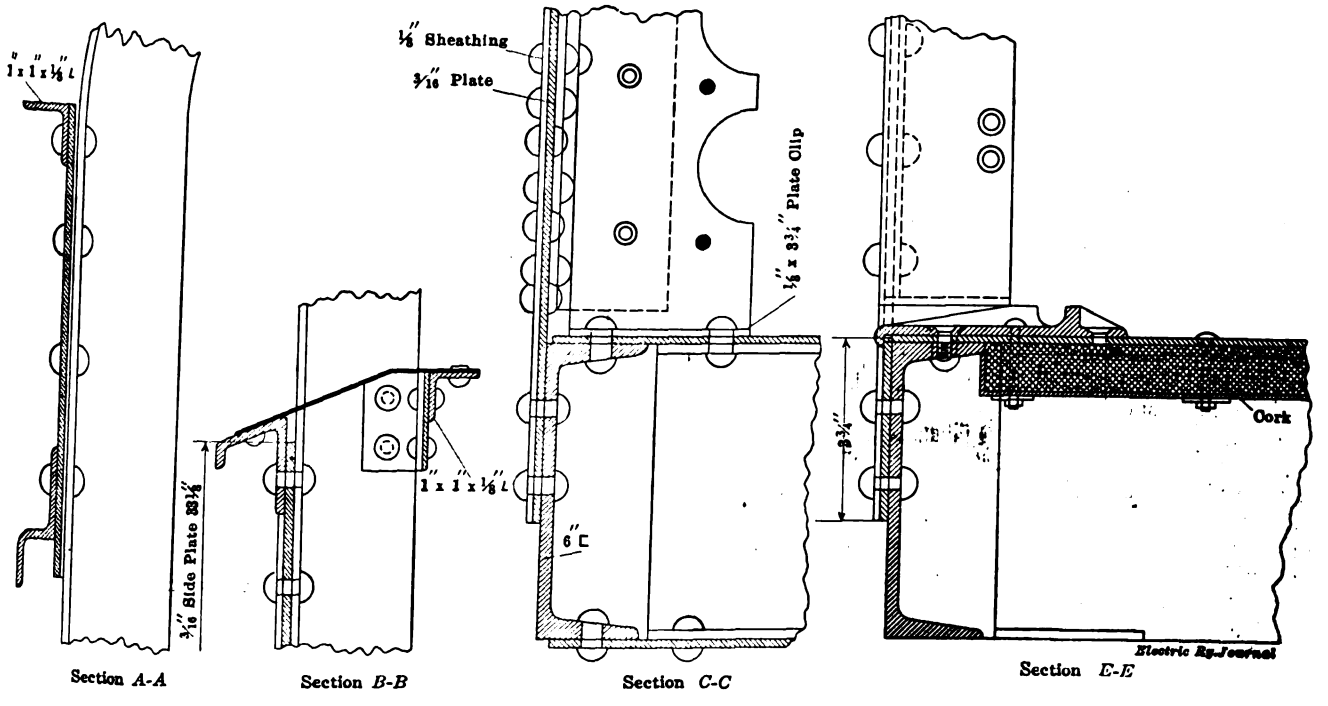
A Peter Smith hot-water heater and a coal bin are installed in one corner of the baggage compartment, and a liberal installation of Utility ventilators provides ventilation throughout the car body. Other car equipment includes Alert fire extinguishers, Tomlinson M. C. B. radial couplers, Edwards steel trap doors in the rear vestibule, Universal safety treads, Ackley adjustable hand brakes with drop brake handles for use in case of an emergency, United States incandescent headlights, Knutson trolley retrievers and Keystone pneumatic gongs. The car bodies are



Indiana All-Steel Car—Cross-Section of Roof



Indiana All-Steel Car—Plan of Side Framing



Indiana All-Steel Car—Details of Side Framing

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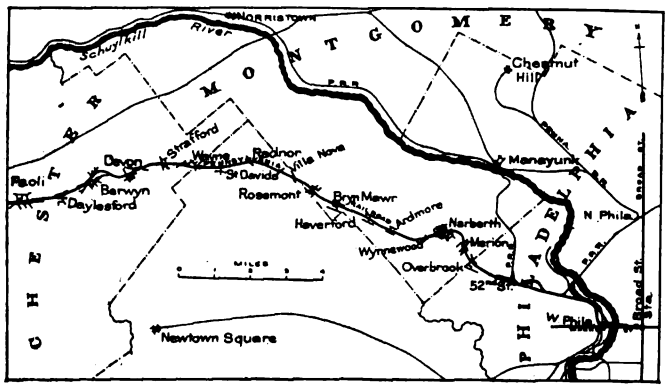
arranged for single-end operation and are mounted on Standard C-80-P high-speed interurban trucks. Each truck was equipped with two Westinghouse No. 303 motors with HL control. All wiring, including that for the propulsion current as well as for the lighting and bell circuits, is installed in steel conduit housed in the car body. The air-brake equipment is Westinghouse NM type.

A headlight cabinet is provided in the center of the hood at the front end of the car. This opens into the motorman's cab and thus permits adjustment from the inside of the car. Each side of the front end at the letter board is equipped with openings provided with green and white roundels for electric markers. Similar openings are provided at each side of the rear end of the car at the letter board for red electric rear markers.

NEW ELECTRIFICATION PLANS OF THE PENNSYLVANIA RAILROAD

As a further step in the general electrification projects of the Pennsylvania Railroad it has been announced officially that the line between the Broad Street station and Chestnut Hill on the New York division is to be electrified within one year. The present plan comprehends the operation by electricity of suburban service only, and the through trains will be handled by steam locomotives.



Map of Philadelphia Suburbs, Showing Authorized Electrification to Paoli and Extension to Chestnut Hill

Multiple-unit cars will be used exclusively, one of the latest types of passenger coach, built by the Pennsylvania, having been designed so that it can readily be equipped with motors. A number of these coaches have been built within the past three years in anticipation of the suburban electrifications, so that no delay in changing the method of operation is expected on the score of necessity for building new car equipment. No purchases of electrical equipment have, however, been made as yet.

The matter of power supply is also undecided at the present time, and while negotiations are under way for the purchase of three-phase current from central stations in the vicinity of Philadelphia, it is still considered a question whether the railway company cannot generate its own power at a lower rate than that offered by any power company in view of considerations which will influence the problem in the near future.

The projected electrification to Chestnut Hill will involve an expenditure of $1,250,000, or for the 12 miles of route will cost $104,000 per mile. This is $96,000 per mile less than the estimated cost of the electrification to Paoli, 20 miles west of Philadelphia, which, as outlined in the Electric Railway Journal for March 15, 1913, page 515, is expected to cost $4,000,000 for 20 miles of route, or $200,000 per mile.

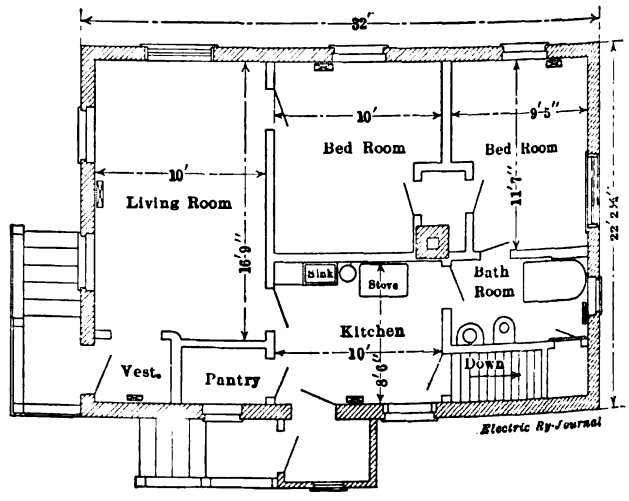
Both of these electrifications, one to the north and one to the west of Philadelphia, have been authorized as a means for relieving the existing congestion at the Broad Street station at the earliest possible moment. The two lines have the heaviest suburban travel of all lines out of Philadelphia, and as the proposed subway for Broad Street extending out to North Philadelphia could not be completed for some five years, the necessity at the present time for a frequent electric service to the suburbs is obvious.

A part of the railroad company's plans for general improvement of terminal facilities in Philadelphia includes the widening of the Broad Street station and the construction of eight tracks and high-level island platforms at North Philadelphia, and as the former work is largely dependent upon the outcome of negotiations with the city, an increase in the capacity of the existing Broad Street station was considered to be essential. There are at present eighty-five steam trains for the Paoli line operating in and out of the station every day and sixty-six to and from Chestnut Hill. By the operation of all of these by electricity in multiple-unit trains not only may immediate relief from congestion in the terminal station be obtained but the suburban service will be greatly benefited by the greater speed, frequency of operation and cleanliness of electric traction.

HOUSE FOR SUBSTATION OPERATOR

The accompanying plan shows the living floor of a two-story house recently erected at the rear of the Girard Avenue substation lot in Minneapolis by the Twin City Rapid Transit Company. The other floor is a basement, containing laundry, heater room and storeroom, and the house is rented to the substation operator at the nominal price of $10 per month. The building is of brick and is designed to accord with the style of the substation, which is a very handsome brick structure. It measures 22 ft. x 32 ft., outside, and is placed at the extreme rear of the substation lot to allow room for an attractive, pleasantly shaded yard between it and the substation. While primarily designed for two floors only, another story could be added without great cost. As the plan indicates, the details have been worked out with regard to the convenience of the occupants and economy of space, and as a result the substation operator has for a nominal rent what would be an expensive flat in an apartment house.

The Twin City Rapid Transit Company has had some experience with the plan of renting apartments to substation operators and finds that fewer operators are required when the chief operator lives on the premises, as he is able to give better supervision to the station and is available for emergency calls without delay. The practice is in line with that of German companies as outlined in an editorial in the issue of the Electric Railway Journal for Aug. 30, 1913.



Plan of Living Floor for Twin City Substation Operator

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Watch Inspection on High-Speed Interurban Railways in the Central West

A Description of the Watch Inspection Methods Employed by the Aurora, Elgin & Chicago Railroad, the Illinois Traction System and the Chicago & Milwaukee Electric Railroad—Inspection Reports Used by These Companies Are Reproduced

Little need be said regarding the importance of accurate and reliable watches on high-speed interurban railways. The close headway as well as the short intervals allowed at meeting points on roads operating local and limited trains makes the reliability of its trainmen's watches of vital importance. This not only is true of the watches of all employees in the transportation department, but everyone interested in the time card, namely, foremen in charge of all classes of track men, linemen engaged on the bridges and structures and signal maintainers, must be provided with watches conforming to a certain standard. In fact, accurate watches in the hands of employees are a safety pledge in every road's operation.

The methods employed by several of the larger interurban railway companies in the Central West are both interesting and instructive. Essentially, each employs a general inspector to whom local inspectors, conveniently located, report the results of their inspections. The general inspector in turn condenses these reports into one general report for the head of the transportation department, and he is held responsible for the accuracy of all watches inspected. Watches must meeet certain standards as to movement and adjustment and must pass inspection at least every fifteen days, at which time they are set and regulated as required. In case repairs are necessary, the local inspectors, who in all cases are jewelers, must loan the trainman a watch which will conform to standard specifications.

On the Aurora, Elgin & Chicago Railroad the Ball inspection system has been adopted. This includes the appointment of the jewelry firm as general inspector, and it in turn appoints the local inspectors. The local inspectors are situated at the three terminals of the road, namely, Aurora, Elgin and Chicago. They make all inspections free of charge to either the company or the general inspector, but receive compensation for their work from watch sales and repairs. The general inspector, however, is under contract with the railroad company and receives a fixed salary based on the miles of road operated.

When a trainman or anyone connected with the service and interested in the time card is employed, he must obtain a certificate of general watch inspection. These certificates of inspection are issued by the division superintendent to all trainmen semi-annually. Following the receipt of the certificate they must present it to the most convenient local inspector, who checks the condition of the watch as he finds it. The form of this certificate is reproduced. Upon completing the general inspection, the local inspectors present the certificate to the general inspector, who makes such recommendations to the company as the condition of the watch may require.

If the watch is accepted as standard, the employee receives an inspection card, the form of which is shown in one of the illustrations. Following the receipt of this card the employee is required to report to the local inspectors at least every two weeks. A record of each watch's perform-

New Form 59

ILLINOIS TRACTION SYSETM

NAME_____

OCCUPATION_____ ADDRESS_____

MOVEMENT, DESCRIPTION AND NUMBER _____

CASE DESCRIPTION AND NUMBER_____

DATE OF EXAMINATION_____ CERTIFICATE ISSUED_____ NUMBER OF CERTIFICATE_____

+ FAST −SLOW ○ RUN DOWN □ STOPPED ∮ SET ◊ REGULATED

Date	Sec. Fast or Slow.	Why Set or Regu'd	Daily Rate Sec.	Inspector fill out and sign with Ink.	Date	Sec. Fast or Slow.	Why Set or Regu'd	Daily Rate Sec.	Inspector fill out and sign with Ink.	Date	Sec. Fast or Slow.	Why Set or Regu'd	Daily Rate Sec.	Inspector fill out and sign with Ink.	Date	Sec. Fast or Slow.	Why Set or	Daily Rate Sec.	Inspector fill out and sign with Ink.

Watch Inspection—Form of Record Used by Illinois Traction System

ance is made on the inspection card, and the employee must carry this card at all times, as he may be required to show the record to the head of the transportation department if there is any question as to the accuracy of his watch. If the watch varies over thirty seconds during the interval between inspections it is set and regulated by the local inspector.

A report of all semi-monthly inspections is made on a form provided for that purpose. This record shows the variations for the two last inspections and is sent to the division superintendent's office at the end of each month. After the results of the inspection have been recorded on this general form the employee is required to sign the sheet opposite the check of his watch. This record advises the transportation department of the condition of all watches in the service and at the same time is a check on the information contained on trainmen's certificates of inspection. These are also carefully checked by the transportation department to ascertain if the employees' watches are being inspected promptly. In addition to the inspection just described, trainmen are required to compare their watches with a standard Western Union clock before taking out their runs. This standard clock is situated in the dispatcher's office, and comparisons may be made personally or by telephoning the dispatcher.

In case an employee's watch fails to pass the general inspection and does not conform to the standard specifica-

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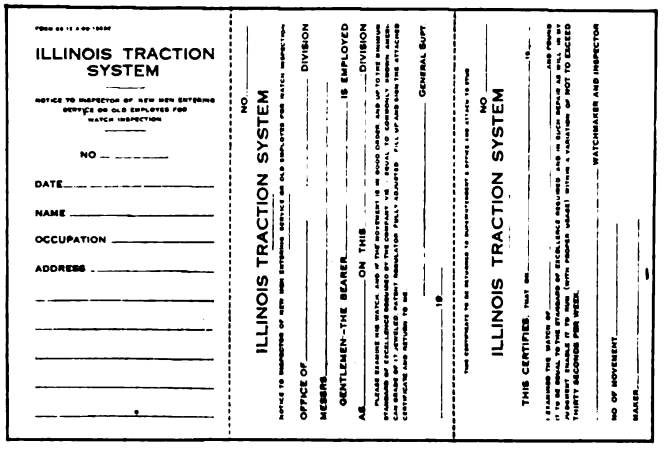
tions, he must procure one that does before he is accepted for regular service. The minimum standard of excellence for watches in service is of a grade equal to what is known, among American movements, as the seventeen-jeweled, lever-set Brequet hairspring, patent regulator, adjusted, and


ILLINOIS TRACTION SYSTEM

NO. ____

DATE ____

NAME ____

OCCUPATION ____

ADDRESS ____

ILLINOIS TRACTION SYSTEM

NO. ____

OFFICE OF ____ DIVISION

MESSRS. ____ IS EMPLOYED

GENTLEMEN—THE BEARER ____ ON THIS ____ DIVISION

AS ____

GENERAL SUPT.

ILLINOIS TRACTION SYSTEM

NO. ____

THIS CERTIFIES, That on ____ 19__

WATCHMAKER AND INSPECTOR

NO. OF MOVEMENT ____

MAKER ____

Watch Inspection—Certificate Used by Illinois Traction System

a sixteen or eighteen size. It must be in such repair that it will be able to run within a variation of thirty seconds per week. When watches are presented for inspection the local inspectors are instructed to exercise considerable care so as not to impose any hardship or annoyance on employees. In cases of doubt, the employee has the benefit if it can be given to him with safety to the service.

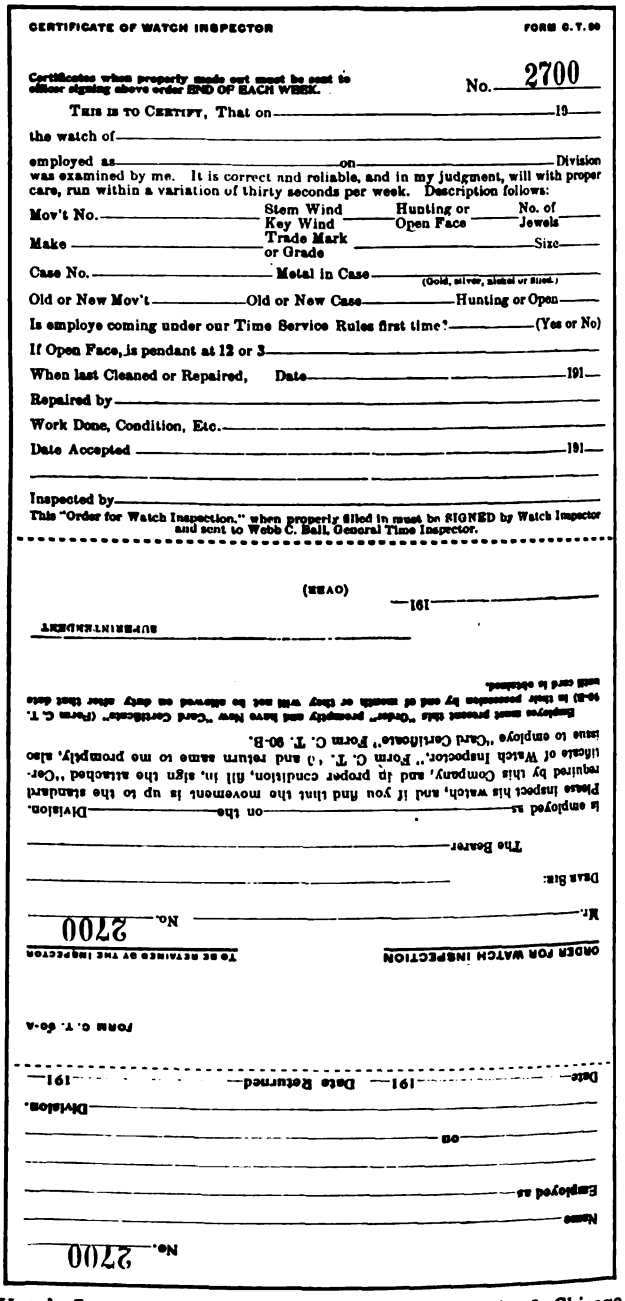
If a watch is accepted for service and later it becomes necessary to repair it, a standard "loaner" watch is furnished to the employee by the local inspector. When the loaner watch is obtained the employee leaves his time record certificate with his own watch, and a loaner card is given to him in its place. During the period his watch is undergoing repairs the employee must conform to the instructions as regards bi-weekly inspections. When his own watch is returned he receives his original certificate and leaves the loaner card with the inspector. To distinguish between the regular and the loaner certificates they are printed in different forms and on differently colored cards.

The transportation department of the Illinois Traction System has inaugurated a system of watch inspection which is essentially similar to that employed by the Aurora, Elgin & Chicago Railroad. Exceptions to this are that employees must submit watches for comparison and rating once each week and the variation must not exceed thirty seconds for that period. As to the standard of excellence adopted by the Illinois Traction System, in addition to meeting the foregoing specifications, watches must be fully adjusted to temperature and to at least five positions. About the same system of forms is employed, namely, the general inspection certificate, the weekly comparison card and a weekly comparison report to the superintendent, but, in addition, the local inspector maintains a permanent record of each employee's watch. This record is kept in a book containing 200 pages. Each employee's watch performance record appears on a certain page, and the result of each new inspection is recorded.

The Illinois Traction System does not employ a general watch inspector, but the local inspectors are appointed by the general superintendent and report to the division trainmasters. Arrangements have been made with the different local inspectors whereby an employee accepted for service who does not own a standard watch may purchase one on four monthly payments. The company makes deductions necessary to meet these payments from the payroll if the employee so elects.

As an additional check on the accuracy of trainmen's watches, the men are required to compare their time with each other and with the dispatcher before leaving the terminal at the beginning of a day's work. This system employed by the Illinois Traction System has been in operation for three years and has given good satisfaction. Not a single accident has occurred on account of errors in timepieces. At its inauguration the employees were earnestly requested to lend hearty co-operation to insure improved efficiency in train service and to provide additional safeguards against accident, thus affording greater security to life and property.

The Chicago & Milwaukee Electric Railroad Company, operating a high-speed electric road between Chicago and Milwaukee, also requires watch inspection by local inspectors appointed by a chief watch inspector. The latter is appointed by the company and is held responsible for the acccurate condition of all watches on the system. At present this chief inspector is a representative of one of the


CERTIFICATE OF WATCH INSPECTOR FORM C. T. 00

Certificates when properly made out must be sent to officer signing above order END OF EACH WEEK. No. 2700

THIS IS TO CERTIFY, That on ____ 19__

the watch of ____

employed as ____ on ____ Division

was examined by me. It is correct and reliable, and in my judgment, will with proper care, run within a variation of thirty seconds per week. Description follows:

Mov't No. ____ Stem Wind ____ Hunting or ____ No. of Jewels ____

Key Wind ____ Open Face ____

Make ____ Trade Mark or Grade ____ Size ____

Case No. ____ Metal in Case ____ (Gold, silver, nickel or Steel.)

Old or New Mov't ____ Old or New Case ____ Hunting or Open ____

Is employe coming under our Time Service Rules first time? ____ (Yes or No)

If Open Face, is pendant at 12 or 3 ____

When last Cleaned or Repaired, Date ____ 191__

Repaired by ____

Work Done, Condition, Etc. ____

Date Accepted ____ 191__

Inspected by ____

This "Order for Watch Inspection," when properly filled in must be SIGNED by Watch Inspector and sent to Webb C. Ball, General Time Inspector.

(OVER)

191__

SUPERINTENDENT

Employes must present this "Order" promptly and have New "Card Certificate" (Form C. T. 90-B) in their possession by end of month or they will not be allowed on duty after that date until card is obtained.

ORDER FOR WATCH INSPECTION TO BE RETAINED BY THE INSPECTOR

No. 2700

Mr. ____

Dear Sir: ____

The Bearer ____

is employed as ____ on the ____ Division.

Please inspect his watch, and if you find that the movement is up to the standard required by this Company, and in proper condition, fill in, sign the attached "Certificate of Watch Inspector," Form C. T. 1, and return same to me promptly, also issue to employe "Card Certificate" Form C. T. 90-B.

FORM C. T. 60-A

Date ____ 191__ Date Returned ____ 191__

Division ____

on ____

Employed as ____

Name ____

No. 2700

Watch Inspection—Certificate of Aurora, Elgin & Chicago Railroad

large jewelry houses in Chicago. Trainmen and dispatchers are required to have watches inspected by local inspectors each week. The result of this inspection, as in the other instances cited, is indicated on a card which the trainman carries at all times. The local watch inspector forwards a

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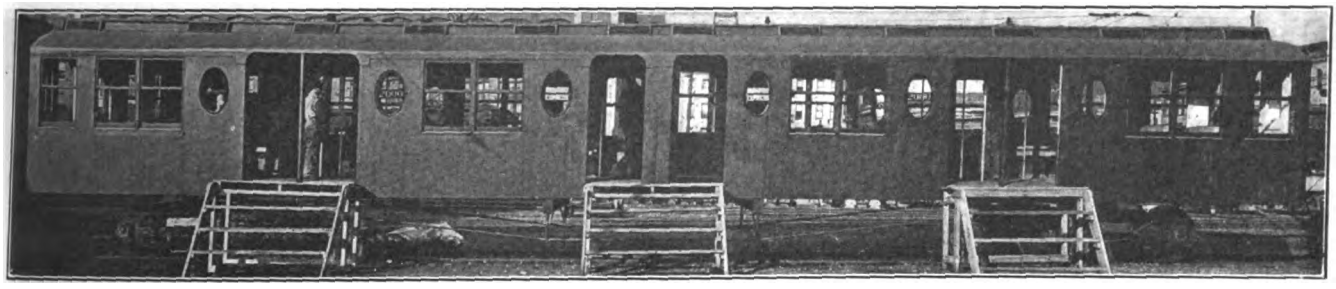
complete list of these inspections to the superintendent of transportation every week. The chief watch inspector examines all watches annually, at which time they receive their proper rating. All watches must meet certain specifications, namely, no standard watch can be less than sixteen jewels nor smaller than a sixteen size case. It must be tested in three different positions and not vary more than fifteen seconds in any of them. All trainmen are required to compare their watches with the dispatcher before beginning their runs and must compare their watches with the standard clocks installed in each terminal station.

PUBLIC INSPECTION OF PROPOSED BROOKLYN SUBWAY CAR

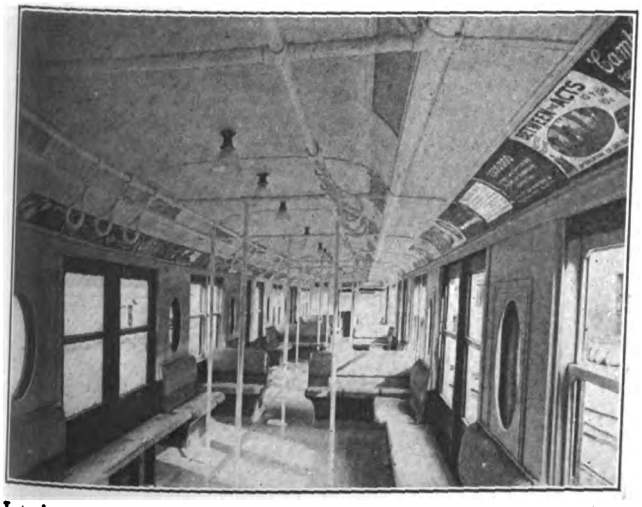
Upon invitation of the New York Municipal Railway Corporation, a subsidiary of the Brooklyn Rapid Transit system, representatives of New York newspapers and civic associations inspected on Sept. 24 at the Thirty-ninth Street shops a full-sized model of the car which this company proposes to use for subway service. General plans for this car were filed for approval with the Public Service Commission, First District, New York, Aug. 19, 1913. An elevation and seating plan of this design were published in the ELECTRIC RAILWAY JOURNAL for Dec. 30, 1911.

In sending out its invitation, the company stated that it would appreciate any suggestions which would improve still further the facilities which this multi-side door car offers to the public, more particularly as regards the seating arrangement, ease of entrance and exit, lighting, comfort of the seats and plan of interior decoration. Views of the exterior and interior of the dummy car are presented in the accompanying halftones. Although three pairs of doors are provided on each side, it is proposed to operate only the center pair during the light hours. All doors will be pneumatically controlled by the guard, who will be elevated on a pedestal alongside the idle pair of center doors, from which position he will be able to see all passenger movement with ease. End doors will also be provided for going from car to car. The seating plan is of such character that permanent and temporary longitudinal seats are provided near and in front of the doors, while one row of transverse seats is placed midway between the doors. These transverse seats are of back-to-back design, one bench being wide enough for three passengers and the other for two. With all doors on one side in use the car will seat seventy-eight, but when operation is limited to the center doors it will seat ninety-eight passengers. It is announced that all cars will be motor cars, a desirable feature in view of their great capacity and length, namely, 67 ft.

The outside color of the cars will be dark green; the interior will be light enamel. The view of the interior shows a lighting scheme in which centrally placed tungsten lamps are used with holophane reflectors, but tests are being made also with other combinations and in different positions. Mechanical ventilators are to be used.



Model of Proposed Brooklyn Subway Car, Showing Arrangement of Three Pairs of Side Doors



Interior of Proposed Brooklyn Subway Car, Showing Seating Arrangement

The following comparisons are made by the New York Municipal Railway between its proposed car and that now used in the subway service of the Interborough Rapid Transit Company:

	N. Y. Mun. Ry. Car	Interboro Subway Car
Length	67 ft.	51 ft. 5 in.
Width	10 ft.	8 ft. 8¾ in.
Seats:		
In rush hours	78 persons	44 persons
In non-rush hours	98 persons	46 persons
Average walk per passenger from seat to door	82½ in.	90 in.
Length of train (eight cars)	538 ft. 4 in.	513 ft. 5 in.
Total space in train available for passengers	4,711 sq. ft.	3,702 sq. ft.

The company estimates that with a train load of 1200 persons, that now carried in the present ten-car subway trains during rush hours, eight cars only of the new type would be required. With 150 passengers per car seventy-eight would be seated and seventy-two standing. As there is 370 sq. ft. of standing space per car, each standing passenger would have an average of 5 sq. ft.

"KINKS" ON THE DENVER & INTERURBAN RAILWAY

On the Denver & Interurban Railway the air connections between the motor car and trailer are carried up on the dash several feet above the bumper instead of being under the bumper. This is claimed to have two advantages. One is that it is easier to couple up the connections when they are in plain sight in this way. The other is that the hose is out of the dirt and not so much subject to wear.

The carhouse adjoins the power station and an ingenious method is followed in keeping the lubricating oil warm in winter. The oil tank is surrounded by a box in which is a coil pipe supplied by steam from the power station so that the temperature of the oil when taken from the pump is about 90 deg. In consequence the company can use a heavy cylinder oil in its armature boxes.

In all cases the company puts a push-button stop signal for the use of the conductor in the jamb of the door in the rear end of the car.

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COMMUNICATION

A QUESTION OF NAMES

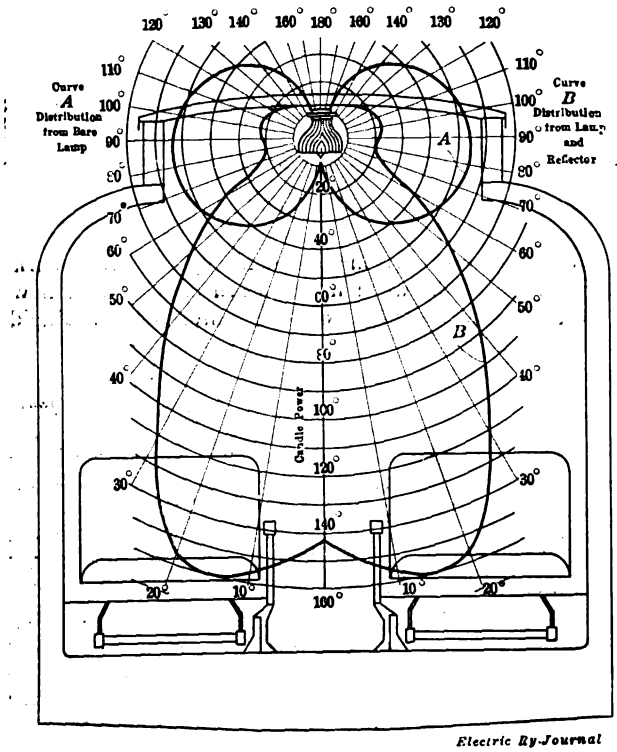
LAKE CHARLES RAILWAY, LIGHT & WATER WORKS COMPANY
LAKE CHARLES, LA., Sept. 17, 1913.

To the Editors:

Referring to the discussion in your columns as to the name of the system to be used by the Norfolk & Western Railroad, it occurs to the writer that the "split-phase system" would seem to cover the case to the satisfaction of both factions. F. V. GALLAUGHER.

CAR-LIGHTING TESTS ON THE BAY STATE STREET RAILWAY

The Sept. 28, 1912, issue of the ELECTRIC RAILWAY JOURNAL contained an account of lighting tests in a 28-ft. car of the Bay State Street Railway, Boston, Mass. Since that time a second series of photometer tests has been conducted by L. C. Porter, of the General Electric Company, in co-operation with E. W. Holst, superintendent of equipment of the Bay State Street Railway. The latter tests, which were



Comparative Light Distribution from Bare Lamps and Lamps with Reflectors

made in two 34-ft. easy-access, semi-convertible cars, offer an interesting comparison between the old and new methods of car lighting. One car was furnished with ten 56-watt flexible-mount Mazda lamps, equipped with clear Holophane reflectors, and the other with twenty-five 64-watt carbon lamps. Photometer readings were taken with a Sharpe-Millar photometer on a horizontal plane 3 ft. above the floor. Five readings were taken at each station. Simultaneous readings were taken on a voltmeter, and each photometer reading was corrected to normal voltage. Three lines of stations were chosen—one down the center of the aisle, another halfway between the aisle center and the windowsills and a third along the windowsills. Stations were taken 1 ft. apart. The center-line stations were extended 3 ft. out over each platform. In addition to these, four stations were taken across half of each platform. Similar stations were taken in the carbon and Mazda cars. In order to determine the average foot-candle intensity in the entire car body, all readings, aside from those on the center line, had double value given to them, to allow for the light on the opposite half of the car from that photometered.

The results of the test were as follows:

	Carbon Car	Mazda Car
Average foot-candle intensity along center line of aisle	1.70	3.91
Average foot-candle intensity half way to windowsills	1.46	3.15
Average foot-candle intensity along windowsills	1.26	2.14
Average foot-candle intensity across forward platform (platform lamps extinguished)	1.28	1.32
Average foot-candle intensity across rear platform (platform lamps lighted)	1.62	3.03
Total wattage on car	1600	560
Wattage in car body	1280	336
Effective lumens per watt in car body	0.41	2.37
Efficiency of light utilization, per cent	15.8	31.2

The effectiveness of the reflector is indicated in the accompanying drawing, which shows the light distribution from a clear 56-watt tungsten lamp and from the same lamp equipped with a reflector. Experience indicates that the best reflector for a trolley car having, say, an 8-ft. ceiling and a width of 8 ft. is one giving the intensive type of light distribution. When such reflectors are placed down the center line of the ceiling the maximum intensity of lighting is thrown where it will be of the most service, that is to say, directly on the reading matter of a seated passenger.

TIMETABLE MAKING IN BUFFALO

The International Railway Company, Buffalo lines, has given especial attention this year to the routing of cars and the making of scientific timetables. The lines in Buffalo are laid out somewhat like the ribs of a fan and were planned to bring passengers down town without transfer. The congestion in Main Street for a few blocks gradually became more serious until the maintenance of reasonable schedules was difficult. The plan of the present president, E. G. Connette, is gradually to introduce cross-town routes which will take care of passengers who do not wish to go down town. The new routes will not only prevent pocketing of cars in the down-town district but will reduce the number of transfers issued. They will also cut down the car mileage, for under the old arrangement passengers were obliged to go down town and to transfer out again because there was no direct route between two points in the up-town district. After one change of this kind the number of transfers issued was reduced by 1500 per day, and a cash saving of at least $36 per day was effected. This saving, however, was put back into the service by increasing the number of cars, so that the public benefited doubly, first by the passengers reaching their destinations more quickly, second by their losing less time in waiting for cars.

The timetable department comprises at present five men, one chief and four checkers and assistants. Two checkers are employed on this work continuously, the other two being used for special investigations. That the work of this force should much more than save the expense can be seen by a simple calculation of what can be made or lost by attention to timetables or the lack of it. Suppose that on a certain line using twenty-seven cars the headway is four minutes where a scientific checking of service requirements shows that a four-and-a-half-minute schedule would serve the purpose. The new headway reduces the number of cars to twenty-four. Estimating the cost of operating at the rate of $1.80 per car hour and the duration of service at eight hours per day for 365 days, the saving amounts to $5,256 per year. The difference of a half minute in the schedule would not be noticed provided that twenty-four cars were enough to accommodate the public riding on this line.

The foundation of good timetable making is, of course, accurate knowledge of traffic conditions. In Buffalo the checkers who gather this information are provided with

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notebooks in which they record the number of passengers on each car passing the maximum load points between 6 a. m. and 12 midnight. The records are then entered, in the office, on sheets 10½ in. x 17 in. in size. From this a third form is made up to show the number of cars passing, the total seating capacity, the total passengers, the total passengers standing and the percentage standing. A third form is made up to show the number of cars passing the checking point in each fifteen minutes, together with the total corresponding number of passengers. The seating capacity of these cars is also entered and subtracted from the total number of passengers, giving the number standing. These results are not plotted in graphical form, but the uniformity of the car distribution is determined directly from the charts, and the timetables are laid out accordingly.

The checkers not only obtain information as to distribution of cars, but their records also show irregularity of schedule and departures from the timetables. When such are noted they are recorded on 8½-in. x 8½-in. sheets, which are first shown to the superintendent of transportation and are sent to the division superintendent for explanation. The explanations are entered on the sheets, which are then returned to the chief of timetables, who files them for reference in making timetable changes.

The timetables are made up in the form of charts for the guidance of division superintendents. In these four kinds of runs are recognized—"day," "splits," covering some hours each in day and night, "straight lates" and "owls." The day crews are off on Sunday; the owl, late and split crews work seven days per week. The usual practice is followed in assigning crews to the various runs. Once adopted, the timetable stands until good reason arises for changing it, but troubles with the timetable are kept track of by means of a daily deviation sheet. The mileage records are made up on the basis of the regular timetable, modified by the deviation record, the timetable department sending to the auditor a statement for each line showing the number of miles normally made by each car together with the times at which the car goes into and leaves service. This statement is modified for every change in timetable.

The results of the work of the new timetable department are already showing in improved service.

REPORT OF PROPOSED ELECTRIFICATION OF LONDON & PORT STANLEY RAILWAY

In 1854 the city of London, Ont., built a railroad to Port Stanley, on Lake Erie, and since then it has leased the line to steam railroads. The last lease will expire Jan. 1, 1914. The original construction cost was $765,311, but as the city has never received more than $18,000 per annum from the leases, the deficit since the year 1854 has cost the taxpayers of London nearly $1,500,000.

Recently the Hon. Adam Beck, of London, who is the chairman of the Ontario Hydro-Electric Commission, engaged employees of the Hydro-Electric Commission and other engineers to report on the feasibility of electrifying this line. The ensuing study indicated that electrification would give a net annual revenue of $40,000 after payment of all fixed charges on the original investment and also on the investment required for electrification. Following this investigation the municipality of London engaged A. N. Warfield & Company, consulting engineers of that city, to make a report on the cost of operating the line by steam throughout; with steam freight and Edison storage battery passenger cars; by electricity from hydroelectric sources, and by electricity from a steam turbine plant. They were also requested to report on the cost of double-tracking the line between London and St. Thomas. The freight traffic on this railway has always been very heavy. In fact, it is believed that there is not another line of equal length (24 miles) on which so much freight is handled.

The accompanying tabulated recapitulations of the operating and income accounts from the report of the Warfield company show an annual deficit of $33,644 for all-steam operation, a net revenue of $17,636 for combined steam freight and storage battery passenger car operation and a net revenue of $38,062 for all-electric operation. The unit costs were calculated as follows: Steam freight, based on 8,200,468 ton miles, operating cost, 0.948 cent per ton mile, and fixed charges, 0.206 cent per ton mile; steam passenger, based on 198,580 car miles, operating cost, 31.1 cents per car mile, and fixed charges, 8.54 cents per car mile; steam freight in case of storage battery passenger operation, based on 8,200,568 ton miles, operating cost, 0.993 cent per ton mile, and fixed charges, 0.252 cent per ton mile; storage battery passenger operation, based on 367,650 passenger miles, operating cost, 14.88 cents per car mile, and fixed charges, 5.63 cents per car mile; electric freight operation, based on 8,200,468 ton miles, operating cost, 0.804 cent per ton mile, and fixed charges, 0.279 cent per ton mile; electric passenger operation, based on 431,775 car miles, operating cost, 10.5 cents per car mile, and fixed charges, 5.31 cents per car mile. It was also estimated that the fixed charges on the original cost of the road would be as follows: For steam or electric freight, 0.233 cent per ton mile; steam passenger, 0.64 cent per car mile; storage battery passenger, 5.2 cents per car mile; electric passenger, 4.44 cents per car mile.

The cost of double-tracking the road for steam is given as $17,823.73 per mile.

RECAPITULATION OF THE OPERATION AND INCOME OF THE THREE SYSTEMS

*I—Steam Operation.**

Total operating expenses and taxes	$139,686.93
Interest and sinking fund on money required to reconstruct and equip the railway, at 6.8 per cent on $497,190.68	33,808.97
Interest on money expended on the first cost of the railway in year 1854, at 5 per cent on $765,311.00	38,265.55
Total fixed charges	$211,761.45
Total gross earnings from operation	178,117.40
Deficit	$33,644.05

*Rolling stock: Freight equipment to consist of four locomotives and two cars; passenger equipment, four first-class and two second-class coaches.

II—Combination Steam Freight and Storage Battery Passenger Car Operation.†

Total operating expenses and taxes	$136,025.01
Interest and sinking fund on moneys required to reconstruct and equip the railway, at 6.8 per cent on $607,127.90	41,284.70
Interest on moneys expended on first cost of the railway in year 1854, at 5 per cent on $765,311.00	38,265.55
Total fixed charges	$215,575.26
Total gross earnings from operation	233,211.92
Net revenue	$17,636.66

†Rolling stock to include six accumulator cars and four passenger tractors, with steam freight equipment as above.

III—Electric Operation with Catenary Suspension.

Total operating expenses and taxes	$111,197.90
Interest and sinking fund on moneys required to reconstruct and equip the railway, at 6.8 per cent on $671,857.13	45,686.28
Interest and depreciation on storage battery (value $35,000) charged in price of power.	
Interest on moneys expended on the first cost of the railway in year 1854, at 5 per cent on $765,311.00	38,265.55
Total fixed charges	$195,149.73
Total gross earnings from operation	233,211.92
Net revenue	$38,062.19

The annual meeting of the Empire State Gas & Electric Association will be held on Oct. 2 at the Engineering Societies Building, New York. President C. G. M. Thomas will review the work of the past and offer suggestions for the coming year. Reports of other officers and committees will be made, and the plans for the advertising campaigns of the Society for Electrical Development and of the National Commercial Gas Association will be explained and discussed. Addresses will be made by Martin S. Decker, chairman of the Public Service Commission of the Second District, New York, and by M. R. Maltbie, commissioner of the First District. Accident prevention and fire prevention will be discussed at the afternoon session.

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RENEWABLE PLATE FOR THIRD-RAIL SHOE

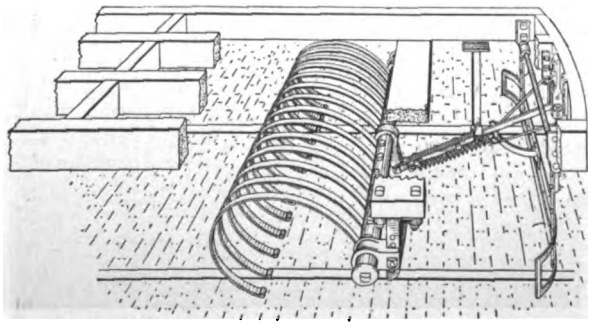
The Central California Traction Company, whose line connects Stockton, Cal., with Sacramento, Cal., was one of the first 1200-volt lines to be built in this country and the first to use a 1200-volt third rail. An underrunning shoe of the usual type is employed, but to avoid the necessity of scrapping an entire shoe, a wear plate is used. This plate is the invention of W. E. Rose, master mechanic of the company. The plate is of soft steel, ¾ in. x 3 in. x 6 in., and is attached to the upper or wearing part of the shoe by tapering copper rivets so that as the plate wears away the rivets also wear down and the plate remains on the casting of the shoe. It has been found practicable on the lines of the Central California Traction Company to wear the plate down to ⅛ in. thickness. It can then be scrapped and a new plate attached at the cost of a few cents.

Renewable Third-Rail Shoe

A SPRING-TOOTH WHEEL GUARD

The Root Spring Scraper Company, Kalamazoo, Mich., has recently placed on the market the spring-tooth wheel guard shown in the accompanying cut. In principle this wheel guard resembles the ordinary type, but its construction is like that of a farmer's hay rake. Although now first offered for general use, the new scraper has already been tried out satisfactorily on the Kalamazoo city lines.

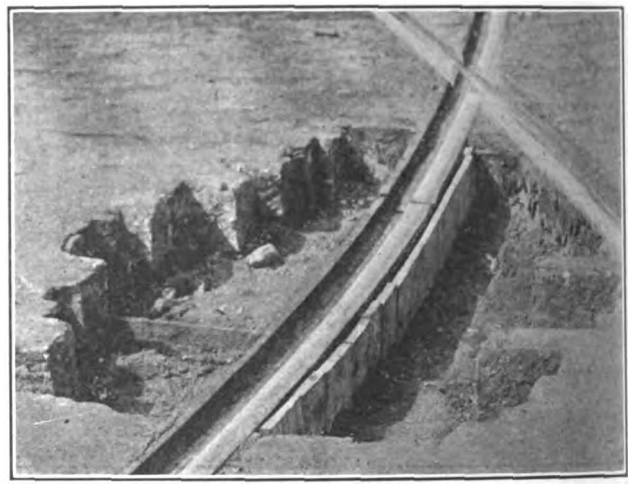
The essential parts of this guard include a tripping fender which when engaged with an object breaks a trigger joint, thereby allowing the guard to drop to the rails. This fender, however, is not affected by the vibration incidental to ordinary car running. A pedal on the platform is used to restore the wheel guard to its original position. The guard basket will pick up an object from the track without the jarring which is unavoidable with a rigid basket because it is constructed of fourteen curved teeth made from 1½-in. x ¼-in. spring steel. These spring teeth are spaced 4½ in. apart and are secured to a hanger board which in turn is fastened to the car-body sill. The lower end of each tooth is rounded slightly in order to give a sleigh-runner effect when the teeth drop into operating position. As each tooth is made independent of the others, the teeth upon being lowered conform readily to the crown of the track and pavement, thus making it impossible for an object to escape them. The entire combination also forms a spring basket which will prevent any pick-up from falling back onto the track.



Spring-Tooth Wheel Guard

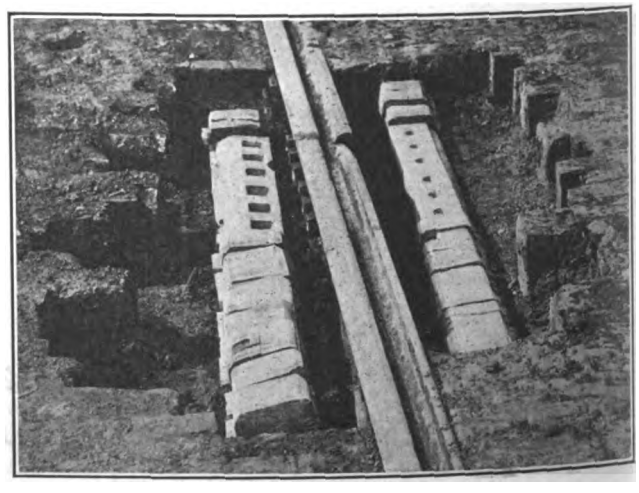
JOINT PLATE PROTECTORS OF WOOD

During the past winter the Virginia Railway & Power Company installed on about 1 mile of track in Norfolk a new form of joint plate capping of wood which accomplishes the twofold object of protecting the bolts and nuts and of permitting a perfect connection with the paving. These protectors were furnished by Edward Alcott, Manassas, Va., whose oak keys and wooden filler blocks for rails were described in the ELECTRIC RAILWAY JOURNAL for July 27, 1912.



Filler Block at Curve Including Keyed Pavement

As shown clearly in the accompanying illustrations, the protectors consist of blocks in which square and round holes have been bored to cap the projecting ends of the joint fastenings. The blocks are 2½ in. thick and the holes 1 in. deep. As the nuts fit snugly into the square holes, they are prevented from turning and thus the effect of a nut lock is secured. At the same time, the fastenings are protected from the grinding action of the paving. When the blocks have been applied a perfectly flat surface is offered for the adjacent paving so that no grouting is necessary nor are any unsightly gaps formed. These blocks are used in connection with the rail filler blocks and wood keys previously described to form a perfectly tight pavement.



Oak Keys Applied to Old Rail Joint

Plans for a tube railway in Sydney, Australia, have been approved by the New South Wales Cabinet. The Minister of Works stated that the matter will be submitted to Parliament as early as possible this session, in order to start the work without unavoidable delay.

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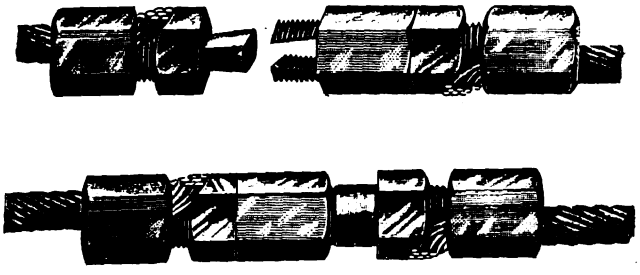
A QUICK DETACHABLE CABLE CONNECTOR

The accompanying illustration shows a new type of quick detachable connector which has just been placed on the market by the North Western Construction Company, New York City. This has been designed so that it can be taken apart easily and quickly and so that it will combine mechanical strength and a good electrical contact. One



Cable Connector With and Without Soldered Terminals

end of the connector is shaped in the form of a dovetail wedge, while the opposite end is milled properly to fit the wedge. The end in which the wedge fits is threaded, and over this is screwed a nut. When the wedge end of the connnector is placed in the slotted end, the nut is screwed over the wedge portion, making contact between the slot and the wedge.

This connector can be furnished with either soldered or solderless terminals.

The two illustrations herewith show the connectors with soldered terminals, assembled and disassembled. These terminals are drilled to accommodate the proper size wire or cable. The illustrations also show the connector with a new form of solderless terminals in which the use of solder has been entirely eliminated by threading and grooving the ends of the connector. When the connector is attached, the nut is forced over the cable and the end of the cable is placed in the groove in the threaded end of the connector. The nut is then screwed on and the threads bite into the cable, giving a maximum of conductivity and tensile strength. This connector is manufactured to fit any size ranging from No. 6 wire to 500,000-circ. mil cable.

NEW CARS FOR TORONTO

The Toronto Municipal Railway has recently purchased twenty prepayment cars from the Niles Car & Manufacturing Company. These are arranged for double-end operation and have a symmetrical seating plan with 5-ft. longitudinal seats holding four passengers at the corners and 35-in. cross-seats in the center portion of the body. The total seating capacity is forty eight, the cross-seats being

New Prepayment Car for Toronto Municipal Railway

spaced on 2-ft. 5½-in. centers on either side of a 22-in. aisle. The length over bumpers is 45 ft. 1 in., and the platforms from the bulkhead line to the outside of dashboards are 6 ft. 6 in. long. The width over side posts is 8 ft. 5½ in.

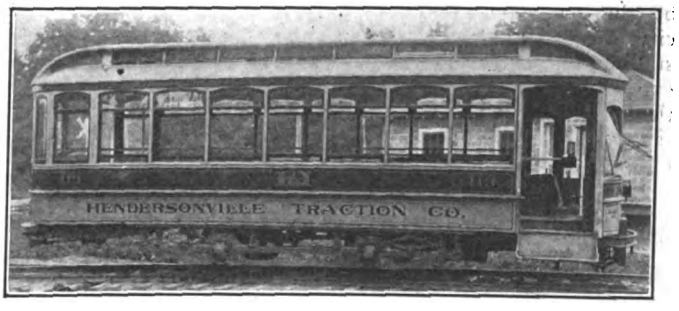
The trucks, which are designed for a track gage of 4 ft. 10⅞ in., are spaced on centers 18 ft. 7 in. apart and are of the Baldwin K type. They are equipped with 33-in. cast-iron wheels on 5-in. axles, and each has two Canadian General Electric No. 80 motors which will operate with 550-volt direct current.

The underframe is of composite steel and wood, and the outside sheathing is narrow tongue-and-groove oak on double-side walls having drop sashes. The interior finish is of quartered oak with Agasote ceiling. The seats are Hale & Kilburn No. 199-A, and the other interior equipment includes Pantasote curtains, Forsyth fixtures and Rex rollers, sanitary hand straps, electric buzzers, Knutson trolley retrievers, Peacock brakes, Hunter signs and hot-air heaters with forced ventilation.

The rear vestibule has two sets of two-panel folding doors opening inward and folding steps controlled by the same handle as the doors. This handle is on a shaft extending down through one of the pipe supports for the single curved railing which separates the exit and entrance passageways. No bulkheads are installed, as the vestibules are completely inclosed. The exit at the front end of the car has a sliding door with a folding step which is controlled by the motorman.

SELF-PROPELLED ONE-MAN CAR

The Hendersonville (N. C.) Traction Company has been operating for several months the straight gasoline type of self-propelled car shown in the accompanying illustration. This car is of single-truck, single-ended design, 30 ft. over all and built for one-man prepayment operation. The



One-Man Gasoline Car for Hendersonville Traction Company

capacity of the longitudinal seating is forty-five, although a load of 103 passengers has been carried up a 7 per cent grade. No car space whatever is required for machinery as the four-cylinder horizontal opposed motors are located directly under the front platform, whence they can be removed and replaced in twenty minutes. A feature of the truck is that the wheels, which are mounted on special tapered roller bearings and revolve on the axles, make it possible to take the car around curves of very short radius. A storage battery is provided for lighting.

The report of the operation of this car for August, 1913, shows that it covered 3200 miles, using $71.87 of gasoline at 19 cents per gallon and $14.25 of oil at 30 cents per gallon. At this rate the cost of power per car mile is 2.8 cents, and even this low figure will soon be reduced considerably by using a gasoline which costs but 15 cents per gallon. The speed of the car is 25 m.p.h. The car is operated in accordance with standard prepayment principles. The motorman, who sits on the left-hand side of the vestibule, is provided with a cash box of the type shown. The equipment of the car was designed by Charles A. Carlson, mechanical engineer, New York. Mr. Carlson believes that a car of this type is well suited for towns of, say, 5000 to 15,000 population, where a standard overhead system would be too costly.

The Rockland, South Thomaston & St. George Railway, Rockland, Maine, has recently built a swimming pool, 100 ft. x 50 ft., at Ginn's Point, for the use of its patrons.

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ELECTRIC RAILWAY LEGAL DECISIONS

CHARTERS, ORDINANCES, FRANCHISES

Alabama.—Nuisance Caused by Power Plant—Damages.

A nuisance from noise and vibration caused by the operation of machinery in a power plant injuring the adjoining property of plaintiff and causing her personal discomfort is not necessarily a permanent nuisance but is subject to abatement by stopping the machinery. But where at the time of the trial of an action for the nuisance the machinery has stopped the damages recoverable are not measured by the difference between the value of the property before the nuisance was started and its value afterward. (Birmingham Ry., Light & Powr Co. v. Bruce, 57 Southern Rep., 1011.)

Connecticut.—Additional Servitude—Action for Damages.

Where a street railway was chartered to carry passengers and was at most only authorized to carry their hand baggage, a complaint in trespass against the road for imposing an additional servitude on the fee of the highway, which alleged that the road is operated as a carrier of property by means of cars designed for and carrying property exclusively and that the cars run from terminus to terminus without stopping to receive or discharge contents and receive and discharge such freight at the two termini only, is not defective on demurrer in failing to charge an additional servitude. (Cadwell v. Connecticut Co., 83 Atlantic Rep., 215.)

Montana.—Contracts for Municipal Work Performed by Railway Companies.

Even though the city council does not exceed its power by the provision of a street railway's franchise that the city when taking up any tracks for the purpose of installing a sewer shall remove and replace them at its own expense, yet the city's contract with the railway company that the company shall take them up and replace them at the city's expense is void, not having been let, as required by Rev. Codes, Sec. 3278, to the lowest responsible bidder. (Missoula St. Ry. Co. v. City of Missoula, 130 Pac. Rep., 771.)

New Jersey.—Receivers—Insolvency—Claims for Traffic Exchange and Maintenance Not Preferred Claims.

Under P. L. 1896, page 277, revising the laws concerning corporations, claims against railroads in receivership for traffic exchange and for maintenance incurred prior to the receivership are not preferred. (Massey v. Camden & T. Ry. Co., 82 Atlantic Rep., 917.)

New Jersey.—Powers of City Council Over Stops.

Under the power given by the charter of Camden to the City Council to regulate the streets and prescribe the manner in which corporations shall exercise any privilege granted to them in the use of any street, an ordinance may be passed requiring street cars running from Merchantville and Moorestown through Camden to the Philadelphia ferry to stop for passengers at the intersection of all cross streets. Such an ordinance is an exercise of the police power. (City of Camden v. Public Service Ry. Co., 86 Atlantic Rep., 447.)

New York.—Additional Burden—Rights of Abutting Owners.

An abutting owner who has no title to the fee of the street may not complain of the construction and operation under a franchise of a street surface railroad operating by horse or electric power. (Pfohl et al. v. International Ry. Co., 136 New York Sup., 175.)

New York.—Compensation—Additional Servitude—Ownership of Lots and Fee of Street.

When a lot abutting on a street and the fee of the street in front of it are owned by different persons, and a street railroad was constructed on the street, without acquisition of legal right, the owner of the lot cannot maintain an action for the additional servitude, and the owner of the fee of the street is entitled only to nominal damages. But when the ownership of the lot and the fee of such part of the street are merged in the same person before commencement of the action he can recover substantial damages, the fee when so owned having a different value from that which it has when owned alone. (Mayne v. Nassau Electric R. Co. et al., 136 New York Sup., 375.)

LIABILITY FOR NEGLIGENCE

Alabama.—Interurban Railroads—Crossing Signals—Statutes—"Locomotive."

Code 1907, Sec. 5473, providing that the engineer having the control of the running of a locomotive on any railroad shall give specific signals in designated situation, does not apply to a street or interurban railroad operated by electric power, for a street car, in its popular sense, is not a "locomotive." (Birmingham Ry., Light & Power Co. v. Green, 58 Southern Rep., 801.)

Indiana.—Live Stock—Duty to Fence.

Burns' Ann. St. 1908, Sec. 5707, giving interurban railroad companies a year from the date of the completion of any part of the line in which to fence it against stock, did not relieve such companies from liability for injuries to stock on a part of their lines completed within less than a year by failure properly to fence the right-of-way. It simply imposed an additional duty upon such companies to fence their tracks within a given period. (Terre Haute, I. & E. Traction Co. v. Phillips, 97 Northeastern Rep., 1014.)

Indiana.—Crossing Accident to Infant—Wilfulness.

Evidence that defendant's motorman saw plaintiff's child, a boy seven and one-half years old, approaching the track engrossed in reading a postal card when the car was a quarter of a mile away and watched him continuously until within 50 ft. or 100 ft. of the point where the boy was struck and did not sound the whistle or gong or make any effort to stop the car and gave no reason for his failure to do so authorized a finding that he was guilty of wilfulness. (Terre Haute, I. & E. Traction Co. v. Baberry, 100 Northeastern Rep., 401.)

Indiana.—Passenger Leaving Train in Motion.

It is not negligence per se for a passenger to alight from a slowly moving train.

A carrier owes the highest degree of care to set a passenger safely down at his destination, and where the conductor of a street car knew, or should have known, the speed at which his car was running, and that plaintiff was intending to alight, he was bound to warn her that the car was still in motion. (Indiana Union Traction Co. v. Swafford, 100 Northeastern Rep., 840.)

Kentucky.—More Evidence Required Under Federal Employers' Liability Act Than Under State Law.

Where a motorman engaged in interstate commerce was killed by the derailment of his car, due to alleged defective condition of the wheels, mere proof of the existence of defects in the car, though sufficient to establish a prima facie case of negligence under an Ohio statute, was insufficient since the case was governed by the federal employers' liability act (act April 22, 1908, Chap. 149, 35 Stat. 65 [U. S. Comp. St. Supp. 1911, page 1322]), under which plaintiff could not recover except on proof that the defect was due to the master's negligence. (South Covington & C. St. Ry. Co. v. Finan's Adm'x, 155 Southwestern Rep., 742.)

Kentucky.—Duty to Passengers on Rear Platform of Crowded Car.

While a carrier is not liable for injury inflicted by a fellow passenger if the injury could not have been reasonably foreseen by the carrier's employees, as where a fellow-passenger in alighting from a car not overcrowded carelessly or intentionally shoves or pushes another passenger, a street railway company is liable for injuries sustained by a passenger who, on account of the crowded condition of a car, was compelled to stand on the rear platform and was injured by a rush of passengers in leaving the car at a transfer point, if the company's employees failed to use a high degree of care to avoid such injury. (South Covington & C. St. Ry. Co. v. Harris, 154 Southwestern Rep., 35.)

Maine.—Duty to Passengers After They Leave the Car.

When a street railway company maintains or adopts a platform or station at a stopping place, it is bound to provide passengers with a reasonably safe way by which to leave the platform or station and reach the sidewalk. But this rule does not apply to ordinary stops on public streets, where the company is merely bound to use proper care in selecting a place for passengers to alight. (Carleton v. Rockland, T. & C. St. Ry., 86 Atlantic Rep., 334.)

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Maine.—Riding on Rear Platform—Care Required.

A passenger is not negligent *per se* in riding upon a rear platform of a street car, but if he voluntarily chooses to ride there he is held to the exercise of a high degree of care to avoid the dangers known or to be reasonably apprehended.

A street railroad permitting a passenger to ride on the platform is bound to take into account that he is thereby subjected to greater risks and to observe a high degree of care in the running of the car at points where there is danger that he may be thrown off. (Blair v. Lewiston, A. & W. St. Ry., 85 Atlantic Rep., 792.)

Massachusetts.—Car Started After Instructions from Passenger.

When the conductor of a crowded car, while in the front end collecting fares, knew that the car had stopped to take on passengers, and on assurance from one or more passengers upon the rear platform that it was "all right," and that he should "go ahead," started the car, the question of his negligence in acting upon such assurance was for the jury. (Pickford v. Boston Elevated Ry. Co., 100 Northeastern Rep., 548.)

Massachusetts.—Boarding Car Without Knowledge of Conductor.

While a car was momentarily stopping to allow the passage of a team, a man attempted to board it. Until he did so he had shown in no way his intention to become a passenger, nor was there any proof that the conductor knew of his presence. Held, that he was not a passenger and the starting of the car was not in violation of any duty owed to him. (Lauchtamacher v. Boston Elevated Ry., 100 Northeastern Rep., 1068.)

Missouri.—Time When a Person Becomes a Passenger.

A street railway company impliedly extends an invitation to persons at a regular stopping place to enter the car when it stops, and the relation of carrier and passenger begins at the time such person indicates his acceptance of such invitation. (Fields vs. Metropolitan St. Ry. Co., 155 Southwestern Rep., 846.)

Montana.—Obligation of Motorman in Case of Unmanageable Horse.

A motorman need not stop his car on first observing one approaching on horseback, or on observing that the horse is becoming unmanageable. But he is chargeable with the duty, on observing that the horse is likely to go in front of the car, to take immediate precautions to avoid a collision. (Singer v. Missoula St. Ry. Co. et al., 131 Pacific Rep., 593.)

New Jersey.—Care Required in Crossing Street.

A pedestrian was guilty of contributory negligence barring recovery for injury received by being struck by a street car, where he attempted to cross the track before another car, which obstructed his view of the approach of the car which struck him, had moved far enough away to give him a clear view of the approach of any car on the track upon which he was struck. (Devine v. Public Service Ry. Co., 86 Atlantic Rep., 260.)

New Jersey.—Ejection of Drunken Passenger.

In ejecting a drunken passenger from its car, the carrier is bound to exercise reasonable care to avoid injuring him. The servants of the carrier should use due care not to expel a passenger (or even a trespasser) at a time or place which is dangerous, and the carrier will be liable for negligence in that regard, not only for injuries directly suffered in connection with such expulsion but also for subsequent injuries proximately due thereto, such as an injury from other cars which the ejected passenger could not reasonably avoid, the probable consequences of improper exposure, and the like. And it will be no answer that the person was injured by reason of his helplessness due to intoxication or like cause, if his condition was known to the servants of the carrier and the consequent injury resulting from such expulsion could have been reasonably anticipated. (McCoy v. Millville Traction Co., 85 Atlantic Rep., 358.)

Pennsylvania.—Punitive Damages for Intentional Injury Only.

In an action against a street railway to recover for injuries from collision between two of defendant's cars, it is reversible error to submit the question of punitive damages to the jury, where there was no evidence that the action was wilfully intentional or that it resulted from anything other than the negligent operation of the car. (Wright v. Philadelphia Rapid Transit Co., 84 Atiantic Rep., 669.)

Pennsylvania.—No Damages for Nervous Shock or Fright.

There can be no recovery for nervous shock unaccompanied by physical injury, but if the nervous shock follows as the result of physical injury it is part of the physical injury, and plaintiff can recover for that. (Samarra et ux. v. Allegheny Valley St. Ry. Co., 86 Atlantic Rep., 287.)

Pennsylvania.—Duty of Motorman When Path Adjoins Railway Track.

It was the duty of the motorman to keep a constant lookout ahead so as to see and be prepared to avoid dangers to pedestrians rightly making use of a cinder walk alongside the track, especially where there was no well-marked division line between the walk and the track. (Kennewig et al. v. Pittsburgh Rys. Co., 86 Atlantic Rep., 702.)

Pennsylvania.—Injuries to Trespasser—Liability of Road.

Where a boy twelve years old climbs on the back bumper of a street car without the conductor's knowledge and rides thereon and is warned of his danger by the motorman of a following car, he cannot recover for injuries by a collision with such car, where the motorman of the latter car was not guilty of wantonness in its operation. (Coyne et al. v. Pittsburgh Rys. Co., 86 Atlantic Rep., 524.)

South Carolina.—Injuries to Persons on Tracks—Punitive Damages.

Where persons on a street railway track were injured in a collision resulting from the intentional act of the motorman in running the car at an unlawful speed, punitive damages may be awarded. (Kramer v. Greenville, S. & A. Ry. Co., Kramer et ux. v. Same, 77 Southeastern Rep., 738.)

Texas.—Injury from Being Struck by Fender.

Where plaintiff, about to board a street car, got too close to the track and was struck by the overhang of the fender as the car was rounding the curve, he was negligent as a matter of law, and therefore could not recover for negligence of the motorman in failing to keep a proper lookout. (Townsend v. Houston Electric Co., 154 Southwestern Rep., 629.)

Texas.—Projection of Track Proximate Cause of Injury.

Where it is shown that car tracks project too far above the street and that the occupants of a vehicle, in attempting to get off the track on seeing an approaching car, were prevented by the projection, which caused the wheels to skid, and the car ran into them, the projecting track was the proximate cause of the injury. (San Antonio Traction Co. v. Cassanova, 154 Southwestern Rep., 1190.)

West Virginia.—Injury to Passengers Transferring from One Car to Another.

One in transit from one car to another substituted therefor because of an obstruction remains a passenger and is entitled to the protection that the highest degree of care on the part of the carrier can afford under the circumstances. (Killmeyer v. Wheeling Traction Co., 77 Southeastern Rep., 908.)

West Virginia.—Injury to Traveler Driving in Dark on Track.

It is negligence to drive in the darkness of the night closely along or on the track of an interurban railway that occupies part of the highway and on which the running of cars at any moment must reasonably be anticipated, when there is ample width of road to drive clear of it, and where one guilty of such negligence is overthrown by a car handled with reasonable care in the emergency, and is injured thereby, he cannot recover. (Boyles v. Wheeling Traction Co., 76 Southeastern Rep., 673.)

Wisconsin.—Assumption of Risk of Conductor from Riding on Running Board.

An experienced street car conductor, who had many times daily for more than a month passed over the line, riding on the running board of an open street car, must be held to have known of and appreciated the risk of injury from a defect in the roadbed of a street railroad, where two rails joined, making them spring and jolting a car whenever it passed over the joint at the usual speed, as was the case when he was thrown therefrom. (Luebben v. Wisconsin Traction, Light, Heat & Power Co., 141 Northwestern Rep., 214.)

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News of Electric Railways

Franchise Revision Completed in Kansas City

The conferences between the receivers of the Metropolitan Street Railway and representatives of Kansas City, Kan., and Kansas City, Mo., in regard to the franchise submitted by Mayor Jost on Aug. 13, have been completed. The ELECTRIC RAILWAY JOURNAL of Sept. 20, 1913, contained a digest of the first sections as they stood after all revisions. The latter sections, dealing with the questions of control, rights of interurban lines and forfeiture, have now been completed, and the ordinance is ready to be printed.

The steps now to be taken in connection with the proposed franchise are these: Within a short period of time public hearings will be announced, at which the negotiators will receive suggestions from any person or interest that may be affected because of the proposed franchise. In the meantime the receivers will submit the tentative draft of the franchise to their bankers to learn whether the company can be financed under its terms. The franchise will also be submitted by the Mayor and by the receivers to experts other than those who have taken part in the negotiations. Committees representing bondholders and stockholders of the Metropolitan Street Railway also must examine it before it goes to the Council. It is probable the measure will be introduced in the Council some time in October. Then will come another series of public hearings before committees. Once out of the Council, the franchise must go to the State Public Utilities Commission for approval and then to Judge Hook of the federal court. If it has the approval of both the commission and the court, it will be submitted to the voters, probably not before December.

Receiver Ford F. Harvey, who took no part in the present negotiations, has yet to approve the tentative draft.

Before the ordinance goes to the Council there will be inserted in blank places left for that purpose the names of the two men who are to compose the board of control and the three directors to represent the city. L. R. Ash, city engineer, who made the appraisal for the city, has been mentioned as the city's representative on the board of control, and Philip J. Kealy, representative of Bion J. Arnold in the appraisal for the receivers, as the representative of the company.

One of the most important points decided by the later conferences had to do with the power and authority of the board of control. This board is to consist of one engineer named by the city and one by the company, with their action to be reviewed on all matters pertaining to schedules and routing by the city's members of the board of directors. They are to pass also on extensions and determine what shall be charged to capital value and what to maintenance and operation. If the two members of the board of control disagree on where an extension shall next be made in the limitation fixed, any two of the city's three directors are to arbitrate the question.

An expenditure of $7,500,000 for extensions and betterments of the system is also provided. This is to be taken out of the earnings of the company and applied to the purposes before either the city or the company gets any interest in the earnings. Within three years after the ordinance is adopted by a vote of the people, the entire system is to be rehabilitated.

The present system of universal transfers, secured to the city under the peace agreement negotiated by James A. Reed, has been sustained It is provided that the present transfer privileges between Kansas City, Kan., and Kansas City, Mo., shall obtain unless this privilege shall operate to the prejudice of Kansas City, Mo.

The general provisions of the section of the franchise dealing with interurban traffic within the city limits are:

"Connections with interurbans shall be compulsory at points designated by the board of control. Entrance to any downtown passenger and freight depots built by or for interurban lines is guaranteed.

"The same fare shall be charged within the city limits on interurbans as is charged by the Metropolitan and the same transfer privileges given.

"The Metropolitan shall not charge the interurbans more for conveying their passengers and freight than it charges for traffic in its own cars.

"The Metropolitan is to take all interurban cars at the city limits, thereby assuming all responsibility for them, including damage suits.

"It is to collect and receive fare and freight charges for traffic within the city and is to pay to the interurban companies such part of the proceeds as may be decided by a commission composed of the two members of the board of control and one man named by the interurban companies.

"Package freight cars and cars for the conveyance of all sorts of produce are to be operated for the interurbans over city lines from midnight until 6 o'clock of each day, and access to the city market is to be assured.

"The Metropolitan board of control, of which the city has one of two members, is to have charge of all routings and schedules of the interurban cars within the city, subject to the approval of the city's directors."

Some of the interurban companies wanted written into the ordinance a provision relieving the company from taking on and discharging passengers on the "out" trips, except at transfer points and downtown depots. The object of this provision was to get rid of the strictly city business, which crowds outgoing interurban cars and forces interurban passengers to stand for several miles. This matter was at last left to the Metropolitan board of control.

In regard to the disposition of earnings and defining the city's purchasing power the following provisions were made: There shall be taken first from the earnings of the company all reasonable expense of management and operation, together with all taxes and the like. There shall go to the company an amount equal to 6 per cent of its value. The remainder of surplus earnings shall go to the company, but shall be credited as the city's payment upon the property until a certain sum, yet to be fixed but probably $7,500,000, is invested in extensions. This is to make the physical value equal to that of capital value.

After the two values are equal, the surplus earnings are to be divided, one-third going to stockholders and two-thirds going to the city. The city's share can be used to pay off the funded debt, to reduce fares or to build extensions. Certificates of ownership are given in return for the city's money and it is provided in the franchise that the city's share in the property is to be recognized by all future holders of it, regardless of whether or not the property goes through bankruptcy proceedings.

No extensions built out of the city's share of the surplus are to increase the capital upon which the company draws interest, and as fast as the city makes payments to decrease the bonded debt or the stock of the company, interest upon that much of it is to cease.

The city reserves the right to purchase the property under two conditions. The first is when the debt on the property shall have been reduced to one-half of the physical value. It is then to be entitled to take the property by assuming the rest of the debt. The city may pay this sum out of its surplus, or by cash raised by other means, it being provided that if it shall purchase before the time when the surplus would pay off half the debt, a concession must be made to the company in the way of payment for the earnings that would have belonged to it had the company been left in possession until the surplus had made purchase possible.

Under like conditions, the city may purchase at any time it can obtain the money, it being provided, however, that it shall pay the company for the company's part of the surplus as yet uncollected. In the event this transaction should involve the redemption of bonds, the premium upon the bonds is not to be more than 3 per cent.

The forfeiture clause, which was the last important point in the franchise, was settled in the following manner: It is provided that if the company fails to abide by the terms of its agreement the city shall hold the company's share of the surplus earnings while legal proceedings determine whether the city shall take over the management of the property. If the court finds that there is cause for for-

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feiture, the city will own the company's share of the surplus which has accumulated during the proceedings and will further have 25 per cent of the company's share in the surplus to apply to extra betterments and improvements, to which it would not have been entitled if the company had not forfeited management of its properties. It is also provided that the city, by mandamus, may force the company to comply with the terms of its contract.

The Boston Arbitration Hearings

Consideration of the working conditions in the department of wires and conduits on the Boston Elevated Railway occupied the board of arbitration in the labor hearings at the close of the week ended Sept. 20. A recess was then taken until Sept. 25 to enable the employees' counsel further to analyze wage data submitted by the company. Before the work of this department was taken up evidence was presented to show that the average pay of a coal-hoisting engineer in a representative case was $35.26 per week, covering a period of one year. The engineer selected by the union as a typical man worked on the average sixty hours per week. His regular pay averaged $19.96 per week and his bonus pay $15.30. Long shifts were required when emptying vessels, and the maximum pay earned in any one week of the year was $71.63. In emergencies it was necessary to work almost continuously for four days and three nights on a stretch. It was contended by the engineer that a preferable compensation would be $23.50 per week, on the basis of a nine-hour day, five and one-half to six days per week, with no docking for holidays and time and one-half and meal hours for overtime work.

The duties of a power station clerk were outlined to the board. These consist in the main of making up station attendants' time cards and preparing the payroll, with the distribution of labor costs to proper accounts; the instruction of new men in time-card entering, supplying them with rules, checking the station log book and keeping a card record of the stock account at each plant. At the Lincoln power station from fifty to seventy-five requisitions on the stock room are filled daily. The stock used per month cost about $1,000.

James P. Boyden, superintendent of wires and conduits, occupied the witness stand for several sessions. From 180 to 200 men are employed in his department and he has charge of the hiring and the recommending for discharge. On outside work employees are classified as foremen, sub-foremen, linemen, sub-linemen, cable splicers, cablemen, sub-cablemen, inspectors, groundmen, teamsters, stablemen and laborers. On inside work there are foremen, sub-foremen, wiremen and sub-wiremen, helpers and occasionally cadets learning the business, inspectors, stockroom men, clerks and a tool keeper. Regular linemen are rated at from 30 to 34 cents an hour, depending upon length of service and individual capacity. The usual line of advance is from groundman up. Mr. Boyden said that the work of a lineman is not so dangerous as that of the man employed in modern steel building construction. In case of accident a man receives half pay covering the first two weeks' absence from the service. Longer disablements are covered by insurance. Prior to April 1, 1913, there had been no compensation of this character in the first fortnight following an injury. A groundman who works two weeks on the line wins a lineman's rating. In emergencies it is sometimes necessary for an employee of one rating to do work of another rating without advance in pay. Sub-foremen are classified by the number of men in their respective gangs and by seniority. Promotion depends upon seniority and the ability of the individual as shown under observation by his superiors.

Mr. Boyden stated that groundmen perform mainly unskilled work. They help linemen, paint poles, dig post-holes, etc. Outside of Boston the wires of other companies are often located on the poles, but in most cases such wires are far above the wires which belong to the railway. Line workers receive special cautionary instructions in regard to the avoidance of other wires than those of the railway. The company provides insulated tools for men who work on the live third-rail. Groundmen are no longer required to perform linemen's work. Cable splicers are paid 40 cents an hour and sub-linemen 22.5 cents. It was stated that the work of a cable splicer is less hazardous than that of a lineman. The cable splicer, however, is obliged to know more than the latter. He must necessarily be a good plumber, machinist, practical electrician and carpenter.

John Hamilton, chief electrician in the wires and conduits department, testified that the ratings of the men under him are passed upon by the superintendent of wires and conduits in all cases. Under him are one general foreman, three sub-foremen, six head wiremen at 38 cents an hour, an inspector at 41 cents, and wiremen earning from 34.5 to 30 cents. Sub-wiremen are paid from 30 to 28 cents. They are recruited from boys who start at 12 cents an hour and advance by steps to 24 cents as helpers. All the interior wiring and lighting service of the company falls under the direction of Mr. Hamilton. A monthly inventory of stock carried by emergency crews is taken, and time sheets are filled out daily which show the actual hours of service inside and outside the station. A crew responds to 1100 or 1200 emergency calls a year. Emergency linemen are allowed two days off per month. The average time per day spent on outside work is about four or five hours. Night emergency men are paid 26 cents an hour. Special care is taken to keep in touch with all feeder conditions and switch locations, which are constantly changed to meet the requirements of a shifting traffic.

Service and Order Restored in Dublin

The general strike situation in Dublin continues serious. So far as the strike of the employees of the Dublin United Tramways is concerned, conditions are practically normal again, except that the traffic has fallen off on account of threats of intimidation. There have been, however, no recurrences of the terrible disorder which followed the declaration of the strike. The extent to which the strike among other trades in sympathy with the tramway workers has gone is instanced by the fact that even farmhands in some localities have been induced to join the sympathetic movement. On Sept. 16 a number of vessels were reported to be lying in the harbor of Dublin unable to discharge their cargoes.

The strike movement which began in the city of Dublin seemed likely on Sept. 17 to be extended to London, for on that date a strike of the employees of the motor bus and the underground railway employees was threatened. The whole dispute in London seems to have arisen over the question whether the employees should be permitted to wear their union badges while at work. A cable from London on Sept. 22 said that the pending strike of the employees of the bus lines had been averted at a conference that day at the Board of Trade. It was said unofficially that the union of the employees is to be recognized and that representatives of the union are to be permitted to serve as members of the board of arbitration which is provided to adjust disputes between the men and the officers of the companies. The men are to be permitted to wear their union badges, but are not to engage in sympathetic strikes.

In an editorial, "Morals of the Dublin Strike," the London *Times* in a recent issue called attention particularly to the inability to compel the representatives of the unions to live up to the obligations of strike settlement agreements. In this connection the *Times* said in part:

"How is collective bargaining to be made effective? Our Dublin correspondent states that the employers and the trade union delegates who were in conference found themselves at issue over two points. One was the local but always delicate question of the reinstatement of the workers who had been locked out. The other was the far more fundamental problem of the guarantees for the observance of whatever settlement might be reached. This latter question is, indeed, or is rapidly coming to be, the gravest with which trade unionism in these islands is confronted. But of all the adverse signs the growing and pronounced inability of the trade union leaders to control their members and to suppress local and individual and sectional revolts seems to us the most disquieting. It springs from many and divers sources—from the impossibility, in these days of gigantic organizations, of looking after local interests and grievances and of allowing for local conditions with the old particularity; from the change that has overtaken not only the type but the outlook of trade union

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leaders and rendered them in many respects almost as remote from the average workingman as the employer himself; from the gradual attrition of interest in the provident and economic sides of the movement and the growing habit of looking upon the unions less as industrial organizations than as effective and wealthy machines for securing and maintaining labor representation in the House of Commons; from the spread of a class consciousness, unfortified by any real knowledge of economics and reverting more and more to Marxian theories. All these influences, and many others, have contributed to a revolution in the spirit and practices of trade unionism that might well, one would have thought, have merited discussion last week by the trade union congress. It is a revolution that threatens, in Dublin and elsewhere, to make collective bargaining almost a waste of time and to secure for industrial anarchy and warfare a new lease of life."

Larkin, the strike leader in Dublin, has again been remanded on the charge of sedition.

Elevated Railway Franchise Recommended in Los Angeles

The Board of Public Utilities of Los Angeles, Cal., has recommended to the City Council the granting of the Pacific Electric Railway's application for a franchise to construct and operate an elevated railway running east from the Pacific Electric station at Sixth and Main Streets to San Pedro Street, Los Angeles. The total cost of the improvement will be $500,000. The elevated structure will be built on a private right-of-way between Sixth and Seventh Streets, the incline rising across San Julian Street and crossing Wall Street and Maple Avenue. The four tracks will stop at Los Angeles Street. Umbrella sheds will extend down between the tracks to Maple Avenue, where the four tracks become two tracks for the rest of the distance to San Pedro Street, at which point the elevated tracks will connect with the line now being installed on San Pedro Street. The proposed franchise is for forty years with the exception of the temporary turnout at San Pedro Street to connect with the San Pedro Street line, now almost completed.

Paul Shoup, president of the Pacific Electric Railway, says:

"The immediate purpose of this overhead construction is to give the greatest utility possible in the use of San Pedro Street in making better and quicker connection between the heart of Los Angeles and all the territory to the east and south of the city reached by our lines. A temporary connection will be made by descending to grade at San Pedro Street. The flyer service to and from the territories described can be very much improved by being brought in on San Pedro Street and thence over this elevated road into the main waiting room of the Pacific Electric terminal, thus avoiding the delays incident to the busy sections of streets and the annoyance that would follow the operation of two stations.

"The further purpose of this elevated road is that it provides the first step in an elevated system which will be of such manifestly great benefit to the city and the outside territories served."

Convention of the Amalgamated Association

The biennial convention of the Amalgamated Association of Street and Electric Railway Employees of America was held at the Hotel Utah, Salt Lake City, Sept. 8 to Sept. 18. Perhaps the most important matter which came before the delegates was the proposed lifting of the suspension of C. O. Pratt and the 2600 members of the Philadelphia local union suspended two years ago. At the opening session on Sept 8 W. D. Mahon, president, stated that since the last convention the officers had reached practically every system throughout the United States and Canada in their efforts to unionize the unorganized systems. The recommendation of short-term contracts made at a previous convention was reiterated. The representatives of the old organization in Philadelphia not accredited at the convention objected to the ruling that C. O. Pratt is ineligible to hold office in the Philadelphia local union and is also ineligible to membership in that local, and that the union at Philadelphia was guilty of insubordination in voting against requesting the international officers to represent the local union in negotiations with the Philadelphia Rapid Transit Company.

At the session on Sept. 11 Mr. Mahon proposed that on account of the growth of the association the number of international vice-presidents should be increased from seven to ten and that two of the vice-presidents be selected from the Canadian carmen. On Sept. 13 the question of the suspension of Pratt and the members of the Philadelphia union came up on appeal and was tabled. Pratt and the representatives who were with him from Philadelphia hired the Salt Lake Theater on Sunday, Sept. 14, and made a direct appeal to the delegates for their support.

A disturbance almost amounting to a riot was precipitated on Sept. 15 when W. L. Merrill, the national organizer for the American Federation of Labor, urged the delegates to reconsider the action in dismissing the appeal of Pratt for reinstatement. At the session on Sept. 16 Mr. Mahon announced that the action of the executive board in regard to the reinstatement of Pratt and the Philadelphia delegation was final. On the same day it was voted to increase the salary of the president from $5,000 to $6,000, the salaries of the other officers from $7 to $9 a day and the salaries of the local organizers from $5 to $6 a day. On Sept. 17 all the officers of the association were re-elected and Rochester, N. Y., was selected as the convention city for 1915. Three additional vice-presidents were elected in accordance with the plan previously mentioned to give representation to Canada.

The convention adjourned without reconsidering the appeal of Pratt and he secured a court writ ordering officials of the association to appear before the district bench and show reason for their action. Service of the writ was accepted by William H. King, who has been retained as counsel by the general executive board to represent the officers of the association in the case.

New York Transit Contracts Modified to Expedite Construction

The Public Service Commission for the First District of New York has executed two agreements with the New York Municipal Railway Corporation (Brooklyn Rapid Transit) for important modifications of the dual system subway contracts, by which the construction and operation of two important links in the Brooklyn system will be expedited. Under the dual system contracts it was provided that the commission should let all contracts for the construction of city-owned lines. In the agreements just signed this provision is modified so as to allow the Brooklyn company to do the construction work in question, provided it charges up to the cost of construction only the actual cost of the work. The Brooklyn company, therefore, will make no profit out of the construction, and it undertakes the work solely because of its desire, which the commission shares, to have the work done in the shortest possible time. One agreement covers the construction of the Thirty-eighth Street line, in Brooklyn, from Fourth Avenue to Tenth Avenue, a stretch of road which will be part subway and part open cut and which will connect the Fourth Avenue subway with the new elevated roads to be built over the routes of the Culver line and the new Utrecht Avenue line to Coney Island. The other agreement applies to the remaining reconstruction work in the Centre Street subway loop, in Manhattan, already under partial operation in connection with the elevated trains of the Brooklyn company. At present only the two westerly tracks in this subway are in operation. Under the new agreement the other two tracks will be equipped for use, certain crossovers will be constructed, the Essex Street station of the Williamsburg Bridge will be reconstructed, and the station at Chambers Street, underneath the Municipal Building, altered so as to permit the entrance of the track connection with the Brooklyn Bridge now under construction. The Brooklyn company agrees to have the work under both agreements completed within eighteen months.

The form of contract for another section of the Seventh Avenue subway, in Manhattan, to be operated by the Interborough Rapid Transit Company, has been completed by the Public Service Commission for the First District and submitted to that company for its criticisms and suggestions. This subway, which will be a four-track line running from Times Square south through Seventh Avenue,

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Varick Street and other streets, to the Battery and to Brooklyn, while built by the city, will be paid for out of the money which the Interborough company contributes toward the cost of the new work under the dual system contracts. For that reason the form of contract must be first submitted to the company and approved by it before being finally adopted by the commission. The section for which the form of contract has just been submitted to the company is known as "Section No. 3" and begins at a point under Varick Street about 100 ft. south of the southerly building line of Beach Street and runs northerly under Varick Street and the Seventh Avenue extension to a point opposite the southerly building line of Commerce Street. The Interborough company will return the contract to the commission by Oct. 1, after which it will be adopted and advertised for bidders. The section immediately south of this one is now being advertised and bids therefor will be opened on Oct. 1.

Entertainment Committee

S. K. Colby, vice-president in charge of entertainment of the American Electric Railway Manufacturers' Association, has announced the appointment of the entertainment committee for the Atlantic City convention. The names of the members of the exhibit committee and finance committee have already been published. The entertainment committee will be composed of:

Henry G. Pearce (chairman), Standard Steel Works, Philadelphia.
H. G. Barbee, Maryland Steel Company.
Samuel T. Bole, The J. G. Brill Company.
Edward F. Chaffee, The O. M. Edwards Company, Inc.
Robert Coe, Carnegie Steel Company.
Thomas Cooper, Westinghouse Electric & Manufacturing Company.
J. T. Cunningham, Allis-Chalmers Manufacturing Company.
J. H. Denton, Railway Utility Company.
John R. Dickey, Philadelphia Holding Company.
Clarence Dodson, Standard Steel Works.
E. L. Folsom, Railway Materials Company.
N. M. Garland, Ohio Brass Company.
Allan E. Goodhue, Midvale Steel Company.
Alfred Green, Galena-Signal Oil Company.
A. A. Hale, Griffin Wheel Company.
H. A. Hegeman, U. S. Metal & Manufacturing Company.
Herman H. Helms, Aluminum Company of America.
E. J. Hunt, ELECTRIC RAILWAY JOURNAL.
William P. Hunt, Jr., The Buda Company.
W. G. Kaylor, Westinghouse Traction Brake Company.
H. J. Kenfield, *Electric Traction.*
M. T. Kirschke, Jr., Baldwin Locomotive Works.
W. A. Lake, The Pantasote Company.
Charles H. Machen, Standard Roller Bearing Company.
E. R. Mason, E. R. Mason Company.
James G. Mowry, Patton Paint Company.
W. M. McKee, Electric Equipment Company.
H. N. Ransom, Westinghouse Electric & Manufacturing Company, New York.
Robert W. Read, Pennsylvania Steel Company.
W. H. Wilkinson, Pressed Steel Car Company.
W. L. Wright, Wm. Wharton Jr. & Company, Inc.

Extensions Approved by Utilities Committee of Detroit Council

Alderman Hess introduced a resolution in the Common Council of Detroit, Mich., on the evening of Sept. 16, authorizing the Detroit (Mich.) United Railway to extend its Fourteenth Street line to Marentette Street and build a loop to Fifteenth Street, passing the entrance to the new station of the Michigan Central Railroad, and returning to Fourteenth Street. This is intended to be temporary, as an approach is to be built later on and changes will be necessary. The station will probably be opened for use in November. It is understood that the Detroit United Railway has approved the plan.

On Sept. 19 the depot extension, together with the Junction Avenue and Kercheval Avenue extensions, were approved by the public utilities committee of the Council. There is to be double track on Junction Avenue between West Jefferson Avenue and Michigan Avenue, single track on Thirty-fourth Street north to Warren Avenue, on Thornton Avenue north to Seebald Avenue, and on Seebald Avenue east to Grand River Avenue, looping on Grand River Avenue to Larchmont Avenue, west on Larchmont to Van Court Avenue, south on Van Court to West Warren Avenue and south on Thirty-third Street to Michigan Avenue. For the Kercheval Avenue extension there is to be double track on this thoroughfare east of Jean Avenue and south on St. Jean Street to Jefferson Avenue, the cars to run out Jefferson Avenue and Alter Road and return by the same route.

The public utilities committee of the City Council asked the company to consider the construction of double track on some of the other lines, but F. W. Brooks, general manager of the company, insisted that its plans for the present have been made and the finances provided, so that it will be impossible to take up anything additional.

Progress with the Toronto Valuations

R. A. Ross, who is appraising the assets of the Toronto (Ont.) Electric Light Company in connection with the proposed street railway deal, promised Mayor Hocken on Sept. 19 that his report would be in the city's hands by Oct. 1. The Mayor expects that the report from Messrs. Arnold and Moyes, who are appraising the property of the Toronto Railway, will be submitted earlier than that of Mr. Ross. If the Hydroelectric Power Commission of Ontario approves the two reports on the street railway deal, a by-law concerning the proposed purchase will probably be submitted to the ratepayers of Toronto some weeks before the end of this year. Mayor Hocken is determined not to have the issue involved in the municipal elections on Jan. 1, while Comptroller Church favors the vote on that day. Mr. Church is quoted as follows:

"If there is an attempt to submit this railway deal to the ratepayers any time but January, an injunction will be applied for. After spending $25,000 on a traffic expert's report we are not going to be so foolish as to submit the question without a legal offer from the company. To get a legal offer would require three months. The shareholders must be consulted and must indorse the proposition. I should like to know if the Mayor instructed the experts to place a value on the railway as it will be at the expiration of the franchise. This proposed railway deal has stopped us from getting better car service, from going in for motor buses for the outlying districts, and from proceeding with the plan for civic and radial car lines mapped out by the experts."

Terms of Extensions in Akron Under Consideration

A. B. du Pont met the members of the railroad and the bridge committees of the City Council of Akron, Ohio, on Sept. 17, and ways and means of securing the extensions to the local lines of the Northern Ohio Traction & Light Company were discussed. Mr. du Pont had talked with the officers of the company and said that an extension of one year to the franchise of the company for each mile of new track built and put into operation would be accepted by the company. Mr. du Pont was instructed to prepare another proposition.

At the regular meeeting of the City Council of Akron on Sept. 22 four members blocked an attempt to rush through legislation for the issue of $225,000 of bonds under suspension of the rules for the purpose of building a municipal railway to be operated in competition with the city lines of the Northern Ohio Traction & Light Company. The ordinance for this purpose had received its first reading at a special meeting a few days previously and City Solicitor Taylor had rendered an opinion to the effect that the rules might be suspended and the ordinance passed at this meeting. Councilman Whittamore argued that bond issues should not be passed without some specific purpose being fixed and that plans and specifications in this case should be made for the proposed line.

Mayor Rockwell is opposed to the attempt to secure municipal ownership of any car lines at this time on the ground that the city's finances will not permit the ex-

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periment. He says it would be better to allow matters to go on until the expiration of the present franchise, eleven years hence, and when that time comes take over the company's property.

The City Council must now proceed along regular lines with this ordinance, and, if passed, the measure will then go to a referendum vote.

Boston Subway Construction

The Boston Transit Commission has awarded the contract for the Cambridge Street extension of the East Boston tunnel to the firm of Coleman Brothers, Boston. The successful bid was $86,130. Work is being steadily pushed on the section of the extension in the Scollay Square district, and the walls of the Scollay Square station are being cut away in preparation for a lowering of the grade at this point in order to insure a straight connection below the Tremont Street subway between the tunnel and its extension. Street widening will be carried out where the extension is brought to the surface in the West End. Work on the Boylston Street subway is making rapid progress, and it is expected that if no delay occurs service may be given through the new tube between the outer Back Bay and Park Street by the fall of 1914. The stations, as in the Washington Street tunnel, are to be 350 ft. in length, the platform width being from 20 ft. to 25 ft. on each side. At the Massachusetts Avenue station exits and entrances will be established on two intersecting streets and at the Copley Square station a portion of the Public Library esplanade will be used in this way. Heavy reinforcement of the foundations of the Old South Church tower has been necessary in connection with the work at Copley Square. Excavation will shortly be begun for the Church Street incline of the subway south of the Public Garden. Lawrence B. Manley is assistant on the Boylston Street subway in immediate charge of field work.

Petition for Compulsory Extension in Oregon Dismissed.—The Oregon Railroad Commission has dismissed the petition to require the Portland Railway, Light & Power Company, Portland, Ore., to extend its system to Mount Scott Cemetery.

Denver City Tramway to Pay Taxes.—Announcement has been made by the Denver (Col.) City Tramway of its intention to pay the city $263,813 in delinquent taxes for last year, preparatory to bringing suit against the assessor for a further reduction of $736,785, in addition to the $1,976,315 granted in August.

Temporary Fare Reduction Ordered.—James D. Mortimer, president of The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., has announced that the company will obey the order of the Railroad Commission for a reduction in the fare to the state fair park during fair week. The order virtually establishes a 6-cent fare each way, being one fare plus 2 cents.

Negotiations Regarding Subways in Chicago.—In an opinion to the local transportation committee of the City Council of Chicago Corporation Counsel Sexton held that a franchise for the operation of subways in Chicago cannot be made for a period of twenty years exclusive of the time required in the construction work of the tunnels. He maintained the Council has the right only to grant a franchise for twenty years, the time necessary for the excavation work to be included in that period. The local transportation committee of the Council has decided to request the surface railway interests to confer with the members of the committee with reference to the proposed rapid transit ordinance.

Control of Equipment Proposed for I. C. C.—A bill is to be introduced in Congress by Representative R. B. Stevens, of New Hampshire, chairman of a sub-committee of the House committee on interstate and foreign commerce, which will confer upon the Interstate Commerce Commission control over the physical equipment of railroads, with power to compel the roads to provide and maintain roadbed and equipment such as the commission may specify. The bill will provide for standard rules for the operation of trains, and, in a general way, the power of the British Board of Trade over the railroads of Great Britain will be conferred upon the Interstate Commerce Commission.

Personnel of Mesaba Railway.—The Mesaba Railway, Virginia, Minn., which was placed in operation early this year, has completed its departmental organization, which includes the following: Oscar Mitchell, president; R. W. Watson, vice-president; Philip Saltenstall, treasurer; H. S. Newton, general manager; H. K. Greenwood, assistant general manager; L. J. Daly, chief dispatcher in charge of operation; D. H. Doughty, general traffic agent; Thomas Dwyer, chief engineer; O. A. Ericksen, auditor and purchasing agent; Robert Anderson, master mechanic, and W. B. Hale, roadmaster. The company has recently installed the Simmen block signal system.

Jovian Campaign to Assist the Society for Electrical Development.—The Jovian campaign to secure subscriptions for the Society for Electrical Development in compliance with the resolution passed by the Eleventh Jovian Congress at the recent meeting at Niagara Falls, is progressing satisfactorily. Some forty-five Jovian leagues have reported to the central office indicating their interest in the work and their determination to win the prizes offered by the society. Through the courtesy of Edwards & Company, New York, Thomas H. Bibber, Jovian statesman-at-large, will for the period from Sept. 15 to Oct. 1 assist Eleventh Mercury E. C. Bennett in the work of managing the campaign for the society.

Further Study of Compensation Acts by the National Civic Federation.—The joint commission on the operation of workmen's compensation acts in the various states which was created by the National Civic Federation has decided to extend its investigation by visiting Washington, Oregon and California. The operation of the Washington act is to be studied because that State is the only one in which compulsory state workmen's compensation insurance is in force. The members of the commission have just returned from a trip through Massachusetts, Michigan, Ohio, Wisconsin and Illinois, and they purpose to ascertain the facts with regard to the operation of the workmen's compensation laws, rather than to report recommendations. These facts will be utilized by the workman's compensation department of the Civic Federation in formulating a new model law for uniform state legislation.

St. Paul Litigation Ended.—At a recent conference between the officials of St. Paul, Minn., and the officers of the Twin City Rapid Transit Company it was agreed that official notification of the dismissal of the litigation carried to the United States Supreme Court by the St. Paul City Railway will be followed by the City Council considering the compromise recently advanced by the company in regard to the right of the city to stipulate in the matter of extensions which shall be built to the railway system. Horace Lowry, vice-president of the company, is quoted as follows: "We have decided, without official action on the part of the Council, to dismiss our appeal in the Maryland Street case, and then put our proposition in the hands of the Council. This action will establish the right of the city to order a line on any sewered street where necessity demands, and puts the city in the same position as if it had argued the case before the Supreme Court and won."

Final Mississippi River Development Bulletin.—The Mississippi River Power Company has issued the final bulletin, No. 10, of its attractive series entitled "Electric Power from the Mississippi River," describing the completion of its large hydroelectric plant at Keokuk, Ia. The section just published contains a description of the work accomplished from March 1 to July 1, 1913, and illustrations of the work at various stages of construction, the object being to present a brief review of the progress made. On July 1 the dam was entirely finished and the level of the Mississippi was raised to form the lake which reaches to Burlington, 40 miles north. Ten of the fifteen turbo-generators installed in the station are in operation. They supply power to Keokuk and St. Louis and will soon supply power to Hannibal, Quincy, Alton, Fort Madison and Burlington. The new government lock is in successful operation and the dry dock is nearing completion.

Improvements of the Pennsylvania Railroad at Baltimore.—The directors of the Chamber of Commerce of Baltimore,

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Md., have made a report approving in the main the Pennsylvania Railroad's proposition for enlarged terminals in the vicinity of Calvert Station. A few modifications have been suggested, the chief one the building of a viaduct or an elevated street over Centre Street and the widening of Calvert Street 10 ft. for the length of the railroad's improvement. It is also suggested that the city shall widen Calvert Street from Bath to Lexington to the same dimensions. In regard to electrification, the report shows that business expediency was the controlling motive of its authors. It takes the ground that all that should be required of the railroad is to promise that it will change from steam to electricity whenever the latter can be practically adopted. This, the report says, should be within a reasonable time.

Valuation of Tacoma Company Reported.—F. S. Burroughs, engineer of the Public Service Commission of Washington, has completed his report upon the value of all the physical property of the Tacoma Railway & Power Company, Tacoma, Wash., and the report has been presented to the commission. According to the report the entire railway plant of the company could be reproduced at a cost of $4,585,388, exclusive of real estate holdings, and the depreciated value at present is $3,567,034. The gross earnings of the company in 1912 are set down as $1,046,093, and the expenses at $798,805. The amount of annual depreciation upon the plant is figured at $118,478. The real estate holdings, however, show steady appreciation. Mr. Burroughs announced that he expected to be able to complete his real estate estimates by Oct. 1. When the estimates of real estate holdings have been completed and the final valuation has been placed upon the property, the commission will continue with the hearing in the Spanaway rate case.

The Proposed Hamilton-St. Catharines Electric Railway.—Norman M. Todd, president of the Galt, Preston & Hespeler Electric Railway, who has charge of the electric railway projects of the Canadian Pacific Railway, met the members of the City Council of St. Catharines, Ont., on Sept. 12 in reference to the building of a high-speed electric railway from Hamilton to St. Catharines. An agreement was drawn up which will be laid before the Canadian Pacific Railway officials at Montreal and if agreeable will be incorporated into a by-law that will be submitted to the people of St. Catharines for approval, probably before the end of the year. St. Catharines is to contribute $100,000 toward the construction of a bridge across the old Welland Canal. The company agrees to commence work within six months of the passage of the by-law and have the line completed within two years, although it is expected that it will be constructed within one year. A maximum rate of 2 cents a mile for passengers was agreed to. It is understood that the line will not be extended to the frontier, but may later be run to Merritton and Thorold.

Booklet on 1913 Flood Issued by the Pennsylvania Lines.—The Pennsylvania Lines, Pittsburgh, Pa., have issued a 72-page booklet entitled "The 1913 Flood and How It Was Met by a Railroad," written by Lewis S. Bigelow. This is a graphic description of the disastrous floods which swept the Central West, principally Ohio and Indiana, from March 23 to April 15, 1913. The Pennsylvania Railroad was affected to the extent that for some time beginning March 26, when the flood was at its height, three of its most important branches were completely paralyzed, as shown in one of the maps in the booklet. The story records the difficulties the floods heaped up and how they were surmounted and overcome. The booklet is divided into six chapters as follows: "The Coming of the Flood," "The Fight for Existence," "Caring for Passengers," "Rescuing the Railroad," "Relief Work," "The Floods Subside." Many illustrations are presented showing the damage done to bridges, stations and roadbed on the various divisions in the territory which was flooded. In bridges alone there were seventy-four steel structures entirely destroyed or rendered unsafe. The washouts, of which there were thousands, ranged from comparatively small breaks to sections of roadbed 2 miles in length. It is estimated that the direct property loss to the Pennsylvania Railroad was about $3,600,000.

Financial and Corporate

Stock and Money Markets

Sept. 24, 1913.

The tendency of the prices of the securities traded in on the New York Stock Exchange was downward to-day and sufficient pressure developed to cause a net decline of half a point in the general level of quotations. The notable exceptions to the decline were the New Haven and the Rock Island issues. The money market continued easy. The government bond market again lacked support. Rates in the money market to-day were: Call, 2½@3 per cent, with the last loan at 2¾ per cent; sixty days, 4¼@4½ per cent; ninety days, 4½@4¾ per cent; four, five and six months, 5 per cent.

Very little interest was manifested in the market in Philadelphia to-day. Trading was light and without feature.

The Chicago market was broad to-day, but the volume of transactions was small. The market for bonds was good.

The Boston market was weak to-day. Activity and strength in New Haven issues were the features of the afternoon.

The market for stocks in Baltimore was very narrow today and the volume of transactions was small. The demand for bonds was good.

Quotations of traction and manufacturing securities as compared with last week follow:

	Sept. 17	Sept. 24
American Brake Shoe & Foundry (common)	92	92⅜
American Brake Shoe & Foundry (preferred)	133⅞	135
American Cities Company (common)	37	37½
American Cities Company (preferred)	65	65
American Light & Traction Company (common)	354	354
American Light & Traction Company (preferred)	105	105
American Railways Company	39⅜	39⅜
Aurora, Elgin & Chicago Railroad (common)	41¼	42
Aurora, Elgin & Chicago Railroad (preferred)	83	84
Boston Elevated Railway	88	86½
Boston Suburban Electric Companies (common)	7	7
Boston Suburban Electric Companies (preferred)	56½	56½
Boston & Worcester Electric Companies (common)	a10	a10
Boston & Worcester Electric Companies (preferred)	43	43
Brooklyn Rapid Transit Company	89¼	89⅛
Capital Traction Company, Washington	a116¼	116
Chicago City Railway	160	165
Chicago Elevated Railways (common)	25	25
Chicago Elevated Railways (preferred)	75	75
Chicago Railways, ptcptg., ctf. 1	94½	94
Chicago Railways, ptcptg., ctf. 2	29	30⅛
Chicago Railways, ptcptg., ctf. 3	8	8
Chicago Railways, ptcptg., ctf. 4	3	3
Cincinnati Street Railway	103	120
Cleveland Railway	101	102⅝
Cleveland, Southwestern & Columbus Ry. (common)	5½	*5½
Cleveland, Southwestern & Columbus Ry. (preferred)	28¼	*28¼
Columbus Railway & Light Company	18	18
Columbus Railway (common)	a69½	a69½
Columbus Railway (preferred)	88	88
Denver & Northwestern Railway	104	*104
Detroit United Railway	69	69
General Electric Company	147	146
Georgia Railway & Electric Company (common)	117	117
Georgia Railway & Electric Company (preferred)	86	87
Interborough Metropolitan Company (common)	15⅝	15⅝
Interborough Metropolitan Company (preferred)	61	60⅜
International Traction Company (common)	30	*30
International Traction Company (preferred)	95	*95
Kansas City Railway & Light Company (common)	20	22
Kansas City Railway & Light Company (preferred)	30	30
Lake Shore Electric Railway (common)	5	*5
Lake Shore Electric Railway (1st preferred)	89	*89
Lake Shore Electric Railway (2d preferred)	24	*24
Manhattan Railway	129	130
Massachusetts Electric Companies (common)	14	14
Massachusetts Electric Companies (preferred)	68	a68
Milwaukee Electric Railway & Light Co. (preferred)	95	95
Norfolk Railway & Light Company	27½	*27½
North American Company	75	73
Northern Ohio Light & Traction Company (common)	65	63
Northern Ohio Light & Traction Company (preferred)	100	97
Philadelphia Company, Pittsburgh (common)	44	43⅜
Philadelphia Company, Pittsburgh (preferred)	40	40
Philadelphia Rapid Transit Company	23	23
Portland Railway, Light & Power Company	55	55
Public Service Corporation	114	114
Third Avenue Railway, New York	40⅝	42½
Toledo Traction, Light & Power Company (common)	a30	a30
Toledo Traction, Light & Power Company (preferred)	a80	a80
Twin City Rapid Transit Co., Minneapolis (common)	107½	106
Union Traction Company of Indiana (common)	*5	*5
Union Traction Company of Indiana (1st preferred)	*80	*80
Union Traction Company of Indiana (2d preferred)	*20	*20
United Rys. & Electric Company (Baltimore)	27	26⅞
United Rys. Inv. Company (common)	19	22
United Rys. Inv. Company (preferred)	39	40
Virginia Railway & Power Company (common)	52	56
Virginia Railway & Power Company (preferred)	93	94
Washington Ry. & Electric Company (common)	89	89
Washington Ry. & Electric Company (preferred)	89	89½
West End Street Railway, Boston (common)	72	70
West End Street Railway, Boston (preferred)	88	88
Westinghouse Elec. & Mfg. Company	72	70½
Westinghouse Elec. & Mfg. Company (1st preferred)	114	115

*Last sale. a Asked.

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ANNUAL REPORTS

Boston Elevated Railway

The Boston (Mass.) Elevated Railway failed to earn the dividends paid during the fiscal year ended June 30, 1913, owing largely to the fact that the strike of 1912 carried over into the accounts of the last fiscal year. Had not the miscellaneous income fallen off $450,000 from the preceding year the results would have been different, for the deficit was but slightly in excess of this amount.

The operating revenue was $904,800 greater than in the preceding year and operating expenses were but $158,900 larger, making really an increase of $745,900 in the operating net. The year's deficit of $496,377 compares with a deficit of $491,632 the previous year, both of which can be ascribed directly to the strike. Interest charges were increased by an addition of $4,000,000 funded debt, and the capital was also increased $3,929,400, but the dividend did not accrue on this stock during the year.

Following is the statement for the year ended June 30, 1913, as reported to the Massachusetts Public Service Commission, in comparison with the preceding year:

	1913	1912
Operating revenue	$16,808,908	$15,904,046
Operating expense	11,135,581	10,976,634
Operating net	$5,673,327	$4,927,412
Miscellaneous income	159,419	618,495
Total income	$5,832,747	$5,545,907
Charges	5,132,124	4,840,539
Balance	$700,622	$705,368
Dividends	1,197,000	1,197,000
Deficit	$496,377	$491,632

The traffic statistics for the past two fiscal years ended June 30 compare as follows:

	1913	1912
Revenue car miles	57,784,319	54,790,173
Revenue passengers carried	326,352,863	310,310,009
Employees	9,882	9,998
Maintenance of way and structures	$1,761,842	$1,593,013
Maintenance of equipment	1,282,655	1,428,574
General expense	1,773,597	1,857,126
Traffic expense	16,048	35,784
Transportation expense	6,301,400	6,062,136
Ratio of operating expenses to operating revenue	66.25	69.02

Railway & Light Securities Company

The semi-annual report of the Railway & Light Securities Company, a corporation organized by Stone & Webster for the purpose of investing and dealing in public utility securities, contains a profit and loss statement for the twelve months ended July 31, 1913, as follows:

Underlying and investment bond interest received and accrued		$205,498
Dividends on investment stocks		52,183
Interest on notes, etc		17,187
		$274,868
Collateral trust interest paid and accrued	$85,681	
Taxes	3,991	
Expenses	8,757	98,429
Profit from income		$176,438
Profit on securities bought and sold	$47,074	
Premium on collateral trust bonds	3,045	44,029
		$220,467
Preferred stock dividends		
3 per cent paid Jan. 31, 1913—No. 16	$45,000	
3 per cent paid July 31, 1913—No. 17	45,000	
Common stock dividends		
3 per cent paid Jan. 31, 1913—No. 7	30,000	
3 per cent paid July 31, 1913—No. 8	30,000	150,000
Net profit carried to surplus		$70,467
Surplus as of Aug. 1, 1912		400,537
Total surplus		$471,004

The Railway & Light Securities Company has outstanding $1,500,000 of 6 per cent preferred stock and $1,000,000 of common stock, on which dividends of 3 per cent semi-annually are being paid. Under its charter the company may issue its own collateral trust bonds secured by the bonds of other companies as collateral. It has outstanding $1,601,000 of thirty-year 5 per cent collateral trust bonds. These bonds are secured by bonds of other companies of at least 25 per cent greater value than the face of bonds issued. Of these bonds $349,000 mature May 1, 1935, $500,000 mature May 1, 1939, $369,000 mature Nov. 1, 1939, and $383,000 mature May 1, 1942. The semi-annual report contains a list of the underlying bonds deposited as security for each of the four collateral series issues.

Melbourne Tramway & Omnibus Company

According to a report recently submitted to the shareholders of the Melbourne Tramway & Omnibus Company, Melbourne, Australia, the traffic receipts for the year ended June 30, 1913, amounted to £755,091, which, added to interest received of £38,112 and miscellaneous income of £1,888, made a total income of £891,082. From this amount deductions were made to the extent of £24,372 for salaries, £252,269 for wages, £1,668 for depreciation of leaseholds, £8,261 for income and land taxes, £74,250 for interest on debentures, £$49,500 for the sinking fund, £7,313 for a reserve for a renewal of tramways, £144,000 for dividends paid, leaving a balance on hand for the period of £202,754. From this amount the directors of the company propose to pay a final bonus of £48,000 and to carry £105,741 to a reserve for the return of capital, which leaves a total of £49,013 to be carried forward for the ensuing fiscal year. The tramway receipts show an increase of £35,567, while the omnibuses show a decrease of £1,284, a total increase of £34,282. The number of passengers carried by the tramways amounted to 89,359,248, an increase of 4,432,530; the omnibuses carried 493,516, a decrease of 147,726, making a total increase of 4,284,810. The train miles run by the tram cars amounted to 11 839,473, an increase of 526,261, while the same statistics for the omnibuses are 95,783 train miles for the year, a decrease of 9,846, or a total increase of 516,415.

Buffalo Reorganization Hearings Continued

At the hearing on Sept. 19 in Buffalo before the members of the Public Service Commission of the Second District of New York counsel for the petitioning bondholders of the Buffalo & Lake Erie Traction Company and for the banking house of Bertron, Griscom & Company, New York, intimated that the reorganization of the Buffalo & Lake Erie Traction Company and the acquisition by the reorganized company of the capital stock of the Buffalo, Lockport & Rochester Railway and the Canadian-American Power Corporation will eventually include the International Railway.

Under the provisions of the new $60,000,000 mortgage recently executed by the International Railway it cannot absorb other lines. When Edward G. Connette, president of the International Railway, was asked about this new phase of the situation, he merely said he did not believe the company would be included in the merger scheme.

Since the merger plan has been before the Public Service Commission, little or nothing has been said about the Frontier Electric Railway, which is to be built from Buffalo to Niagara Falls, N. Y., to connect with the new MacKenzie-Mann line from Toronto to Niagara Falls, Ont. More than 95 per cent of the right-of-way has been secured by that line and Mr. Connette has admitted that the interurban cars of the International Railway will operate between Buffalo and Niagara Falls over the new line. The present Niagara Falls line will be used only for freight service.

The International Railway has been double-tracking its line from Tonawanda to Lockport, N. Y., and the cars of the Buffalo & Lake Erie Traction Company will operate over this line and connect with the Buffalo, Lockport & Rochester Railway at Lockport. Mr. Connette says the reorganized lines will have a trackage agreement with the International Railway to run interurban electric trains over the city lines and interurban tracks as far as Tonawanda and Lockport.

The Canadian-American Power Corporation, which proposes to import 46,000 hp at the international boundary, has on its board of directors members of the banking firm of Bertron, Griscom & Company and Mr. Connette.

It developed at the hearing before Commissioner Decker on Sept. 19 that the petitioning bondholders will confer soon in New York with counsel representing the minority bondholders who are protesting against the proposed plan of reorganization and merger.

The next hearing will be held in Albany at the request of Chairman Decker of the commission. The date of this hearing has not been fixed.

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References to Electric Railway Holdings at the New Haven Bond Hearing

Brief references to the electric railway properties of the New York, New Haven & Hartford Railroad were made at the hearings during the week ended Sept. 20 upon the petition of the company to the Massachusetts Railroad Commission for authority to issue debenture bonds to the amount of $67,552,000. Howard Elliott, president of the company, and Samuel Rea, president of the Pennsylvania Railroad, appeared before the board at its offices in Boston on behalf of the proposed issue. Mr. Elliott said that if the commission authorizes the issue $7,000,000 will be expended immediately to increase safety of travel on the New Haven lines. He said that at this time he is unable to make any statement regarding the future policy of the company toward its electric railway and steamship holdings. Mr. Rea, who is a director of the New Haven company, said that it would be impracticable to dispose of the electric railways and steamship holdings of the road as a means of avoiding a bond issue of the size desired. Such a disposal would have to be made on a piecemeal basis, if at all, and would cause enormous loss to the stockholders. Mr. Rea said that he did not know whether the New Haven company had accepted the Massachusetts act of 1913 relative to electric railway extensions in the Berkshire district. He understood that the Interstate Commerce Commission had merely suggested that the company dispose of its electric railway holdings. He was opposed to railroads holding other property. He said:

"The company purchased the electric railways to protect itself. I was not a member of the board of directors at that time, but I have no doubt that the directors thought the electric railways threatened very serious competition. The Pennsylvania Railroad at one time suffered from the trolley lines which parallel its line to Wilmington, Del. In the first year the Pennsylvania lost $50,000 in traffic from the territory and it was a question whether the railroad would not have to buy the electric railways. In time we got the long-haul and they the short-haul traffic."

H. M. Kochersperger, vice-president of the New Haven company in charge of financial matters, said at one of the sessions that the directors have appropriated $668,000 for the electrification of the passenger service on the Harlem River branch and $753,000 for the electrification between Glenbrook and New Haven.

Chicago (Ill.) Railways.—The proxy committee of the Chicago Railways, consisting of Wallace Heckman, Seymour Morris and Henry A. Blair, on Sept. 15 issued a circular criticising the contents of the circular sent out recently by the Chicago Railways Protective Association, mentioned in the ELECTRIC RAILWAY JOURNAL for Sept. 20, 1913. It is claimed that the statement made by the protective association that the signing of the proxy sent out by the proxy committee of the company would authorize the company to sell, lease or merge its property without further consent of the certificate holders is false, for all the powers under the formal proxy are strictly confined to the steps provided by the participation certificate to be taken relative to the election of the directors for the present year.

Columbus Railway & Light Company, Columbus, Ohio.—On Sept. 15 Judge Dillon in the Court of Common Pleas overruled the contention of the stockholders of the Columbus Light, Heat & Power Company that the proposed organization plan of the Columbus Railway, the Columbus Edison Company, the Columbus Light, Heat & Power Company and the Columbus Railway, Power & Light Company, referred to at length in the ELECTRIC RAILWAY JOURNAL of May 3, 1913, should have been approved by shareholders of the various companies before being submitted to the Public Service Commission. The court held that the statutes are silent as to whether the proposition of purchase and sale should be submitted to the stockholders and then to the commission or vice versa, and that either course could be followed. It is reported that since the decision some of the stockholders of the Columbus Light, Heat & Power Company have indicated their willingness to consent to the plans of the management. Final action on the consolidation of the four constituent companies has been postponed by the directors until Nov. 15, when the stockholders will act on the matter.

Consolidated Cities Light, Power & Traction Company, New York, N. Y.—An initial quarterly dividend of one-half of 1 per cent has been declared on the capital stock of the Consolidated Cities Light, Power & Traction Company, payable on Oct. 1 to holders of record of Sept. 15.

Elmira Water, Light & Railroad Company, Elmira, N. Y.—Bertron, Griscom & Company, New York, N. Y., are offering for sale 6 per cent debenture gold notes of the Elmira Water, Light & Railroad Company, dated May 1, 1913, and due May 1, 1914, par value $1,000, $10,000 and $50,000. The total authorized issue is $1,250,000 with $602,000 outstanding. The following statement was issued by the bankers: "This issue is to pay underlying bonds and unfunded debt and to permit new construction and improvements, including the cost of a new central power station. The work on this station will be pushed to completion and it is expected that it will add materially to the net earnings. The company covenants that it will not during the life of these notes (a) issue any of its first consolidated mortgage 5 per cent bonds; (b) create any new mortgage on its property without including these notes as part of such mortgage; or (c) create any other indebtedness except for current operating account save with the consent of 75 per cent of the note holders."

Evansville (Ind.) Railways.—The Evansville Railways has filed a mortgage with the Pittsburgh Trust Company, Pittsburgh, Pa., to secure an authorized issue of $5,000,000 of 5 per cent forty-year bonds, of which $1,331,500 are set aside to retire three underlying issues, the balance to remain in the principal for future extensions or improvements, except $800,000 which will be used immediately.

Fresno, Hanford & Summit Lake Interurban Railway, Fresno, Cal.—At a meeting recently held by the directors of the Fresno, Hanford & Summit Lake Interurban Railway the question of issuing preferred stock was discussed. The matter of advertising for the stockholders' meeting to secure permission to issue this stock is only a formality, as all of the stock was represented by the owners or proxies at the directors' meeting, but the sixty days' advertising is required by law. The preferred stock is to be issued in order to clear up the outstanding business of the company and to change the 5 per cent fifty-year mortgage to a 6 per cent forty-year type.

Galveston-Houston Electric Company, Galveston, Tex.—The stockholders of the Galveston-Houston Electric Company will vote on Oct. 6 on authorizing an increase in capital stock from $4,000,000 of common stock and $3,000,000 of preferred stock to $5,000,000 of common stock and $4,000,000 of preferred stock. Various improvements to the system in Galveston and Houston and to the interurban line between the two cities are contemplated during the coming year. The principal items are an increase of power facilities, the purchase of new equipment, construction of carhouses and extensions of track. The stock will be issued from time to time as required.

Greenville, Spartanburg & Anderson Railway, Greenville, S. C.—The stockholders of the Greenville, Spartanburg & Anderson Railway have authorized an increase of $2,500,000 in the capital stock, which makes the total authorized issue $7,500,000. The new capital will be used in financing the new line of the company of about 50 miles between Gastonia and Spartanburg. This link will connect the northern and southern divisions of the Piedmont Northern lines, and with its completion there will be a through route of 205 miles between Charlotte, N. C., and Augusta, Ga.

Joliet & Southern Traction Company, Joliet, Ill.—The property of the Joliet & Southern Traction Company has been advertised for sale under foreclosure of its mortgages at Geneva, Ill., on Nov. 18.

New Hampshire Electric Railways, Haverhill, Mass.—The Massachusetts Northeastern Street Railway, a subsidiary of the New Hampshire Electric Railways, has petitioned the Massachusetts Public Service Commission for the following: (1) an increase of capital stock from $1,455,000 to $2,175,000 by an addition of $675,000 of preferred stock and $45,000 of common stock for the following pur-

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poses: (a) $415,000 of preferred stock to be exchanged dollar for dollar for the bonds of the Hudson, Pelham & Salem Street Railway, the Haverhill, Plaistow & Newton Street Railway and the Lowe & Pelham Street Railway; (b) $260,000 of preferred stock and $45,000 of common stock to buy pleasure grounds and additional property, including the property of the Canobie Lake Company in Salem, N. H., a bridge across the Hampton River and land owned by the Granite State Land Company; (2) an issue of $1,000,000 of a proposed $2,000,000 issue of twenty-year 5 per cent mortgage bonds, $670,000 to pay the floating debt of the company and $330,000 to retire the ($23,000) bonds of the Citizens' Electric Street Railway and the ($100,000) bonds of the Amesbury-Hampton Street Railway.

Northern Ohio Traction & Light Company, Akron, Ohio.—Hayden, Miller & Company, Cleveland, Ohio, after having sold about $1,250,000, are offering at par and interest the remainder of the $1,500,000 new collateral trust 6 per cent gold notes issued with the approval of the Ohio Public Service Commission to take up the $800,000 collateral trust 6's of 1909 and to provide for additions and improvements, as noted in the Electric Railway Journal of Sept. 20. These notes are dated Aug. 1, 1913, and due $100,000 annually on Nov. 1, 1914, 1915 and 1916, and thereafter $100,000 semi-annually ending Nov. 1, 1922, but redeemable in whole or in part at 101 and interest upon thirty days' notice prior to any interest date in the inverse order of maturities and numbers. The principal and interest are payable at the office of the Citizens' Savings & Trust Company, Cleveland, trustee, or at the office of the First National Bank, New York.

Philadelphia (Pa.) Rapid Transit Company.—Drexel & Company, Philadelphia, will offer on a 5.09 basis the 5 per cent equipment trust gold certificates, series C, of the Philadelphia Rapid Transit Company, issued under the Philadelphia plan, dated May 1, 1912, maturing in semi-annual instalments of $81,000 from Nov. 1, 1913, to May 1, 1923, inclusive, but callable at 102½ and interest. The Fidelity Trust Company, Philadelphia, is trustee. The total issue of $1,944,000 is secured by 500 new double-truck vestibuled cars, purchased from The J. G. Brill Company at a cost of $2,453,025, of which $509,025 has been met in cash.

Sandwich, Windsor & Amherstburg Railway, Windsor, Ont.—The Ontario Railway & Municipal Board will have its auditor investigate the operation of the Sandwich, Windsor & Amherstburg Electric Railway before passing on the application, heard on Sept. 16, to compel specific performance of the agreement between the township of Tecumseh and the railway. Under an agreement the Essex, Windsor & Tecumseh Railway was to make certain extensions when the road became profitable. The Essex, Windsor & Tecumseh Railway was subsequently leased to the Sandwich, Windsor & Amherstburg Electric Railway and the question now to be decided is whether the road is profitable.

Southern Pacific Company, San Francisco, Cal.—It was announced on Sept. 13 that Kuhn, Loeb & Company, New York, have sold on a 5¼ per cent basis $7,130,000 of equipment trust 4½ per cent certificates, representing 90 per cent of the cost of new equipment for the Southern Pacific Company.

Southwestern Traction Company, Temple, Tex.—A. F. Bentley, president of the Southwestern Traction Company, has announced that an amendment to the charter of the corporation, increasing its capital stock to $3,500,000, will be filed in the Secretary of State's office at Austin. Mr. Bentley says the purpose of this proposed increase of capital is to provide funds to extend the line from Temple to Waco, about 30 miles, and from Temple south of Austin, about 80 miles.

Toledo Railways & Light Company, Toledo, Ohio.—The reorganization committee of the Toledo Railways & Light Company has issued notices that all the holders of the New York Trust Company certificates of deposit of stock of that company who have not exchanged these for the voting trust certificates of the preferred and common stocks of the Toledo Traction, Light & Power Company must do so immediately.

Dividends Declared

Aurora, Elgin & Chicago Railroad, Wheaton, Ill., quarterly, 1½ per cent, preferred; quarterly, three-quarters of 1 per cent, common.

Chicago (Ill.) City Railway, quarterly, 2½ per cent.

Cleveland (Ohio) Railway, quarterly, 1½ per cent.

Consolidated Cities Light, Power & Traction Company, New York, N. Y., quarterly, one-half of 1 per cent.

Germantown Passenger Railway, Philadelphia, Pa., quarterly, $1.31¼.

Halifax (N. S.) Electric Tramway, Ltd., quarterly, 2 per cent.

Houghton County Traction Company, Houghton, Mich., 3 per cent, preferred; 2½ per cent, common.

Omaha & Council Bluffs Street Railway, Omaha, Neb., quarterly, 1¼ per cent, preferred.

Philadelphia Company, Pittsburgh, Pa., 3 per cent, cumulative preferred; quarterly, 1¾ per cent, common.

Porto Rico Railways, Ltd., Ponce, P. R., quarterly, 1¾ per cent, preferred; quarterly, 1 per cent, common.

Public Service Corporation of New Jersey, Newark, N. J., quarterly, 1½ per cent.

Republic Railway & Light Company, Youngstown, Ohio, quarterly, 1½ per cent, preferred.

Ridge Avenue Passenger Railway, Philadelphia, Pa., quarterly, $3.

Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., quarterly, 1½ per cent, preferred.

Washington Water Power Company, Spokane, Wash., quarterly, 2 per cent.

ELECTRIC RAILWAY MONTHLY EARNINGS

AMERICAN RAILWAYS, PHILADELPHIA, PA.

Period			Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1 mo.	August	'13	$498,976	.....	.....	.....	.....
1 "	"	'12	450,274	.....	.....	.....	.....
2 "	"	'13	1,003,044	.....	.....	.....	.....
2 "	"	'12	912,511	.....	.....	.....	.....

ATLANTIC SHORE RAILWAY, SANFORD, MAINE

1 mo.	August	'13	$60,233	$30,403	$29,830	$654	$29,177
1 "	"	'12	56,221	28,269	27,952	467	27,485

BATON ROUGE (LA.) ELECTRIC COMPANY

1 mo.	July	'13	$13,774	*$8,522	$5,253	$2,082	$3,171
1 "	"	'12	12,479	*8,101	4,378	1,729	2,649
12 "	"	'13	151,510	*91,570	59,940	22,857	37,083
12 "	"	'12	137,813	*83,253	54,561	20,758	33,802

BROCKTON & PLYMOUTH STREET RAILWAY, PLYMOUTH, MASS.

1 mo.	July	'13	$16,883	*$10,177	$6,706	$1,117	$5,589
1 "	"	'12	15,476	*9,469	6,006	1,050	4,956
12 "	"	'13	123,511	*95,599	27,911	12,939	14,972
12 "	"	'12	119,329	*89,802	29,527	12,576	16,951

CAPE BRETON ELECTRIC COMPANY, SYDNEY, N. S.

1 mo.	July	'13	$32,543	*$17,616	$14,928	$6,082	$8,846
1 "	"	'12	33,116	*16,974	16,142	5,703	10,439
12 "	"	'13	373,216	*201,385	171,831	70,690	101,141
12 "	"	'12	348,338	*192,034	156,304	67,980	88,324

DALLAS (TEX.) ELECTRIC CORPORATION

1 mo.	July	'13	$175,352	*$101,295	$74,057	$24,852	$49,205
1 "	"	'12	144,534	*88,839	55,695	24,666	31,029
12 "	"	'13	2,039,099	*1,186,806	852,294	295,946	556,348
12 "	"	'12	1,728,517	*1,106,421	622,096	264,752	357,345

EL PASO (TEX.) ELECTRIC COMPANY

1 mo.	July	'13	$67,219	*$35,970	$31,249	$4,178	$27,071
1 "	"	'12	59,620	36,328	23,293	5,877	17,416
12 "	"	'13	873,223	465,728	407,495	49,848	357,646
12 "	"	'12	737,955	412,355	325,600	81,267	244,333

GALVESTON-HOUSTON ELECTRIC COMPANY, HOUSTON, TEX.

1 mo.	July	'13	$228,910	*$121,141	$107,769	$35,469	$73,299
1 "	"	'12	180,558	*100,556	80,003	33,501	46,502
12 "	"	'13	2,265,182	*1,294,545	970,636	412,554	559,082
12 "	"	'12	1,778,397	*1,077,923	700,474	332,683	367,791

HOUGHTON (MICH.) COUNTY TRACTION COMPANY

1 mo.	July	'13	$31,758	*$15,998	$15,759	$5,629	$10,130
1 "	"	'12	30,784	*14,634	16,149	5,677	10,472
12 "	"	'13	312,500	*179,225	133,275	67,933	65,343
12 "	"	'12	300,671	*178,625	122,046	64,920	57,126

JACKSONVILLE (FLA.) TRACTION COMPANY

1 mo.	July	'13	$57,130	*$35,934	$21,195	$12,976	$8,220
1 "	"	'12	49,248	*23,100	16,147	9,810	6,338
12 "	"	'13	600,897	*402,285	198,512	130,161	68,351
12 "	"	'12	584,690	*367,170	217,521	113,409	104,112

*Includes taxes.

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Traffic and Transportation

California Fare Complaint Dismissed

The Railroad Commission of California has dismissed the complaint against the Peninsular Railway, San José, Cal., in which unreasonableness of passenger rates was charged between Los Gatos and San José. The complaint was originally directed against the one-way fare, the individual monthly commutation fare and the family commutation fare of the Peninsular Railway, in effect between San José and Los Gatos, and also comprehended the service between these points. At the hearing the children's forty-six ride individual monthly commutation fare of $2.30 between Saratoga and Los Gatos, for a distance of approximately 4.3 miles, was alleged to be unreasonable and unjust as compared with the fare of $2.75 for the same class of service between Saratoga and San José for a distance of 11.3 miles. At the same time, the single-trip fare of 10 cents between Campbell and a station called Pines, and between Pines and certain adjacent points, was complained of as being unreasonable. These allegations, however, were entirely without the issues raised by the pleadings and no further consideration was given to them.

The service between San José and Los Gatos is practically hourly throughout the day and until 11.30 o'clock at night, and during some parts of the day cars leave San José for Los Gatos, via Campbell and via Saratoga, at practically the same time and thereby afford optional routes between San José and Los Gatos on practically the same schedule. The complainant had no fault to find with the number of trains between Los Gatos and San José, but with the manner in which they were operated.

A. D. Loveland of the commission said in part in his opinion:

"It is my opinion that the interest of the parties living in the territory between San José and Los Gatos should be fully considered in this matter before any change in the schedules of the trains is made. In view of the fact that it has not been possible to look into this feature of this matter, and that the testimony of the defendant was uncontroverted, that 90 per cent of its traffic on this part of its line originates and terminates at points intermediate to Los Gatos, and that the present schedules were specially arranged to take care of the traffic of the whole community, rather than of any particular section, I do not believe that it is proper at this time to make any change in the defendant's train schedules between San José and Los Gatos.

"I next come to the complaint against the passenger fares of the defendant. The fares which were particularly called into question in this proceeding are the one-way fare of 25 cents, the sixty-two-ride individual monthly commutation fare of $5, and the thirty-ride family six-month commutation fare of $5 between San José and Los Gatos. It is contended that these fares are excessive and unjust, for the reason that they are inconsistent with other fares of the defendant and exceed fares between other points on other lines in California where the transportation conditions and circumstances are similar, and in support of this contention the complainant points out, in comparison, the fares of the defendant between San José and Saratoga, the fares of the Pacific Electric Railway between Los Angeles and Pasadena and the fares of the Northwestern Pacific Railroad between San Francisco and Fairfax.

"The testimony of the defendant that it is operating its entire line at a loss is uncontroverted, and from the exhibit offered in this case and from the records on file in the office of the commission it appears that there is a deficit of from $8,000 to $12,000 per month. As suggested by the complainant, this deficit may, to a large extent, be brought about by the payment of interest on outstanding stocks or bonds which do not represent actual values, but in the absence of any information or evidence to support such a statement it is obviously of small use. The commission's valuation of this property had not proceeded far enough to enable it to form its conclusions in regard thereto and ascertain therefrom some idea of the proper capitalization of this line.

"While it would, no doubt, as the complainant contends, be to the advantage of the residents and property owners of Los Gatos and intermediate territory to secure reductions in the present fares, and in the end might prove beneficial to the railroad itself, if the carrier is unwilling to experiment in this regard it does not follow that this commission should adjust the fares so as to bring about this result, this commission being empowered only to prescribe just and reasonable rates. The carrier should, in this regard at least, adjust its fares so that all discrimination between persons and localities is entirely eliminated and should provide in so far as possible relative rates for the various classes of service, which relation should generally be maintained without discrimination.

"From a consideration of all of these matters I am led to the conclusion that the facts do not sustain the complaint and recommend that it be dismissed."

The Toronto Safety First Movement

The Ontario Safety League is the title under which the new "safety first" movement will be started in Toronto. It was proposed at the organization meeting, held on Sept. 15, to provide moving pictures in connection with the schools, to circulate literature and perhaps arrange lectures, to place before the public the actual dangers they face and show the wisdom of exercising care when on the street. It was also suggested that a competition be held with prizes for the six best methods to avoid street accidents. In explaining the purpose of the meeting, Chairman McIntyre of the Ontario Railway & Municipal Board said that in Montreal and in a number of cities in the United States campaigns had been instituted to teach the public to avoid accidents. He said: "Toronto boasts that it is in the van of progress. This board thought it ought to bring the influential men of the city together, present the matter to them, and leave it in their hands to look after. Some permanent organization should exist to educate the public to avoid accidents."

For organization purposes four committees as follows were appointed: Membership, J. C. Eaton, J. T. Burke, Dr. Doolittle; organization, W. P. Gundy, J. E. Aitkinson, Dr. J. L. Hughes; finance, J. M. McIntosh, C. L. Wilson, O. Hezzlewood; campaign, W. R. McRae, G. G. Powell, W. F. Maclean. The league intends to interest practically all the organizations in the city in the movement. Although at first the educational campaign will be devoted to eliminating street accidents, the intention of the members is to have it embrace railroad and steamship traffic.

Railroad Commission of California on Napa Wreck

The Railroad Commission of California has rendered its findings in the matter of the investigation which it conducted into the causes of the wreck on June 19, 1913, on the San Francisco, Napa & Calistoga Railway, in which ten passengers and three employees were killed and twenty-five passengers and three employees were injured. The conclusions of W. C. Earle, chief engineer of the commission, follow:

"Circumstantial evidence indicates that Conductor Richmond (train 6) failed to call for his clearance before leaving Vallejo as required by custom of the company. Motorman Hough failed to obtain a copy of this clearance or verbal confirmation of it from the conductor before starting his train. Dispatcher O'Leary violated the rules in allowing an inferior train to move before restricting the superior train. The officers of the company were negligent in their duties in allowing single-track high-speed operation to be conducted without maintaining the proper observation of the rules on the part of all employees.

"It is necessary to make mention of the fact that had the railroad been equipped with automatic block signals the accident would have been prevented, assuming that sufficient discipline was maintained to obtain observance of signals.

"The direct causes of the accident were—

"(1) Failure of Conductor Richmond to call the dispatcher for a clearance before leaving Vallejo with train.

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"(2) Failure of Motorman Hough to obtain the clearance from his conductor.

"(3) Dispatcher O'Leary's violation of the rule requiring him first to restrict the superior train before moving the inferior train.

"(4) Failure of the officers of the company to correct the above violations of the rules which had been occurring daily and had become an established practice.

"The indirect cause of the accident was—

"General violation of the rules, which ultimately results in such disasters as this one.

"The company should require its officers to operate the railroad under safe rules. They should examine men as to their fitness before allowing them to occupy positions that involve the handling of trains and train orders and should employ only competent men in such positions who are qualified to fill them. They should know that all rules are being observed."

Decision Fixing Joint Rate for Lumber.—In the complaint before the Railroad Commission of California alleging excessive rates on lumber on the lines of the Salt Lake Railroad and the Pacific Electric Railway, Los Angeles, Cal., between East San Pedro and Florence Avenue, outside the city limits of Los Angeles, the commission has rendered a decision holding that the lumber rate of 6 cents per 100 lb. between these points is excessive and discriminatory and the defendants have been ordered to publish a rate of $1 per ton on lumber in carload lots.

Notice of Through Routes and Joint Rates Filed.—The Louisville Board of Trade has received notice that through routes and joint rates have been established by the electric railways which operate between Louisville, Ky., and Indianapolis. A joint freight tariff has been filed with the Interstate Commerce Commission and has now become effective, this action following a recent order of the commission growing out of a complaint of the Board of Trade. The Board of Trade has taken up with the commission the question of having tariffs filed for joint rates and through routes from Louisville to points beyond Indianapolis which have not been provided for by the companies as yet. The commission will probably enter an additional order on the subject if this step is not taken by the lines affected.

Near-Side Stop Opposed in Detroit.—In Detroit, Mich., opposition to the near-side stop rule promulgated some time ago by Police Commissioner Gillispie has developed among individuals, shop and store organizations and club members. Mr. Gillispie holds, however, that the near-side stop is conducive to safety. At the meeting of the Mayor's cabinet on Sept. 18, S. T. McGraw, president of the fire commission, declared in favor of the far-side stop, to the surprise of Commissioner Gillispie and some of the other city officials. Several members of the Twentieth Century Club, a prominent women's organization, have voiced objections to the near-side stop. They believe that cars should stop so that they may be boarded from the crossing walks. The officers of the company are willing to have the public decide the matter.

Accident on Electric Division of Long Island Railroad.—Three men, employees of the Long Island Railroad, were killed and more than fifty passengers were injured on the morning of Sept. 22 in a head-on collision between two electric all-steel trains which met on a sharp curve of single track 500 ft. east of the College Point station. A statement issued from the office of J. A. McCrea, general manager of the Long Island Railroad, said: "We believe there is no question that the use of steel cars on the trains in the collision materially reduced the loss of life and injury to persons. We have equipped 218 of our smaller type of cars—that is, the subway type, operated on trains out of Flatbush Avenue—with the Hedley anti-climber, but we have not equipped the heavy type of steel cars, such as were in collision, with the device. These cars are a much heavier type than the subway car. The Hedley device was invented specially for the subway type of car. It has not been considered seriously for the standard type of steel car. That is the first serious accident of this kind we have had with the steel cars, and if our investigation shows that there is anything left undone in the construction or the equipment of these cars, we will, of course, take advantage of the knowledge which we gain."

Personal Mention

Mr. B. H. Doughty has been made general traffic agent of the Mesaba Railway, Virginia, Minn.

Mr. William H. Shelmerdine has been elected first vice-president of the American Railways, Philadelphia, Pa., to succeed the late William F. Harrity.

Mr. A. E. Blackburn has been made assistant general superintendent of the Chicago, Ottawa & Peoria Railway, Ottawa, Ill. He was formerly traffic manager of the company.

Mr. W. B. Hale has resigned as roadmaster of the Hartford & Springfield Street Railway, Warehouse Point, Conn., to become roadmaster of the Mesaba Railway, Virginia, Minn.

Mr. A. M. Farrell has been appointed chief clerk to the general superintendent of the Chicago, Ottawa & Peoria Railway, Ottawa, Ill., with supervision over the traffic department.

Mr. J. O. Tucker has resigned as electrical engineer of the Chicago, Ottawa & Peoria Railway, Ottawa, Ill., to accept a position with the Central Illinois Public Service Company, Mattoon, Ill.

Mr. Lawrence J. Daly, formerly park manager of the Hartford & Springfield Street Railway, Warehouse Point, Conn., has been appointed chief dispatcher in charge of operation of the Mesaba Railway, Virginia, Minn.

Mr. Henry K. Greenwood, formerly superintendent of electric lines of the Hartford & Springfield Street Railway Company, Warehouse Point, Conn., has been appointed assistant general manager of the Mesaba Railway, Virginia, Minn.

Mr. Thomas Dwyer, whose resignation as chief engineer of the Hartford & Springfield Street Railway, Warehouse Point, Conn., was mentioned recently in the ELECTRIC RAILWAY JOURNAL, has been appointed chief engineer of the Mesaba Railway, Virginia, Minn.

Mr. W. J. Bowman, master mechanic of the Fox River division of the Aurora, Elgin & Chicago Railroad, Wheaton, Ill., has had his jurisdiction enlarged to include the territory formerly under the supervision of Mr. E. P. Doyle, master mechanic of the third-rail division, whose resignation was mentioned in the Sept. 13 issue of the ELECTRIC RAILWAY JOURNAL.

Mr. Howard Elliott has been elected president of the New England Navigation Company, New England Steamship Company, Connecticut Company, New York & Stamford Railway and Housatonic Power Company. Mr. Elliott has also been made a director of the Millbrook Company and the New York, Westchester & Boston Railway. He will later be made chairman of the board of the Connecticut Company and the steamship companies.

Mr. Judson Zimmer has been appointed acting master mechanic of the Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y., to succeed Mr. John Sibbald, whose resignation is referred to elsewhere in this column. Mr. Zimmer was graduated from Union College, Schenectady, N. Y. He entered the service of the Fonda, Johnstown & Gloversville Railroad as assistant engineer, maintenance of way department, several years ago.

Mr. Frank L. Dame has joined the staff of Mr. Harrison Williams, New York. He has just been elected a director of the Central States Electric Corporation and the Appalachian Power Company. Mr. Dame was vice-president of the Electric Bond & Share Company, in charge of the operating department, from 1909 until Jan. 1, 1913. Since his resignation from that position he has been taking a long vacation. Mr. Dame is a graduate of the Massachusetts Institute of Technology. For some years he was connected with the General Electric Company interests on the Pacific Coast and afterward was general manager of the Union Electric Company, Dubuque, Ia.

Mr. John Sibbald has resigned as master mechanic of the Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y., to engage in industrial engineering and will have his offices in New York City. Mr. Sibbald was graduated from Rensselaer Polytechnic Institute at Troy, N. Y. He

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entered the service of the Fonda, Johnstown & Gloversville Railroad as mechanical engineer in 1906. He was appointed master mechanic of the company on July 1, 1907. Mr. Sibbald is a member of the American Electric Railway Engineering Association, the American Railway Master Mechanics' Association and the Rensselaer Society of Engineers and is an associate of the American Institute of Electrical Engineers.

Mr. Edward H. Howard, for a number of years chief engineer of the Boston & Worcester Street Railway, South Framingham, Mass., has resigned from the company to open an office in South Framingham as a consulting and general engineer. His resignation is to take effect on Oct. 1. Mr. Howard was graduated from Worcester Polytechnic Institute and is a member of the American Society of Civil Engineers and the New England Street Railway Club. He has been connected with the Boston & Worcester Street Railway about twelve years. Mr. Howard began his work as a division engineer in charge of preliminary surveys, locations and construction and was gradually advanced to take charge of the engineering of the entire system.

OBITUARY

W. W. Gamwell, a director of the Sheboygan Railway & Electric Company, Sheboygan, Wis., is dead. Mr. Gamwell was financially interested in a number of public utility companies and was formerly treasurer of the Stanley Electric Company, Pittsfield, Mass. He was stricken with apoplexy at the meeting of the directors of the Sheboygan Railway & Electric Company on Sept. 17 and died on Sept. 21. He was sixty-three years of age.

Richard Anderson, who was in charge of the south division of the track department of the Denver (Col.) City Tramway, is dead. Mr. Anderson was born in Moline, Ill., on Nov. 24, 1873. Before locating in Denver he resided in Chicago, where he learned the carpenter's trade. In 1900 he entered the service of the track department of the Denver City Tramway and rose to the position of foreman in 1903. Later, when the track department was reorganized and divisions established, Mr. Anderson was placed in charge of that territory known as the south division.

James Ross died at Montreal on Sept. 20, 1913, at the age of sixty-five years. Mr. Ross was born in Cromarty, Ross-shire, Scotland, in 1848. He was educated at Inverness Academy, Scotland, and in England. He came to America in 1868, and two years after was made resident manager of the Ulster & Delaware Railway and later its chief engineer. During 1873 he was resident engineer of the Wisconsin Central Railway and later he was with the Lake Ontario Shore Railway, afterward becoming first chief engineer and then general manager of the Victoria Railway. In 1878-1879 he supervised the construction of the Credit Valley Railway and became its general manager and was consulting engineer of the Ontario & Quebec Railway. In 1883 he took control of the construction of the Canadian Pacific Railway west of Winnipeg and in 1885 completed the line over the Rocky Mountains, Selkirk and Gold Ranges. Next he conducted the settlement of the location of the line east of Montreal, was instrumental in procuring the necessary legislation in Maine and then obtained the contract to build the remaining portion of the system. In 1888 Mr. Ross assisted in building the Regina & Long Lake Railway, 250 miles long, and the next year the Calgary & Edmonton Railway, 300 miles in length. In 1892, with Sir William MacKenzie, he purchased the Toronto (Ont.) Railway and equipped it with electricity. Through his instrumentality the Montreal Street Railway was reorganized in 1892 and equipped with electricity, as were also the railways of Winnipeg, Man., and St. John, N. B. In 1896, with Sir William MacKenzie, he acquired the tramways systems of Birmingham, Eng., and formed the City of Birmingham Tramways Company. The next year he secured rights to build electric tramways on the island of Jamaica. He has been vice-president and managing director of the Montreal Street Railway, vice-president of the Toronto Railway, president of the Winnipeg Street Railway, St. John Railway, Dominion Bridge Company, Dominion Coal Company and Mexican Light & Power Company. He was also a director of the Bank of Montreal, the Canadian General Electric Company and a number of other large corporations.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

Red Lodge (Mont.) Electric Railway.—Application for a charter will be made by this company in Montana to build a 9-mile electric railway to connect Red Lodge, Washoe and Bear Creek. Capital stock, $100. H. A. Glasmacher and C. L. Mayo, Seattle, are interested. [E. R. J., Aug. 30, '13.]

***Union Interurban Terminal Company, Dayton, Ohio.**—Incorporated in Ohio with a capitalization of $10,000. Incorporators: William A. Keyes, president of the Dayton Street Railway, R. V. Burkhard and H. G. Wagner.

FRANCHISES

Oakland, Cal.—The San Francisco-Oakland Terminal Railways has been asked by the Council to move its double-track line in Sixteenth Street to the center of the street from Wood Street west to the terminal of the line in Oakland.

Sacramento, Cal.—The Central California Traction Company, San Francisco, has received permission from the Railroad Commission to build over certain streets in Sacramento.

Santa Clara, Cal.—The Peninsular Railway, San José, has asked the County Board for an extension of time on its franchise to build the line from the Santa Clara city limits to Meridian Corners.

Visalia, Cal.—The Big Four Electric Railway has received a franchise from the Council in Visalia. [E. R. J., Sept. 20, '13.]

***Bradentown, Fla.**—C. A. Matson, Bradentown, has received a thirty-year franchise from the Council in Bradentown. This is part of a plan to build an electric railway from Bradentown to Braden Castle, via Manatee. Another branch will take in the Palma Sola peninsula and a third line is planned to reach Cortez.

***Milton, Fla.**—H. S. Laird, Milton, and associates have asked the Council for a thirty-year franchise to build an electric railway in Milton and extend it to Bagdad.

Athens, Ga.—The Atlanta & Carolina Electric Railway has asked for an extension of time on its franchise in Athens.

Pittsfield, Mass.—The Berkshire Street Railway has asked the Council for more time on its franchise in Pittsfield within which to fulfil the construction provisions of the law of 1910 for extensions of its lines. More time on the company's franchise is also asked of the Council in North Adams.

Brooklyn, N. Y.—The Nassau Electric Railway, a subsidiary of the Brooklyn Rapid Transit Company, has asked for a franchise for a line along Atlantic Avenue in Brooklyn.

TRACK AND ROADWAY

Birmingham-Tuscaloosa Railroad & Utilities Corporation, Birmingham, Ala.—Engineers have completed surveys and estimates for the 47-mile line which this company, a subsidiary of the Birmingham, Ensley & Bessemer Railway, will build between Tuscaloosa and Bessemer. Interests associated with the construction of the new line say that a good route has been found, the maximum grade being seven-tenths of 1 per cent and the maximum curvature 4½ deg., while 70 per cent of the line will be tangent. At Tuscaloosa the new line will connect with the Tuscaloosa Belt Line, which is owned by the same interests, and at Bessemer with the Birmingham, Ensley & Bessemer Railway, which will give it an entrance into Birmingham. [E. R. J., Sept. 6, '13.]

Helena Street & Interurban Railway, Helena, Ark.—Surveys are being made by this company for an extension to the Chicago Mill & Lumber Company's plant in Helena.

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***Fresno, Cal.**—J. B. Rogers, Fresno, is securing right-of-way to build a 10-mile electric interurban railway from Fresno to Clovis. It is stated that the Mahoney Brothers, San Francisco, will finance the new line, and it is proposed to raise a bonus of $40,000.

San José (Cal.) Railways.—The Railroad Commission has rendered a decision directing this company to reconstruct as a standard-gage line its narrow-gage system from San José to Toyon station, a distance of 4½ miles. The company was also directed to make connection at Toyon station with the Peninsular Railway.

Peninsular Railway, San José, Cal.—Work will soon be begun by this company linking its Palo Alto line with the United Railroads, which has a terminal at San Mateo, thus giving San Mateo a direct line to San Francisco.

Stockton Terminal & Eastern Railway, Stockton, Cal.—This company has received permission from the Railroad Commission to construct its track at grade across eight public highways in Stockton.

Jacksonville (Fla.) Traction Company.—Grading has been completed by this company on its extension to the Florida Military Academy in Murray Hill Heights.

Carolina & Georgia Railway, Augusta, Ga.—At a meeting of the directors of this company, it was decided to increase its bonded debt from $2,000,000 to $3,000,000. It is planned to begin the construction within thirty days on its line from Augusta to Columbia, via Johnston and Greenwood. James U. Jackson, Augusta, president. [E. R. J., Sept. 13, '13.]

Rome Railway & Light Company, Rome, Ga.—This company has begun the construction of a 2-mile extension to East Rome. The work is being done by the company. Construction material has been purchased.

Belleville, Ill.—William R. Lorimer, has closed a deal by which his firm, the Lorimer-Gallagher Construction Company, Chicago, has paid $18,500 for 6 miles of roadbed and a few trestles between Belleville and Smithton. The property is incorporated as the Belleville & Interurban Railroad. The new company is said to be closely connected with the Southern Traction Company of Illinois, which is building a line from Belleville to East St. Louis.

Indianapolis, Linton & Vincennes Railroad, Indianapolis, Ind.—This company plans to build a line from Indianapolis through Mooresville, Linton, Bicknell and Vincennes to Patoka, connecting there with the line from Evansville. Branch lines are proposed from Linton to Jasonville and Sullivan. John A. Shaffer, who is the engineer in charge of the projected line, states that surveys are now being made and that right-of-way will be acquired as rapidly as possible. He expects that the work of construction may be started during the year 1914. Arrangements are said to have been made with Indianapolis brokers for handling the bond issue of the proposed line. [E. R. J., Sept. 20, '13.]

Madisonville, Ky.—James Breathitt, Jr., Hopkinsville, Ky., who is promoting the construction of a 12-mile line between Madisonville and Nortonville, Ky., has announced that arrangements for financing the work have been made in New York. The plan proposed by Mr. Breathitt is to purchase the municipal electric-light plant at Madisonville and enlarge it to serve as a power station for the electric railway. The Hopkins County Commercial Club, Madisonville, is assisting in the work of securing right-of-way and in preparing for a survey of the proposed line. [E. R. J., Sept. 13, '13.]

Olympian Springs Railway, Power & Light Company, Olympian Springs, Ky.—Work has been begun by this company on its 4-mile line between Olympia and Olympian Springs. S. F. Crecilius, Louisville, chief engineer. [E. R. J., Aug. 9, '13.]

Bay State Street Railway, Boston, Mass.—Work will be begun at once by this company on its new Ames Street extension in Montello.

Springfield (Mass.) Street Railway.—Plans are being made by this company to build its Sheridan Street extension at once. The company will soon apply for a franchise to build the line. The company is asked to consider plans to build a 1¼-mile line between Chicopee Falls and East Springfield.

Detroit (Mich.) United Railway.—Work will be begun in the near future by this company on its 9-mile extension from Romeo to Almont.

***Detroit, Mich.**—An electric railway to extend from Detroit to Grand Rapids, is being promoted by H. M. Wallace, Detroit. He claims to have secured the capital and to have the necessary franchises and rights-of-way from the limits of the two terminal cities.

***Hillsdale, Mich.**—W. E. Elliott, Hillsdale, has been securing right-of-way and will soon apply for a charter to build an electric railway between Hillsdale, Mich., and Pioneer, Ohio. It will conect with the lines of the Toledo & Western Railway at Pioneer. The plan is to extend this line eventually from Hillsdale to Elkhart, and then there will be a through line from Chicago to Toledo.

Mesaba Railway, Virginia, Minn.—This company is considering overtures made by the citizens of Biwabik and Aurora, Minn., to extend its lines beyond Gilbert. At the present time the managerial organization is engaged in gathering data on traffic and cost of construction with a view of presenting it to the holding company for consideration. Contracts have recently been closed with Hibbing, Gilbert and Biwabik to furnish light and power. A transmission line from the company's power house at Virginia, Minn., is being extended to these points so that it may begin rendering service by Oct. 1, 1913.

City Light & Traction Company, Sedalia, Mo.—This company has recently constructed considerable double track and built loops and switches in Sedalia.

***Helena, Mont.**—John D. Ryan, president of the Montana Reservoir & Irrigation Company, states that he will subscribe $50,000 toward the construction of an interurban railway to Hauser Lake, provided the citizens of Helena will raise a like amount to complete the project.

Northern Ohio Traction & Light Company, Akron, Ohio.—The railroad committee of the City Council and City Solicitor Taylor, of Akron, have decided to request A. B. du Pont to formulate a new proposal for extensions of lines within Akron to be submitted to the Northern Ohio Traction & Light Company. Nothing has been done with the proposition that was offered some time ago, as the company found it objectionable in several particulars.

Poland Street Railway, Youngstown, Ohio.—Rails have been laid by this company as far south as 1 mile beyond the Poland-Youngstown township line road, on its 16-mile line to connect Poland and Youngstown, via Lansingville, Pine Hollow and Poland Heights. George E. Rose is interested. [E. R. J., Sept. 13, '13.]

Oklahoma Southern Interurban Corporation, Chickasha, Okla.—Plans are being made by this company to apply for a charter soon to build a 100-mile electric railway from Chickasha passing through the oil fields of Stevens and Carter Counties. The company will use gasoline motor cars from present indications. A. W. Thornley, Chickasha, is interested. [E. R. J., Aug. 2, '13.]

Toronto Suburban Street Railway, Toronto Junction, Ont.—The construction of this railway is being held up near Islington owing to some difficulties as to street crossing, to which the Etobicoke Council objects. A compromise is being arranged. Grading is practically completed for the greater part of the distance into Guelph, and considerable material for tracklaying has been delivered on the right-of-way from Cookville westerly, but so far no track has been laid. An extension to Erindale is planned by this company.

***Portland, Ore.**—Property owners living in the Marquam Gulch District are working for the construction of a municipal line in that section of Portland.

Portland, Eugene & Eastern Railway, Portland, Ore.—This company plans to soon rebuild a 6-mile loop in Eugene. New rails will be laid and the track ballasted.

Harrisburg (Pa.) Railways.—A contract for the reconstruction of the Dock Street bridge in Harrisburg is to be let within thirty days. Part of the cost will be assumed by the Harrisburg Railways.

Chambersburg & Shippensburg Railway, Shippensburg, Pa.—Grading has been completed and 3 miles of track have been laid between Chambersburg and Red Bridge Park by this company, which was recently chartered to build a 9-mile line between Shippensburg and Chambersburg

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It was only necessary to build from Shippensburg to Red Bridge Park. There it will join the Chambersburg, Greencastle & Waynesburg Railway tracks and use them to Memorial Square, Chambersburg, under a lease. T. M. Mahon, Chambersburg, president. [E. R. J., April 12, '13.]

Shippensburg, Newburg & Western Railway Shippensburg, Pa.—About 2½ miles of this company's line has been graded on its 13-mile line between Shippensburg, Middlespring, Newburg, McKenney and Roxbury. The company's repair shops will be located at Newburg, and it will purchase power from the Shippensburg Gas & Electric Company. It will operate four cars. Capital stock authorized, $100,000; issued, $60,300. Bonds authorized, $100,000. Paul Noftsker, Shippensburg, secretary. [E. R. J., Sept. 13, '13.]

Greenville, Spartanburg & Anderson Railway, Greenville, S. C.—About 60 per cent of the track is down, 75 per cent of the bridges are up and 98 per cent of the grading has been done on the line between Greenville and Spartanburg, according to a statement made by this company. Work is being rushed on the Enoree bridge, which is a viaduct across the stream approximately 950 ft. in length and 70 ft. in height.

Spartanburg & Glenn Springs Railroad, Spartanburg, S. C.—No definite plans have yet been decided upon by this company to build its 14-mile line between Spartanburg and Glenn Springs via Cedar Springs, Golightly and Pauline. W. F. Walker, Cedar Springs, is president, and F. H. Knox, Spartanburg, chief engineer. [E. R. J., June 1, '12.]

Chattanooga Railway & Light Company, Chattanooga, Tenn.—This company has completed its new line up the Lookout Mountain, a short distance out of Chattanooga.

Jackson Railway & Light Company, Jackson, Tenn.—Provided a franchise ordinance which is now pending in the City Council at Jackson is adopted, this company will make a number of improvements in the system, chief among which will be an extension of the line to West Jackson. S. S. Bush, Columbia Building, Louisville, Ky., manager.

Cumberland Valley Interurban Railway, Nashville, Tenn.—Preliminary surveys are under way for this company's 80-mile line between Nashville and Sparta, via Greenvale, Auburn, Liberty and Alexandria. The company has a capital stock of $10,000, all of which has been sold for organization purposes and preliminary work. J. H. Cartwright, 410 Union Bank Building, Nashville, president. [E. R. J., Sept. 20, '13.]

Nashville-Gallatin Interurban Railway, Nashville, Tenn.—Plans are being made by this company to build its line between Gallatin and Bowling Green.

Eastern Texas Traction Company, Dallas, Tex.—Preparations are being made by this company to begin laying rails at an early date. The entire grade was completed during August and pile driving for bridge work is now under way.

Blue Ridge Interurban Railway, Greenville, Tex.—At a meeting of the Greenville Chamber of Commerce held during the latter part of August it was unanimously decided to raise a $75,000 bonus to secure the extension of this company's line into Greenville. The fund is now being raised and construction is expected to start in the near future.

Texas City (Tex.) Street Railway.—This company is asked to consider plans to extend its line past the Pierce-Fordyce Oil Association refinery and thence along the bay to Virginia Point, connecting with the Galveston-Houston Interurban Railway and Galveston causeway.

Tyler City Light & Railway Company, Tyler, Tex.—Track laying has been begun by this company on its 7-mile line in Tyler. It is stated that 2 miles of this line will soon be placed in operation.

Ogden, Lewiston & Northern Railway, Ogden, Utah.—Arrangements have been completed by this company for financing the electric railway proposed between Alexander, Idaho, and Ogden, Utah. The plans embrace the erection of an 18,000-hp. power plant at some point in Idaho. Frederick W. Crockett, Logan, president. [E. R. J., May 10, '13.]

Lynchburg Traction & Light Company, Lynchburg, Va.—Work has been begun by this company on the cross-town line from Twelfth Street to Buchanan Street in Lynchburg. The company has been asked to extend its Cabell Street line to Daniles Hill.

Henrico & Chesterfield Railroad, Richmond, Va.—Plans have not yet been made by this company to resume the construction of its 3½-mile gasoline railway to Bon Air, where it will connect with the lines of the Virginia Railway & Power Company. Thomas S. Winston, Richmond, president and secretary; William C. Schmidt, vice-president. [E. R. J., May 27, '11.]

Virginia Railway & Power Company, Richmond, Va.—This company has completed and will soon place in operation its Hull Street extension from the head of Hull Street to Broad Rock Road.

Roanoke Railway & Electric Company, Roanoke, Va.—Work has been begun by this company double-tracking some of its lines in Roanoke.

Washington-Oregon Corporation, Vancouver, Wash.—This company has filed a mortgage in Olympia of $1,000,000 to secure funds to extend its lines in Olympia.

West Virginia Traction & Electric Company, Wheeling, W. Va.—Numerous improvements are being made by this company on some of its lines in Wheeling.

Chicago & Wisconsin Valley Railroad, Madison, Wis.—Work will be begun at once by this company on the section of its line between Portage and Madison.

SHOPS AND BUILDINGS

Clinton (Ia.) Street Railway.—It is reported that work has been begun by this company on its new carhouse in Clinton.

Rapid Transit Railway, Dallas, Tex.—Construction will soon be begun by this company on its new carhouses on Elm Street and Peak Street in Dallas. The structure will be 180 ft. x 155 ft. The machinery in the company's present carhouses and some additional equipment will be placed in the new building, leaving all the old carhouses for use for storage purposes only. The company has asked for permission to lay fourteen switch tracks and one cross-over track from the Peak Street lines westward into the property purchased on which the new carhouse will be built.

Texas Traction Company, Dallas, Tex.—This company has awarded a contract to E. S. Bose, Waxahachie, to build a baggage and express station on Jefferson Street in Dallas. The structure will be 50 ft. x 100 ft., one story and of brick construction. The cost is estimated to be about $12,000.

Tyler Traction Company, Clarksburg, W. Va.—This company has awarded a contract to Dayton & Francis, Martinsville, to build its new carhouse at Sistersville. The structure will be of brick, stone and cement construction.

POWER HOUSES AND SUBSTATIONS

Aurora, Elgin & Chicago Railroad, Wheaton, Ill.—During the next few weeks this company will award contracts to build an addition to its Ingalton substation and a new brick oil house. It plans to purchase two 500-hp boilers with stokers.

Houghton (Mich.) County Traction Company.—Contracts have been awarded by this company to Edward Ulseth for the entire remodeling of its substation at the carhouse in Laurium. It is understood that as soon as the necessary work can be completed the Calumet power plants of the Houghton County Traction Company and the Houghton County Electric Light Company will be centralized there.

Public Service Railway, Newark, N. J.—This company has awarded a contract to the Heddon Construction Company, Newark, to build its new substation at Burlington. The structure will be brick and stone construction. The company plans to build a new substation at Riverside. The building will be of brick and stone construction.

Citizens' Traction Company, Oil City, Pa.—Additions to the equipment at the power plant of this company at West End, which will mean an outlay of $85,000, are to be made this fall, the preliminary work to be begun at once. New automatic stokers for the boilers will be installed and two new boilers will be purchased. An order has been placed for a 1500-kw turbo-generator which will reinforce the smaller generators now in use. This addition will double the capacity of the plant. Another improvement decided upon is the placing of new panels in the switchboard at the power house.

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Manufactures and Supplies

ROLLING STOCK

Pennsylvania Equipment Company, Philadelphia, Pa., is in the market for one second-hand snow sweeper.

Brooklyn (N. Y.) Rapid Transit Company has received the approval of the Public Service Commission to obtain bids for the construction of its new type of steel subway cars described in an article on page 503 of this issue.

Chicago City (Ill.) Railway is asking for bids on 100 double-end, double-truck, closed motor cars, which will be equipped with maximum traction trucks and provide seating space for fifty-three people. The estimated weight is 38,000 lb. and the specifications provide for an all-steel underframe with the sides and roof of wood reinforced with steel.

Manhattan Bridge Three-Cent Fare Line, Brooklyn, N. Y., reported in the ELECTRIC RAILWAY JOURNAL of May 10, 1913, as having ordered six double-truck cars from the Cincinnati Car Company, has specified the following details for this equipment:

Number ordered.....six
Type of car.....semi-conv.
Prepayment type, straight fare
Seating capacity.....52
Weight (car body only), 16,000 lb.
Bolster centers, length..21 ft.
Length of body..33 ft. 2½ in.
Length over vestibule .....44 ft. 6½ in.
Width over sills.. 8 ft. 4 in.
Width over all... 8 ft. 4 in.
Height, rail to sills..30¾ in.
Height, sill to trolley base, 11 ft. 1 in.
Body.....wood and steel
Interior trim.....cherry
Headlining .....Agasote
Roof .....arch
Underframe .....steel
Air brakes.....West. D-I-F
Axles....4½-in. heat treated
Bumpers, Hedley anti-climber
Cables.....wired in conduit
Car trimmings.....bronze
Conduits and junction boxes .....steel
Control, type.....West. H-L
Couplers..Cin. Car Co. radial
Curtain fixtures..Cur. Sup. Co.
Curtain material...Pantasote
Destination signs.....Hunter
Fenders or wheelguards..H.B.
Gears and pinions.....West.
Gongs .....Dayton
Hand brakes.....Peacock
Heaters .....Consolidated
Headlights .....Dayton
Journal boxes....Symington
Motors, type and number, 2 West. interpole outside-hung
Paint .....Sherwin-Williams
Registers .....International
Sanders .....Cin. Car Co.
Sash fixtures....Cin. Car Co.
Seats....Walkover, H. & K.
Seating material.....rattan
Springs..Standard Steel Co.
Step treads....Mason safety
Trolley catchers.....Lord
Trolley base..Nutall No. 13
Trucks....Baldwin Max. Tr.
Varnish ..Sherwin-Williams
Ventilators, Hartley & Goodwin
Special devices, conductor's emergency valve, Pullman drop brake handle.

TRADE NOTES

Buckeye Engine Company, Salem, Ohio, has appointed Herbert E. Stone, 63 Equitable Building, Boston, district sales agent for New England.

Stow Manufacturing Company, Binghamton, N. Y., has elected D. Walker Wear vice-president and director of this company. Mr. Wear was formerly purchaser of the Chicago Tunnel Company.

American Carbon & Battery Company, East St. Louis, Ill., has consolidated its office at St. Louis with its factory at East St. Louis, Ill., to which address all communications should be sent after Oct. 1, 1913.

Vacuum Car Ventilating Company, Chicago, Ill., has received an order from the Chicago City Railway for a sufficient number of ventilators to equip 125 near-side cars with the Cook system of car ventilation.

Frank S. Pritchard, Cincinnati, Ohio, formerly with the United States Graphite Company, has become associated with the Dearborn Chemical Company at Cincinnati, as assistant to Dan Delaney, for many years manager of its Cincinnati office.

Railway Utility Company, Chicago, Ill., has received an order to equip with ventilators the 200 new cars which are being built by the Chicago (Ill.) Railways and to install utility electric thermometer heating control in eighty cars which are now undergoing reconstruction in its shops.

Automatic Ventilator Company, New York, N. Y., has become general distributor for the Worcester Brush & Scraper Company's detachable broom for track and general purposes, and will exhibit this broom at the convention of the American Electric Railway Association in Atlantic City.

Union Switch & Signal Company, Swissvale, Pa., has received an order from the Illinois Traction System for complete signal equipment sufficient to equip its line between Springfield and Virden, Ill., a distance of 24 miles. The forty-nine style B semaphore signals required for this installation will form a part of the complete protection outlined by this company for its line between Springfield and St. Louis, a large portion of which already is protected. Work already has been started on the foundations and overhead lines and it is anticipated that the signals will be in operation before the end of the year.

ADVERTISING LITERATURE

Baldwin Locomotive Company, Philadelphia, Pa., has issued a catalog commemorating the completion, after eighty-two years of operation, of its forty-thousandth locomotive.

Chicago Pneumatic Tool Company, Chicago, Ill., has issued Bulletin No. 148, describing and illustrating its valveless hand drills and portable gasoline-engine-driven air compressors.

Trussed Concrete Steel Company, Detroit, Mich., has issued a well-illustrated catalog, describing the following kinds of steel sashes and window equipment manufactured by it: sidewall sashes with pivoted or sliding ventilators; continuous sashes, center pivoted or top hung, for monitor and sawtooth roof construction; hinged and sliding doors; metal and glass partitions; casement sashes and special sashes.

Sanford Riley Stoker Company, Ltd., Worcester, Mass., has published a circular in regard to its new self-heating underfeed stoker, which is of the inclined type, that is, the fuel supply is forced up from beneath the point where the air is admitted and then is worked along toward the bridge wall. Instead of stationary dead plates, the Riley Stoker has moving, air-supplying grates, carried by the reciprocating sides of the retorts, and also moving overfeed grates, extending across the entire width of the stoker. Beyond these are pushers for continuously dumping the refuse. The travel of these reciprocating parts is adjustable so as to control completely the movement of the fuel bed and dumping of refuse.

NEW PUBLICATIONS

Safety. By William H. Tolman, Ph. D., director of the American Museum of Safety, and Leonard B. Kendall. New York: Harper & Brothers. 422 pages. Price, $3.

This handbook, which is said to be the only comprehensive work on safety that has yet appeared in the English language, contains practical information for industrialists showing how large economical saving in industries can be made by surrounding workers with adequate safeguards and by promoting shop hygiene. The book proves by examples taken from many sources the correctness of the author's contention that 50 per cent of industrial accidents are preventable. The book is fully illustrated with photographs of safety devices and methods used in various shops and plants. As director of the American Museum of Safety and as delegate to various international committees, the author has had unusual opportunity to study the subject.

Accident Prevention, Safety First. By James B. Douglas. United Gas Improvement Company, Philadelphia, Pa. 111 pages. Price, 75 cents.

The subject matter of this little book is an amplified revision of an illustrated talk on "Accident Prevention in Certain Public Utilities," presented at the public policy meeting of the thirty-sixth annual convention of the National Electric Light Association, Chicago, June 4, 1913. Emphasizing the great importance of the work of accident prevention from an economical as well as a humanitarian viewpoint, the writer clearly describes, by means of a series of illustrations secured from widely scattered sources in the industrial field, cases of preventable accidents resulting from three causes—use of a wrong method by a workman, carelessness by the workman of his own safety and that of his fellow employees, and defective or unguarded machinery.

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THE CONVENTION ISSUE

For twenty-six years the ELECTRIC RAILWAY JOURNAL has published a special issue just prior to the annual electric railway convention. When this plan was begun the association met at a different city each year, and the pre-convention issue contained a description of the transportation system in that city so as to aid the visiting delegates in their inspection of it. Lately, as the association has found it more convenient to meet in the same place from year to year, the subject discussed has been some topic of special interest at the time. This year it has been considered desirable to summarize the progress made in different departments of electric railway operation during the past few years. In our issues from week to week we have described different installations, but in the present issue an attempt has been made to eliminate the effect of local conditions in each installation and thus leave only the broad underlying principles which point to the direction in which progress is being made. It has been impossible, of course, to include a discussion on all of the departments of electric railway practice or to refer even in those selected for treatment to interesting work done by all companies, but enough have been considered, we believe, to give a good bird's-eye view of the development in the industry. This issue is being mailed to subscribers more than a week in advance of the opening of the convention so that they will receive it at their home address before they leave for Atlantic City.

THE UPKEEP OF BRIDGES BY ELECTRIC LINES

The article in this issue entitled "Bridges of the Connecticut Company" brings out two very important differences in the bridge practice of steam and electric railways. The steam railroad owns practically all of the bridges, viaducts and similar structures on its right-of-way, and in designing them it usually makes ample allowance for the probable increase of axle loading, higher speed and the like. The electric railway is obliged to operate chiefly over bridges built by the local municipalities for all kinds of traffic, and even its own bridges are likely to become antiquated sooner than steam railroad bridges because of faster and more radical changes in electric railway standards and operation. In taking over the care of the way structures used by the original companies the Connecticut Company found that many of the bridges were inadequate to carry modern car equipment. In fact, some of the highway bridges had never been designed for electric railway service at all. The rehabilitation and partial replacement of these structures, numbering nearly 400, constitute one of the most extensive improvements ever known in electric railway engineering. But the methods of inspection and the character of the engineers' recommendations are more important to other electric railways than the mere size of the task. These are now available in an article published in this issue, which includes, besides an account of the work, a series of loading diagrams which should help the maintenance-of-way engineers on other roads to keep a better check on this most vital feature of their work.

THE NEW BERLIN CARHOUSES

The article on the new carhouses in Berlin published elsewhere in this issue will serve to call attention to striking engineering and political differences from American conditions. So far as engineering features are concerned, it may be said with perfect frankness that in the United States it is not considered best practice to build non-sprinkler carhouses with exposed roof trusses and without fireproof partitions. No recent American carhouse has anything like 200 cars stored as one risk. Instead of the American limitation of 20,000 sq. ft., which in one instance was granted by the fire underwriters for the minimum rate, the Berlin carhouses actually have open areas as great as 76,855 sq. ft. The explanation of this construction is to be found in the better discipline of employees which naturally obtains in a country where former soldiers receive the preference in railway employment. In Germany a carhouse fire from such a fertile cause as negligent accumulation of rubbish and oily waste is almost inconceivable. One may say that what these carhouses lack in fire-restricting construction appears to be balanced by closer superintendence of fire-breeding conditions. Furthermore, this superintendence is greatly aided by the liberal natural lighting of the buildings, which would make any neglect visible at once, and by the care given to the fire-fighting equipment. The utilities rooms include a substation, but all the transportation business is conducted in a nearby building, in which living apartments are also provided for the families of the carhouse supervisor and other petty officers.

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MAYOR JOST'S FRANCHISE

Arduous and prolonged labors on the part of Mayor Jost of Kansas City and representatives of the Metropolitan Street Railway have culminated in a revised franchise that is soon to be submitted to the Kansas City Council for approval. As it now stands, the franchise is essentially a Jost instrument. Almost every disputed point that has arisen in the several conferences has been settled practically in accordance with the views of the Mayor and his advisers.

It is contended by Mayor Jost and his representatives that the revised instrument is the last word in franchise making, and from the viewpoint that every possible advantage to the administration has been gained without any substantial concessions to the company, this is true. The main sections, providing for the control of the company, the reduction of debt by application of the company's surplus earnings, the option to buy the property out of surplus, to reduce fares or to make extensions, and then, too, the requirement that the company must provide good service and extensions without making the purchase an impossibility—all of these compose a franchise which from the city's point of view is an advance over the previous one. These points are only a few of the evidences that a casual reader will find indicating that the main object of the draft is to extract every ounce of benefit for the city and leave the company merely to raise money for the refinancing with greatly reduced authority in the management of the property.

One of the most interesting sections of the new ordinance is that which deals with the method of control of the company. The position of general manager is to be abolished and the conduct of the business is placed in the hands of two members, one named by the company and one by the Mayor. Any differences between these two are to be submitted to and summarily determined by a third person selected as an arbiter by the Kansas City Court of Appeals. There will be a board of eleven directors, three for Kansas City, Mo., two for Kansas City, Kan., and six for the company. The board of control has the ordinary administrative duties and powers, but in matters of extensions, new lines, re-routing and schedules its action must be approved by a majority of the three Kansas City, Mo., directors. Inasmuch as it is evident that under the State law and city charter the City Council has the supervision of these points, in reality the board of control and the directors are only advisory to the Council and the latter has the determinative word in regard to extensions and impovements to be made within a given time.

Under the terms of the proposed franchise the city virtually guarantees the company a return of 6 per cent on the capital value of $30,000,000. The surplus earnings up to $7,500,000 are to be expended for extensions and betterments before any division is made between the city and the company, by which time the actual physical value of the property will be equal to the capital value. After this the surplus earnings are to be divided one-third to the company and two-thirds to the city. When the city has reduced the capital value to half the physical value, it may take over the property. It was insisted by the city, however, that its portion of the surplus should be applicable to the reduction of fares and the making of extensions as well as to amortizing the debt of the company. This provision places it within the power of the people at a special election to hasten the time of municipal ownership or else open up new city districts and lower the fares. If the city's surplus is used for extensions, however, city ownership is deferred only through this use of money that might be applied to capital reduction, for none of such extensions is to increase the capital value on which the company draws interest.

The forfeiture clause in the proposed ordinance, while not so severe as some others, is sufficiently formidable. The city officials happily realized that a forfeiture clause driving the company from the streets and depriving the public of its service was equivalent to no forfeiture at all, and yet they desired an effective remedy that would not amount to confiscation of the investment of an innocent stockholder or bondholder because of an error of judgment on the part of the management of the company. As finally decided upon, the sequestration or tying up of the company's money, pending court action in regard to some delinquency, serves to inflict a penalty at once instead of waiting for the result of several years' litigation. This places the entire incubus on the company, for the city, if action against the company is found unjustifiable, suffers nothing except the release of the company's accrued earnings.

One praiseworthy move on the part of the conferees is the introduction of consistency into the relations between the Metropolitan system and interurban lines entering the city. Heretofore some interurban lines have desired the city company to operate their cars, to be responsible for them within the city limits and to take the greater proportion of the fare and pay damage suits. Other lines desired to operate their cars themselves and to be responsible accordingly. Under the proposed arrangement all responsibility is placed on the shoulders of the Metropolitan company and the board of control governs the routings, fares and transfers of the entering lines and may make rulings concerning the intrusion of local passengers on through cars. The general result of this settlement is a classification and standardization of existing practices, and it should be the means of encouraging interurban traffic.

The prime consideration of the proposed franchise, according to a special clause inserted by the revisers, is first-class modern service, and to this all other considerations are to be sacrificed if sacrifice becomes necessary. Not even the 6 per cent guarantee to the company, its right to participate in the surplus earnings or the city's right to share therein is to be of prior moment. This promise, when considered in connection with the minimum of 16 per cent fixed for maintenance, repairs and depreciation and the definite amounts agreed upon to be raised and spent for improvements each year from 1914 to 1943, ought to appease those who have been bewailing the lack of service. The struggle, however, is by no means over. Complications are liable to arise through the declaration of the local council of labor unions that all members will be instructed to vote against the franchise unless the Metropolitan agrees to recognize the unions. The revised plan has yet to be approved by representatives of the bankers, bondholders and

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stockholders, by the Council, the Public Service Commission, Judge Hook of the Court of Appeals and the voters. Moreover, the entire question has yet to be settled with the Council and voters of Kansas City, Kan. Whether this ordinance will ultimately run the gauntlet more successfully than did the 1909 franchise remains to to seen, but it is quite apparent that its path will be a rocky one.

PROGRESS IN ELECTRIC RAILWAY OPERATION

That statistics may be made to prove nearly anything desired by the compiler is unfortunately true in a good many cases. Yet it cannot be denied that a summary of past results is invariably productive of a great deal of valuable information, and in the Convention Section of this issue the outline of progress in different branches of the electric railway field gives definite expression to tendencies of which the existence has been largely a matter of surmise. In the chapter on track construction the practically universal use of concrete is obvious, as might be expected, for out of a list of twenty representative cities of which track sections are shown there is only one, Houston, that does not utilize it in some manner in the construction of the permanent way, and even in this city part of the track is laid upon a solid concrete foundation.

Of the twenty roads, however, ten use concrete above the tie or prevent it from extending below the lower edge so that the support is really afforded by the ballast which is tamped underneath. Here is, indeed, a demonstration of the fact that concrete is regarded fully as much for its ability to support the paving and waterproof the foundation and thus limit the frost damage to the track alignment as for its ballasting qualities. Only six of the remaining ten roads use concrete below the tie as a standard construction, two using both forms of construction, one using either an all-concrete or an all-gravel construction and one using a steel tie under which no tamping is done.

In the chapter on power generation and distribution the keynote is the evidence that great changes in substation equipment are under way, taking the form of remarkable decreases in the sizes of rotary converters. Substation equipment has been, of course, the weak point in the chain of power supply. Decreased size and cost for the same output and improved design for rotaries constitute steps which have been needed badly, but it is by no means certain that the improvements have not arrived too late, as the mercury-arc rectifier is looming up to-day as a possible rival. The growing use of a frequency of sixty cycles for primary power, as pointed out in this chapter, will cause an increase in purchased current, for with the commercial development of the commutating-pole rotary the gap has been bridged between the sixty-cycle lighting plants and the railway substation, heretofore operating almost exclusively on twenty-five cycles. In this chapter the latest published figures on storage battery operation are of interest, as they indicate the difficulty of getting cheap power out of a large floating battery.

In the matter of city car design the spectacular center-entrance cars of the year 1912 have left a mark, but the majority of the cars ordered during 1913 have been of the end-entrance type, and the use of steel in the construction and the arrangement of prepayment platforms have again come to the front as features of paramount interest. The composite designs of steel and wood appear to be losing ground, and as no composite design has been of exceptionally low weight this would seem to be eminently logical, weight being considered to-day of vital importance.

In repair shop practice the evident trend is toward a departmental organization, for in practically every reference cited in the chapter on this subject the elimination of the general repair shop and all-around workman is indicated. Even in the reorganization of old properties the feeling is strongly evidenced that much can be gained by localizing all work of a certain character so that specialists may be developed and expert supervision concentrated. This seems to be as far as any electric railway wishes to go into the comparatively recent and possibly dangerous doctrines of efficiency engineering. Indeed, an excess of system is apparently not considered desirable anywhere, as indicated in the chapter on fare accounting.

The chapter on the transportation of freight demonstrates the fact that but few electric railways are making the most of their opportunities in this line of business. There are, it is true, several obstacles opposed to the building up of a profitable freight department, prominent among which is the incomprehensible objection of many communities to the hauling of freight over the city tracks even at night. Yet the fact that a number of roads have succeeded in building up a highly remunerative freight and express business is an indication of the possibilities for others, the field lying rather in quick deliveries and high rates than in bulk freight hauled in trains.

The subject of automatic block signaling is one which is so new in the electric railway field and at the same time is so constantly being affected by improvements that an outline of past installations which were of importance in the development is quite likely to have to be rewritten at any time. But it is possible to-day to divide existing methods of signaling into seven different forms, of which one is a dispatcher's signal, four are of the trolley contact type and two are controlled by continuous track circuits, one using the so-called preliminaries and one eliminating them. In one way the presence of such widely different schemes is a distinct advantage as it affords an opportunity for the selection of a system in accordance with the traffic requirements, the cost ranging all the way from $200 per mile up to $2,000.

In the chapter on self-propelled cars the most striking point is afforded by the diverse lines of development which have been taken by the storage battery car here and abroad. In Germany almost all long-distance operation is carried out with accumulator cars, while in the United States gasoline and gas-electric cars are most common for steam railroad conditions. This may be largely accounted for by the fact that in a densely settled country like Germany sources of energy for charging the cars are usually within moderate distances of one another so that the batteries are of reasonable capacity. In this country, however, power supplies are scarce in most of the sparsely settled territories where self-propelled cars are desired. Consequently, American storage battery cars have found their widest application in or near cities, and by far the greater number are small enough for possible one-man operation.

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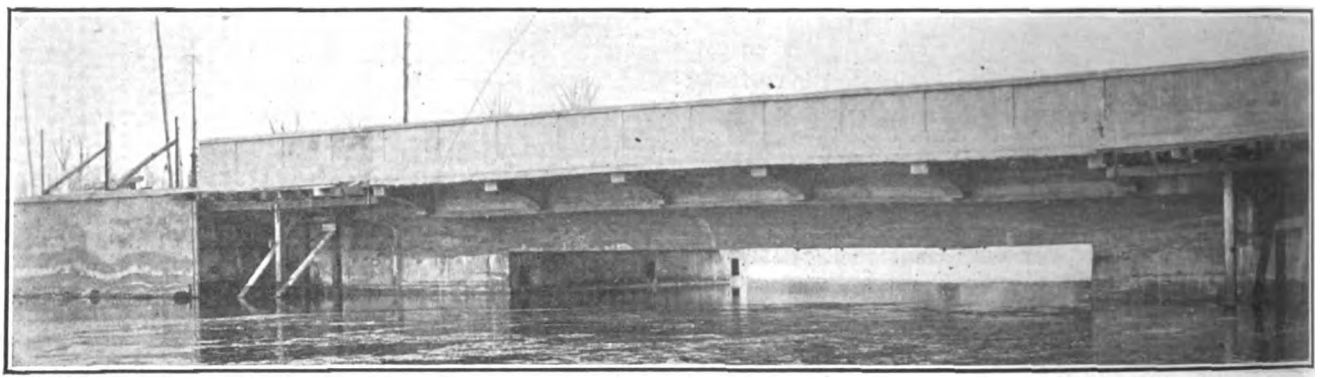
Bridges of the Connecticut Company

Views and Brief Descriptions of a Number of Bridge Structures Are Presented, Together with an Account of an Extended Bridge Investigation Which Includes Approximate Methods of Determining Loading

The Connecticut Company now maintains 397 bridges, arches and like structures of 10-ft. span or more. Some of these structures are the property of the company, but others are highway bridges which are maintained jointly with the municipality as provided by statute. The variety of these structures on a single division will appear from the following partial record of the New Haven division:



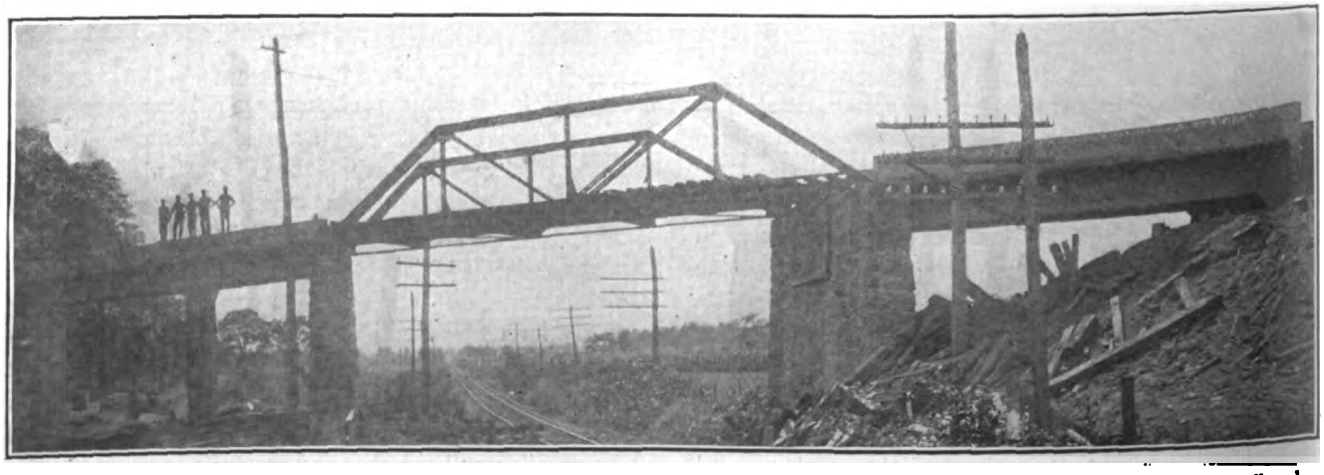
Connecticut Way—Reinforced Concrete Bridge with Cantilevered Sides Built Across Lake Whitney, New Haven, Without Disturbing the Abutments of the Original Bridge

Partial Record of Bridges Maintained on New Haven Division No. 2

Name or Location	Length	Type
416—East Chapel Street, Belle Dock Branch Railroad.	52 ft. 0 in.	Pony plate girders—highway.
417—Chapel Street, over railroad cut.	Three-span	Three centered reinforced concrete arches—highway.
418—Water Street, over railroad.	166 ft. 6 in.	Through-pin subdivided Pratt truss—highway.
419—Forbes Avenue, over Mill River.	539 ft. 0 in.	Draw; pin-connected through Whipple truss—highway.
420—Oyster River.	33 ft. 6 in.	20-in. I-beams—railway.
423—Kimberly Avenue, over West River, draw.	193 ft. 0 in.	Draw; two-leaf rolling lift—highway.
424—Kimberly Avenue, over West River.	75 ft. 4 in.	Three-bay trestle with concrete abutments—highway.
425—Howard and Kimberly Avenues.	67 ft. 0 in.	54-in. and 36-in. deck girders, two spans, 100-ft. highway.
429—Derby Avenue, over outlet of Maltby Lakes.	10 ft. 0 in.	Semicircular rubble arch—highway.
432—Whalley Avenue, over Rifle Range Brook.	13 ft. 1 in.	Stone-arch culvert—highway.

It will be noted from the foregoing list that each structure has a number in the 400's, in accordance with the company's method of reserving an even 100 to designate the bridges, arches, viaducts, etc., of each division.

In most cases the highway bridges are designed by the municipalities, their work being subject to the company's approval on engineering considerations only. So far as the Connecticut Company's bridges are concerned, many of its I-beam structures have been replaced with reinforced concrete slabs, the reinforcement consisting either of old rails or plain rods. For culverts concrete is used up to 6-ft. spans. Reinforced concrete and the American Ingot Iron Company's malleable-iron culverts are also employed. No attempt has been made to standardize bridges, one reason being that quite a number are old steam railroad structures assigned to the Connecticut Company by the New Haven Railroad and of more than ample strength for electric railway service. However, the form of floor shown in an accompanying drawing is standard for any deck or through bridge with open-floor construction. The ties are spaced 16 in. on centers.



Connecticut Way—New Concrete Approaches Which Replace Timber at Crossing Over Central Vermont Railroad Between Norwich and Willimantic

On all new non-highway bridges and also on some of the older ones railed walks have been provided for the use of trackmen and for the convenience of passengers in stalled cars. These footpaths also eliminate accidents to pedestrians. Conspicuous warning signs are erected so that trespassers who cross the bridge do so knowingly at their own risk. The approaches also have cattle guards.

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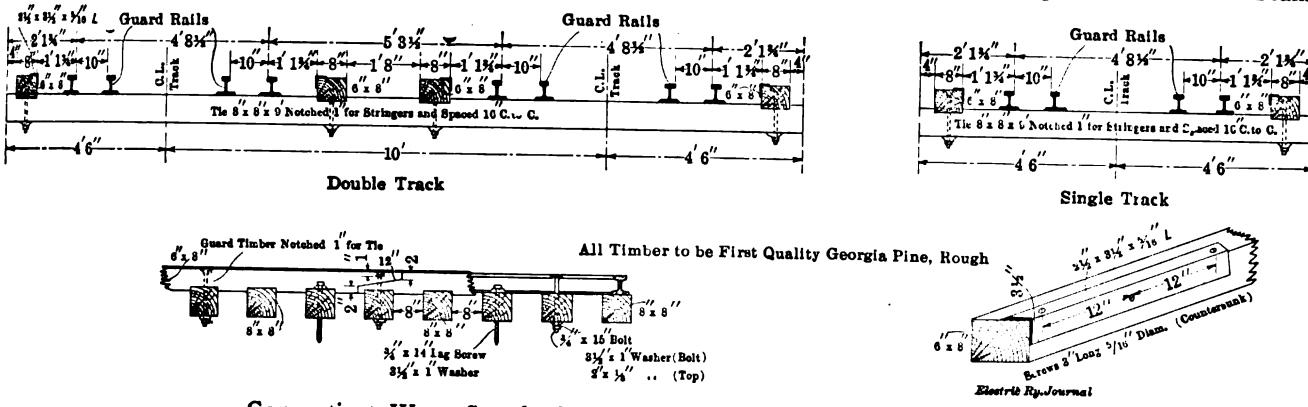
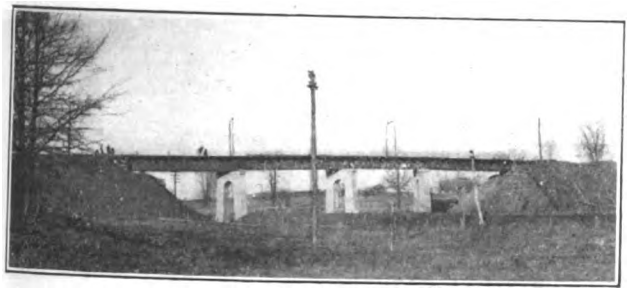
The illustrations of a four-span (53 ft.-55 ft.-41 ft.-45 ft.) bridge over a brook and the tracks of the Central New England Railroad show a structure where the walkway on each side of the bridge is carried on the extended third ties. Another bridge with railroad walks is the three-span (75 ft.-150 ft.-75 ft.) bridge located at Stafford Springs over the Central Vermont Railway tracks on the Rockville-Stafford Springs division. This bridge, which was built in 1907, has concrete abutments and piers. Other illustrations show locations where bridges have been rebuilt, enlarged or strengthened. The view on page 638 shows a new bridge built over Lake Whitney, New Haven, of which the old abutments were retained. The change consisted in the replacement of a through-plate girder with a concrete girder and the flaring out of the deck to obtain a wider floor. The cars are run directly over the abutments while pedestrian and highway traffic is carried on the cantilevers. The installation of a new floor jointly by the city and the company in the bridge at Norwich is illustrated on page 640. This bridge is of the lenticular truss type, 144 ft. long over all. Both the stringers and the floor beams were renewed. The floor of this bridge is paved with asphalt.

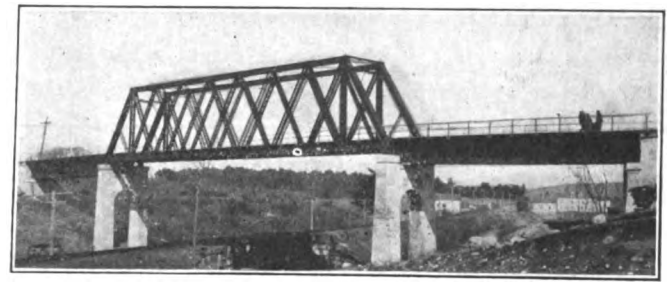


Connecticut Way—Standard Floor System for Bridges and Trestles

The bridges are maintained entirely from the office of the civil engineer. At this date no regular inspection periods have been fixed owing to the recent general overhauling of all bridges as hereinafter mentioned. Bridge work is let by contract on a cost plus percentage basis almost entirely. It is carried out by the company's forces only when items like timber work, etc., can be handled by local shop forces.

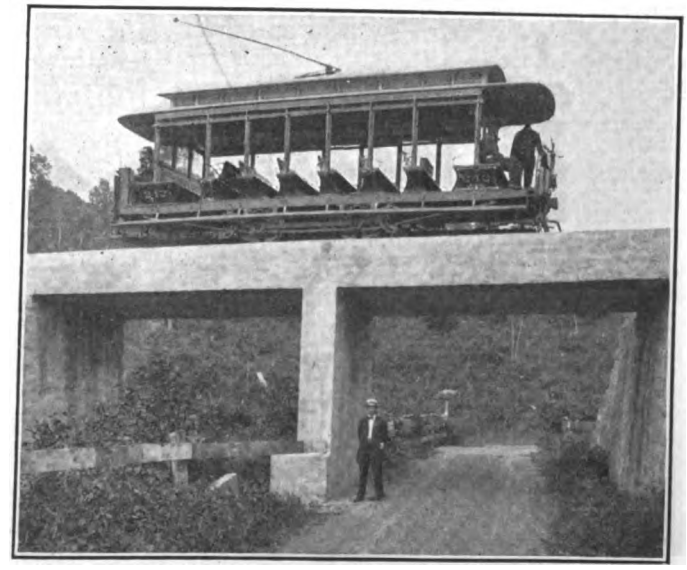


Connecticut Way—Four-Span Bridge with Walk Carried on Extended Third Ties on Each Side of the Bridge



Connecticut Way—Footpath Bridge Over Central Vermont Tracks at Stafford Springs

Connecticut Way—Old Highway and Brook Crossing North of Ayer's Gap Between Norwich and Willimantic



Connecticut Way—The New Reinforced Concrete Crossing Which Has Replaced Old Structure North of Ayer's Gap

BRIDGE RECORDS

The history of each bridge is kept in a numbered loose-leaf book giving the location, type, length, substructure,

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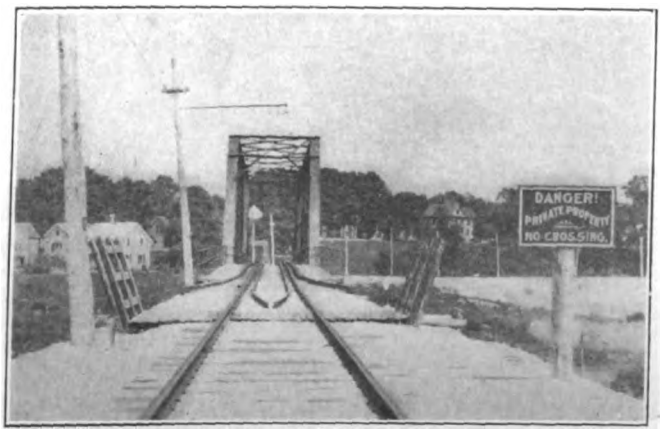
clear spans, number of spans, etc., with sketches referring to particular features. Primarily these records are based upon an extended inspection of all bridge structures which was made in 1907 and 1908 by Herbert C. Keith, a bridge expert of New York. When Mr. Keith made the preliminary inspection the bridges were divided into several classes as follows: those requiring immediate attention, those to receive attention soon, those where changes were desirable and those which required change only to enable them to carry heavier cars. The company's intention was that old bridges should be rebuilt and that new bridges should be erected for a maximum concentrated live load of 50 tons on two trucks of 5-ft. wheelbase placed 25-ft. centers. The company's standard car weights are 50 tons, 36.4 tons, 26 tons and 18.3 tons, the last for a single-truck car of 6-ft. 6-in. wheelbase.

The preliminary report was followed by more detailed reports of each location, giving the data on which the

Connecticut Way—Concrete Girder and Slab-Paneled Side Bridge Which Replaced Pratt Truss and Trestle Structure Between New Haven and Cheshire

condensed loose-leaf record book was based, except that the original reports also contained remarks and recommendations. Next a detailed report on each bridge was made upon which the investigator showed the ratio of the stresses produced by the four standard weights of cars as compared with the standards of the Massachusetts Railroad Commissioners. Detailed computations were made for the lighter cars only when the heavier cars would cause unit stresses greater than would be permitted by the Massachusetts specification.

As a result of the "immediate attention" report, many repairs were made before the detailed reports were received. Beginning with the autumn of 1911, another in-



Connecticut Way—Standard Bridge Approach, Showing Cattle Guard, Warning Sign, Footpaths, Etc.

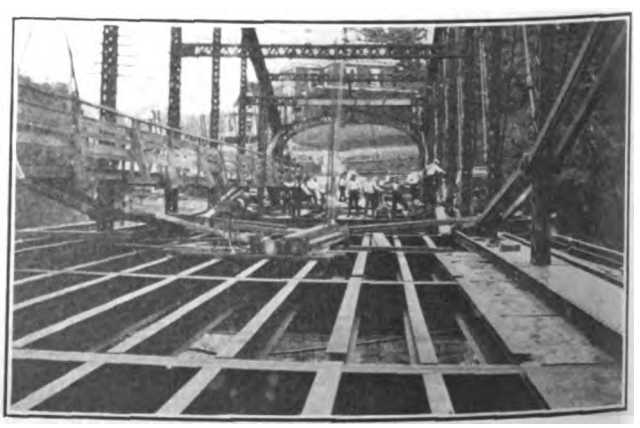
spection was made by Mr. Keith to cover only the more complex structures and those which apparently were not absolutely satisfactory for the heaviest loadings. This report eliminated the simpler structures which had already been recorded. It also eliminated those structures that were known to be satisfactory for the maximum loading. The middle class included somewhere from seventy-five to 100 bridges. On these a final report was made in which the ratios were worked out not for each weight of car but for the maximum permissible weight of a car with the same wheelbase as the standard car of the Massachusetts Railroad Commission, which weighs 50 tons and differs from

Connecticut Way—Three-Span Bridge Over Central Vermont Tracks and Willimantic River at Stafford Springs

the Connecticut Company's car only in having a truck center distance of 20 ft. instead of 25 ft.

METHOD OF INSPECTION

The course followed by the consulting bridge engineer of the Connecticut Company will best be understood by citing two typical structures in the Waterbury district, one being No. 1004, a straight railway bridge, and the other No. 1025, a highway bridge. In 1908 Mr. Keith presented a report on the bridges of the Waterbury district under the classification of "immediate attention," "soon" and "desirable," and noting that the bridges were intended for 36.4-ton and 50-ton cars. The list was accompanied by a series of sheets giving the type, substructure, superstructure,



Connecticut Way—Rebuilding the Floor of Laurel Hill Bridge, Norwich

floor and other details of each bridge with recommendations as to immediate changes to fit the bridge for desired weights of cars. Reports of the two bridges selected, one of straight railway and the other of highway type, are given on the opposite page. The second report, made in 1911, is also presented.

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FIRST REPORT ON BRIDGE NO. 1004. 1908

LOCATION

Over Northampton division New York, New Haven & Hartford Railroad and driveway and brook, one-half mile west of Scott's Junction, in town of Cheshire. Pole C-315. No. 1004.

TYPE

Two spans deck girders. Railway. One track. Right ahead, 3:10.

CLEAR SPAN

Two at 58 ft. 4 in.

LENGTH

Two at 62 ft., set 2 in. open at center = 124 ft. 2 in.

SUBSTRUCTURE

Concrete abutments and pier. Abutments built for double track except parapets; pier for single track. Good.

SUPERSTRUCTURE

Girders, 6-ft. o.c.; 54-in. webs; eleven panels top and bottom laterals, staggered; sway frames at each end and third panel points. Scant provision for expansion in setting the stone bolts; girders would fit the masonry better if 2 in. or 3 in. further west (up hill). A little sandy gravel on bridge seats has caused paint to be rusted off somewhat from bottom of girders; not bad yet.

FLOOR

Hard-pine ties, 6-in. x 8-in., planed, with bolts through flange angles of girders; Good. Hard-pine guard timbers, 6-in. x 8-in., planed, lined with angles; Good. Inside guard rails. Sidewalks of 2-in. hard-pine planking from guard timbers to tight board fences 5 ft. high, 14 ft. 10 in. apart: Good.

REMARKS AND RECOMMENDATIONS

Clean dirt from bridge seats.

FIRST REPORT ON BRIDGE NO. 1025. 1908

LOCATION

Bank Street over Naugatuck River at Waterbury. No. 1025.

TYPE

Through lenticular pin truss with outside sidewalks. 50-ft. highway. One track, 1 in. to 2 in. west of center line bridge. Left ahead, 2:10.

CLEAR SPAN

169 ft. 6 in.

LENGTH

172 ft. 9½ in.

SUBSTRUCTURE

Boulder rubble in mortar. Mortar gone from joints for small area in east abutment. Otherwise Good.

SUPERSTRUCTURE

(This part of original report described the construction of the bridge.) End posts at both ends S. truss and W. end N. truss have lost about 1/16 in. thickness from cover plate and outer web; W. end S. truss has L broken from inner web for 1 ft. length about 3 ft. above floor; L 4 and L 5 at W. end S. truss more than 1/16 in. lost from outside pin plate; at L 5 E. and S. truss loop hanger for floor beam has lost 1/16 in. on top (over pin). Floor beams and stringers show surface rust and paint is nearly all gone, but no depth of corrosion.

FLOOR

No special support for track, but rails rest on 5-in. x 8-in. hard-pine timbers laid transversely from center to each curb, 20 in. o.c., these timbers being laid flat and cut down to 3¼ in. thick for the rails. On these timbers is laid a floor of 3-in. hard-pine plank, laid longitudinally for 8 ft. width at track and diagonally outside of this strip; Good. Sidewalk planking 2 in. on five stringers, 2 in. x 12 in. No guards.

REMARKS AND RECOMMENDATIONS

I-beams for stringers are extremely light for carrying the track, also very shallow for the span, causing excessive deflection. Should be strengthened. (Apparently rest of bridge much larger capacity, but this can be determined only by calculation).

REPORT ON BRIDGE NO. 1004. 1911

LOCATION

Over Northampton division, New York, New Haven & Hartford Railroad, one-half mile west of Scott's Junction, in town of Cheshire. No. 1004.

TYPE

Two spans deck girders. Railway. One track, within ½ in. o.c., with girders. Right ahead, 3:10. Level: steep up grade east of 250 ft. or 300 ft. from bridge.

CLEAR SPAN

Two at 58 ft. 4 in.

LENGTH

Two at 62 ft., set 2 in. open at pier = 124 ft. 2 in.

SUBSTRUCTURE

Abutments and pier of concrete. Condition, Good, except surface scaled in few spots, especially lower part of pier. Base at rail, 29 ft. 11 in. to passway. Base of rail, 34 ft. to brook, 1½ ft. deep. Base of rail, 27 ft. 4 in. to base of low rail (4-ft. elevation). New York, New Haven & Hartford Railroad has 5-in. rails. Switch to turnout for double track, 129 ft. west of bridge.

SUPERSTRUCTURE

54-in. plate girders, 6-ft. o.c., with eleven panels of top laterals, eleven panels of bottom laterals, and four sway frames in each span. Condition, Good, except not quite perfect bearings of shoes on masonry at east abutment for north girder, and pier for south girders of both spans. Slight rust through paint. Strength, *ample* for 50-ton car; permits 88-ton car.

FLOOR

Ties: 8-in. x 6-in. x 9-ft. 1-in. hard pine, 14-in. o.c., not dapped, hook-bolted through outer top flange angle of girders at third ties; eight ties Poor (five together over railroad track). Guard timbers: 8-in. x 6-in. hard pine, dapped to 5 in., bolted to third ties, and lined with 2½-in. x 6-in. angles. 30 per cent Poor. 4-in. guard rails 8 in. from 5⅛-in. main rails, spiked to every tie, and well spliced on bridge and to east but west of bridge only two bolts in 6-bolt splices. Ends brought together at center line without point blocks, at 43 ft. east and 159 ft. west of bridge. West of bridge, ballast filled in to top of guard rails. Fences: At 7 ft. 5 in. each side of center-line track is tight board fence, from 6 in. to 5 ft. above base of rail, with posts and braces 7 ft. o.c. on sidewalk timber; Good. Planking: Between guard timbers and fence on each side is a 2-in. plank walk carried by 6-in x 6-in. x 8-ft. 10-in timbers between ties, from 1 ft. 4 in. to 10 ft. 2 in. from center line. These timbers hooked under guard rails, and bolted to guard timbers.

REMARKS AND RECOMMENDATIONS

Renew rotten ties (at least the five over railroad).

REPORT ON BRIDGE NO. 1025. 1911

LOCATION

Bank Street over Naugatuck River at Waterbury, No. 1025.

TYPE

Through pin-connected lenticular trusses. 49 ft. highway. One track, varying ⅝ in. to 1⅞ in. east of center line between trusses. Left ahead, 0.18:1. Steep down grade south from bridge for 200 ft., slight down grade, north from bridge for 100 ft. 70-deg. ± curve to east from 19 ft. to 46 ft. south of bridge, thence tangent for 98 ft., and thence 33 ft. radius curve to west for 23 ft. 50-deg. ± curve to west for 28 ft. north of bridge.

CLEAR SPAN

169 ft. 6 in.

LENGTH

174 ft. 4 in.

SUBSTRUCTURE

Abutments of field-stone rubble (large stone) laid in mortar. Sewer passes through each abutment just above water level. Condition, Good. Base of rail, 17 ft. 6 in. to water 3 ft. deep. Midland and Naugatuck division New York, New Haven & Hartford Railroad cross overhead 235 ± ft. south of bridge. Switch and frog for double track at 28 ft. and 68 ft. north of bridge (center line of double track ranges to and tangential with center line single track at switch. Tracks 10 ft. 0 in. o.c.).

SUPERSTRUCTURE

(This part of original report described the construction of the bridge.) Condition: End posts of trusses have lost about 1/16 in. from thickness of cover and outer web, at both ends of east truss and south end of west truss, at and just above sidewalk. South end post of east truss has angle broken away from inner web, probably by hub of wheel. Slight loss from some other members of trusses. Six floor beams nearest mid-span have lost 1/16 in. thickness from horizontal legs of top flange angles. Stringers at track nearly full section. Strength: Stringers *not permissible* for 50-ton car, permits 40-ton car; floor beams, *not permissible* for 50-ton car and 100 lb. per sq. ft. on roadway and sidewalk; permits 38-ton car and 100 lb. per sq. ft., *permissible* for 50-ton car alone, permits 53-ton car alone; trusses, *not permissible* for 50-ton car, and 100 lb. per sq. ft. on roadway and sidewalk, permits 46-ton car and 100 lb. sq. ft.; *ample* for 50-ton car alone, permits 128-ton car alone.

FLOOR

Ties: 8 in. x 5 in. to 9 in. x 5 in. hard-pine cross timbers, from channel stringer at center line to truss each side, resting on all intermediate stringers. 19 in. ± o. c., and dapped on top to 4 in. for rails. Generally Good, but some decay. Guard timbers: None. Guard rails: None; lip guard on west rail for 7 ft. on bridge at north end and thence north to switch. Planking: At track, 3 in. hard-pine planking laid longitudinally. For highway each side, 3 in. hard-pine planking laid at 45 deg. Sidewalks have 2 in. hard-pine planking laid transversely on five stringers of 2-in. x 12-in. spruce.

REMARKS AND RECOMMENDATIONS

Limit load to 40-ton car, or strengthen bridge.

The reports were accompanied by an analysis of conditions in each district. The Waterbury district, for example, had the following discussion:

"The stresses in these bridges are figured for a 50-ton car on each track with a wheelbase

25,000 lb. O 5 ft. 0 in. 25,000 lb. O 15 ft. 0 in. 25,000 lb O 5 ft. 0 in. 25,000 lb. O

and on highway bridges a live load of 100 lb. per sq. foot outside of a line 4 ft. 6 in. from center of track.

"The ratios of these stresses to those permitted by the 1908 specifications of the Massachusetts Railroad Commissioners for the design of new bridges are added. In case these actual stresses exceed those allowed by the specifications, the stresses with a 36.4-ton car with a wheelbase

18,200 lb. O 4 ft. 6 in. 18,200 lb. O 17 ft. 8 in. 18,200 lb. O 4 ft. 6 in. 18,200 lb. O

are added with the ratio of these stresses to those specified.

"All bridges that are not ample for a 36.4-ton car are figured for a 26-ton car with a wheelbase

13,000 lb. O 4 ft. 6 in. 13,000 lb. O 14 ft. 10 in. 13,000 lb. O 4 ft. 6 in. 13,000 lb. O

and also for an 18.3-ton single-truck car with a wheelbase

18,300 lb O 6 ft. 6 in. 18,300 lb. O

"All highway bridges that are not ample for car and 100 lb. per sq. ft. on roadway and sidewalk are figured for car only. Bridges with double track, if not ample for a car on each track, are also figured for a car on one track.

"Generally an excess of 40 per cent above the specifications (or a ratio of 1.40) is permissible for sound timber or iron or steel in good condition. Thoroughly sound timber may be used temporarily where the ratio does not exceed 2.00.

"Where the specifications are too exacting for the consideration of old structures, the figures below are modified to fit the conditions.

"Ratios inclosed in parentheses in the summary allow for reduced strength due to decay or corrosion.

"Generally an excess of 100 per cent above the specified stresses may be permitted for rivet details to correspond with 40 per cent excess in sections. In special cases larger ratios are permissible as noted.

"In general, where the ratio of actual stress to that al-

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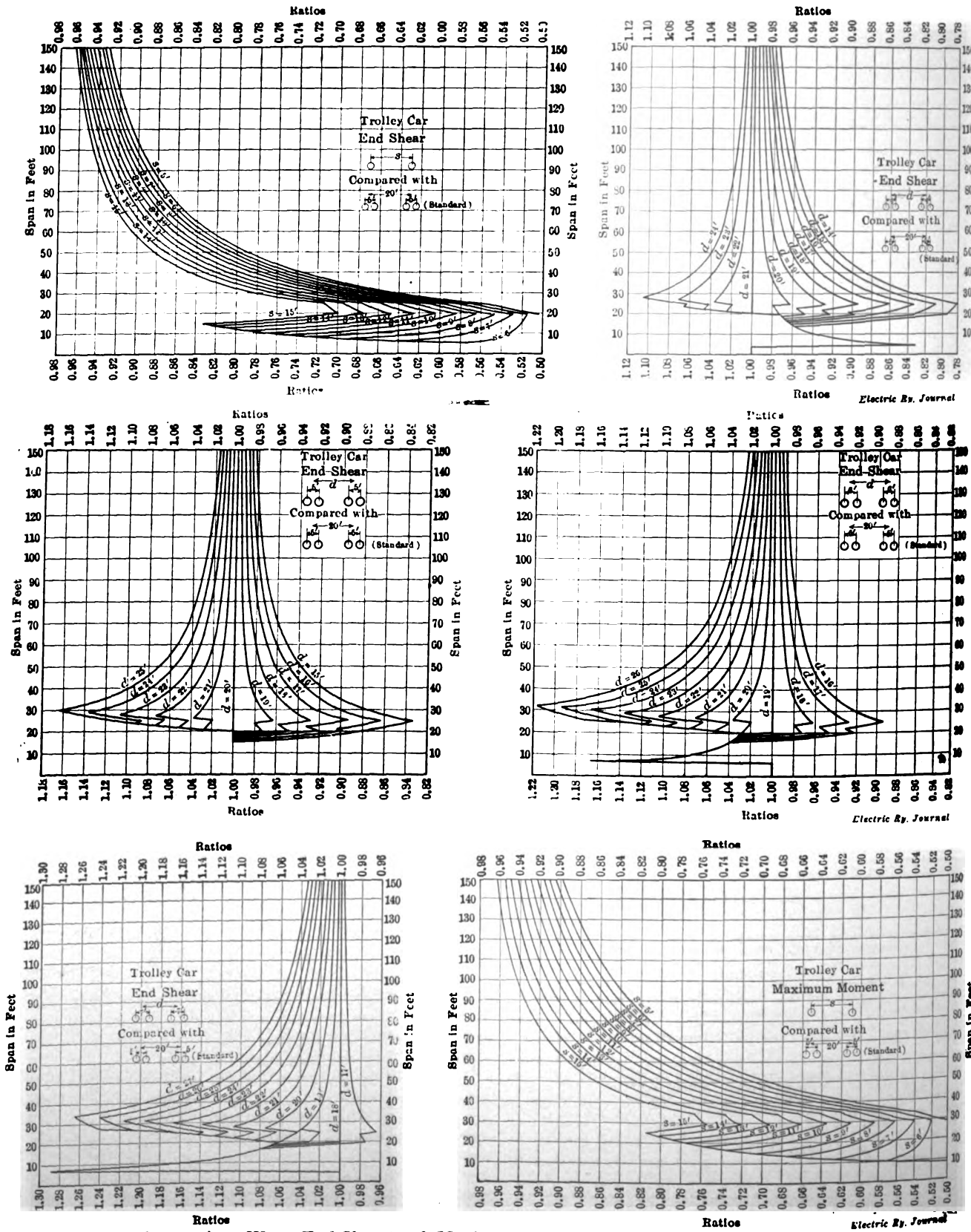
lowed by the Massachusetts Railroad Commission specifications is:

less than 1.00, it is called *'ample'*;
between 1.00 and 1.15, it is called *'good'*;
between 1.15 and 1.25, it is called *'fair'*;

The study of the Bank Street bridge was much more complicated owing to the presence of a roadway and sidewalk and is therefore not reproduced. It may be stated, however, that the calculations were made to cover a great variety of combinations of weights of cars and other



Connecticut Way—End-Shear and Maximum-Moment Diagrams for Bridge Loading

between 1.25 and 1.40, it is called *'permissible'*;
above 1.40, it is called *'not permissible.'"*

The foregoing report was followed by a loading study of each bridge, as will be understood from the calculations for bridge No. 1004 printed on the next page.

vehicles. Thus, under certain conditions 50-ton double-truck cars were not permissible if the weight of the roadway and sidewalk was equivalent to 100 lb. per square foot. The effect of corrosion was also noted.

One of the most interesting results of the report made

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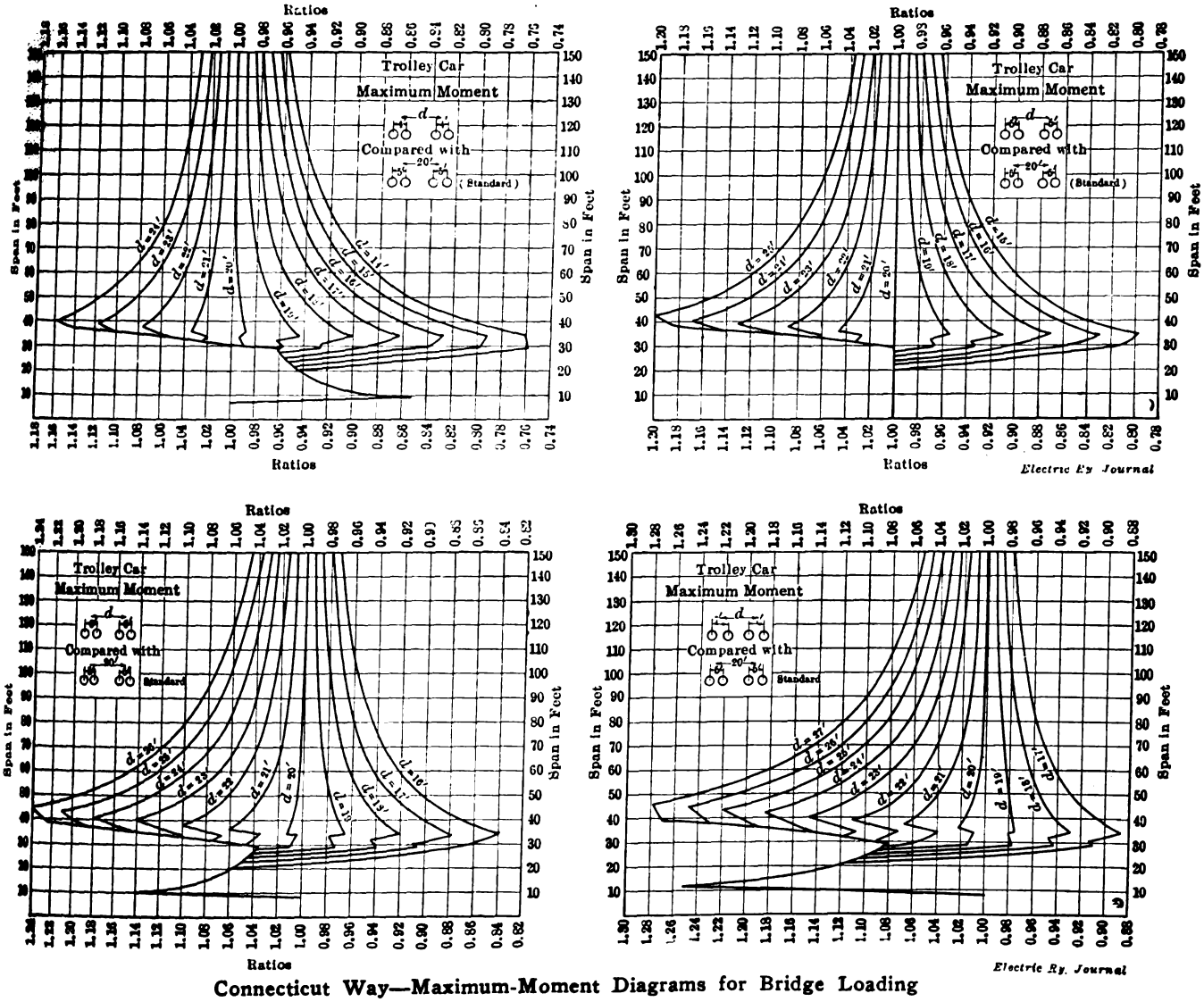
by Mr. Keith was his working out of a series of end shear and maximum moment diagrams as reproduced on pages 642 and 643, whereby when the span of the bridge and permissible weight of car with the standard Massachusetts wheelbase are given the capacity of the bridge can be corrected for a definite wheelbase; or, in other words, given the capacity of the bridge for loading on a certain wheelbase, approximations can be made by means of the diagrams for safe loading with any other wheelbase. It should be understood that these curves are based on the assumption that the weight distribution on the axles of the car is approximately equal throughout. Thus the curves would not apply to a car fitted with one motor and one trail truck.



Connecticut Way—Maximum-Moment Diagrams for Bridge Loading

CONNECTICUT RAILWAY & LIGHTING COMPANY, WATERBURY DISTRICT

Waterbury Extension, Cheshire Street Railway.

Scott's to Waterbury. Cheshire.

Over Northampton division N. Y., N. H. & H. R. R.—½ mile west of Scott's; also over driveway and brook east of railroad.

Deck girder ..... span 60 ft. 7½ in.

Live load ..... 1 50-ton double-truck car

	Max. Moment, Inch-Lb.	End Shear, Lb.	Shear, Lb., 6 Ft. from End
Live	6,232,900	39,700	34,770
Impact	1,348,000	8,600	7,520
Dead	2,430,000	13,200	10,560
	10,010,900	61,500	52,850

Effective depth ..... 50.58 in.

Net area of flange ..... 3.92 sq. in.

Unit stress ..... 14,220 lb. per sq. in.

Allowed by Massachusetts Railroad Commission ..... 16,000 lb. per sq. in.

Ratio 0.89

Unit shear at end ..... 3025 lb. per sq. in.

Allowed by Massachusetts Railroad Commission ..... 7080 lb. per sq. in.

Ratio 0.43

Unit shear 6 ft. from end ..... 2610 lb. per sq. in.

Allowed by Massachusetts Railroad Commission ..... 2900 lb. per sq. in.

Ratio 0.90

End pitch required ..... 4.3 in.

Actual pitch ..... 3 in.

Ratio 0.70

(*Ample* for 50-ton double-truck car.)

INTERURBAN RAILWAYS OF AUSTRIA

The official statistics of the Austrian government for the calendar year of 1911 on secondary or interurban railways show a total mileage of 473 miles, of which 383 miles are electrically operated. Of the latter mileage 64.5 per cent is standard gage and the remainder narrow gage. More than three-fourths of the electric mileage was on highways.

The electric lines in question operated ten locomotives, 2242 motor cars and 1976 trailers with a total seating capacity of 161,941. The number of passengers carried was 451,580,269 and the amount of freight 209,171 metric tons. The passenger miles were 1,055,484,200 and the metric ton miles 543,587. The electric lines earned $13,510,940, of which 98.9 per cent was due to passenger business. The total operating expenses were 67.76 per cent of the gross earnings. The average surplus was 9.48 per cent on the investment, the latter being equivalent to $147,230 per mile of track.

It is reported that the Maschinenfabrik Oerlikon, near Zurich, Switzerland, has received an order for the electrical equipments of more than forty trains for the electric section of the London & North Western Railway in England.

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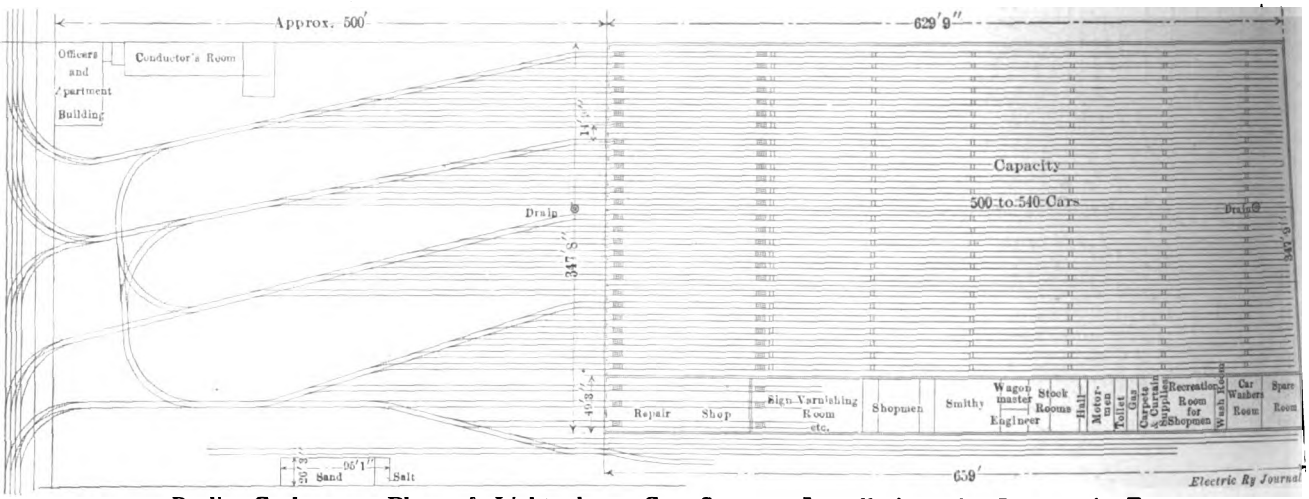
Old and New Carhouses at Berlin, Germany

Brief Descriptions Are Presented to Show Recent Changes in the Carhouse Construction Standards of the Great Berlin Street Railway

The Grosse Berliner Strassenbahn (Great Berlin Street Railway) is the largest street railway on the Continent of Europe and operated at the end of the year 1912 a total of 1757 motor cars and 1091 trailers. The increase of this company's business and the expansion of the Berlin metropolitan area made it necessary recently to build five carhouses. Of these structures, those at Britz, Weissensee and Lichtenberg have been completed, while those at Mariendorf and Steglitz are scheduled for completion before the end of this year. The land for all buildings except at Steglitz was donated by the authorities of the local suburban towns to the company. The value of the land at Britz is estimated at $150,000 and that at Lichtenberg at approximately $166,000. The capacities of the new carhouses in cars are as follows: Britz, 200 to 240; Weissensee, 200 to 240; Mariendorf, 160; Steglitz, 260; Lichtenberg, 500 to 540. The last, which will be the largest carhouse in Europe, will replace three old carhouses, but the other structures were built principally to care for line extensions. In accordance with the company's practice it has provided ample room for switching cars within yard limits, instead of using the street, at all of the new installations except at Britz. The yard wires are carried from latticed A-poles with ornamental caps. Much attention has also been given toward making these yards attractive by means of gardens.

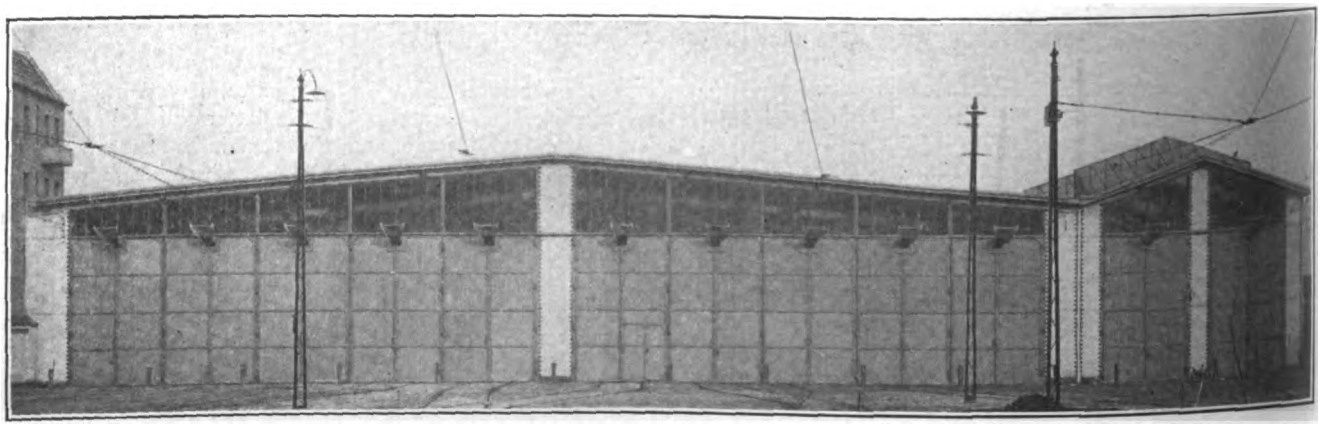
The general arrangement of all the new carhouses is substantially alike, consisting of a short two-track or three-track light repair shop, forming a part of a partitioned utilities bay, and a storage structure with two-car or four-car open pits per track at both ends or one end respectively, according to the layout. The accompanying plan of the Lichtenberg carhouse will serve to show approximately the arrangements at the other buildings also. The transportation features such as conductors' and receivers' rooms, public ticket offices, etc., are placed in a nearby building, which is furnished with living apartments for the local superintendent and other officials whose presence outside of their regular working hours is desirable.



Berlin Carhouses—Plan of Lichtenberg Car Storage Installation, the Largest in Europe.

The older type of carhouse, of which the one illustrated (Huttenstrasse, Charlottenburg) is a typical example, is constructed of brick walls and wooden roofs on heavy steel trusses. The front of the building is of highly ornate brick of castellated style forming solid arches for track entrances with wooden swing doors. In the Charlottenburg carhouse partition walls separate the building into four six-track bays, and fire parapet walls are carried at the base of the steep slope formed by the roofs of adjoining bays.

The new carhouses are also constructed of brick, but the only partition wall is that which separates the storage section from the shop and utilities bay. The roof is of wood carried on light steel trusses, which in turn are supported by the walls and one or more rows of A-form latticed



Berlin Carhouses—Front of New Weissensee Carhouse, Showing Use of Glass Above Doorways, Shop Section at Right

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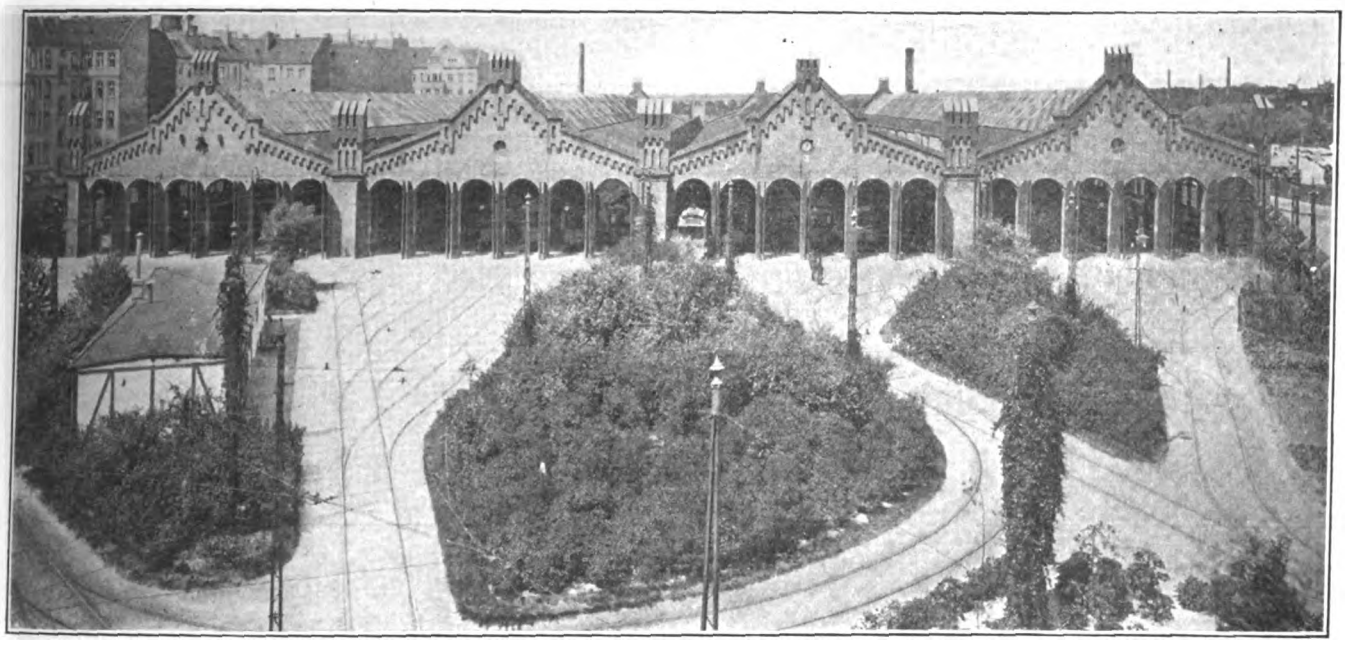
columns spaced 26 ft. 3 in. It is evident from the view of the Weissensee carhouse that the inclination of the roof is much less than in the old carhouses, so that in this way the company secures considerable economy in material. The clearance between the floor and bottom member of the roof trusses is 16 ft. 5 in. The roof, as at Britz, is fitted with transverse wired-glass skylights, the whole comprising 25 per cent of the roof area. Additional natural light is also obtained by the use of glass above the doors. These track doors are of the swinging type and are built of corrugated iron. One or more of these doors have smaller doors built in so that a man can enter the carhouse without opening the track doors. The devil-strips and pit floors are of concrete and are carried on diagonal trusses which are connected to channel-iron pit columns. The devil-strips are usually 5 ft. 10 in. wide. The pit rails are bolted directly to I-beams. These carhouses are not heated, but the company prevents the freezing of the water lines in winter by packing all exposed piping in jute and installing the standpipe connections in glazed dust-tight boxes.

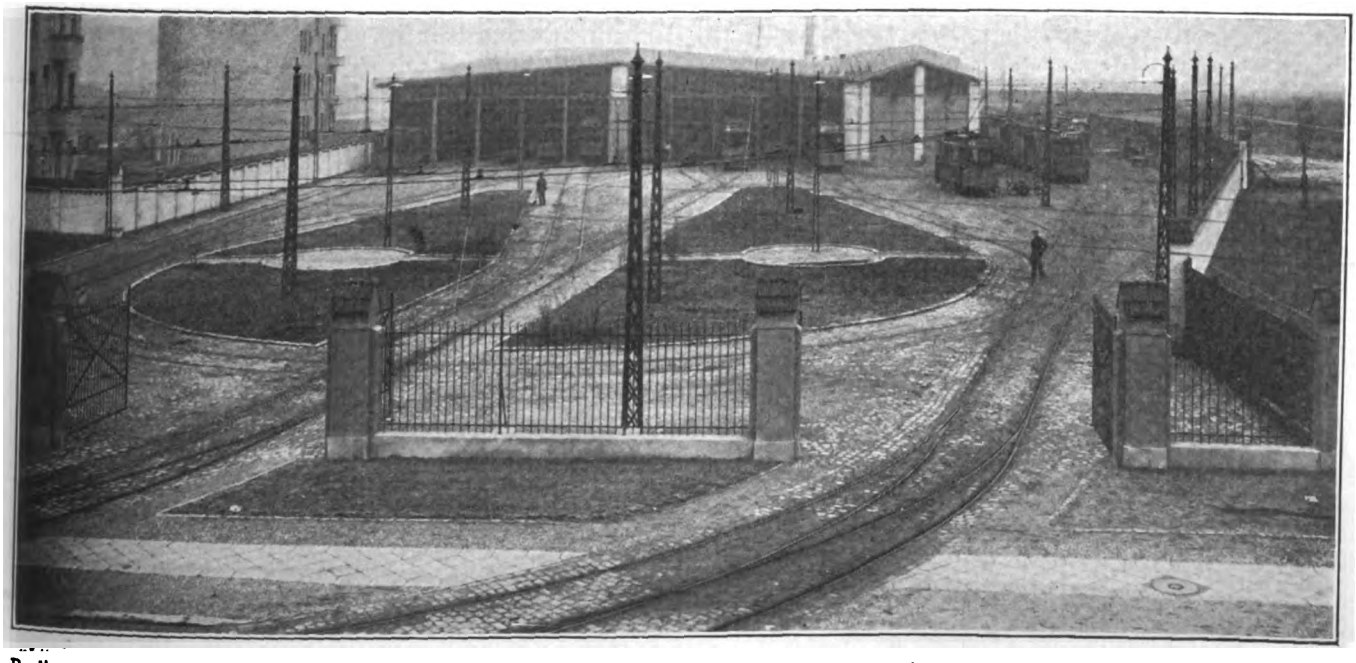
It is clear from the foregoing description of the constructional features of the new carhouses that economy in first cost was a prime consideration in their design. Arthur Busse, chief engineer of way and structure Great Berlin Street Railway, estimates that their average cost per car stored is but two-thirds that of the older structures. The construction cost of the Britz installation for 200 to 240 cars was $150,000.



Berlin Carhouses—Charlottenburg Installation, Which Is Typical of the Older Designs

DETAILS OF INDIVIDUAL INSTALLATIONS

The Britz carhouse is 656 ft. long and 139 ft. wide. The utilities section, which includes a substation, is 26 ft. wide and is so placed that it will form the center of the enlarged structure. Unlike the other new carhouses, this one was intended for double-end operation but it is not so used. The double-end construction accounts for the use of two-car pits at each end of nine of the ten storage tracks instead of two-car pits at the entrance only. Storage track



Berlin Carhouses—General View of New Weissensee Carhouse, Showing Switching Yard and Entrance Gates in the Foreground

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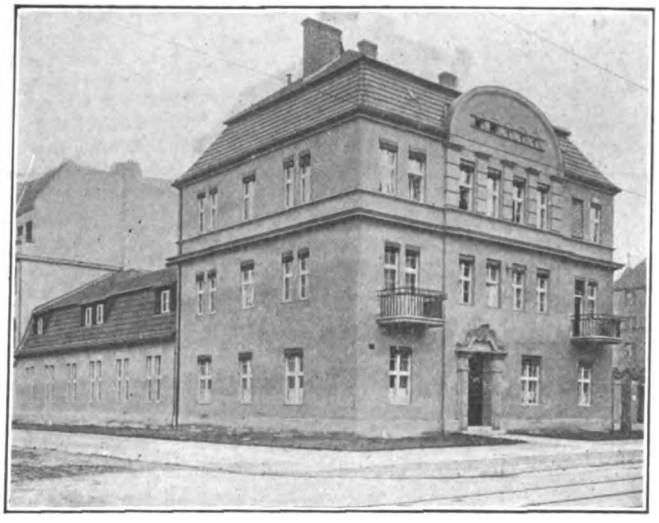
No. 1 along the outer wall has four two-car pits alternately with flush sections. There are two tracks with pits in the repair shop. Sliding doors in the partition give access between the carhouse proper and the utilities section.

The Weissensee carhouse is 656 ft. long x 148 ft. wide. It is almost a duplicate of the earlier Britz installation



Berlin Carhouses—Combined Office, Apartment Structure and Employees' Restaurant Near Weissensee Carhouse

except that it is single-ended and that the track along the outside wall has a pit for its entire length. This carhouse, which was opened on Oct. 11, 1913, is the headquarters of seven officers, 207 motormen, 234 conductors (including trail-car conductors), twenty-seven mechanics and thirty-one car cleaners, pitmen, etc.

One of the accompanying illustrations shows the handsome cement-faced building which is used for the business of the transportation department and for living apartments for several local division officers. The one-story annex is the company's first carhouse canteen since the old ones were discarded some years ago. The new installation includes an excellent restaurant where a great variety of cold and warm foods is obtainable at practically cost prices. A similar restaurant has been operated at the shops for many years.

The plan of the Lichtenberg carhouse on page 644 shows that this structure, which was opened on Aug. 16, has a maximum length of 659 ft. and a maximum width of 347 ft. 9 in. It has twenty through storage tracks and three two-car shop tracks. Ladder tracks and loops permit any desired car shifting within the yard limits. About 280,000 passengers a day are handled in cars run from this station.

THE RJUKAN RAILWAY

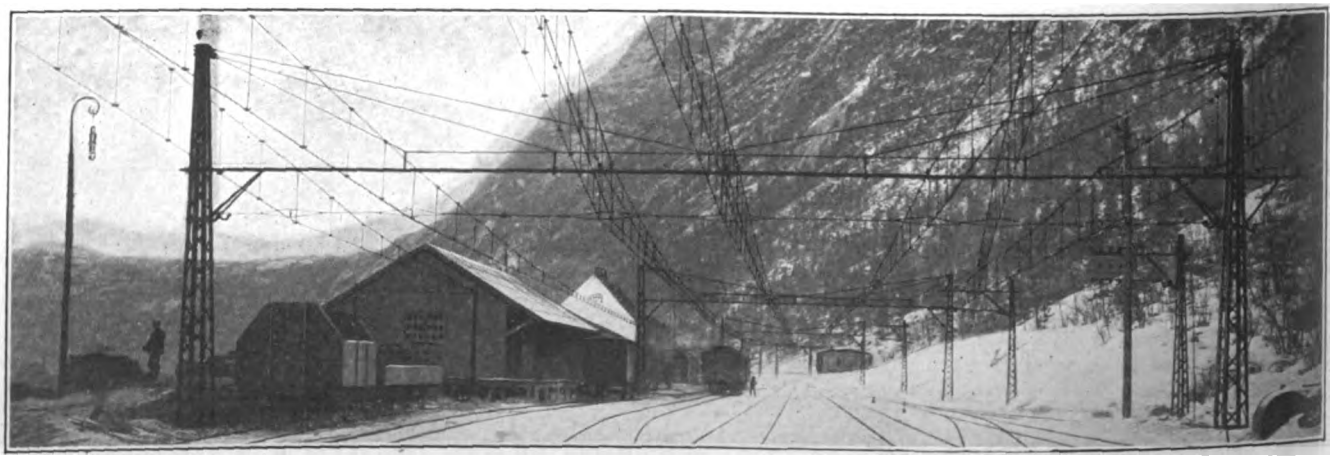
The first standard-gage single-phase electrification of Norway has recently been made in the southern part of that country on the Rjukan Railway. The line consists of two sections separated by the Tinnsee. The northern section is the Vestfjorddals Railway, 10 miles long, running from Saaheim to the Tinnsee, and the southern section is the Tinnos Railway, about 18.6 miles long, running from Tinnoset to Notodden along Lake Hitterdals. The con-

Berlin Carhouses—Interior of New Weissensee Carhouse, Showing Truss Roof and Steel Columns

nection between the two sections will be made by means of a ferry across the lake.

The chief business of the railway is the transport to Notodden of artificial saltpeter manufactured in Saaheim. Trains, with a maximum trailer weight of 290 metric tons, are drawn on the section from Notodden to Lilleherred (which has a constant grade of about 2.7 per cent) by two locomotives, one locomotive being employed for the other sections. Three four-axle and two two-axle locomotives have been supplied. The former have two two-axle trucks, are fitted with four 125-hp alternating-current motors and weigh approximately 46 tons. The two-axle locomotives have two motors of the same size and weigh about 23 tons. The locomotives are constructed for a line potential of 10,000 volts to 11,000 volts and 15 cycles to 16 cycles and are provided with contactor control.

The overhead suspension is of the single catenary type with a steel messenger of 31.5 sq. mm (No. 2 B. & S.) cross-section, a contact wire of 65 sq. mm (No. 00 B. & S.) cross-section and hangers of 3-mm (0.09-in.) diameter with top and bottom clamp installed at intervals of 16 ft. 5 in. At crossings and stations the spacing between hangers is reduced to 8 ft. to insure greater safety. The



Rjukan Railway—Single Catenary Construction from Bridges at Stations

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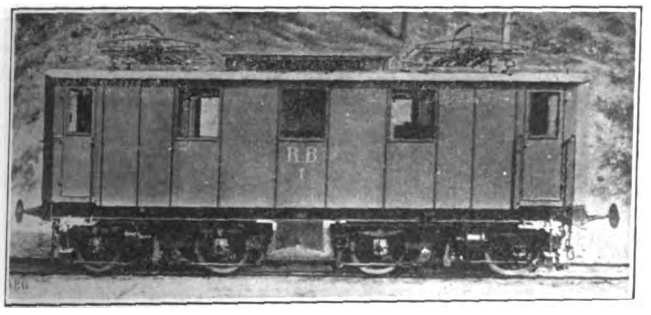
normal clearance between the top of the rails and the contact wire is 18 ft., but it is as low as 14 ft. 9 in. for tunnels, bridges and yards. Equal wear of the bow collector is assured by zigzagging the contact wire 17½ in. from the center line.

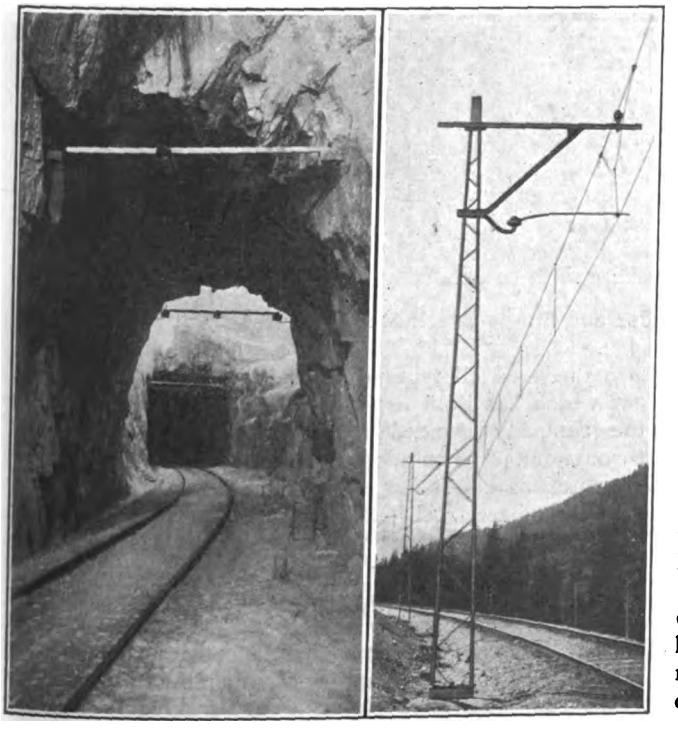
Along the right-of-way the overhead line is carried from steel brackets on A-frame lattice poles set 7 ft. 10 in. from the center line of the track, while in yards it is carried from pyramid-type towers with span suspension. The usual pole spacing is 177 ft., but an additional strain pole is in-



Rjukan Railway—Motor Car

stalled on curves of 1640-ft. radius or less. All poles are grounded and provided with a danger sign. In the two tunnels the contact wire is suspended from an intermediate insulator which is attached to a rigid span member at intervals of 16 ft. 5 in. Each end of the span is attached to an insulator, the arm of which is in turn anchored in the walls of the tunnel.

The catenary cable is carried over each bracket arm in the groove of a porcelain double-petticoat insulator. Anchor poles for the catenary are installed at intervals of about 3300 ft. Special anchor insulators are located between these poles and the overhead line. Three hand-operated tension take-up devices are also placed in each anchorage section.



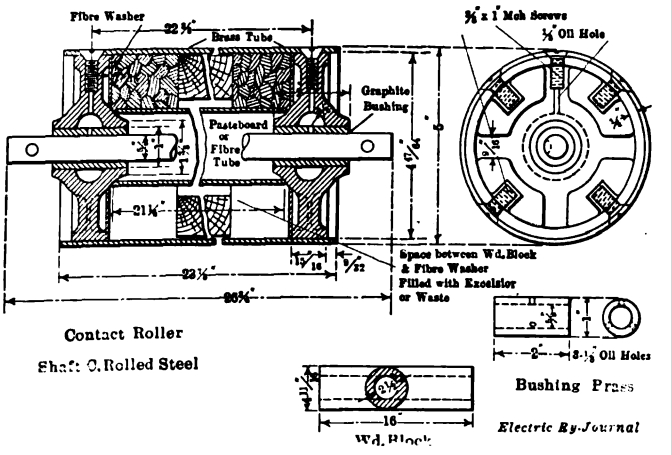
Rjukan Railway—Construction in Tunnels and on Open Single Track

Section insulators isolate the line into divisions about 15,400 ft. long. In addition, the overhead line opposite each station can be cut out by circuit-breakers carried on the top of the poles. These breakers are operated from below by chains which are fastened to a lock mechanism on the post in such manner that they can be operated only by authorized employees who are supplied with a key. All section insulators are protected with a lightning arrester.

The power supply is derived from a separate converter station for each section of the line, as only 50-cycle, three-phase current at a pressure of 10,000 volts to 11,000 volts is available. The converter station which feeds the Vestfjorddals railway is situated in Vestfjorddalen. It contains two converter sets, each of which consists of a three-phase transformer which steps down the 10,000-volt pressure to 500 volts and feeds an asynchronous motor driving an alternating-current generator with an output of 400 kva at 15 cycles to 16 cycles. The latter supplies single-phase current at a terminal pressure of 10,000 volts. The converter station receives the necessary energy from the Rjukan power station, about 3.1 miles distant. The Tinnos Railway is fed from the Svaelgfos converter station, which is placed in the railway power station. The equipment consists of three converter sets similar to those described hereinbefore. All line supplies and apparatus were furnished by the Allgemeine Elektricitäts-Gesellschaft.

THE ROLLER TROLLEY

The adoption of the roller trolley and pantograph on several recent heavy-traction, high-tension, direct-current lines makes a short account of the construction of this roller of interest. It was developed and used on a large scale first on the Key Route cars in Oakland and Berkeley, Cal.



Latest Roller Trolley—Key Route, California

On these lines trains of six or more heavy cars run at high speeds with an ordinary trolley voltage, and this made necessary a current collector which would have greater capacity than the ordinary trolley. Since the first roller trolley was adopted on that line several improvements have been made, and the accompanying engraving shows the latest type of Key Route trolley.

The roller is mounted on a pantograph frame and weighs, complete with spindle, 28 lb. The wearing surface is a tube of non-arcing brass, supported on a wooden roller. The height of the trolley wire above the head of the rail varies from 14 ft. 6 in. to 22 ft., yet, owing to the pantograph construction, the pressure of the roller against the wire is kept practically constant at about 34 lb. The average mileage of the rollers is 55,000. The cost of manufacture on a large scale is $6.62 each.

The Elevated & Underground Railway Company, Berlin, Germany, is planning to establish auto-bus lines. It is reported that the police will soon grant the company running powers for two such lines. Both of these lines are to start from Neuköln but will follow different courses to establish connection with the Stettin trunk line station and the Prenzlau station of the Berlin steam belt railway.

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Electric Railway Construction in Paris

The Principal Surface Electric Railway System in Paris Is Undergoing Extensive Rehabilitation—The Standard Car Will Have a Center Entrance and Will Be Mounted on a Single Truck with an 11-ft. 10-in. Wheelbase

The principal tramway system of Paris, that owned by the General Omnibus Company, is undergoing extensive rehabilitation. Up to about three years ago no attempt had been made to introduce electric power except on a very small scale, because the early expiration of the company's franchise did not warrant the investment of any large sum of money in street construction or other property which could not be removed from the streets in case the franchise was not renewed. On May 31, 1910, however, an extension for forty-five years was granted by the municipality, and an abstract of the franchise then granted was printed on page 505 of the issue of this paper for Oct. 1, 1910. Under this franchise the company is installing electric power and will use the underground conduit construction in the central portion of the city and trolley in the outlying portions. Pending this change a considerable portion of the system is being operated with the old motive powers.

Previously, where the underground conduit system has been employed in Paris, and it has been installed for short sections by a few other companies there, the "side conduit" has been employed. In the side-conduit system the conduit is placed at the side of the track instead of at the center, and its slot rails are used instead of a rail for one side of the track. This plan has now been abandoned, and in all new track construction in Paris the conduit is in the center of the track, as in New York and Washington. The standard depth of the excavation is 0.88 m (34¼ in.). The yoke is 0.78 m (30½ in.) in depth and rests on a layer of concrete 0.10 m (4 in.) in thickness. On certain parts of the line, however, a shallower conduit is used where the circumstances did not permit the standard form of construction without great cost.

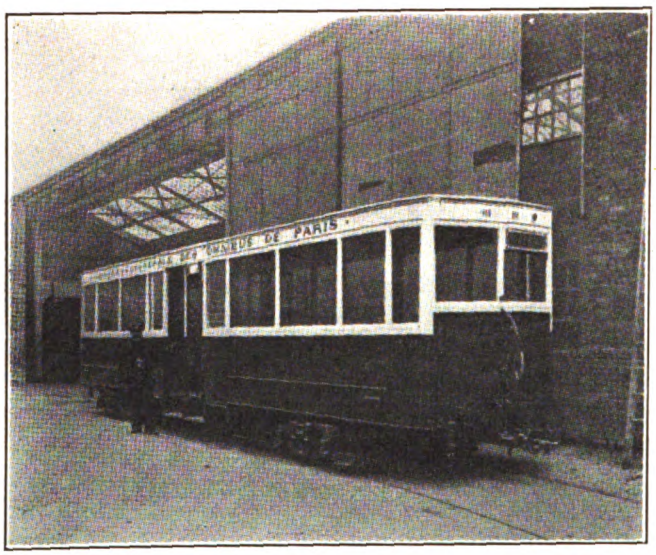
In an article which appeared in a recent issue of *L'Industrie des Tramways* by M. A. Mariage, general manager of the company, the reasons are given for the change from the side conduit to the center conduit. One of these is that it is possible to use a narrow slot, because the side conduit requires a slot large enough for the wheel flange, whereas the center conduit has to accommodate only the plow. The slot in the side conduit in Paris is from 30 mm to 35 mm (1¼ in. to 1½ in.) in width. The slot with the center conduit is only 25 mm (1 in.) in width. This change will greatly reduce the amount of dirt which will get into the conduit. Again, the slot rails and entire conduit construction had to be made heavier with the side conduit because it had to support the weight of the cars, whereas the center conduit supports simply the vehicular traffic. It will also be much easier to remove the slot rails and get at the conductors in the conduit with the center construction, and the construction at switches and turnouts will be much simplified.

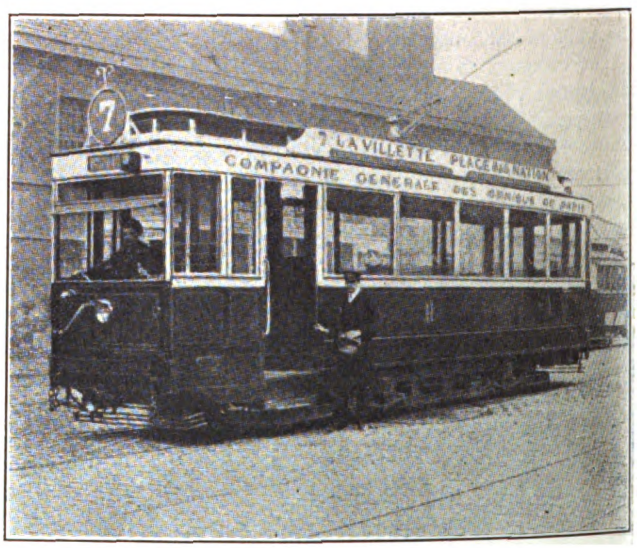
The method of conduit construction, according to the report printed in the foreign paper mentioned, seems to be very similar to that followed in New York. After a trench has been excavated, the yokes and the slot rails and running rails are set in place and aligned. Then a sheet-iron liner is inserted, and the concrete is put in place. The wooden blocks used to hold the yokes and rails in place are then removed, and the space occupied by them is filled with concrete.

NEW TYPES OF CARS

Mr. Mariage also gives an account of the new types of cars which are now being built for the system. A study was made of all types of cars, including the double-deck car which has been used to some extent in Paris. Finally the company decided in favor of the single-deck car throughout. It has adopted for most of its service a center-entrance motor car 40 ft. 1 in. over all, mounted on a long-wheelbase truck and capable of hauling a trailer. For lines with light grades the company has adopted a maximum-traction truck car, also with center entrance. This car was not adopted as standard principally because it could not haul a trailer on a 3 per cent grade. For light traffic lines the company has adopted an end-entrance single-truck car somewhat shorter than the standard single-truck car.

The long-wheelbase truck for the standard motor car for city service is illustrated in two engravings. The wheelbase is 3.6 m (11 ft. 10 in.), yet this truck operates without difficulty around a curve with 18-m (59-ft.) radius, with a suitable selection of wheel flange, in spite of the fact that there is no radial action in the axles. One truck of this type has been in service since October, 1911, and





Paris Tramway Rehabilitation—Double-Truck Trail Car and Single-Truck Motor Car for Light Service

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twenty others since November, 1912, with satisfactory results. The car body is supported on this truck by two sets of springs, one set being spiral springs carried on a spring plank at each end of the truck, the other set being semi-elliptic springs under the journal boxes, as shown by the illustrations.

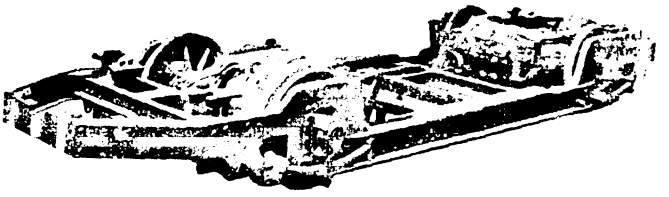
The car body to go on this truck is no less interesting than the truck itself. Owing to the limitations of width imposed by the narrow streets in Paris, single seats have to be used on one side of the center aisle, yet by an ingenious arrangement of seats the car provides seats for thirty passengers and standing room for nineteen more. As already stated, the car has a center entrance with double sliding doors. The first step is 32 cm (12½ in.) and the second step is 25 cm (10 in.) in height, making the car floor 22½ in. above the head of the rail.

The construction of the body is largely of steel, and an effort has been made to secure a maximum of lightness. Flanged sheet steel is used for the body panels, the sheet-steel plate being carried around to form the end panels and being tied in with light framework around the center entrance and to the steel side posts. The weight of the car complete with truck and electrical equipment is 13.5 metric tons (29,700 lb.), or 742 lb. per linear foot, or 990 lb. per seat.

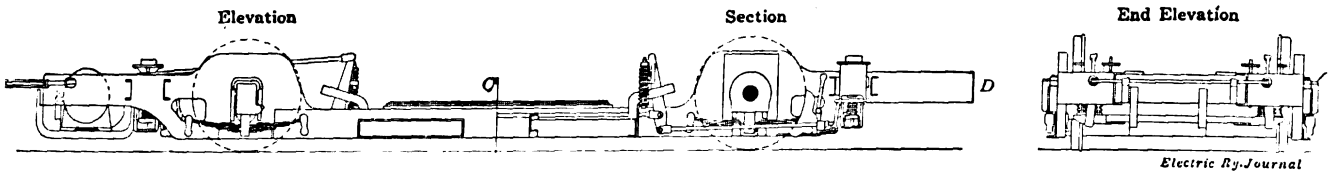
This car will be used in times of heavy service with a double-truck trail car, also illustrated. The truck of this trail car is of the simple arch type with small diameter wheels. This car also has a center entrance and seats thirty-eight passengers with standing room for nineteen passengers. The weight empty is 7.9 metric tons (17,380 lb.), or 457 lb. per passenger.

The maximum-traction truck car also has a center entrance. This car seats thirty-six passengers and also has room for eighteen standing passengers. Its weight with electrical equipment is 14.8 metric tons (29,600 lb.), or 822 lb. per passenger. The construction is also of steel and very similar to that of the single-truck car already described.

For lines of light traffic the company is also using the end-platform single-truck car illustrated. This car has a length of 10.3 m (33 ft. 9 in.) and a wheelbase of 3.25 m (10 ft. 9 in.). It has accommodation for forty-five passengers, of whom thirty can be seated, and weighs 12.5 metric tons (27,500 lb.).



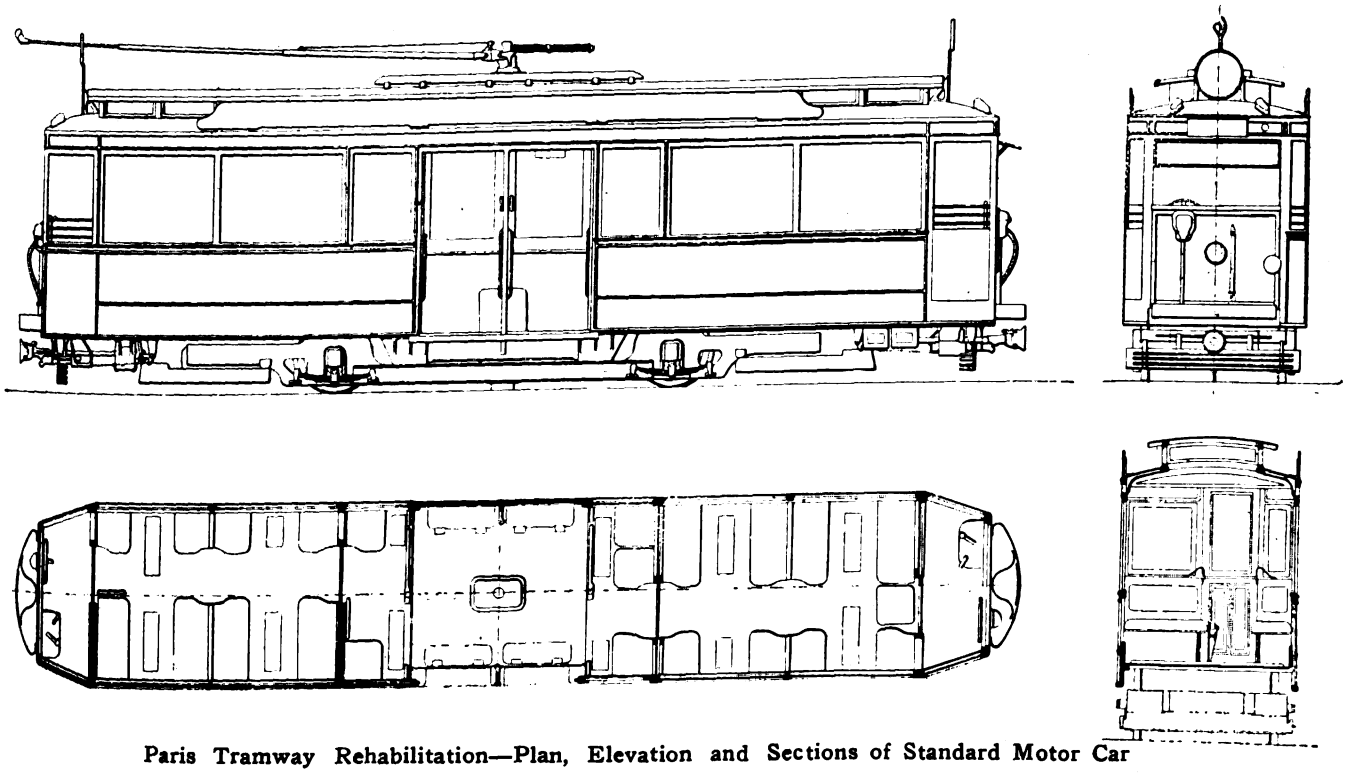
Paris Tramway Rehabilitation—Long-Wheelbase Truck for Standard Motor Car



Paris Tramway Rehabilitation—Elevations and Section of Long-Wheelbase Truck

All cars, including trail cars, are equipped with the Westinghouse straight-air brake. The long-wheelbase motor cars use GE-216 motors. The maximum traction cars are equipped with TH-523 motors. On one of the interurban lines the company will use a three-car train consisting of two motor cars and one trail car with multiple-unit control. For the lines now under construction the company will require 200 motor cars with maximum traction trucks, 450 motor cars with long-wheelbase single trucks and 400 trail cars.

The standard motor cars will be lighted by two circuits of nine lamps each in series, and a 10-volt storage battery auxiliary is provided to supply an auxiliary circuit of lights in the case of interruption to the main circuit.



Paris Tramway Rehabilitation—Plan, Elevation and Sections of Standard Motor Car

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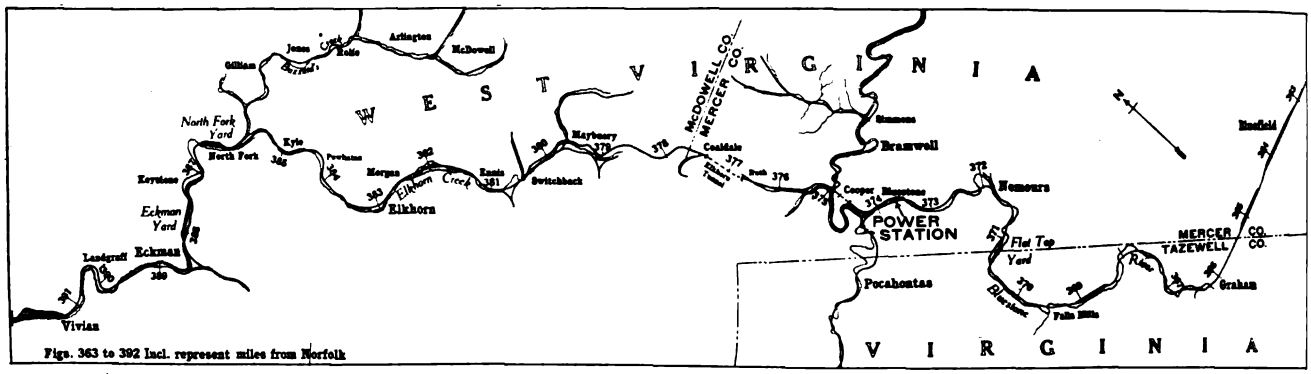
LOCOMOTIVES FOR THE NORFOLK & WESTERN ELECTRIFICATION

The locomotives for the most recent electrification project, that of the Norfolk & Western Railway, will be the first to be commercially used in this country with a combined jack shaft and gear drive. These machines, as reported in recent issues of the ELECTRIC RAILWAY JOURNAL, will have articulated trucks and will weigh complete approximately 130 tons each. As shown in the accompanying illustration, four driving axles and two carrying axles are used, the wheelbase being divided into two separate units or trucks, connected at adjacent ends by a hinge coupling. The carrying axles are mounted radially, and each main truck has two driving axles and one radial axle. The outer ends of the trucks are fitted with standard buffers and friction draft gear with standard couplers, the drawbar pull being transmitted through the truck frames to the train. The weight does not exceed 57,000 lb. per pair of drivers and is sufficient to produce a tractive adhesion for a maximum effort of 62,500 lb. per locomotive, the weight on each radial axle being not less than 20,000 lb. at the rail. The locomotive will, with forced ventilation, have sufficient capacity to exert continuously a tractive effort of 33,600 lb.



Norfolk & Western Locomotives—Map of Electrified Part of Line

A single cab supported on the trucks at suitable bearing points contains the operating and control apparatus of the locomotive. The cab is of the box form, provided with end doors and platforms for convenient passage between two or more locomotives when coupled together, and between the locomotive and train; in addition, side doors are provided at diagonally opposite corners. There are also side and end windows for lighting the cab. The apparatus is arranged along the center of the cab, making it conveniently accessible and leaving a clear, unobstructed passageway at either side.

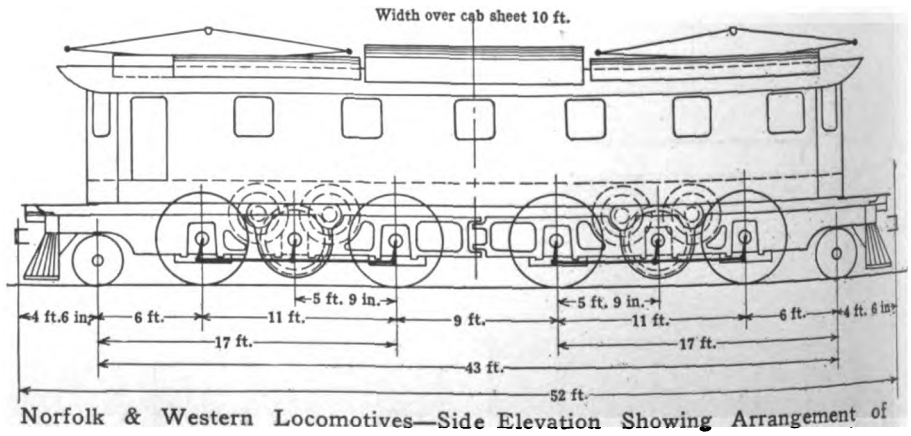
The control apparatus, both air and electric, is located at one end of the cab, in such a manner as to leave an unobstructed view along the track. The operator's seat is placed so that there will be a clear view of the signals.

Each locomotive is provided with two overhead pantograph trolleys having automatic self-adjusting action and arranged for a working height of 16 ft. under bridges or other permanent structures and a normal height of 24 ft. along the open line, the trolleys being controlled by air pressure.

The motors, which are of Westinghouse make, will be connected through twin gearing to a jack shaft. They are to be of the polyphase, twenty-five-cycle induction type with wound secondaries, which are connected in cascade for producing low speed in starting and switching. There are two running speeds, 28 and 14 m.p.h., and a switching speed of 7 m.p.h. In starting with the 7-mile combination, the motor on each truck will be connected in cascade, and the two sets of cascades will be connected in parallel. Resistance will be inserted in the secondaries at starting. In this combination the primaries will be arranged for eight poles. With the 14-mile combination all motors will be in parallel connected for eight poles, and with the 28-mile combination the four-pole arrangement will be used, resistance being used on intermediate steps.

A multiple-unit system of control is to be provided for the independent operation of each locomotive, or for the operation of two units simultaneously from the control end of either locomotive in whatever order or arrangement the locomotive may be coupled together. The control equipment is arranged and constructed to provide for the use of single-phase current from the pantograph trolley, which is connected to the primary winding of the main transformer through a suitable line switch, and from the secondary of the transformer circuits will be established through and in connection with the phase converter in such a manner as to deliver polyphase current to the main motors.

Each locomotive is to be provided with an air compressor driven from the phase converter, through a multiple-disk friction clutch. This clutch is controlled by the main reservoir pressure so that the compressor is operated only as required. Straight-air and automatic air brakes will be installed together with the necessary ventilating apparatus for the motors. The electrical equipment has been designed with special consideration for regeneration and electric braking at grades, both for the purpose of safety and for economy of operation, the local conditions being very favorable for this type of operation.



Norfolk & Western Locomotives—Side Elevation Showing Arrangement of Motors and Gears

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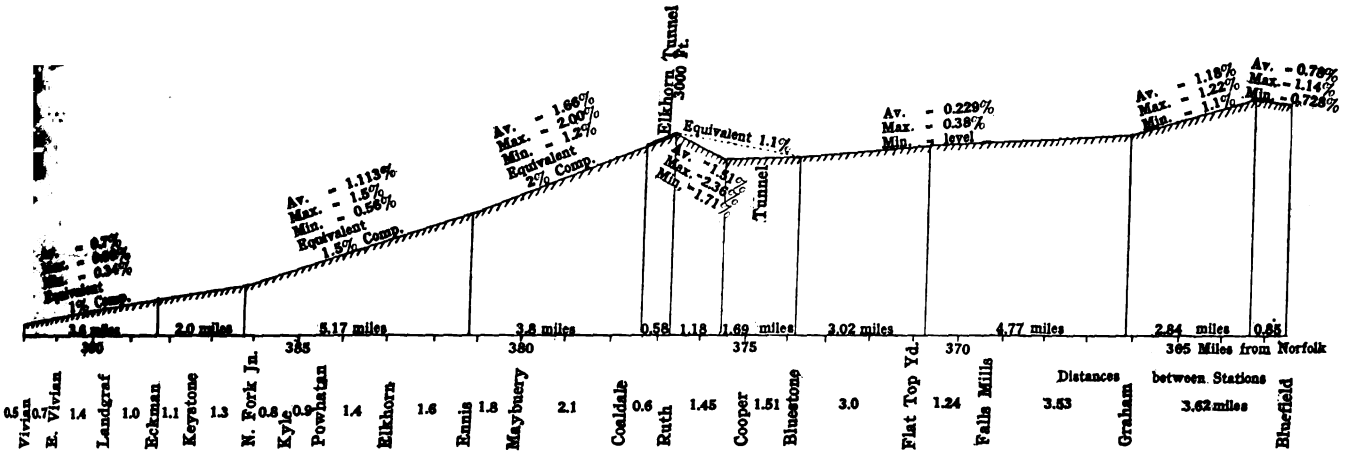
LOCOMOTIVE SERVICE

As the electrified section is about 30 miles long, extending from Vivian, W. Va., to Bluefield, W. Va., and is provided with numerous industrial sidings and storage and terminal yards, the work of the locomotives will consist in large part of switching service. East-bound trains are to be made up either at Vivian, Eckman or North Fork, to a also be used as a switcher to pick up loaded cars at the various stops on the grade. The tractive efforts exerted under the various operating conditions are given in the accompanying table.

POWER HOUSE EQUIPMENT

The power house will be located at Bluestone, the equipment consisting of three 9000-kw, single-phase, twenty-five



Norfolk & Western Locomotives—Profile of Electrified Division

normal weight of 3250 tons, and to be run through to Flat Top or Bluefield. At Flat Top they may be filled out to 3500 tons for movement to Bluefield. Trains of 3250 tons may be operated through to Bluefield without filling out at Flat Top, and in that event the locomotives are to be capable of operating at approximately 28 m.p.h. from Cooper to Graham. West-bound trains are in general made up of empties as required and run from Bluefield to points of distribution at the various coal operations on the grade west of the Elkhorn tunnel, or these empty trains may be run through to Eckman or Vivian. East-bound trains average about forty-five loaded cars each up the Elkhorn grade and may be filled out to fifty loaded cars at Flat Top. Standard west-bound trains consist of about sixty-five cars of empties, but lighter trains are run as occasion demands. Loaded trains are sometimes run west from Flat Top, and

TABLE SHOWING TRACTIVE EFFORTS FOR DIFFERENT GRADES AND LOADS

	Train on 1.5 and 2 per Cent Grades	Train on 1 per Cent Grades	Train on 1.22 per Cent Grades	Train on 0.4 per Cent Grades
Weight of train, tons	3,250	3,250	3,500	3,250
Locomotives per train	4	2	3	2
Approximate speed, m.p.h.	14	14	14	28
Drawbar pull per locomotive, lb:				
Uniform acceleration	45,900	57,000	47,700	39,700
On 2 per cent grade	37,700	.....	.....	.....
On 1 per cent grade	.....	42,900	.....	.....
On 1.22 per cent grade	.....	.....	36,000	.....
On 0.4 per cent grade	.....	.....	.....	23,000
Maximum accelerative tractive effort per locomotive, lb	62,500	62,500	62,500	45,000

these consist of about forty-five loaded cars, or 3250 tons.

Trains of 3250 tons are to be operated at a normal running speed of approximately 14 m.p.h. up grades of from 1 to 2 per cent and at a normal running speed of approximately 28 m.p.h. on level track and existing main line grades up to 0.4 per cent. The normal running speed down grades of 1 to 2.5 per cent will be approximately 15 m.p.h. when the locomotive is holding the train in regeneration.

Two single electric locomotives will form one road unit, making the round-trip runs between Bluefield and either Vivian, Eckman or North Fork, as required, handling empty cars on the west-bound trip and loaded cars on the east-bound trip. Two locomotives coupled and operated together will form one pusher unit and will make round trips between Ruth and Vivian, Eckman or North Fork. On the west-bound trip the pusher unit will be coupled to the rear of the train and will be used as a switcher to distribute empties as required on the grade. On the east-bound trip the pusher unit, operating at the rear end of the train, will

cycle, 11,000-volt Westinghouse turbo-generator units operating at 1500 r.p.m., with two turbo-exciters, a motor-generator set exciter, together with step-up transformers for 33,000-volt transmission lines to feed the transformer substations.

TRAMWAYS IN GREAT BRITAIN AND IRELAND

In its issues of Aug. 8 and 15 the London *Electrician* published an analysis, prepared by A. J. Lawson, of the operating results of the tramways in the United Kingdom. This statement was based upon the report of the Board of Trade for the calendar year 1911 in the case of companies and for the year ended March 31, 1912, in the case of municipalities.

Since 1895 municipalities and companies have expended on the construction of their lines £77,377,390, of which £58,051,093 was raised by loans and debentures and £18,011,093 by stock; £11,000,000 of this loan capital has been repaid or provided for. The total length of track at present is 2,637.05 route miles, of which 1,660.75 are double-track and 976.3 single-track, the total equivalent length of single-track line being 4,298.8 miles. In addition, 5.2 miles of road are being worked by trackless trolley cars. The highest average capitalization is for the London County Council Tramways, namely £87,590. The lowest is in Halifax, £10,755.

On all of the tramways mentioned in the Board of Trade return the number of car miles run by the 12,435 electric and the 509 non-electric cars in stock at the end of the twelve months was 323,354,389, carrying 3,127,318,732 passengers, giving an average of 9.67 persons per car mile. The number of route miles worked electrically was 2,517.77, by cable 25.56 miles, by locomotives 46 miles and by animal traction 47.6 miles.

Statistics show that where the receipts per car mile on the average are not 10d. in London and 9d. in the provinces the service is not profitable. On only five lines are the gross receipts £10,000 per route mile. These are the lines in London, Edinburgh, Hull, Liverpool and Glasgow.

Twenty-two of the municipal lines report deficits after payments of interest and sinking fund charges. On the other hand, the profits of forty-two municipal undertakings were used for the relief of rates. The highest figure for car miles per car was 35,780 and the average was 25,000. The average cost of operation was 6.64d. per car mile.

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STRIKING MAPS OF PHILADELPHIA REPORT—OFFICIALS APPROVE PLANS

The Philadelphia Department of Public Works has now issued Volume II, comprising the maps belonging to the report of A. Merritt Taylor, director of the department of city transit. An abstract of this report, which was designated as Volume I, was published in the Electric Railway Journal for Aug. 9, 1913. Many of these maps, as prepared under the direction of Ford, Bacon & Davis, consulting engineers, are of striking originality.

APPROVAL OF TRANSIT REPORT

The complete report was approved by Mayor Blankenburg and the Select Council on Sept. 18, when the latter adopted a resolution authorizing Director Taylor "to take any and all steps necessary to carry the recommendations into effect, subject to such revision thereof as may be designated from time to time by Councils." The resolution and the Mayor's message on the subject are now in the hands of the committee on finance and street railways for investigation of the data and for final report to both branches of Councils. Director Taylor has stated that if the necessary legislation is passed work can begin April 1, 1914. Mayor Blankenburg in his letter to Councils which led to the resolution noted recommended that "there shall be submitted to vote of the people next November a permanent loan of $9,000,000, which shall include $4,000,000 for subway and other rapid transit work."

LIST OF MAPS IN VOLUME II

Map No. 1 of Volume II of the report shows all steam railroad passenger and suburban electric lines in metropolitan Philadelphia. Maps Nos. 2, 3 and 4 show the rapid transit systems of New York, Chicago and Boston respectively superimposed on a map of metropolitan Philadelphia. This group gives a vivid idea of the great area of Philadelphia as compared with the cities named. Map No. 5 shows electric railway time zones of the Philadelphia district and the distribution of population in 1910, while Maps Nos. 6, 7 and 8 show the time zones of New York, Chicago and Boston respectively superimposed on metropolitan Philadelphia. The figures for New York and Philadelphia show startling comparisons for the same distances, such as ten minutes against forty minutes, twenty minutes against fifty minutes, thirty minutes against sixty minutes, 100 minutes against 150 minutes, etc., all in favor of New York. The contrasts of Philadelphia with Chicago and Boston are not so great, but a difference of from ten to fifteen minutes within 5 to 6 miles of the center of travel is quite common.

Maps Nos. 9, 10, 11 and 12 show electric railway zone fares of metropolitan Philadelphia, New York, Chicago and Boston, while Maps Nos. 13, 14 and 15 present these zone fares superimposed on Philadelphia. Map No. 16 shows the steam railroad time zones of metropolitan Philadelphia, and this is followed by Maps Nos. 17, 18, 19 and 20 to cover the steam railroad fare zones of the four cities named. The rapid transit systems of Brooklyn, Chicago and Boston follow as Maps Nos. 21, 22 and 23. Maps Nos. 24 and 25 illustrate by means of colored bands the present and estimated time zones from Market Street to Broad and Eighth Streets, Philadelphia, their derivatives, Maps Nos. 26 and 27, showing the estimated time saving for the same territory if the new lines were operated with or without the co-operation of the Philadelphia Rapid Transit Company. Map No. 28 indicates the time saving in West Philadelphia from Broad Street. Map No. 29 charts by sections the composite traffic survey of 175 divisions of Philadelphia according to population, residential area in acres, passengers originating on composite day of count, equivalent revenue year to June 30, 1913, rides per capita during the year ended June 30, 1913, and revenue per capita during the same year. Map No. 30 shows the same sections and indicates the time which their inhabitants would save by means of the proposed lines. A further analysis of these sections is offered by Map No. 31. Maps Nos. 32 to 41 inclusive show volume and distribution of traffic in various parts of the city and the amount of traffic tributary to present and proposed rapid transit lines. Map No. 42 shows the street railway lines existing in the year 1860, Maps Nos. 43 to 47 inclusive relate to lines recommended for immediate construction, tentative locations, etc. Detail plans and suggested way constructions follow in Maps Nos. 48 to 65 inclusive. The remaining maps or plans, concluding with No. 69, show time-distance diagrams, clearances of cars in subways with 12-ft. headroom and proposed design of car. The latter would be 50 ft. 6 in. over all, have three single sliding doors, each of 4 ft. opening, on each side with dividing rails for incoming and outgoing travel; seating capacity, forty-eight with all doors free or fifty-four with folding seats placed opposite the doors on one side. The seats of these cars would be longitudinal, leaving a maximum standing area of 188 sq. ft.

QUICK WORK AFTER THE HOT SPRINGS FIRE

The Hot Springs Street Railway Company has been very busy during the past three weeks in rehabilitating its system since the disastrous fire of Sept. 5, which destroyed thirty-three business blocks at Hot Springs, including the company's power plant. As soon as large gangs of men had cleared away the débris from the car tracks, General Manager Dillon hired horses and mules, including even some which were quite antiquated, had them hitched to the old light-weight street cars, which were not too heavy for the mules to pull, and had a street car system "at your service."

Tally-ho Operated by Hot Springs Street Railway After Fire

The mule-drawn street cars attracted considerable attention and recalled the era of yesterday. As the company had only a few light-weight cars that could be drawn by mules, it put into service tally-hos, automobiles, delivery carts, buggies and anything that people could ride in. The fare remained at 5 cents, though it cost the company much more than this to haul the passengers. General Manager Dillon brought the company's slogan, "Service—That's What Counts," into play and won the day.

By herculean efforts temporary electric traction service was resumed on Thursday, Sept. 25, and on Saturday, Sept. 27, the first electric lights since the night of the fire were put into use. Although the public utilities, which are controlled by the Federal Light & Traction Company, have always been popular in Hot Springs, the company won many additional friends by its splendid efforts to give traction, lighting and gas service in spite of great handicaps suffered after the fire. Its energy and promptness in retrieving itself after the disaster received many complimentary notices in the daily press.

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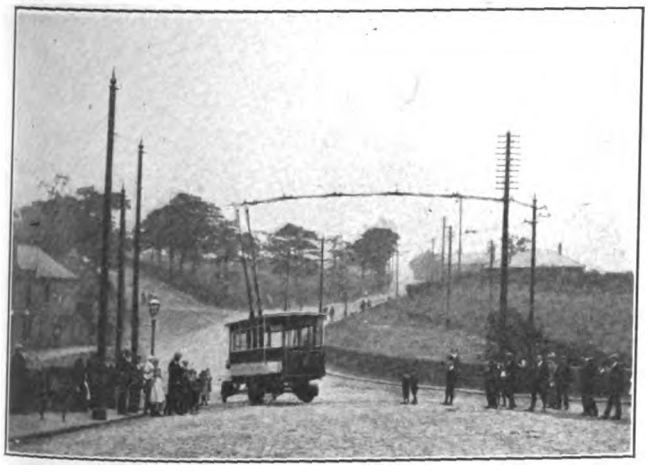
The Business Men's League of Hot Springs has sent out thousands of letters to counteract the general impression that the city was entirely destroyed. On the contrary, only the negro section and a part of the business section were devastated. The fine bathhouses, magnificent hotels and government reservation, as well as the principal business section and the promenade, were not touched by the fire.

Mules Attached to Light-Weight Trolley Car After Fire

Work is now being rushed day and night on a new fireproof 2500-kw power station. The new power plant will be far removed from the center of the city. It is expected to be completed and in operation by Jan. 1, 1914. W. A. Haller, chief engineer Federal Light & Traction Company, is in active charge of construction. Lee Skipwith, purchasing agent of the company in New York, is handling the purchases.

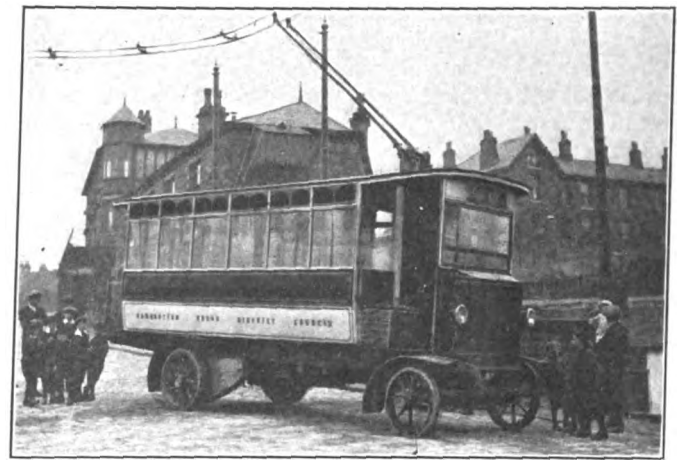
TRACKLESS TROLLEYS IN ENGLAND

During the last year or two the R. E. T. Construction Company, Ltd., London, Eng., has installed a number of trackless trolley lines in several British cities like Leeds, Bradford and Dundee. With the inauguration of the routes at Ramsbottom, however, this company reached the point of installing complete systems instead of extensions alone. The progress of the system seems due to the superiority of the trolley to the gasoline bus in point of cost and popularity with the public, and also to the adaptability



Trackless Trolley Rounding Terminal

of the trackless trolley to narrow streets which are not suitable for tracks. The trackless car possesses the flexibility of the ordinary omnibus since it can receive and discharge passengers at the curb and swerve to the opposite side of the roadway when necessary to pass opposing vehicles. It is asserted that the investment for the system is less than one-fifth of the capital needed for a double-track street railway of the same length when constructed under English city conditions. A feature of this company's system is that the bus may be operated easily over ordinary track sections by taking down the return circuit pole and lowering a contact shoe to the rail.



Standard Trackless Trolley Ready for Service

In general, the guiding principle of the designers of this system is to have the electrical equipment, especially the overhead apparatus, conform as nearly as possible to the standard designs of electric railways. The cars are turned at the terminus of the line by means of a simple loop as illustrated. Where this arrangement is impracticable, the vehicle may easily be turned in a street only 20 ft. wide by using a side street near the terminus for the construction, in the outward trolley wire, of a V whose apex points down the side street. In this way frogs are obviated. Where cars are operated in opposite directions on a route equipped with but one pair of overhead wires, one car lowers its trolley poles to allow the other to pass. These poles can be lowered and replaced in about ten seconds.

The accompanying views give an idea of the rural and hilly district served by the Ramsbottom vehicles, which are of the single-deck type, each with seating capacity for twenty-eight passengers. Two 20-hp motors are fitted on each car, each being connected independently to one of the rear driving wheels. The transmission is by means of chain and sprocket drive. As the motors are suspended on the chassis, they are protected from road shocks. The driver's platform is protected by a wind screen, the entrance for passengers being at the rear of the cars.

The running costs of the system at Rotherham are stated to be 11 cents per car mile. This figure included an allowance of 3 cents per car mile for tires, and as the Rotherham Corporation has placed contracts for its rubber tires at 2 cents per car mile the running costs mentioned may be reduced to approximately 10 cents per car mile. The energy consumption varies from 0.87 kw-hr. to 0.89 kw-hr., including line losses, or about 0.75 kw-hr. metered at the car.

It is also stated that the receipts of the tramway route at Rotherham which is fed by this service have gone up from 11 cents to between 20 cents and 22 cents per car mile, while the average receipts of the trackless trolley cars alone are about 20 cents per car mile, showing a handsome profit after setting aside the necessary reserve for sinking fund and interest on capital. At Leeds the cost of car operation is stated to be 13 cents, including the sinking fund and interest.

The "R. E. T." system is now being installed in South Africa, South America and China. The installation of double-deck vehicles in several important centers is also contemplated.

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SAMUEL INSULL ON CURRENT TOPICS

The first fall meeting of the Electric Club of Chicago was held at the Hotel Sherman Sept. 25, 1913. Mr. Samuel Insull, president of the Commonwealth Edison Company, of Chicago, addressed the club at this time. No subject had been selected for this address, but his talk was along the lines of electrical development prospective and retrospective. In opening Mr. Insull dwelt on the enthusiasm with which young men were solving the electrical problems, which largely explained the remarkable development of the art in late years. He cited the personnel of the Electric Club to emphasize his point and said that this characteristic was prominently displayed in a recent meeting of the Edison companies at Cooperstown, N. Y. In the end, however, the prosperity of the industry depends wholly upon the success of the consumer. No doubt great economies are possible through the concentration of production, a phase of the industry which was being rapidly brought about. A few isolated plants still exist, largely because they are unable to realize that one and one make two, as it were, or have not studied the question with sufficient care to arrive at the correct answer.

Strained financial conditions during the past year have made it extremely hard to secure new capital for development work. Consequently development has been seriously retarded, but the electric industries have not felt the restraint as much as other propositions. Conservative ventures for the development of electrical industries have had far less trouble in securing funds than equally meritorious propositions in other fields. This indicates that the electrical business, which represents an investment of practically $250,000,000, is on a firm basis.

Mr. Insull next discussed the political situation in the State of Illinois as regards public utilities. There is a possibility of serious conditions arising in the near future from the fact that the public utilities bill places under the control of the Governor all the utilities in the State. Unless great care was exercised in making the appointments to the Public Utilities Commission, with a view of protecting not alone the public but the utility companies as well, harm is certain to result. If the appointments are made on the basis of political reward it would result in the greatest possible detriment to the utilities of the State. He stated, however, that he had confidence in Governor Dunne and felt sure that he would exercise good judgment and appoint men from the ability standpoint. Public utility owners and operators stand ready to do all in their power to make the commission a success, and it is to be hoped that the quality of men appointed will be such as to make co-operation possible.

Another phase of the electrical industry discussed by Mr. Insull was along the lines of benefits to the communities served. He cited the great expenditure of money in Chicago following the panic of 1907 in street railway rehabilitation. A move of its magnitude at that particular time had a tendency to offset financial stringency in this territory. In closing he stated that one of the newspapers had recently stated that it was his ambition to abolish every smokestack in Chicago. While he did not remember making a statement to this effect, he stood ready to indorse it at this time. If all light, heat and power could be furnished to the city of Chicago electrically, the material saving in life and property would more than counterbalance the cost of the service.

ELECTRIC RAILWAYS OF SOUTH AFRICA

The South African municipal year book for 1911 shows that there are now five municipalities in South Africa which own street railways, namely, Durban, East London, Johannesburg, Pietermaritzburg and Pretoria. Operations in Johannesburg and Durban showed net profits of £45,187 and £16,589 respectively, while the other cities had slight deficits due to the opening of new lines in rapidly developing territory. The cities of Cape Town, Port Elizabeth and Kimberley have privately owned street railways. It is stated that trackless trolley systems have been decided upon in the cities of Bloemfontein, Boksburg, Benoni and Germiston.

The data in the accompanying table are selected from an article in the *Tramway and Railway World* for Feb. 6, 1913.

In addition to the foregoing data, the Durban Tramways assigned £2,766 to the sinking fund and £7,560 to depreciation and reserve; the Pietermaritzburg Municipal Tramways assigned £1,114 to the sinking fund only, while the East London Municipal Tramways assigned £2,120 to depreciation and nothing to the sinking fund. The report of the Durban Tramways for 1912 just issued shows 34 miles of track, gross earnings of £122,056, operating expenses of £72,217, net earnings of £49,839, surplus of £716 after paying capital charges and 4 per cent to the borough fund. The tramways operated 1,672,220 car miles and carried 15,655,737 passengers.

STATISTICS ON SOUTH AFRICAN ELECTRIC RAILWAYS.

	Population	Miles of Track	Capital Expenditure	Passengers Carried	Car Miles Run	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Traffic Receipts Per Car Mile	Operating Expenses per Car Mile	Kw-Hours Used	Cost per Kw-Hour	Cars
Durban Corporation Tramways	69,165	32	£428,000	16,343,420	1,607,941	£113,708	£67,310	£46,398	£16,733	16.87d	10.03d	2,964,255	1.125d	77
East London Municipal Tramways	23,500	5.9	£52,246	1,679,391	245,996	£13,506	£16,661	£13,506	£3,292	13.18d	16.25d	327,933	3.d	15
Johannesburg Municipal Tramways***	331,869*	57	£744,538	26,632,215	2,548,177	£319,974	£196,413	£45,186	£68,776	30.13d	24.97d	5,777,261	2.05d	109
Pietermaritzburg Municipal Tramways ***	30,539	8.5	£133,340	1,662,636	244,750	£10,747	£9,645	£1,082	£4,934	10.00d	9.46d	279,202	1.5	16
Pretoria Municipal Tramways	41,630	10	£150,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	21
Cape Town Tramways Company	154,000	28	.....	13,224,621	1,930,693	£130,078	£71,742	£58,336	.....	16.17d	8.92d	3,268,841	.....	78
Kimberley, Beaconsfield & Kenilworth Company***	.....	5.5**	.....	360,595	44,340	.....	.....	.....	.....	.....	.....	.....	4.d	12
Port Elizabeth***	32,000	23	£180,000	3,250,000	467,000	£32,000	£20,500	£11,500	.....	16.44d	10.53d	.....	.....	30

*Only white population of 111,857 is carried. **Three miles horse. ***Figures are for 1910.

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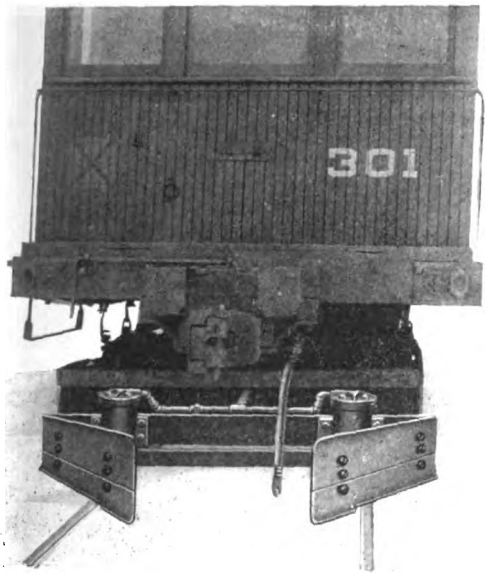
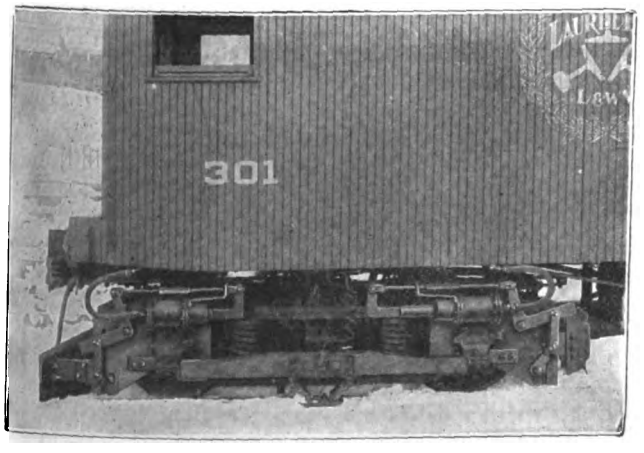
EQUIPMENT FOR SNOW AND ICE ON INTERURBAN LINES

With the purpose of keeping equipment costs low, many interurban lines have attempted to minimize the importance of the interference of snow and ice in winter and thus have limited their investments in a class of equipment which has been recognized for years on steam roads as necessary to satisfactory operation. Most managers, however, are coming to recognize that a more vigorous treatment of this phase of operation is desirable in order to avoid not only delays in the movement of traffic but also unnecessary consumption of current, and several types of snow and ice fighting devices are now available for this purpose.

Among these are several devices manufactured by the Railway Appliances Company, Chicago, and the accompanying illustration shows a combined car plow and flanger made by this company. This is a very strong and efficient device for use where the snows are heavy and subject to deep drifting in cuts. It does not merely throw the snow off the line, for a flanging device at the same time clears the rails and flanges and gives the wheels a chance for tractive effort. This plow is of steel construction throughout, framed with angle iron which is bolted to the body of an ordinary gondola car. The flanger may be hung from the plow frame so as to be applied and removed with the plow. The plow is usually about 9 ft. wide and 8 ft. to 10 ft. high to suit conditions. It weighs 3 tons or upward according to size required.



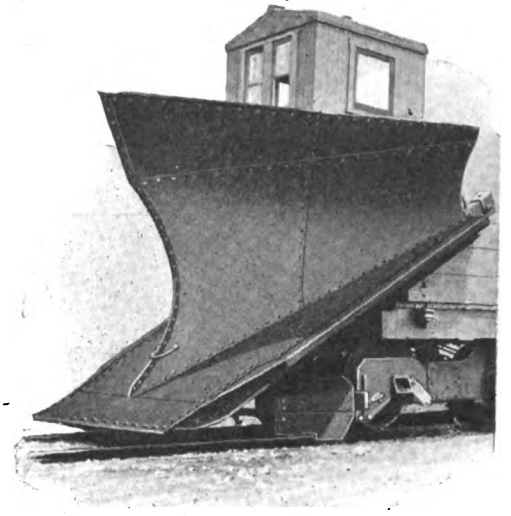
Snow Removal—Air-Operated Flanger on Standard Car



Snow Removal—Air-Operated Flanger for Third-Rail Line

Another illustration shows a motor car flanger which has now been in service for several seasons on the Lackawanna & Wyoming Valley Railroad and was designed to throw the snow away from the third-rail in whichever direction the car might be moving. This has proved to be a very effective device for localities where much crusted snow and ice is encountered.

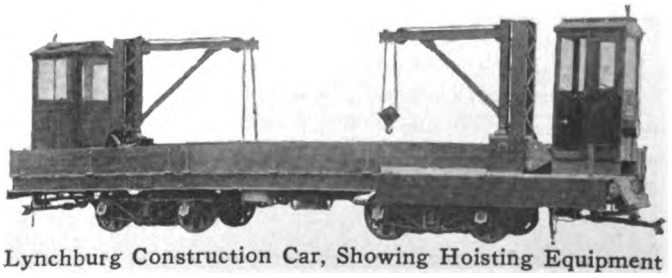
A third illustration shows the application of an air-operated ray flanger to an ordinary motor car. This type of flanger is easily applied to any motor car truck, gasoline-electric car or electric locomotive. It is hung in guide plates securely attached to the side frames or equalizer bars of the motor truck, and the flanging blades are carried on cross-bars which move up and down in the guide plates. The blades are raised or lowered by air, the air cylinders being a part of the cross-bar assembly, and the control is by means of a three-way valve located near the hand of the motorman. When not in action the flanger is held up to the car body by a swivel connection. All of the plows and flangers illustrated can be installed and removed from the cars without difficulty.



Snow Removal—Combined Snow Plow and Flanger

CONSTRUCTION CAR FOR LYNCHBURG

The tendency toward using highly efficient new equipment for service cars is indicated by the recent order of the Lynchburg (Va.) Traction & Light Company from The J. G. Brill Company for the construction car shown in the accompanying illustration. This car has hoisting equipment of 4000-lb. capacity and is used to haul rails, ties, poles, ballast, line material, etc. Hinged sides are provided to facilitate loading. The body is 40 ft. long over all and is notable for the use of an all-steel underframe. The distance between the bolster centers is 18 ft. 6 in. The width over the sills is 8 ft. 2 in., the height from rail to sills 2 ft. 8⅜ in. and that from the sill to the trolley base 6 ft. 10 in. Two completely inclosed cabs permit double-end operation. The body is carried on No. 50-E-1 trucks, which are furnished with four Westinghouse 101-B motors.



Lynchburg Construction Car, Showing Hoisting Equipment

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GAS-ELECTRIC TRAIN FOR THE KHEDIVE OF EGYPT

A train composed of two motor cars, each equipped with a gas-electric set, was recently supplied by the Allgemeine Elektricitäts Gesellschaft, Berlin, Germany, to the Khedive of Egypt. The coach bodies were constructed by the Metropolitan Carriage, Wagon & Finance Company, Birmingham, England. The train comprises a saloon coach and a composite coach for the suite and attendants. Each has a combustion engine, generator, motors and double-end control. It is intended to travel at 40 m.p.h. on the level, and the total train weight without passengers is approximately 100 tons.

CONSTRUCTION OF CARS

Each car is mounted on two double trucks. The gas-electric sets are carried on the trucks at each end of the train, the four motors being placed in the center trucks. The combustion engines are fixed to a special inner frame which is supported from the axles by springs, so that with the ordinary double-spring suspension of the car body from the axles, a triple-spring suspension is obtained between the car body and motor. The engine trucks are placed so far in front of the body that the engines and auxiliary machinery are completely exposed when the bonnets are removed. The electric motors are accessible through openings in the floor. The radiators are mounted on the roof above the two engineer's cabs, and the connecting pipes between the engine and radiator and the exhaust are contained in a chimney-shaped erection in the front of each car. The chief dimensions of the train follow:

	Saloon Car.	Composite Car
Length over buffers	60 ft. 0 in.	63 ft. 0 in.
Length of car body	45 ft. 5 in.	48 ft. 5 in.
Width of car	9 ft. 3 in.	9 ft. 3 in.
Height from rails to roof	14 ft. 8 in.	14 ft. 8 in.
Height inside car body	9 ft. 5 in.	9 ft. 5 in.

The saloon car has a reception saloon, a private saloon, a lavatory, an observation platform and an engineer's cab. The composite car contains two second-class compartments, three third-class compartments, a baggage compartment, a lavatory and a corridor leading through the whole car to the cab.

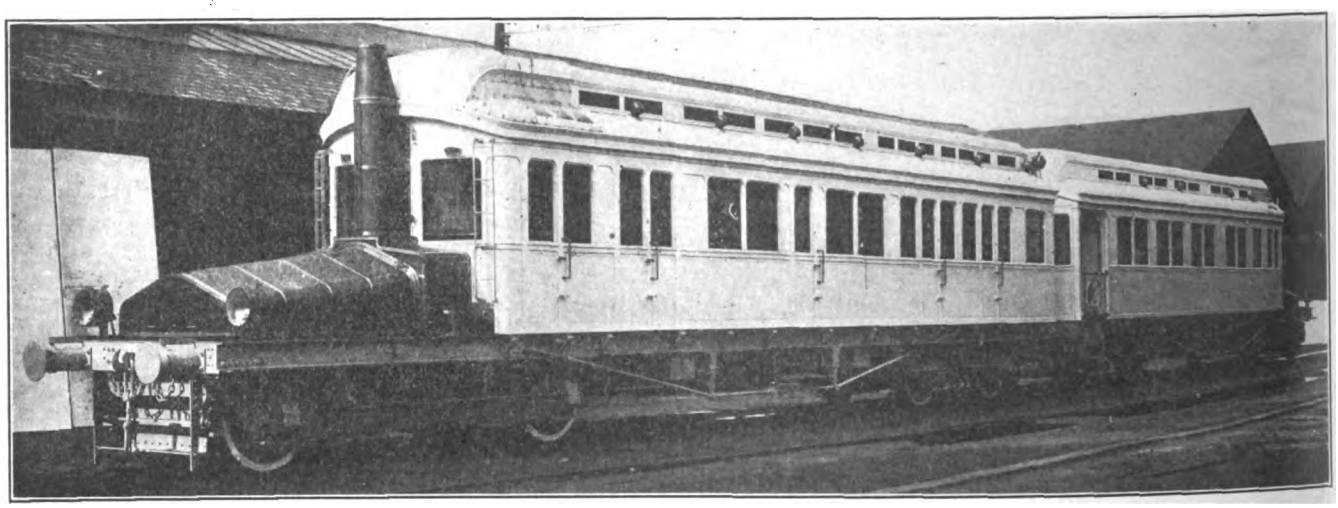
MACHINE EQUIPMENT

The combustion engine gives a continuous output of 120 hp. at a speed of 700 r.p.m. Forced lubrication is effected by means of an oil pump. The engine is started by means of compressed air and is cooled with air-cooled water, which is circulated by a centrifugal pump. The pump drives the water through a honeycomb radiator, mounted on the roof of the car, and in addition to the natural draft when traveling, it is cooled by an electrically driven fan with a vertical shaft mounted on the car roof. The fuel reservoir is suspended from the machine truck. The fuel is kept under the pressure of a neutral gas, nitrogen or carbonic acid, which is drawn from a steel cylinder through a pressure-reducing valve, thus insuring immunity from explosion. A centrifugal governor permits the engine speed to be reduced to approximately one-third when the car is standing. A Bosch high-tension magneto is used for the ignition, a battery being provided as a reserve. The exhaust gases are led over the roof into the open air through a silencer suspended in the chimney by springs and flexibly connected with the motor.

Each generator has an hourly rating of 80 kw and a continuous rating of 50 kw, the exciter having a continuous rating of 3.5 kw. Both machines are cooled by a fan mounted on the same shaft. The normal generator pressure is 300 volts and the exciter pressure is 60 volts. The generator has commutating poles and can be overloaded at starting with a current up to 500 amp. Each car has two series-wound commutating-pole motors rated 80 hp at 300 volts on the hourly basis. The motors are geared in the ratio of 1:2.6.

The control and speed regulation is carried out in accordance with the Ward-Leonard system, namely, by regulating the generator fields. The control of both generators may be carried out in common from either cab. In the field circuit the one exciter excites the two generator fields connected in parallel, through a common resistance. One resistance is used for each direction. The two exciter fields connected in parallel are fed in like manner from an auxiliary battery with a one-hour capacity of 68 amp-hr. at 60 volts, to which the second exciter is connected in parallel. When the engine is running at a low speed this exciter is switched out automatically by a special switch, and when the speed is high it is switched in again, so that in the first case the battery works alone and in the second case it works in parallel with the exciter and can also be charged from the latter while the train is running.

The motor circuits in both cars are completely separate from one another, and the generator of one car feeds only the two motors of the same car. Safety precautions, such as fuses, overload release, deadman's handle, etc., are provided throughout. The lighting, signaling, battery ignition and other auxiliary apparatus are connected up to the battery. Should any part of the equipment develop a defect, the connections can be altered to permit the train to operate with the equipment of one car alone merely by using a throw-over switch, which is sealed in its normal position. All heavy current equipment is carried in a box under the car floor. The train is equipped with Westinghouse automatic air brakes as well as with an air sander and whistle.



Private Gas-Electric Motor Car and Trailer for the Khedive of Egypt

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LONDON LETTER

(From Our Regular Correspondent)

The twelfth annual conference of the Municipal Tramways Association (Incorporated) was held in Sheffield beginning on Sept. 23 under the presidency of A. R. Fearnley, general manager of the Sheffield Corporation Tramways. An informal reception was held at Royal Victoria Station Hotel on the evening of Sept. 23. The Executive Council met on the morning of Sept. 24 at the town hall. A reception by the Lord Mayor, chairman and members of the Sheffield tramways committee followed in the Council Chamber. After the presidential address by Mr. Fearnley, a paper on "Advantages and Disadvantages of Platform Fare Collection" was read by Alderman S. Flint, chairman of the Leicester Corporation Tramways committee. The discussion was opend by Councilor J. A. Smith, chairman of the Aberdeen Corporation Tramways committee. Luncheon was served at the Grand Hotel. In the afternoon a paper on "The Maintenance of Paving on Tramway Track, as Affected by Section 28 of the Tramways Act, 1870," was read by Councilor W. C. Fenton, member of the Sheffield City Council. The discussion was opened by Councilor C. F. Spencer, chairman of the Halifax Corporation Tramways committee. During the afternoon the ladies who attended the conference with the delegates paid a visit to the silverplate and cutlery works and showrooms of Mappin & Webb. In the evening, by invitation of the tramways committee, all of the delegates and the ladies were present at a performance at the Lyceum Theater. Supper was served after the theater at the town hall. On Sept. 25, after the meeting of the executive council and a meeting of the managers' section, a paper on "Urban Passenger Transport" was read by J. B. Hamilton, general manager of the Leeds Corporation Tramways. The discussion was opened by Alderman H. W. Littler, chairman of the West Ham Corporation Tramways committee. Luncheon was served at the Royal Victoria Station Hotel at the invitation of the tramways committee. The delegates then visited the various works in the vicinity, being transported in special cars. Many members decided to visit the plant of Edgar Allen & Company, Ltd., Hadfield's Steel Foundry Company, Ltd., and S. Osborn & Company, Ltd. Others visited the various electric supply and power stations in Sheffield. In the meantime the ladies were entertained by a motor-bus trip to Haddon Hall and Grindleford. At the latter place tea was served at the invitation of the Lady Mayoress of Sheffield. The annual dinner of the association was held at the Royal Victoria Station Hotel in the evening. The executive council and the annual business meetings were held on the last day.

The Council of Morecambe has approved the resolution of the electricity committee of the Corporation instructing the electrical engineer to prepare plans for the electrification of the tramways. At a town meeting four years ago the ratepayers declined to allow the Corporation to proceed with a bill providing for the electrification of the tramways. Morecambe still depends entirely upon a horse tramway service.

The Board of Trade has refused to authorize the Brighton Corporation to run double-decked railless trolley vehicles. There are at present no vehicles of this double-decked type in operation, though the R. E. T. Construction Company, London, has built one for experimental purposes.

The Birkenhead Corporation has decided to seek parliamentary power to run motor omnibuses in Birkenhead and the adjoining districts.

The urban districts of Bolton, Wath, Thurnscoe and Wombwell are promoting a bill for a permanent tramway service to connect the centers in the valley of the Dearne. This action was prompted by the Swinton Tramway withdrawing the places referred to from its railless traction bill.

The Swansea Tramways, which leases the Mumbles Railway, contemplates electrifying the line at an expense of £60,000. The intention is to run a regular ten-minute service from Rutland Street to the pier.

The Sheffield tramways committee has decided to grant the application of the Sheffield University Council for aid in extending the university buildings in Western Bank to meet the immediate requirements of the science and art departments and has recommended that the City Council donate £1,000 a year from the funds of the tramways undertaking for a period of ten years. The committee has also decided to allow children under five years of age to travel free on the tramways and to charge half fare to persons between the ages of five and fifteen years.

C. W. Mallins, general manager of the Liverpool Corporation Tramways, has reported on the question of contract tickets, transfer tickets and cheap fares for children. He communicated with most of the municipalities and eighty-four replied, eighty-one of which do not issue contract tickets. All consider that it is impossible to appraise the value of such a ticket. In the case of one company which reported to Mr. Mallins the practice of issuing contract tickets was discontinued owing to abuse and consequent financial loss. One corporation reported that it is losing at least £1,500 per annum on such tickets. With regard to transfer tickets, of the same eighty-four tramway authorities, forty-eight issue no transfer tickets, and twenty-four undertakings which do issue transfer tickets do not recommend their adoption. Most of the authorities reported that they arrange the fares for children in accordance with local conditions. A number adopt the practice of charging half fares for children between the ages of three and ten years, and in some cases up to twelve and fourteen years of age. A number of other communities, including London and Liverpool, do not charge for children under five years, but over that age charge full fare. Liverpool makes a further concession when special cars are hired for the conveyance of children, but on the whole no uniform practice has been adopted by the various municipalities.

The London County Council appears well satisfied with the experimental petrol-electric tramcar which it placed in service recently. The car is in use on the 3-mile tramway from Stepney to the East India Dock.

The serious decline in the profits of the London County Council tramways has induced the County Council to appeal to the assessment committee for a reduction of its assessment. At present the Council pays rates amounting to about £100,000 a year to the various local authorities through whose jurisdiction the tramways pass. The local rates would, of course, be affected by any reduction in the tramway assessment, as the deficiency would have to be made up by the authorities in some other way.

The new Hagley Road tramway of the Birmingham Corporation has been officially inspected by Major Pringle on behalf of the Board of Trade, and it has now been put into service.

George Balfour, of Balfour, Beatty & Company, has offered £32,892 to the Stirling Town Council for the Stirling tramways and the electric light undertaking. The Stirling tramways are operated with horses.

The linking up of the three electric railways at Charing Cross will probably be completed within the next few months. This work will connect the District Railway, the Bakerloo and the Hampstead tubes physically and obviate the present walk from the Charing Cross station of the Metropolitan District Railway to the Charing Cross station of the Hampstead tube, and the long walk underground from the Embankment station of the Bakerloo tube to the platform of the Metropolitan District Railway. In a month or so trains will run from Hampstead to the Embankment and discharge passengers at platforms almost on a level with those of the Bakerloo station, which will be situated beneath the new District station. A new escalator is being installed to connect the three stations.

Work on the electrification of the new London & Northwestern Railway from Euston to Watford is progressing. The conversion of the suburban lines of the London & Southwestern Railway is now under way. The extension of the Baker Street & Waterloo Bridge Railway from Edgware Road to Paddington has been completed, and it is probable that trains will be running to Paddington before the end of the year. The extension of the Baker Street & Waterloo Railway from Paddington to a junction with the London & Northwestern electric line at Queen's Park, Willesden, is well advanced, and it is likely that within twelve months underground trains will have access to this important main line. The plan to run these trains to Watford cannot, however, be carried out until the London & Northwestern Railway's central station and electrification have been completed.

A. C. S.

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News of Electric Railways

General Suggestions for Railroad Valuation

In connection with the general subject of railroad valuation a sheet of suggestions in diagrammatic form as to inventory and information to be obtained under the valuation act has been issued by Thomas W. Hulme, general secretary of the presidents' conference committee.

The first item suggested is improvements, with an analysis of the methods by which original cost with additions, cost of reproduction and cost of reproduction less depreciation are obtained, and the reasons for their differences, if existent. Supplemental to this it is recommended that other values and elements of values be analyzed as to methods of valuation employed and reasons for any differences between such values and the foregoing costs.

Land, right-of-way and terminals used for common-carrier purposes are proposed for consideration next, original cost being compared with present value, and in the case of land acquired by condemnation the original cost is to be compared with the present cost. The third classification pertains to property held for purposes other than for those of a common carrier, and with such property it is proposed that original cost and present value be obtained, with an analysis of the methods of valuation employed.

Fourthly, financial matters are recommended for consideration, subdivided into (1) history and organization of present and previous corporations operating any part of the property; (2) increases or decreases of stocks, bonds or other securities in reorganization; (3) moneys received by any of the corporations by reason of any issue of stocks, bonds or other securities; (4) moneys for syndicating, banking or other financial arrangements under which such stocks, bonds or other securities were issued, and the expense thereof; (5) gross and net earnings of each present and previous corporation; (6) expenditures of all moneys in such detail as the Interstate Commerce Commission may require, and the purpose thereof, and (7) such other elements as the commission may require to ascertain the original cost to date.

In the fifth and last group are placed for consideration the amount and value of any aid, gift, grant of right-of-way or donation made to the reporting carrier or to any predecessor by any government, individual or others; grants of land and the amount derived from the sale of portions thereof; value of the unsold portion at the time of acquirement; value of the unsold portion at the present time, and the amount and value of any concession and allowance made to the United States or to any State, county or municipal government in consideration of any aid, gift, grant or donation.

Mr. McCall on Rapid Transit Matters

Edward E. McCall, chairman of the Public Service Commission of the First District of New York, who is the Democratic candidate for Mayor of New York, was quoted in part as follows in regard to rapid transit matters in New York in a full-page interview with him which appeared in the editorial section of the New York *World* of Sunday, Sept. 21:

"The matter of the financing of the new subways has led to a great deal of acrimonious discussion. I will not go into that question at present further than to express the opinion, after a very careful consideration of all the circumstances of the case, that on the whole the contracts which have been signed are substantially fair and that they properly protect the city's interest.

"The question is a very complicated one and one in regard to which honest men may well hold conflicting views. My feeling is that those who have most strenuously opposed the contracts have not attached sufficient weight to the two factors which finally led to the action which was taken. In the first place the conditions of the passenger traffic on our subway and elevated systems had become so bad that the need for immediate action was imperative. On this ground alone some sacrifice of the utmost advantage obtainable by the city on the financial side of the transaction would have been justifiable, though personally I do not believe that any material sacrifice was made.

"In the second place the difficulties in the way of raising funds to carry out the project as a municipal undertaking were insuperable. I paid very careful attention to this phase of the question and became absolutely convinced that there was no way out in that direction.

"I may say that in regard to subways and all other public improvements I favor in a general way such plans of financing as will make a fair division of the burden between the present and the future taxpayers of the city. It does not seem fair to me that the taxpayers of to-day should be called upon to bear the whole expense of improvements whose advantages will be enjoyed by a new generation of citizens over a long period of years.

"In the matter of transportation the element which surpasses all others in importance and urgency is that of carrying the people between their homes and their business quickly, safely and comfortably, and if this condition can only be realized by heavy expenditure that expenditure will have to be incurred upon the best terms obtainable."

From New England to the Convention by Trolley

The New England Street Railway Club is perfecting the plans for the trip by trolley from New England to the convention in Atlantic City, to which reference has been made previously in the ELECTRIC RAILWAY JOURNAL. A number of the companies are fitting up special cars for the purpose. Schedules will be arranged to operate cars from various points to New London, Conn., picking up those who wish to go along the way. Outside of New London, the principal points of centralization will be Boston and Worcester. Some cars will leave Boston on Oct. 12 at 8.45 a. m. and go to New London via Brockton, Taunton, Providence, Danielson and Norwich. Some will go from Boston to Worcester and to New London. Other cars will go direct from Worcester.

At 11 p. m. a boat of the Norwich line will leave New London for New York, arriving in New York at Pier 40 at 7 a. m., Monday, Oct. 13. At New York a train will be taken which will reach Atlantic City at 1.15 p. m. Lunch will be served on the cars to New London. Arrangements will be made to take care of baggage and staterooms on the boat will be reserved. Special attention will be paid to arrangements for the pleasure and comfort of the ladies.

For the purpose of arriving at some definite figure of cost, it has been decided to fix the trolley fare to New London, including an attractive buffet lunch on the cars, at $3. The fixed charges follow:

Boston or Worcester to New London, including lunch	$3.00
Boat, New London to New York	1.50
Stateroom on boat (as desired)	1.00 or 2.00
Round trip, New York to Atlantic City	5.00
Parlor car, New York to Atlantic City	0.75
Transfer of baggage (approximately)	0.50

Those who desire to make the trip from New England by trolley are requested to write to H. A. Faulkner, the secretary of the club, to let him know how many will go and to send check, payable to E. P. Shaw, Jr., treasurer of the club. Those who decide to go by trolley will be notified later as to the exact plans.

The Question of Hours of Employees in Cleveland

At the instigation of the city solicitor's department, the Cleveland City Council at its regular meeting on Sept. 23 refused to hear complaints from the street railway men regarding the hours they are compelled to work and the effect the present schedules have on their time. Peter Witt, street railway commissioner, had advised the Council that the city had nothing to do with the working hours of the men or the schedules upon which cars are operated, and he was supported in this by the city solicitor's department. This was done in the face of protests from the men that Mr. Witt is responsible for the schedules now in operation and that they make it impossible for the men to have their proper layovers and force extra men to be on duty long hours for only short periods of work.

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The men, following the action of the Council, threatened to take the matter before the Cleveland Federation of Labor in an effort to force the city to take steps for the betterment of the working conditions. They said that one-fourth of the men are compelled to work from twelve to eighteen hours a day at from 75 cents to $1.50 a day. The statement was also made that thirty men gave up their places in one day recently because of these conditions, and that since Jan. 1 as many as 500 men have resigned for the same reason.

It is probable that this matter will now be taken to John J. Stanley, president of the company. Mr. Stanley has expressed a willingness to meet the men, but is unable to see where he can improve matters under the schedules in use at present. It is possible that the men may ask for arbitration on their demands for improved conditions, but it would seem that as long as the city holds the company to the present schedules and headway it will be impossible to effect a change for the better, whatever the decision of a board of arbitration might be.

Results of Pooling Receipts in New York for the First Month

Edward E. McCall, chairman of the Public Service Commission for the First District of New York, has announced the result of the first month's pooling of receipts under the operating provisions of the dual system contract with the New York Municipal Railway Corporation (Brooklyn Rapid Transit). This company is the first to go under the terms of the new contracts by reason of its commencement of the operation of the Centre Street loop subway. This is a four-track subway, but the Brooklyn company is operating only two tracks. The company has been able to take trains off the Brooklyn Bridge and send them over the Williamsburg Bridge and through the loop subway to the City Hall, Manhattan, thus relieving materially the congestion at the Manhattan terminal of the Brooklyn Bridge.

Under the operating contract the earnings of all the Brooklyn elevated lines and the Centre Street loop are pooled. From the gross earnings the company deducts rentals, taxes, operating expenses, allowances for depreciation, and a certain amount known as the "preferential," which is paid to the company in lieu of the profits it derived from its existing lines at the time of making the contract with the city. After these deductions are made the surplus is to be devoted to paying interest and sinking fund charges upon the city's investment. In the case of the Centre Street loop the city's investment upon that portion now in use is estimated at $6,500,000.

For the first month of operation of this loop the company reported a total revenue of $722,271. After making the deductions for expenses, taxes, depreciation and the preferential there was left a balance of $22,870, which was more than enough to pay the interest on the city's investment and within $2,814.52 of the sinking fund as well.

Akron Ordinance for Municipal Ownership Laid Over

At the regular meeting of the City Council of Akron, Ohio, on the evening of Sept. 24, the ordinance providing for the issue of $225,000 of bonds for the purpose of building a municipal railway line was laid on the table by a vote of seven to four, to await the report of a committee of citizens which has taken the matter to the officials of the Northern Ohio Traction & Light Company. Councilman Shaw, who made the request for delay in action on the ordinance, expressed the belief that the company will make a proposition for extensions and improvements which the Council will be willing to consider. He said, however, that he will vote for the bond issue if the company does not take such a step within a week from the date of the meeting.

A. C. Esch, Socialist member of the Council, has announced that he will circulate petitions to initiate an ordinance providing for municipal ownership. It will be necessary to secure the signature of 30 per cent of the electors in order to have an initiative vote on the question. If the petition is successful, the matter will come up at the regular election in November.

R. P. Stevens on Regulation

R. P. Stevens, the retiring president of the Lehigh Valley Transit Company, Allentown, Pa., concluded in part as follows the address which he made at the banquet tendered to him recently by the newspaper men of Allentown and Bethlehem:

"I thank God that the newspaper men of the Lehigh Valley are broad-minded, are able to look to the future and do not throw away sound principles and good judgment in order to satisfy a temporary, feverish desire of small unthinking groups who do not know what they want and, in order to get what they think they want, would undermine the very industries which are essential to their welfare.

"I think more combined effort should be made to make the people realize that the electric roads are an essential part of every community, that they are an absolutely necessary adjunct to business and that anything done to hinder them or impair their credit, or to prevent the sale of their securities, is a blow to the people themselves.

"I firmly believe in legislation for the public utilities and in government regulation, provided the motive is in the interest of progress and betterment, and not political, but this legislation should be reasonable, practical, clear and effective and should not be planned during the height of agitation.

"I think the fear on the part of the public utility managers at present is not so much for what has been done, but because of the manner and temper in which it was done and for fear of what may come in the future. It is not certain in my mind that the mixture of private ownership and public regulation which is now prevalent will succeed. It is contrary to all rules of political economy and all teachings of history.

"Started as a purely private industry, our public utilities have been appropriated in part, and other parts are apparently to follow, and, granting whatever may be claimed for the advantages of regulation by government, do not equity and ordinary commercial decency require that such close restriction and supervision as are required by some of our public utility laws should be continued by some guarantee or return on the investment?"

Results with Low Fare in Detroit

The fare of seven tickets for 25 cents went into effect on the lines of the Detroit (Mich.) United Railway on Aug. 15 and the old rate was collected for the first fourteen days of the month. The company reported gross earnings of $1,121,125 for the month, as against $1,031,761 for the corresponding month of 1912, a gain of $89,364, or 8.66 per cent. The third week of August, or the first week the low fare agreement was in operation, the gross earnings were $246,466, as compared with $231,430 for the corresponding week a year ago, a gain of $15,036. The fourth week showed $255,141, a gain of $14,095 over the corresponding week in 1912. The increase in gross earnings for the first week in September was $3,268 over the same period in 1912.

The Common Council on the evening of Sept. 23 adopted a resolution, presented by Alderman Lodge, providing for the extension of the Fourteenth Street line to the new Michigan Central station, but making the fare eight tickets for 25 cents on the old Pingree cars. It is believed that the company will refuse to accept the proposition because of the rate of fare provided.

Tentative Franchise in Des Moines

The terms of the franchise which the city of Des Moines, Ia., will submit to the officers of the Des Moines City Railway as the basis of negotiations looking toward an extension of the present grant of that company have been decided upon by the city officials, and H. M. Byers, corporation counsel of the city, has been instructed to redraft the proposed grant. Important provisions of the tentative franchise agreed upon recently follow:

Franchise tax approved—to be voted on separately; city to receive 2 per cent of gross earnings for first five years; 3 per cent of earnings for second five years; 4 per cent for

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third five years, and 5 per cent for last ten years the franchise will run.

After reaching the maximum of dividends to be allowed the company, all surplus shall go to reduce fares instead of to amortize the capital value.

City Council shall approve all compromises of personal injury cases. Company must give city right of way to open Ingersoll Avenue from Seventeenth to Twenty-eighth street.

Council shall approve arrangements to insure property.

Permission given company to use all viaducts.

Company shall spend $1,500,000 to rehabilitate the system.

Special provision for extra cars at rush hours.

Plan to purchase system, if people sanction municipal ownership.

Company shall incorporate in Iowa and keep its books in Des Moines.

Company is given thirty instead of fifty days to accept this franchise.

Progress with Toronto Safety Campaign

The members of the Ontario Safety League, organized to prevent street accidents, met at the City Hall in Toronto on Sept. 23 and formed a tentative membership plan. It is intended to have two classes of members—associates, comprising the younger generation, who will be supplied with celluloid emblem buttons and will be expected to do missionary work in the schools but will pay no fees, and sustaining members, who will pay a fee of $1. It is also planned to raise funds by contribution from various public bodies and from wealthy individuals. Walter McRae, superintendent of motive power of the Toronto Railway, outlined the publicity plan. Buttons and literature are to be distributed, and there will be a campaign of advertising by poster and in the newspapers. A form of covenant will be drawn up for the children to sign.

In furtherance of the purpose of the league the Toronto Railway inserted the following advertisement in all the Toronto daily papers of Sept. 26, over the name of James Gunn, superintendent:

"IT IS TREACHEROUS.

"What railroad people call a 'greasy' rail is a most treacherous and dangerous thing to deal with.

"The wheels won't grip on a 'greasy' rail. The car will slide as though on ice. Hence the danger.

"A car may pass a certain rail and find it clear of 'grease.' Half an hour later another car may come along and with locked wheels skid over it like a toboggan. Hence the word 'treacherous' is used.

"This is the time of year when 'greasy' rail is to be expected in Toronto. The frost causes it. Sometimes a heavy rain or a fall of soft snow will clear the rails for a few days in the winter. As a general rule, though, 'greasy' rail may be looked for as long as the frost lasts.

"Through this season drivers of all sorts of vehicles, and, indeed, foot passengers as well, ought to be very careful about crossing in front of moving street cars.

"A motorman may intend to stop, as the driver expects him to. But a strip of 'greasy' rail is likely to upset all his calculations. It may be that he cannot stop, that all the brakes in the world can't stop him.

"In the time of 'greasy' rail the wise thing to do is not to cross in front of a car because you expect it to stop. Wait until it does stop.

"Don't put it up to the motorman.

"Look after yourself.

"Safety first."

Inspection of New Line Between Dallas and Waco

The Southern Traction Company, Dallas, Tex., sent invitations to stockholders for an inspection trip on Sept. 30 over its line recently completed between Dallas and Waco, Tex. The inspection trains were to consist of two cars each, and were to leave Dallas and Hillsboro, Tex., in the morning. The Dallas train was to be accompanied by the following officers of the Southern Traction Company: J. F. Strickland, president; R. B. Stichter, general manager; Burr Martin, president Southern Engineering & Construction Company; Luther Dean, chief engineer Southern Engineering & Construction Company, and D. G. Fisher, assistant to the general manager. The Hillsboro train, consisting of two sections of two cars each, was to be run under the supervision of James P. Griffin, general passenger agent, and Howard Williams, Waco ticket agent, in charge of one train and H. I. Gahagan, treasurer of the Southern Traction Company, in charge of the other train.

New Officers of Lehigh Valley Transit Company

At a meeting of the board of directors of the Lehigh Valley Transit Company, Allentown, Pa., held on Sept. 29, Col. Harry C. Trexler, Allentown, was elected chairman of the board of directors, Harrison R. Fehr was elected president of the company, vice R. P. Stevens, resigned, and Edward M. Young, Allentown, was elected vice-president of the company, in place of Colonel Trexler, who had formerly held that office. The officers and board of directors as now constituted follow: President, Harrison R. Fehr; vice-president, Edward M. Young; secretary and treasurer, Charles M. Wagner; auditor, C. M. Walter; Charles H. Bean, John C. Dawson, George H. Frazier, Charles E. Ingersoll, Charles M. Schwab, Edward B. Smith, Warren C. Wilbur, Edward M. Young, H. R. Fehr, Col. Harry C. Trexler, chairman of the board.

Chicago Subway Report

Construction of a two-level subway without grade crossings with the $16,000,000 the city now has available, and with which the courts have decided it has the power to proceed under the 1907 traction ordinances, is the chief recommendation in a report completed on Sept. 26 by Bion J. Arnold, chairman of the Board of Supervising Engineers, Chicago, Traction.

The report, which was designed to apply to a subway for the surface lines only, but which the author considered inseparable from a subway for through routing elevated trains, shows clearly that the congested downtown district is overtaxed by passengers, and that this condition is growing worse rapidly.

A subway for the congested district, instead of the comprehensive scheme, is specified in Mr. Arnold's report, but he would have it built along such lines that in the future when the city is ready to extend it could be used as the nucleus of a larger system.

Abolishing the Cable in Kansas City.—The Metropolitan Street Railway, Kansas City, Mo., shortly will abolish the old cable system, which at one time was used almost exclusively. Only one cable line remains in operation at present, running on the west side of Twelfth Street over what is known as the "Bottoms." This is to be eliminated following the Stock Show late in October Whether the Twelfth Street line will run entirely across the city, eliminating the necessity of a transfer system, as at present, has not been decided.

The Question of Extension in Toronto.—The Ontario Railway Board decided on Sept. 24 to appoint an independent traffic expert to investigate and report upon the advisability of the board ordering the Toronto Railway to change routes, add new ones and increase the number of cars. Pending the receipt of this report the board's engineer will look into the delay in the completion of the Teraulay Street line. Despite Corporation Counsel Geary's argument the board declined to issue an order for the construction of the Bloor Street line, agreeing with the declaration of counsel for the company that the line could not be started until next spring in any event, and that if the board delayed making an order until its expert was heard from no time would be lost by the company in carrying out the work.

Service and Labor Questions in Kansas City.—Mayor Green of Kansas City, Kan., explained his attitude in regard to express service between Kansas City, Mo., and Kansas City, Kan., in a recent address before the Mercantile Club of Kansas City, Kan. The Mayor stated that both the intercity viaduct and a structure across the West Bottoms were available for the express service. Mayor Green also wants the principal street car lines to be routed through the main

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business streets on the Kansas side, believing that the interests of the city would be furthered by such a method. Organized labor at a recent meeting adopted a resolution providing for recognition by the Metropolitan Street Railway, Kansas City, Mo. A committee of five men was appointed to appear before the franchise committee of the Kansas City Council and present the demands of the union sympathizers.

Bids for Rapid Transit Construction in New York.—Engineers of the Public Service Commission for the First District of New York are pushing work on plans for the various sections of the dual system of rapid transit. As fast as plans for given sections are completed the commission advertises for bids for construction. On Oct. 1 bids were received for the construction of the first section of the Seventh Avenue subway in Manhattan to be put under contract, and within two months actual work should begin on that important line. The Seventh Avenue subway is the new West Side line which will be provided for operation by the Interborough Rapid Transit Company. It will begin at Times Square (Forty-second Street), where it will connect with the existing subway, and run southward to the Battery and to Brooklyn. Work on the plans for the other sections is approaching completion and within a few months the whole line ought to be under contract. When it is completed trains from northern Manhattan and the Bronx through the existing subway may be operated from Forty-second Street over the new line to lower Manhattan instead of down the East Side as at present. There will be three express stops in Manhattan below Times Square, at Chambers Street, Fourteenth Street and the Pennsylvania Railroad Station.

Unprofitable Extension Sought in Tacoma.—The Commercial Club and Chamber of Commerce of Tacoma, Wash., has made public the correspondence between it and the Tacoma Railway & Power Company in regard to the construction of an electric railway to serve the district known as the tideflats. Jacob Furth, president of the Puget Sound Traction, Light & Power Company, explains that the company desires the city to construct the line and turn it over to the company for operation. Mr. Furth in a letter to the Chamber of Commerce says in part: "We still think that if the city would build a line and turn the operation of the line over to our company the industrial district could be developed, and even if there should be a loss in the operation it would be small if carried by all the people, but it does not seem to us quite fair that one company should be required to sustain the loss which the construction and operation of the line would doubtless involve. The principal reason why our company is not earning sufficient for the investment is the long haul and the large mileage of the city of Tacoma. At the conference we stated the facts practically as I am stating them here. At that time it was understood that we made an offer to throw our books open to an examination by your committee. I assure you that we have no disposition to hide anything."

President Elliott for Full Publicity.—Howard Elliott, president of the New York, New Haven & Hartford Railroad, in a letter to Governor Foss of Massachusetts, which was made public on Sept. 29, answered the criticism of expenditures by the road for "personal services" in the period substantially covered by the last session of the Legislature by the statement that the apparent fault lay almost entirely in the manner of reading the reports filed with the Public Service Commission. President Elliott concluded his letter as follows: "I agree with you wholly that the public has a right to know that all expenditures made by the railroad are proper and for legitimate purposes for the maintenance, operation, and care of the railroad, and that the commissioners have a right to know all the details necessary to satisfy them as to this point. If the company has not furnished the Public Service Commission with complete information, and the commission will indicate just what additional data are required, I will see that the facts are produced so far as the records of the company permit. The management of the New Haven and New England companies, as represented by me—and I believe I speak in this for the board of directors—desires to manage and operate the properties in harmony with the laws of the land, and to co-operate with the public authorities."

Financial and Corporate

Stock and Money Market

Sept. 29, 1913.

Trading on the New York Stock Exchange was dull at the opening and price changes were insignificant. During the early afternoon the market recovered, but on light trading in the late afternoon it closed weak. Interborough-Metropolitan preferred scored an advance. The sales for the day totaled 312,877 shares. Rates in the money market to-day were: Call, 2¾@3 per cent; sixty days, 4¼@4½ per cent; ninety days, 4½@4¾ per cent; four months, 4¾@5 per cent; five and six months, 4½@5 per cent.

The weakness in New York was reflected in Philadelphia and practically discouraged all demand for local issues at the opening. The market was broad but the volume of sales was very small.

The Chicago market was extremely narrow and weak to-day. There was very little demand for bonds.

The Boston market was quiet and weak to-day. There was no great selling pressure and no aggressive buying.

The sales of stock in Baltimore to-day totaled only 584 shares. The demand for bonds was good, the sales totaling $54,900, par value.

Quotations of traction and manufacturing securities as compared with last week follow:

	Sept. 24	Sept. 30
American Brake Shoe & Foundry (common)	92⅝	90
American Brake Shoe & Foundry (preferred)	135	131½
American Cities Company (common)	37½	36
American Cities Company (preferred)	65	66
American Light & Traction Company (common)	354	353
American Light & Traction Company (preferred)	105	105
American Railways Company	39⅜	39⅜
Aurora, Elgin & Chicago Railroad (common)	42	41
Aurora, Elgin & Chicago Railroad (preferred)	84	83
Boston Elevated Railway	86½	86½
Boston Suburban Electric Companies (common)	7	7
Boston Suburban Electric Companies (preferred)	56½	56½
Boston & Worcester Electric Companies (common)	a10	*10
Boston & Worcester Electric Companies (preferred)	43	43
Brooklyn Rapid Transit Company	89¼	89
Capital Traction Company, Washington	116	115
Chicago City Railway	165	150
Chicago Elevated Railways (common)	25	20
Chicago Elevated Railways (preferred)	75	75
Chicago Railways, ptcptg., ctf. 1	94	93
Chicago Railways, ptcptg., ctf. 2	30⅜	30
Chicago Railways, ptcptg., ctf. 3	8	8
Chicago Railways, ptcptg., ctf. 4	3	3
Cincinnati Street Railway	120	107¼
Cleveland Railway	102⅝	102½
Cleveland, Southwestern & Columbus Ry. (common)	*5½	*5½
Cleveland, Southwestern & Columbus Ry. (preferred)	*28¼	*28¼
Columbus Railway & Light Company	18	18
Columbus Railway (common)	a69½	69½
Columbus Railway (preferred)	88	88
Denver & Northwestern Railway	*104	*104
Detroit United Railway	69	69
General Electric Company	146	146¼
Georgia Railway & Electric Company (common)	117	117
Georgia Railway & Electric Company (preferred)	87	87
Interborough Metropolitan Company (common)	15⅜	15¼
Interborough Metropolitan Company (preferred)	60⅜	61¼
International Traction Company (common)	*30	*30
International Traction Company (preferred)	*95	*95
Kansas City Railway & Light Company (common)	22	22
Kansas City Railway & Light Company (preferred)	30	30
Lake Shore Electric Railway (common)	*5	*5
Lake Shore Electric Railway (1st preferred)	*89	*89
Lake Shore Electric Railway (2d preferred)	*24	*24
Manhattan Railway	130	133
Massachusetts Electric Companies (common)	14	13¼
Massachusetts Electric Companies (preferred)	a68	67
Milwaukee Electric Railway & Light Co. preferred)	95	95
Norfolk Railway & Light Company	*27½	*27½
North American Company	73	72
Northern Ohio Light & Traction Company (common)	63	63
Northern Ohio Light & Traction Company (preferred)	97	97
Philadelphia Company, Pittsburgh (common)	43⅜	42⅞
Philadelphia Company, Pittsburgh (preferred)	40	40
Philadelphia Rapid Transit Company	23	22⅝
Portland Railway, Light & Power Company	55	55
Public Service Corporation	114	112
Third Avenue Railway, New York	42½	42
Toledo Traction, Light & Power Company (common)	a30	30
Toledo Traction, Light & Power Company (preferred)	a80	80
Twin City Rapid Transit Co., Minneapolis (common)	106	105
Union Traction Company of Indiana (common)	*5	*5
Union Traction Company of Indiana (1st preferred)	*80	80
Union Traction Company of Indiana (2d preferred)	*20	*20
United Rys. & Electric Company (Baltimore)	26⅞	26⅝
United Rys. Inv. Company (common)	22	20
United Rys. Inv. Company (preferred)	40	40
Virginia Railway & Power Company (common)	56	53
Virginia Railway & Power Company (preferred)	94	94
Washington Ry. & Electric Company (common)	89	89½
Washington Ry. & Electric Company (preferred)	89½	89½
West End Street Railway, Boston (common)	70	71
West End Street Railway, Boston (preferred)	88	89
Westinghouse Elec. & Mfg. Company	70½	69⅞
Westinghouse Elec. & Mfg. Company (1st preferred)	115	110

*Last sale. a Asked.

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ANNUAL REPORTS

Boston & Worcester Electric Companies

The Boston & Worcester Electric Companies, Boston, Mass., the corporation which controls through stock ownership the Boston & Worcester Street Railway, has issued the following comparative statement of income, profit and loss for the years ended June 30, 1912 and 1913:

	1913	1912
Income:		
Dividends on Boston & Worcester Street Railway shares owned	$50,625	$50,625
Other income	19,057	18,964
Total income	$69,682	$69,589
Disbursements:		
Dividend of $1 per share on preferred shares payable Jan. 1, 1913	$33,936	$33,936
Dividend of $1 per share on preferred shares payable July 1, 1913	33,936	33,936
Miscellaneous expenses	1,388	1,113
Total disbursements	$69,260	$68,985
Surplus for year	$422	$604
Surplus brought forward	14,495	13,891
Total surplus	$14,917	$14,495

The statement of income, profit and loss of the Boston & Worcester Street Railway for the years ended June 30, 1912 and 1913, is as follows:

	1913.	1912.
Revenue from transportation:		
Passenger revenue	$631,168	$607,611
Mail revenue	451	451
Freight and express revenue	24,938	.....
Miscellaneous transportation revenue	200	200
Total revenue from transportation	$656,757	$608.262
Miscellaneous revenue:		
Rental of buildings and equipment	$4,079	$3,761
Advertising privilege	1,410	1,410
Trackage and power rental	1,119	3,718
Other miscellaneous revenue	5,572	2,770
Total miscellaneous revenue	$12,180	$11,659
Total revenue	$668,937	$619,921
Expenses of operation:		
For conducting transportation:		
Electric motive power	$77,066	$72,626
Wages of men conducting transportation	102,861	86,737
Other transportation expenses	29,926	17,761
Total	$209,853	$177,124
For maintenance:		
Repairs to track, roadway and line	$72,889	*$63,286
Repairs to buildings	1,536	3,188
Repairs to rolling stock and miscellaneous equipment	51,859	64,005
Repairs to power plant equipment	6,699	5,577
Removal of snow and ice	819	1,816
Total	$133,802	$137,871
For general expense:		
Salaries of officers and clerks	$24,287	$19,831
Damages	20,137	12,156
Insurance	9,893	7,985
Advertising	7,735	3,499
Printing, tickets and stationery	2,448	1,794
Track rental	836	659
Miscellaneous general expense	8,857	7,482
Total	$74,192	$53,406
Total expense of operation	$417,847	$368,401
Net revenue above operation	$251,090	$251,521
Interest on funded and floating debt	124,241	123,450
Taxes	47,971	48,321
Total deductions	$172,212	$171,771
Net surplus for year	$78,878	$79,751
Dividends on preferred stock	23,687	18,344
Dividends on common stock	50,625	50,625
Total dividends	$74,312	$68,969
Surplus for year after dividends	$4,566	$10,780

*Including reconstruction item of $6,963 deducted from surplus in the annual report for 1912.

William M. Butler, president of the company, says:

"The gross passenger earnings of the street railway show an increase for the year of approximately $24,000, or about 4 per cent over the previous year, which indicates a steady growth in the territory served by the lines of the company.

"The general upkeep of the property of the street railway has been carefully looked after, $72,889 having been expended for the past year on track, roadway and overhead lines, or an average of $885 per mile of track owned. In comparing the amounts expended by various other street railway companies throughout New England, it appears that this company has been liberal in its expenditures for this account, and it is believed that the amount spent during the past year represents the maximum of expenditure required for this purpose.

"A tie-treating plant has been purchased, and practically all new ties that are now being laid are chemically treated, which should materially prolong their period of usefulness.

"The block signal system, which has been in process of installation during the past three years, has now been practically completed.

"A freight and express service was inaugurated on the lines of the company about Jan. 1, arrangements having been made with the Boston Elevated Railway and the Worcester Consolidated Street Railway for terminal facilities in both Boston and Worcester. Freight and express stations have been established in various cities and towns in which the company operates, together with necessary track connections, and sufficient freight and express equipment has been provided. This service has not been established long enough to justify a prediction as to its value, but the management is diligently at work to develop it in order to make it a profitable addition to our business.

"The company issued $140,000 additional first mortgage bonds during the year, the sale of which reduced the floating debt to $175,000. This floating debt is held by the Boston & Worcester Electric Companies, and the street railway still continues independent of outside borrowing."

American Public Utilities Company

The board of directors of the American Public Utilities Company, Grand Rapids, Mich., has submitted to the stockholders the following partial comparative income, profit and loss statement for the two years ended June 30, 1911, and June 30, 1912:

	1913	1912
Gross earnings from operations	$1,981,320	$1,738,192
Operating expenses	1,071,621	964,642
Net earnings from operations	$909,699	$773,549
Miscellaneous income	64,627	
Gross income	$974,326	
Less expense	38,150	
Net income	$936,176	
Fixed charges:		
Interest on underlying securities	460,954	
*Interest on average amount of collateral trust bonds outstanding	42,850	
Total fixed charges	$503,804	
†Remainder	432,372	
Dividend on average amount of preferred stock outstanding	203,640	
Balance	$228,732	

*Collateral trust bonds outstanding Sept. 30, 1912, $839,000; outstanding June 30, 1913, $893,000.

†Preferred stock outstanding Sept. 30, 1912, $1,714,000; outstanding June 30, 1913, $3,914,000.

The report says in part:

"The securities of the company outstanding at the present time are: Preferred stock, 6 per cent cumulative preferred (both as to dividends and assets), outstanding, $3,914,000; authorized, $20,000,000; common stock, outstanding, $2,995,000; authorized, $20,000,000; collateral trust 5 per cent thirty-year bonds, outstanding, $893,000; authorized, $20,000,000.

"Immediately upon the organization of the company, its subsidiaries were provided with funds with which to make any needed improvements or extensions.

"The entire street railway system in Jackson, Miss., has been overhauled and placed in first-class condition. Much new rail has been laid and a large amount of paving done between the tracks. The overhead system of the electric department and of the street railway has been improved and strengthened. The gas plant has been overhauled, new mains have been laid, and the entire distribution system has been placed in condition to make efficient service possible. All of the old equipment of the street car company has been abandoned and new cars purchased. The total expenditure for improvements, etc., is $240,447.

"At La Crosse it has been necessary to rehabilitate the gas plant and authority was secured from the Railroad Commission of Wisconsin for the expenditure of approximately $80,000. This work included the erection of a new machinery house, new purifiers, condensers, scrubbers, boilers, water-gas set and several miles of high-pressure main.

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"At the Edison station of the La Crosse Company additional boilers are being installed to take care of the heating business of the company and the heating station equipment is being overhauled generally. The estimated cost of these improvements is $35,000.

"Our business in Indianapolis has been growing very rapidly during the past year. The heating distribution system has been extended, as has also the electrical distribution system. The demand upon the two power houses of the Merchants' company has developed to such an extent that it has become necessary to install additional boilers. It has also been deemed advisable to install a water-softening plant. At the 'East plant' we are entirely rehabilitating the equipment. The expenditures for additional distribution capacity have been about $20,000, and it is estimated that the other improvements which we have inaugurated will cost in the neighborhood of $80,000.

"The plant of the People's Light & Heat Company, Indianapolis, is now being operated in connection with the plant of the Merchants' company and considerable saving in operating cost has been effected. The hot-water system of the People's company and the electrical distribution system are being improved and strengthened at an approximate expenditure of $25,000."

The Public Utilities Commission of Indiana has approved the merging of the Merchants' Light & Heat Company and the People's Light & Heat Company, both of Indianapolis and both controlled by the American Public Utilities Company. The Merchants' company purchases the People's company for $525,000. The bonds issued in payment have been sold to the Harris Trust & Savings Bank and Lee, Higginson & Company.

This merger was the result of the finding recently announced by the Public Utility Commission. Under this finding both companies were required to surrender their franchises, and the Merchants' company, as the merged corporation, was required to take out an indeterminate permit from the commission. The People's company surrendered its franchise some time ago, and the officials of the Merchants' Heat & Light Company recently surrendered the franchise of the company to the Public Utility Commission, as stipulated in the terms of the merger. At the same time a certificate of the increase in capital stock of the Merchants' company was filed with the Secretary of State, but because of technicalities the Secretary has not yet approved the papers. The increase is $230,000 of common stock, making the total common stock of the company $1,500,000. The preferred stock is $1,500,000.

Portland Railway, Light & Power Company

The Portland Railway, Light & Power Company, Portland, Ore., in its earnings statement for the twelve months ended June 30, 1913, showed an increase in gross earnings of $208,707, or 3.2 per cent, with an increase in net earnings of $111,666, or 3.4 per cent. The complete statement follows:

	1913	1912
Gross earnings	$6,683,215	$6,474,508
Operating expenses (including taxes)	3,310,139	3,213,098
Net earnings	$3,373,076	$3,261,410
Interest, etc.	1,851,786	1,638,632
Surplus	$1,521,290	$1,622,778

The decrease of $101,488, or 6.3 per cent, in the surplus was caused by an increase of $213,154, or 13 per cent, in fixed charges for securities issued in connection with improvements and extensions, which have not yet begun to show results in gross and net earnings. The surplus, after charges, for the twelve months was equivalent to 6.1 per cent on the outstanding $25,000,000 of capital stock, on which dividends of 1¼ per cent quarterly are being paid. Much of the new capital expenditure has been on the Mount Hood Railway.

American Cities Company, New York, N. Y.—The stockholders of the United Gas & Electric Company of Connecticut, New York, N. Y., have ratified the plan providing for the acquisition of the common stock of the American Cities Company in accordance with the plan referred to in the ELECTRIC RAILWAY JOURNAL of Aug. 30, 1913, page 353. It is proposed to create a new class of stock, second preferred, and to issue $12,500,000 of this, increasing the corporation's capital from $45,000,000 to $57,500,000. The new stock is to bear interest at 2 per cent for 1914, the rate of interest being increased annually by 1 per cent until a rate of 6 per cent is reached, at which it will be continued. It is stated that the purchase of American Cities stock is to be made by the exchange of stock on a par basis, seventy-five shares of the new second preferred stock and twenty-five shares of the common stock of the United Gas & Electric Corporation being exchanged for each 100 shares of the common stock of the American Cities Company.

Brantford (Ont.) Street Railway.—In the suit of the city of Brantford against the Brantford Street Railway in which cancellation of the fifty-year franchise of the company and the recovery of $27,000 in taxes were asked Justice R. M. Meredith of the High Court ruled in part as follows: "The company has one year in which to complete reconstruction of the line in those portions where it is defective and dangerous. The company is fined $100 per month until such improvements are made. The company pays all costs of the High Court action. If the company does not comply within one year all rights, including the fifty-year franchise, are forfeited, and the company will pay the city $1,200 damages in addition."

Buffalo (N. Y.) Southern Railway.—Justice Marcus in the Supreme Court of Erie County issued an order on Sept. 26 appointing Nathan Bundy receiver of the Buffalo Southern Railway, which operates from Buffalo to Hamburg and East Aurora. The bond was placed at $20,000. The application was made by the Fidelity Trust Company, Buffalo, which is trustee of a mortgage for $600,000 issued against the property of the company. The interest on the mortgage has been in default since 1909.

Chicago (Ill.) Railways.—Henry A. Blair has verified the report that the Chicago Railways management has more than a majority of proxies for the annual meeting. Regarding the negotiations with the city authorities for unified operation, Mr. Blair is reported to have said: "We have made some progress, harmonious feeling is evident and all are agreed to do anything we can toward improvement of the traction service."

Chicago (Ill.) City Railway.—L. A. Busby, president of the Chicago City Railway, and W. W. Gurley, representing the Chicago Railways, appeared before the sub-committee of the local transportation committee of the City Council of Chicago on Sept. 24 to express the attitude of their companies regarding the proposed subway plan. It was stated that while the surface lines were interested in the proposed system of subways, serious thought had not been given the matter recently because of the time expended in working out a unified operating agreement. It was stated that a report of the progress made toward accomplishing a merger of the two surface railway companies would be announced to the committee soon, after which a study would be made of the subway matter.

Denver (Col.) City Tramway.—More than two-thirds of the first collateral mortgage thirty-year 5 per cent gold bonds of the Denver & Northwestern Railway have been deposited for exchange under the terms of the offer of the Denver City Tramway. The exchange provides that for each $1,000 face value of Denver & Northwestern Railway bonds there will be given $1,000 first and refunding sinking fund mortgage twenty-five-year 5 per cent gold bonds of the Denver City Tramway, dated Nov. 1, 1908, due Nov. 1, 1933, and in addition thereto non-interest-bearing scrip of the face value of $50 (issuable for bonds of the same issue in amounts of $500 or multiples thereof), put out pursuant to the issue of the sinking fund mortgage.

Fort Dodge, Des Moines & Southern Railroad, Boone, Ia.—Judge Smith McPherson of the District Court of the United States for the Southern District of Iowa has directed George F. Henry, Des Moines, Ia., as special master to sell the property of the Fort Dodge, Des Moines & Southern Railroad under foreclosure not later than Nov. 29 for not less than $2,676,000. The company was placed in the hands of Homer Loring and Parley Sheldon as receivers on June 6, 1910. Since then $800,000 of receivers' certificates have been issued. There is a first mortgage under which $3,000,000 of 5 per cent bonds are outstanding and a refunding mortgage under which $2,800,000 of bonds are outstand-

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ing. The trustees for the bondholders are respectively the Old Colony Trust Company, Boston, Mass., and the American Trust Company, Boston, Mass. The company was incorporated on Feb. 16, 1906, and acquired the Fort Dodge Street Railway, the Ames & College Railway and the Newton & Northwestern Railroad. The latter is a steam road extending from Newton to Rockwell City, Ia., and 37 miles between Fort Dodge Junction and Des Moines Junction were electrified, forming a part of the high-speed electric railway placed in operation in 1908 between Des Moines and Fort Dodge, with a branch to Ames.

Galveston-Houston Electric Company, Galveston, Tex.—The special meeting of the stockholders of the Galveston-Houston Electric Company called for Oct. 6 is to authorize an increase in the capitalization of the company from $4,000,000 of common stock and $3,000,000 of preferred stock to $5,000,000 of common stock and $4,000,000 of 6 per cent preferred stock. In reference to the increase, officers of the company state that in order to meet the demands of a constantly increasing business it will be necessary to make during the coming year various extensions and improvements to the street railway system in Galveston and Houston, as well as to the interurban line between the two cities. The more important items of construction are an increase of power facilities, purchase of new equipment, construction of carhouses and extensions of track. At least part of this money will be secured by the sale of stocks of the company and such portion of the new stock as required will be offered from time to time pro rata to stockholders of both common and preferred at par, and all stock not subscribed will be disposed of by the board as its judges may determine.

Interborough Rapid Transit Company, New York, N. Y.—T. De Witt Cuyler, Daniel G. Reid, E. R. Bacon and E. S. Marston have been elected directors of the Interborough Rapid Transit Company to fill the places made vacant by the retirement of G. L. Hoyt, John Pierce and G. W. Young, and to fill a previously existing vacancy.

Scioto Valley Traction Company, Columbus, Ohio.—At the annual meeting of the stockholders of the Scioto Valley Traction Company at Columbus on Sept. 23 Isaac B. Cameron, Columbus, and A. B. Voorhies, Cincinnati, retired from the board of directors and were succeeded by R. F. Warner, Columbus, and Harry M. Daugherty, the same city. The other members were all re-elected. The officers were re-elected.

Second Avenue Railroad, New York, N. Y.—The Second Avenue Railroad, which has been operated by receivers since the fall of 1908, has extended $3,140,000 of 5 per cent receiver's certificates, which matured on Oct. 1, another year.

United Railways & Electric Company, Baltimore, Md.—The United Railways & Electric Company has notified the holders of three-year 5 per cent collateral trust convertible notes that the option of converting these notes into stock at $25 a share will expire Jan. 2, 1914. They do not mature until July 1, 1914. There are about $400,000 of these notes which remain unconverted.

Dividends Declared

Auburn & Syracuse Electric Railroad, Syracuse, N. Y., quarterly, 1½ per cent, preferred.

Boston (Mass.) Suburban Electric Companies, quarterly, 1 per cent, preferred.

Chippewa Valley Railway, Light & Power Company, Eau Claire, Wis., quarterly, 2 per cent, common.

Cincinnati, Newport & Covington Light & Traction Company, Covington, Ky., quarterly, 1⅛ per cent, preferred; quarterly, 1½ per cent, common.

City Railway, Dayton, Ohio, 1½ per cent, preferred; quarterly, 2 per cent, common.

Columbia Railway, Gas & Electric Company, Columbia, S. C., quarterly, 1½ per cent, preferred.

Columbus, Newark & Zanesville Electric Railway, Cincinnati, Ohio, quarterly, 1½ per cent, preferred.

Honolulu Rapid Transit & Land Company, Honolulu, Hawaii, quarterly, 2 per cent.

Illinois Traction System, Peoria, Ill., quarterly, 1½ per cent, preferred.

Kentucky Securities Corporation, Lexington, Ky., quarterly, 1½ per cent, preferred.

Manchester Traction, Light & Power Company, Manchester, N. H., quarterly, 2 per cent.

Nashville Railway & Light Company, Nashville, Tenn., quarterly, 1¼ per cent, preferred.

Scioto Valley Traction Company, Columbus, Ohio, quarterly, 1¼ per cent, first preferred and preferred.

United Railways & Electric Company, Baltimore, Md., quarterly, 50 cents, common.

Virginia Railway & Power Company, Richmond, Va., 1½ per cent, common.

Western Ohio Railway, Lima, Ohio, quarterly, 1¾ per cent, first preferred; quarterly, 1½ per cent, second preferred.

West Indian Electric Company, Ltd., Kingston, Jamaica, quarterly, 1¼ per cent.

Winnipeg (Man.) Electric Railway, quarterly, 3 per cent.

ELECTRIC RAILWAY MONTHLY EARNINGS

AURORA, ELGIN & CHICAGO RAILROAD, WHEATON, ILL.

Period			Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m.,	July,	'13	$208,751	*$115,791	$92,960	$33,463	$59,497
1 "	"	'12	192,754	*102,296	90,458	32,037	58,421

KENTUCKY TRACTION & TERMINAL COMPANY, LEXINGTON, KY.

1m.,	July,	'13	$66,081	$33,433	$32,548	$20,414	$12,134
1 "	"	'12	65,773	39,687	26,086	16,144	9,942

PHILADELPHIA (PA.) RAPID TRANSIT COMPANY.

1m.,	Aug.,	'13	$1,970,032	$1,155,959	$814,073	$799,955	$14,118
1 "	"	'12	1,913,094	1,145,964	767,130	757,101	10,029
2 "	"	'13	3,966,645	2,348,490	1,618,155	1,597,645	20,510
2 "	"	'12	3,832,035	2,302,192	1,929,843	1,515,283	14,560

PUGET SOUND TRACTION, LIGHT & POWER COMPANY, SEATTLE, WASH.

1m.,	July,	'13	$736,695	*$416,737	$319,959	$172,609	$147,350
1 "	"	'12	713,526	*415,078	298,448	163,105	135,343
12 "	"	'13	8,400,734	*4,903,129	3,497,605	2,035,398	1,462,207

NORTHERN TEXAS ELECTRIC COMPANY, FORT WORTH, TEX.

1m.,	July,	'13	$180,931	*$101,097	$79,834	$24,166	$55,668
1 "	"	'12	146,289	*76,927	69,363	20,858	48,505
12 "	"	'13	2,039,355	*1,090,251	949,104	286,461	662,643
12 "	"	'12	1,658,121	*899,655	758,467	241,454	507,012

PADUCAH LIGHT & TRACTION COMPANY, PADUCAH, KY.

1m.,	July,	'13	$23,988	*$15,926	$8,062	$7,583	$479
1 "	"	'12	22,875	*14,013	8,862	7,192	1,670
12 "	"	'13	288,317	*192,354	95,963	88,345	7,618
12 "	"	'12	277,349	*181,718	95,632	84,937	10,694

PENSACOLA (FLA.) ELECTRIC COMPANY

1m.,	July,	'13	$24,545	*$15,643	$8,902	$6,767	$2,135
1 "	"	'12	24,389	*14,692	9,697	6,377	3,320
12 "	"	'13	289,988	*181,533	104,455	77,142	27,313
12 "	"	'12	285,100	*179,288	105,812	71,038	34,774

PORTLAND RAILWAY, LIGHT & POWER COMPANY, PORTLAND, ORE.

1m.,	July,	'13	$568,371	*$284,374	$283,997	$171,378	$112,619
1 "	"	'12	580,557	*281,655	298,902	141,015	157,887
12 "	"	'13	6,671,029	*3,312,858	3,358,171	1,882,149	1,476,022
12 "	"	'12	6,511,361	*3,235,816	3,275,545	1,648,986	1,626,559

PORTLAND (MAINE) RAILROAD

1m.,	July,	'13	$120,011	*$58,952	$61,059	$18,025	$43,034
1 "	"	'12	111,584	*59,055	52,529	16,746	35,783
12 "	"	'13	1,015,907	*711,138	304,769	126,282	178,487
12 "	"	'12	972,529	*694,060	278,469	124,025	154,443

ST. JOSEPH RAILWAY, LIGHT, HEAT & POWER COMPANY, ST. JOSEPH, MO.

1m.,	July,	'13	$105,701	*$60,451	$45,250	$20,067	$25,183
1 "	"	'12	98,335	*58,164	40,171	19,582	20,589
12 "	"	'13	1,223,982	*688,445	535,537	239,195	296,341
12 "	"	'12	1,142,078	*684,581	457,497	234,483	223,014

SAVANNAH (GA.) ELECTRIC COMPANY

1m.,	July,	'13	$71,126	*$46,007	$25,119	$22,755	$2,364
1 "	"	'12	61,406	*44,894	16,513	16,313	200
12 "	"	'13	796,749	*559,993	236,756	230,992	5,764
12 "	"	'12	726,793	*536,727	190,066	189,030	1,036

TAMPA (FLA.) ELECTRIC COMPANY

1m.,	July,	'13	$71,407	*$39,877	$31,529	$4,531	$26,998
1 "	"	'12	63,181	*32,340	30,841	4,365	26,476
12 "	"	'13	787,660	*420,927	366,733	55,307	311,426
12 "	"	'12	732,567	*389,833	342,735	54,541	288,194

UNION RAILWAY, GAS & ELECTRIC COMPANY, ROCKFORD, ILL.

1m.,	July,	'13	$362,267	*$197,557	$164,710	$97,925	$66,775
1 "	"	'12	330,434	*196,549	133,885	90,914	42,971
12 "	"	'13	4,577,407	*2,564,971	2,012,436	864,483	315,000
12 "	"	'12	3,508,476	*2,039,244	1,469,232	817,934	651,298

VIRGINIA RAILWAY & POWER COMPANY, RICHMOND, VA.

1m.,	July,	'13	$447,477	$217,922	$229,555	$132,651	$96,904
1 "	"	'12	415,728	211,715	204,012	122,988	81,024

*Includes taxes.

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Traffic and Transportation

Accident Talks in Jackson

When the property of the Jackson Light & Traction Company, Jackson, Miss., was taken over by the American Public Utilities Company more than a year ago the situation in regard to accidents was quite serious and the company was troubled considerably by frivolous complaints. The officers decided upon an accident prevention campaign and under the direction of Raymond H. Smith, general manager, a series of accident talks is being printed and hung in the cars from time to time in packages of twenty-five each so that they can be easily torn down and read by passengers. The accident talks have aroused a great deal of interest and favorable comment and have had a direct bearing in reducing accidents. The first of these talks, together with talks No. 3 and No. 4, entitled respectively "To Drivers of Automobiles and Other Vehicles" and "Damage Suits and Public Opinion," follow:

"Help Us Avoid Accidents

"For humanitarian reasons, as well as for the reason of expense, we are making every effort to avoid accidents. To be successful we must have your assistance, and this can best be given by using great care to avoid injury to yourself. Don't take chances.

"Wait Until the Car Stops

"Boarding or alighting from a moving car is dangerous. The car will come to a complete stop for you and even though you feel competent to board or alight while the car is in motion, remember that there is a possibility of your slipping and being injured. Wait.

"Always Face Front of Car

"In boarding or alighting face in the direction the car is going. Don't form the habit of facing the rear in getting off a car. If you should forget yourself and alight when car is in motion you are sure to be injured if you are facing the rear of the car.

"Passing in Front of Cars

"In crossing streets don't pass directly in front of approaching cars. You may trip and fall. The few seconds you gain by walking in front of a car are unimportant. Pass behind the car—there's more room.

"Look Before Stepping on Track

"Don't step from behind a car onto the other track without looking to see if there is a car approaching. Numerous accidents are caused by the failure to take this simple precaution. Begin now.

"Please Give Your Name

"In case of an accident we must know the facts. These can be obtained only from the witnesses. If the company is not at fault we wish to know it for protection against unjust claims, and, on the other hand, if we are at fault we are equally anxious to have the facts in order that we may deal fairly in all matters connected with the accident. If you are a witness to an accident, whether you are a passenger or not, we ask that you give us your name for the good of all concerned.

"Co-operation

"The co-operation we desire from you is not the kind that will do our work for us, nor do we desire to shift responsibility. We ask merely for the appreciation and encouragement accorded any worthy enterprise whose labor and ambitions help to make the city bigger, better and brighter.

"Let's pull together in this matter of accident reduction, which is of equal importance to us both. Begin now by taking this pamphlet home and asking the other members of your family to read it and

"Wait Until the Car Stops."

"To Drivers of Automobiles and Other Vehicles

"Trolley cars have but one course to follow in the street, that is, along the tracks, while in most cases there is sufficient room for vehicles to be driven elsewhere. It is obvious that the surest way to avoid injury to yourself and property is to keep off the track as far as it is practicable to do so. There are in particular two classes of accidents which can be entirely eliminated with your co-operation. We refer to accidents caused by driving rapidly out of side streets onto the tracks and by people who are driving alongside the tracks suddenly pulling their vehicles onto the track in front of moving cars.

"We ask that you co-operate in the reduction of accidents by starting right now and making it a rule to drive out of side streets onto streets with car tracks at such a slow rate of speed that you can easily stop before reaching track, if a car is approaching. Upon reading this you may think 'Let the motorman look out for me. Why should I look out for him?' Our answer to this is that we are both working with a common end in view—to avoid accidents. If you will co-operate in this by looking out for your own safety, your precaution, together with the care we are asking our employees to exercise will eliminate accidents, suffering and expense.

"So we say, before driving out of side streets onto the car tracks reduce your speed and look out for approaching cars. If a car is coming, don't take a chance and try to pass in front of it, assuming that the motorman can stop. We tell our motormen not to assume and request that you take the same precaution. It takes but a few seconds to slow down and await for a car to pass. Don't assume that a motorman can stop his car in time to avoid hitting you—perhaps he can't. Wait.

"In driving alongside of car tracks, keep as far away as possible, so that a slight movement of your vehicle will not bring it close enough to track to be hit by a passing car. Always look around before driving onto track and see that no car is approaching from the rear. If one is coming, just hold back that temptation to take a chance—wait for it to go by.

"In asking you to do these things we are not remaining idle ourselves. We are each day striving in various ways to reduce accidents and are trying to see just how long we can go without a mishap. We ask your help in this.

"REMEMBER

"Keep off the tracks as much as possible. Don't assume it to be safe to drive in front of an approaching car, but instead get the habit of passing back of it."

"Damage Suits and Public Opinion

"Accidents and resultant damage suits have a direct bearing upon the quality of service a railway can give and the amount of capital it can put into improvements. Right here is where you are interested.

"Many frivolous accident claims have at various times been filed against this company, some of them recently. In one case the company is being sued for several thousand dollars by a lawyer who has yet to learn that this case was settled by his client for a few dollars some time ago. We venture to say that to this day the plaintiff in this case does not even know that a suit has been filed in his behalf. This gives but a slight idea of conditions as they exist.

"The policy of this company is to be absolutely fair in all its dealings, but it also proposes to fight to the end every frivolous and unjust accident claim—just as you would do in your own private business. It is a mistake to think that every accident should be followed by a notice of suit. A calm, frank discussion of the facts of the case would be much more beneficial to all concerned.

"If this company is to be subjected to the expense of defending itself against unjust claims, occasionally being mulcted in damages, it is going to be just so much more difficult to give proper service and make general improvements to the property.

"It is the desire of the company to give the people of Jackson a street railway system of which they will feel proud. We want to do our share toward reaching that 50,000 mark in 1915. But in order to make this possible we must have your assistance in reducing accidents and unjust claims for damages. You can help in the reduction of accidents by using great care to avoid injury to yourself. You can assist in the reduction of frivolous and unfair claims and verdicts by giving us your name, when a witness to an accident, and by doing your share to create a public sentiment against these things. Public opinion is not an intangible, mysterious thing. It is the influence of your own sentiment, your partners, your neighbors, and others of the community. If as individuals you will assist by creating a public sentiment for fairness in these matters, you will play an important part in improving the street railway facilities of this city.

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"COME IN

"The office of the management is open to all—no red tape, no closed doors, no waiting. Nothing like sitting down and talking a thing over. We've always got the time. Try it!"

The accident talks are printed on colored paper 6 in. wide by 9 in. high, and the color of the paper of the next talk is announced at the bottom of each talk as it is placed in the cars for distribution.

Report of California Commission on Los Angeles Accident

The Railroad Commission of California has made public the result of its inquiry into the collision on July 13, 1913, between a three-car electric train operated by the Pacific Electric Railway, Los Angeles, on its so-called "Short Line" between Los Angeles and Venice, and a standing three-car electric train operated by the same company, near a station called Vineyard. As a result of this collision sixteen people died and many were seriously injured. The commission concludes its opinion in part as follows:

"It would appear that the three principal actors in the matter of this collision, to wit, Motorman Clarke, Flagman Bartholomai and Motorman Forster, each contributed to the cause of this collision, either by a violation of the rules of operation or by a failure to apply such rules intelligently."

In its order the commission directs the company in part as follows:

"It is hereby ordered that the Pacific Electric Railway submit for the approval of this commission within sixty days from the date of this order the following:

"A comprehensive and complete plan for the instructing, training, examining and testing of its employees, and within a like period submit for the approval a complete and comprehensive diagram and plan of an automatic block signal and staff signal system, covering its entire system outside of city limits, including the location, type and estimates of cost of such signaling system.

"A complete statement showing the location of all crossings of its tracks by roads or highways; whether such crossings are at grades or are separated; what, if any, protection or warning is provided at such crossings.

"A complete statement showing the location of crossings of main line tracks by other main line tracks, the protection against collisions which now exists at such crossings, together with estimates of the cost of installing at all such crossings adequate interlocking plants in compliance with this commission's General Order No. 33; provided further, that this proceeding will remain open for the rendering of further orders in the premises.

"The foregoing opinion and order are hereby approved and ordered filed as the opinion and order of the Railroad Commission of the State of California."

The case was decided by the commission on Aug. 15.

Chicago Convention Special Train

Indications at the present time are that approximately 150 electric railway and supply men will be aboard the convention special train which leaves Chicago via the Pennsylvania Railroad, Oct. 12, at 10.30 a. m. Up to Sept. 30 a total of 120 reservations have been made on this special train, which now includes twelve coaches. At a luncheon on Sept. 29 the Chicago supply men organized an entertainment committee to act on the special train. Several special committees were appointed to provide entertainment for the railway representatives and the ladies accompanying them.

St. Louis Conductor Arrested for Stealing.—A conductor in the employ of the United Railways, St. Louis, Mo., has been arrested for stealing fares. The practice of the conductor was to extract nickels from the fare box with the aid of part of a small clock spring.

Council Approves London & Port Stanley Electrification.—The City Council of London, Ont., has passed a by-law approving the electrification of the London & Port Stanley Railway. A by-law to this effect will now be submitted to the ratepayers of London for ratification.

Fare Hearing in Schenectady Continued.—The three days' hearings on the application of certain residents of Schenectady to the Public Service Commission of the Second District of New York for a rate of six rides for 25 cents over the lines of the Schenectady Railway ended on Sept. 24 in a postponement until Oct. 20. In the meantime Frank E. Belleville, auditor of the company, is to prepare a statement showing in detail its gross and net receipts for the years from 1898 to 1912.

Smoking Question Up Again in Kansas City.—So much public sentiment in regard to smoking prevails in Kansas City that an effort probably will be made to reinstate the cigars on the back platforms. Smoking was abolished by the Metropolitan Street Railway about a year ago, the City Council co-operating by passing an ordinance prohibiting it. Smokers contend that no annoyance attaches to smoking on the rear platform. No concerted action has as yet been taken, but it is said that tobacco dealers and others are awaiting only a settlement of the franchise questions now affecting the company before pleading the question.

Smoking Prohibited in Brooklyn.—J. F. Calderwood, vice-president of the Brooklyn (N. Y.) Rapid Transit Company, notified the Public Service Commission of the First District of New York recently that the companies in the Brooklyn Rapid Transit system would accept, without contest, the order of the commission prohibiting, after Oct. 1, smoking on street railroad cars, in stations, on station platforms, stairways and in station waiting rooms. The only exception to this order is that open cars having running boards along the sides and having seats directly accessible from such running boards may have four seats at one end for smokers. The order of the commission was published in the Electric Railway Journal of Aug. 23, 1913, page 318.

Conference in Regard to Transfer Modifications in Brooklyn.—After a conference on Sept. 25 between T. S. Williams, president of the Brooklyn (N. Y.) Rapid Transit Company, and Chairman McCall and Commissioner Williams, of the New York Public Service Commission for the First District, a public hearing on transfers between the elevated system and surface lines of the Brooklyn Rapid Transit Company for the purpose of reorganizing the transfer system was held. Frank Bennett, supervising inspector of the commission, and C. D. Meneely, vice-president and treasurer of the Brooklyn Rapid Transit Company, were appointed a committee to arrange a new system of transfers more extensive than that at present in operation. It is understood that the new arrangement will provide for the exchange of transfers between the lines of the Brooklyn Rapid Transit Company and the Coney Island & Brooklyn Railroad.

Prizes Awarded in Baseball League.—The Interborough Baseball League, composed of employees of the Interborough Rapid Transit Company, New York, closed a successful season recently by a dinner at Brighton Beach, with 250 members of the eight teams in the league and invited guests in attendance. Theodore P. Shonts, president of the Interborough Rapid Transit Company, presided, and the guests included Major-General Barry, U. S. A.; Captain Woodward, U. S. A.; Frederick Underwood, president of the Erie Railroad; W. G. Besler, vice-president of the Jersey Central Railroad; A. R. Whaley, vice-president of the New York, New Haven & Hartford Railroad; John E. Eustis, Public Service Commission; Frank Hedley, vice-president and general manager of the Interborough Rapid Transit Company; H. H. Vreeland, F. A. Megeath, president of the Galena-Signal Oil Company; Daniel M. Brady, Samuel Curwen, president of The J. G. Brill Company, Philadelphia, and B. A. Hegeman, president of the U. S. Metal & Manufacturing Company. Mr. Shonts presented each member of the Subway Giants, the winning team, with a gold medal, while the champion pennant went to the transportation department, which the Subway Giants represented. Speeches were made by Mr. Shonts, General Barry, John Whalen and Frederick Underwood. The league was composed of eight teams, representing the different departments of the Interborough system. Twenty-one games were scheduled for each team. The Subway Giants won eighteen games and lost two. The car equipment department finished second, with fifteen victories and four defeats, and the lighting department third, with sixteen games won and five lost.

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Personal Mention

Mr. F. F. Nasmith, auditor of the Kentucky Public Service Company at Hopkinsville, Ky., has been transferred to Jacksonville, Fla., by the J. G. White Management Corporation, which operates the properties, and is to be succeeded at Hopkinsville by Mr. H. R. Gore, assistant auditor of the Washington Railway, Light & Power Company, Washington, D. C.

Mr. Harrison R. Fehr, president and general manager of the Easton (Pa.) Transit Company, has been elected president of the Lehigh Valley Transit Company, Allentown, Pa., to succeed Mr. R. P. Stevens, who, as previously announced in the ELECTRIC RAILWAY JOURNAL, has been elected president of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, and its subsidiaries.

Mr. R. P. Stevens, the retiring president of the Lehigh Valley Transit Company, Allentown, Pa., had a farewell dinner tendered to him on Sept. 20 at the Hotel Allen by the newspaper men of Allentown and Bethlehem. Mr. George Zimmerman, editor of the *Chronicle and News*, as the chairman of the committee of arrangements, introduced Mr. George R. Roth, of the *Leader*, as toastmaster. Among the speakers was Mr. E. C. Spring, of the Philadelphia & Western system, who paid high tribute to Mr. Stevens. Mr. Carson W. Masters followed Mr. Spring. He reviewed the progress of the street railway system of Allentown since 1888. He declared the leaving of Mr. Stevens to be a direct loss to the community. Mr. P. F. Enright, South Bethlehem, also spoke in eulogistic terms of Mr. Stevens. Mr. Stevens was the last speaker. He said that he hoped to return to Allentown some day to live.

Mr. Henry Howland Crapo, who has been elected president of the Massachusetts Street Railway Association, was born in New Bedford, Mass., on Jan. 31, 1862, the son of Mr. William W. Crapo and Mrs. Sarah Tappan Crapo. He prepared for college at the Friends' Academy in New Bedford and was admitted to Harvard in June, 1879. After he was graduated in 1883 he entered the Harvard Law School and remained there two years. He was admitted to the bar in Bristol County, Mass., in June, 1886, and became a member of the law firm of Crapo, Clifford & Clifford, now Crapo, Clifford & Prescott, with which he is still connected. Mr. Crapo served as an alderman of New Bedford in 1893 and as associate justice of the Third District Court of Bristol 1895-1898, and he has been president of the Mechanics' National Bank of New Bedford since 1906. He was elected president of the Union Street Railway, New Bedford, in 1894 and a few years later was elected president of the Dartmouth & Westport Street Railway, which was subsequently consolidated with the Union Street Railway. In 1901 the New Bedford & Onset Street Railway was organized and Mr. Crapo was elected president of the company, which office he now holds. Subsequently the Middleboro, Wareham & Buzzards Bay Street Railway was consolidated with the New Bedford & Onset Street Railway.

OBITUARY

Francis V. T. Lee, formerly assistant to the president of the Pacific Gas & Electric Company, San Francisco, Cal., is dead. Mr. Lee was born at Winchester, Eng., on Aug. 28, 1870. He was educated at the Manchester Grammar School and in France and was graduated with the degree of B.A. in electrical engineering from the Leland Stanford, Jr., University, in California, in 1897. He was assistant to Dr. F. A. C. Perrine, professor of electrical engineering, from 1893 to 1897 and was connected with the Stanley Electric Manufacturing Company on the Pacific Coast for several years. In 1900 he was elected vice-president and general manager of John Martin & Company, San Francisco, and also district Pacific Coast manager for the Stanley Electric Manufacturing Company and other Eastern manufacturers. Early in 1906 he severed his connection with John Martin & Company, became interested with Mr. Martin in the Pacific Coast Gas & Electric Company and was made assistant to the president of that company. He retired from active business about three years ago. He is survived by a widow and two daughters.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

Tipton, Windfall & Marion Traction Company, Windfall, Ind.—Incorporated in Indiana to build an electric railway between Tipton, Windfall and Marion. Capital stock, $10,000. Incorporators: W. R. Bailey, C. S. Cleaver and J. F. Fulton.

Tri-State Railways, Toledo, Ohio.—Application for a charter has been made by this company in Ohio to build an electric line from Pioneer, Ohio, to Hillside, Mich. It will connect with the Toledo & Western Railroad at Pioneer. Capital stock, $100,000. Incorporators: H. McClaue, Charles H. Heller and Miles T. Davis, Hillsdale, and William E. Elliott, Chicago. [E. R. J., Sept. 27, '13.]

***Dakota Eastern Railroad, Pierre, S. D.**—Application for a charter has been made by this company in South Dakota to build a 48-mile interurban railway between Clear Lake and Watertown. Capital stock, $800,000. Incorporators: William Eglend, Harry D. Barrett, Edwin Merhagen, St. Paul; Harry F. Harp and Almon E. Chilson, Webster.

FRANCHISES

Argenta, Ark.—The Argenta Railway has received a three-year extension of time on its franchise to begin the construction of its line in Argenta to the Factoria Land Company.

Los Angeles, Cal.—The Pacific Electric Railway has received a franchise to build its main-line track at grade across a private right-of-way near Santa Ana and at the grade across Main Street in Los Angeles.

San Diego, Cal.—The Los Angeles & San Diego Beach Railway, San Diego, will ask the Council for a renewal of its franchises over its present line to La Jolla from Arctic Street and the present city lines to the Cuyamaca railway station at the foot of Twelfth Street in San Diego.

Sausalito, Cal.—W. W. Hicks, representing the San Rafael & San Anselmo Valley Railway, has asked the Board of Supervisors for a franchise over the county roads between Sausalito and San Rafael. He has also asked the Council for a franchise in Sausalito. This is part of a plan to build a 6-mile line between San Rafael and San Anselmo. [E. R. J., Sept. 20, '13.]

Galesburg, Ill.—The Peoria, Canton & Galesburg Railway, Peoria, has received a thirty-five-year franchise from the Council in Galesburg. The company will soon ask for a franchise from the Councils in Maquon and in Knoxville. This 52-mile line will connect Peoria, Canton and Galesburg. Horace Clark, Peoria, president. [E. R. J., Sept. 20, '13.]

Baltimore, Md.—The United Railways & Electric Company has been authorized by the City Council to lay a single track on the new part of Aisquith Street, between Baltimore Street and Fayette Street, in Baltimore.

Hasbrouck Heights, N. J.—A. L. Whipple of this place, and for a long time prominently connected with the railway supply business, has applied for a franchise for a trackless trolley system for a line about 2 miles in length. Mr. Whipple is interested in real estate in this place.

Wilkes-Barre, Pa.—The Hanover & Southern Railway has received a fifty-year franchise from the Council over Academy Street, Old River Road and other thoroughfares in Wilkes-Barre.

Jackson, Tenn.—The City Council has decided to take final action on a new franchise of the Jackson Railway & Light Company at a meeting to be held Oct. 7. A fifty-year franchise has been asked for, and the company has agreed in case it is granted to build a line to the West Tennessee Experiment Station and other important suburban points.

Nashville, Tenn.—The Nashville Traction Company has asked the Council for a franchise in Nashville. It is to be submitted to the voters. This company plans to build 34

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miles of track in Nashville. Walter O. Parmer, Nashville, is interested. [E. R. J., Aug. 2, '13.]

Dallas, Tex.—The Dallas Consolidated Electric Railway has asked the Council for a franchise to build fourteen switch tracks and one cross-track from its line on Peak Street into the site for its new repair shops on Elm Street in Dallas.

Clark, W. Va.—The Elkhorn Valley Traction Company, Clark, has received a franchise through the corporate limits of Clark and Keystone, a distance of about 5 miles. L. E. Tierney, Powhatan, president. [E. R. J., Sept. 6, '13.]

TRACK AND ROADWAY

Gadsden, Bellevue & Lookout Mountain Railway, Gadsden, Ala.—This company has placed in operation its 3-mile line from Gadsden to Noccalula Falls. It is planned to build an extension soon.

Little Rock Railway & Electric Company, Little Rock, Ark.—This company has awarded a contract to Woodsmall, McCarthy & Peay to subgrade the Neimeyer extension of its Highland Park line for a distance of about 2 miles in Little Rock.

Phoenix (Ariz.) Street Railway.—This company is asked to consider plans to double-track its First Street line between Adams Street and Roosevelt Street in Phoenix. The improvements planned by this company for early installation include the double-tracking of the Indian School line and a new track from the First Street to the Second Street lines along Monroe Street in Phoenix.

British Columbia Electric Railway, Vancouver, B. C.—This company has opened its new 23-mile line from Victoria to Deep Cove and a new 20-mile line from Duncan to Cowichan Lake.

Northern Electric Railway, Chico, Cal.—This company is asked to extend its C Street line to Thirty-first Street in Sacramento.

San José (Cal.) Railways.—The Railroad Commission has rendered a decision directing this company to reconstruct within the next six months the narrow-gage portion of its San José and Alum Rock railway as a standard-gage railway. The section to be converted extends from the present terminus of the company's standard-gage railway at Twenty-sixth Street, San José, to Linda Vista station, a distance of 3¼ miles.

Mount Carmel Railway, Hamden, Conn.—Plans are being made by this company to build an electric line from the terminal of the Connecticut Company's line to the top of Mount Carmel. The charter for this proposed line was granted in 1911. Capital stock, $75,000. Directors: Willis M. Cooke, C. F. Clarke and Sereno P. Cooke.

Georgia Railway & Power Company, Atlanta, Ga.—This company has completed its line from Atlanta to Stone Mountain.

Columbus (Ga.) Electric Company.—The City Council proposes to make arrangements with this company to extend its lines in Girard.

Chicago & Joliet Electric Railway, Joliet, Ill.—Work has been begun by this company laying new tracks on State Street in Lockport.

Springfield & Northwestern Railway, Springfield, Ill.—This company has been selling stock, securing right-of-way and by the sale of lots on a tract of land near the Sangamon River is endeavoring to put assets back of the proposition to build its line to connect Springfield, Cantrall, Casey, Athens, Petersburg, Greenview and Mason City. Ralph N. Baker, president. [E. R. J., Aug. 3, '12.]

Aurora, Elgin & Chicago Railroad, Wheaton, Ill.—Work will be begun at once by this company repairing all of its lines in Aurora.

Union Traction Company of Indiana, Anderson, Ind.—Plans are being considered by this company to build an extension between Alexandria and Muncie.

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind.—Work will soon be begun by this company laying new rails on Wallace Street in Fort Wayne.

Louisville & Southern Indiana Traction Company, New Albany, Ind.—This company has decided to remove its tracks from Market Street between Fourth and Thirteenth Streets in New Albany, and will operate its Silver Hill line on Thirteenth and Spring Streets instead.

Independence, Neodesha & Topeka Traction Company, Independence, Kan.—It is reported that construction will be begun by this company at once on its 17-mile line to connect Independence, Neodesha, Altoona, Fredonia and Topeka. William N. Ness, Independence, general manager. [E. R. J., Aug. 2, '13.]

South Covington & Cincinnati Street Railway, Covington, Ky.—The United States District Court at Covington, Ky., has issued a temporary restraining order to prevent the city of Covington from accepting bids under an ordinance for the sale of an electric railway franchise over certain streets in Covington. The petition for an injunction was filed by the South Covington & Cincinnati Street Railway. The petitioner claims that the sale of a franchise is in violation of its property rights.

New Orleans Railway & Light Company, New Orleans, La.—It is reported that this company plans to build an extension along the shore of Lake Pontchartrain to Spanish Fort, Milneburg and People's Avenue in New Orleans.

Detroit (Mich.) United Railway.—A resolution has been introduced in the City Council requiring this company to lay a double track on Trumbull Avenue from Michigan Avenue south to Fort Street and ordering Trumbull cars to be routed to Detroit via Fort Street, looping around Cadillac Square and returning by the same route.

St. Paul Southern Electric Railway, St. Paul, Minn.—Plans are being considered by this company for an 8-mile extension from Rochester, Minn., to Decorah, Ia. Work on the line between St. Paul and Hastings is progressing rapidly.

Hannibal Railway & Electric Company, Hannibal, Mo.—Plans are being considered by this company to extend its line in Hannibal out Broadway from Hueston Street, to connect with the St. Mary's line at old Smith's Park. Application for a franchise will soon be made to build this branch.

St. Joseph Railway, Light & Power Company, St. Joseph, Mo.—Plans are being considered by this company to build a line between St. Joseph and Atchison via Beanville.

Binghamton (N. Y.) Railway.—New rails are being laid by this company on its State Street line between Henry Street and Eldridge Street in Binghamton.

Brooklyn (N. Y.) Rapid Transit Company.—Work on this company's elevated extension from the city line of Brooklyn along Liberty Avenue and Lefferts Avenue to Morris Park and Jamaica will be begun some time in November, according to a report. It is said the company has secured all the consents of property owners along the line of the proposed extension. It is intended to submit construction contracts to the Public Service Commission at an early date, and as soon as they are approved contracts will be let for the construction work.

New York State Railways, Rochester, N. Y.—This company has purchased property in West Avenue in Rochester, just west of Lincoln Park, on which a loop will be built.

Schenectady (N. Y.) Railway.—Among the improvements planned by this company will be block signals on three interurban divisions of its lines.

Newbern-Ghent Street Railway, Newbern, N. C.—Plans are being considered by this company for an extension in Newbern.

Lake Erie & Northern Railway, Brantford, Ont.—About 4 miles of rails have been laid by this company from Galt, and the grading has been completed from Galt to a point 2 miles south of Glenmorris.

Nipissing Central Railway, North Cobalt, Ont.—The Chamber of Commerce has passed a resolution in favor of the extension of this company's line to Fort Temiskaming and Ville Marie.

Dunnville, Wellandport & Beamsville Electric Railway, Wellandport, Ont.—This company is about to resume construction, arrangements having been completed for the sale of extra bonds. About 13 miles are graded and ties laid on this part of the line, the bridges and structural work being also completed on this division. The line has a

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charter from Port Dover to St. Catharines, with branches to Dunnville, Welland, Jordan Harbor and other points, making train connections with the Grand Trunk Railway, the Wabash Railroad, the Michigan Central Railroad and the Toronto, Hamilton & Buffalo Railway. [E. R. J., Sept. 6, '13.]

*Phoenixville, Pa.—Plans are being considered to build an electric railway from Williams Corner, 1 mile south of Phoenixville, taking the White Horse Road to Cedar Hollow, thence to Valley Stores and then on to Malvern and West Chester. Among those interested are Charles B. Highley, A. A. Catanach, Devault, and Herbert T. Taylor, White Horse Road.

Rhode Island Company, Providence, R. I.—Among the improvements being considered by this company are the extension of the John Street line to Prospect Hill and the laying of new rails between Prospect Hill and Saylesville. The company has awarded a contract to Joseph McCabe to build the extension of its Smith Street line in Providence to Chepachet.

Nashville Railway & Light Company, Nashville, Tenn.—Work will soon be begun by this company for the 1-mile extension of its First Street line in Nashville to Trinity, La. Surveys have been completed.

Bryan & Central Texas Interurban Railroad, Bryan, Tex.—A 20-mile extension is being built by this company to Wilcox.

Dallas Southwestern Traction Company, Dallas, Tex.—Chartered in Texas to build an interurban railway between Dallas and Glen Rose, with a branch from Eagle Ford to Irving. Headquarters, Dallas. Capital stock, $500,000. Incorporators: E. P. Turner, Cullen F. Thomas, S. P. Cochran, E. Strickland, S. P. Morgan and B. M. Sansom. [E. R. J., Sept. 20, '13.]

Texas Traction Company, Dallas, Tex.—Rails have been received and work will soon be begun by this company on its extension on South Willow Street from Lamar Street to St. Vincent's Sanitarium in Sherman.

Galveston-Houston Electric Railway, Houston, Tex.—Plans are being made by this company for extensions and improvements of its lines in Houston.

Salt Lake & Utah Railroad, Salt Lake City, Utah.—This company states that about 7 miles of track have been laid on its line in Salt Lake, Lehi, American Fork and Provo, and an overhead crossing over the steam railroad tracks at Salt Lake City will be completed within the next few weeks. Material is at hand in the yards at Salt Lake City. It is expected to complete the railway to Provo by the first of the year and the line from Provo to Payson during the coming year. All grading will be completed during October. Catenary construction will be used.

Utah Light & Railway Company, Salt Lake City, Utah.—Tracklaying on this company's line from Warm Springs to Centerville, a distance of 13 miles, has been completed. It will not be placed in operation until a power station can be built at Bountiful.

Virginia Railway & Power Company, Richmond, Va.—Work on the 1-mile Broad Street extension of this company's line in Richmond will be begun as soon as the material is obtained.

Kittitas Railway & Power Company, Cle Elum, Wash.—This company states that it plans to begin construction in the spring on its 38-mile line between Roslyn and Cle Elum, via Ronald and Janesville. Paul L. Richards, Tacoma, president. [E. R. J., Dec. 21, '12.]

Kelso & Eastern Railroad, Kelso, Wash.—This company states that surveys have been made but it is uncertain when construction will be begun on its line from Kelso eastward toward Mayfield. Capital stock authorized, $200,000. Officers: J. L. Harris, Kelso, president and general manager; John M. Ayres, Kelso, vice-president; F. L. Stewart, Kelso, secretary, and G. L. Buland, Castle Rock, treasurer. [E. R. J., July 26, '13.]

Puget Sound Traction, Light & Power Company, Seattle, Wash.—This company is asked to consider plans to extend its lines from Seattle Boulevard to Holgate Street on Fourth Avenue South in Seattle.

Elkhorn Valley Traction Company, Clark, W. Va.—Grading has been begun by this company on its line between Clark and Keystone. The following officers have been elected: L. E. Tierney, Powhatan, president; W. E. Stewart, Keystone, vice-president; L. H. Clark, Kyle, treasurer; C. C. Hale, Keystone, secretary, and A. Catzen, Northfolk, general manager. Headquarters: Clark. [E. R. J., Sept. 6, '13.]

SHOPS AND BUILDINGS

British Columbia Electric Railway, Vancouver, B. C.—This company is considering plans to build double-deck carhouses adjacent to its present carhouse at the corner of Thirteenth Avenue and Main Street in Vancouver. Plans and specifications have been submitted to the Board of Public Works. The cost of the buildings is estimated to be about $300,000.

Gainesville Railway & Power Company, Gainesville, Ga.—This company has completed its new office building on Main Street in Gainesville.

Kalamazoo-Grand Rapids Electric Railway, Kalamazoo, Mich.—It is reported that this company will purchase the Nelson Matter tract in Grand Rapids for a site for a new terminal station, which will cost $400,000.

Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo.—This company has been asked to consider plans to build three new passenger stations between Ashton and Ritchey.

Schenectady (N. Y.) Railway.—Within the next few years this company plans to build a new storage house in Schenectady.

Cleveland (Ohio) Railway.—A new group of repair shops and buildings are to be erected this winter by this company at Harvard Avenue and East Forty-ninth Street in Cleveland, at an estimated cost of $600,000. The shops at Euclid Avenue and East Twenty-third Street will be abandoned. The new buildings will be able to care for 3000 cars, or 1800 more than are now in service.

Toronto (Ont.) Railway.—This company plans to build new carhouses on Bracondale Avenue near Benson Avenue in Toronto. The structure will be one-story and of steel, brick and concrete construction. The cost is estimated to be about $14,000.

Eastern Texas Traction Company, Dallas, Tex.—This company has opened headquarters in Greenville and will occupy an entire floor in one of the largest buildings.

POWER HOUSES AND SUBSTATIONS

Havana (Cuba) Central Railroad.—During the next few months this company will award contracts to build new substations at Rincon, Guiva de Melena and Artemisa.

Albany (Ga.) Rapid Transit Company.—This company is installing in its plant on Front Street in Albany entirely new equipment, including a 350-hp generator.

Georgia Railway & Power Company, Atlanta, Ga.—This company has completed its new substation in Atlanta.

Schenectady (N. Y.) Railway.—Among the improvements planned by this company within the next three years will be a new substation in Schenectady.

Philadelphia (Pa.) Rapid Transit Company.—Under a new contract this company expects to get from the Philadelphia Electric Company an additional supply of motive power for some of its lines early in October.

Montreal (Que.) Tramways.—This company has ordered from the Canadian General Electric Company two 1000-kw motor-generator sets. One set is to be installed in the Côte des Neiges station of the Montreal Public Service Corporation and the other in the St. Henry substation of the Montreal Tramways.

Southern Traction Company, Dallas, Tex.—This company has begun the installation of equipment in its power plant at Trinity Heights, near Dallas. The station will be used to operate the company's interurban lines that extend to Waco and Corsicana.

Utah Light & Railway Company, Salt Lake City, Utah.—This company has awarded a contract to E. I. Anderson, Salt Lake City, to build its new substation at Bountiful. The cost is estimated to be about $12,000.

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Manufactures and Supplies

ROLLING STOCK

Grand Rapids, Holland & Chicago Railway, Holland, Mich., has ordered six 61-ft. all-steel interurban coaches from the St. Louis Car Company.

Long Island Railroad, New York, N. Y., has ordered forty motor passenger cars and fifteen motor passenger and baggage cars from the American Car & Foundry Company.

Schenectady (N. Y.) Railway has announced that rolling stock items during the next three years will involve the following expenditures: new cars, $54,000; remodeling cars, $42,000, and new trailers, $30,000.

Galveston-Houston Electric Company, Galveston, Tex., will purchase new car equipment with part of the proceeds of an increase in the capital stock of the company which is to be authorized at a special meeting of the stockholders on Oct. 6, 1913.

Louisville (Ky.) Railway is completing in its shops several trailers of a new design, with entrance and exit at the center of the car instead of at the ends. In the event that the company finds them advantageous, it is probable that the motor cars will be designed along the same lines. The company expects hereafter to build all of its own cars at its new shops, which are now nearing completion.

Brooklyn (N. Y.) Rapid Transit Company, as noted in last week's items in this department, has received the approval of the Public Service Commission to ask for bids on steel subway cars. This approval is subject, however, to possible modifications in equipment. In the meantime the company has sent specifications to the principal car builders asking them for bids on 100 cars with the option to increase the order to 600 within twelve months after ordering the first lot. The principal features of the specifications follow:

Type of car	multiple side-door subway service
Seating capacity	78 to 98
Approximate weight including equipment	121,900 lb.
Weight car, body only	83,165 lb.
Bolster centers, length	47 ft.
Length of body over coupler faces	67 ft. 3½ in.
Width over side sheets	9 ft. 9 7/16 in.
Height, rail to top of roof	12 ft. 3 in.
Height, rail to sills	3 ft. 9 11/16 in.
Body, side frame	pressed steel
Interior trim	Agasote or equivalent and steel
Headlining	Agasote or equivalent
Roof	modified monitor with no ventilator sash
Underframe	steel channels

Operating equipment and miscellaneous fixtures have not yet been specified.

TRADE NOTES

Cincinnati Car Company, Cincinnati, Ohio, has recently constructed ten all-steel interurban cars for the Union Traction Company of Indiana. These cars were described in the ELECTRIC RAILWAY JOURNAL for Sept. 27, but through an oversight the name of the Cincinnati Car Company was not mentioned as the builder of the new equipment.

H. F. McConnell, New York, N. Y., has withdrawn from the firm of Williams, McConnell & Coleman, 60 Wall Street, and formed a co-partnership with W. F. Preston and F. W. Langhorst, former employees of the old organization under the name and style of H. F. McConnell & Company, 25 Pine Street, New York. The new company will buy and sell investment securities, particularly public utility issues, on a commission basis or otherwise.

Johnson Fare Box Company, New York, N. Y., has changed its New York office from 1239 Fourth Avenue to 30 Church Street. This company has received orders for registering fare boxes from the following railways: International Railway, Buffalo, N. Y.; New York State Railways, Rochester, N. Y.; Grand Rapids (Mich.) Railway; Union Railway, New York, N. Y.; Yonkers (N. Y.) Railroad; Westchester Electric Railroad, Mount Vernon, N. Y.

General Railway Signal Company, Rochester, N. Y., has received a report showing that its automatic electric block signal installation on the Toronto, Hamilton & Buffalo Railroad was the means of averting a serious accident. A section of steel rail about 3 ft. in length was discovered broken. This break, however, by opening the track circuit connected with the signals, caused the block signals to indicate danger, and thus prevented an approaching train from being ditched.

Railway Utility Company, Chicago, Ill., has received an order to install utility electric thermometer control in eighty cars of the Chicago City Railway which are now undergoing reconstruction in its shops. This item is a correction of one which appeared in last week's issue of the ELECTRIC RAILWAY JOURNAL, in which it was stated erroneously that the railway installing this thermometer control was the Chicago (Ill.) Railways. The company has also recently received an order from the Chicago City Railway for the Utility Honeycomb type ventilators for 125 near-side cars. The system of ventilation for these cars will be a combination of Utility Honeycomb exhaust ventilators with a mechanical fan used in the Cook system of car ventilation.

Packard Electric Company, Warren, Ohio, has recently placed on the market a new type of transformer. The standard cruciform type of core is employed, but by an ingenious design of yoke the company has been able to provide good interior ventilation by means of ducts and thus insure a supply of cool oil in the interior of the transformer where it is most needed. This feature makes it possible to operate the transformers under more severe conditions and higher overloads than would otherwise be possible. Besides this arrangement a special form of core is used which eliminates cross-magnetization. All secondary leads are brought out through a single strong porcelain bushing which has the effect of reducing stray magnetism in the iron cases and thus improves the copper losses and regulations.

Manning, Maxwell & Moore, Inc., New York, N. Y., have appointed Henry Evans chairman of the executive committee and acting president of the firm. Mr. Evans was formerly president of the Continental Insurance Company This firm has purchased the capital stock of the Putnam Machine Company, Fitchburg, Mass., which makes heavy railroad machine tools. The Putnam company will retain its name and be operated on its own identity, as are the various other subsidiaries of Manning, Maxwell & Moore, Inc. By the purchase the old officers and directors of the Putnam company automatically ceased to hold office and the following are now directors: Salmon W. Putnam, Alfred J. Babcock, John N. Derby, Percy M. Brotherhood and George D. Branston, the last four being executive officers of Manning, Maxwell & Moore, Inc.

ADVERTISING LITERATURE

Trump Manufacturing Company, Springfield, Ohio, has issued a catalog describing and illustrating its turbines.

Ohio Brass Company, Mansfield, Ohio, has issued a folder describing its National open-mesh railroad trolley guard.

National Tube Company, Pittsburgh, Pa., has issued its N. T. C. Bulletin, No. 16, which describes and illustrates the tests to which its boiler tubes are subjected.

Niles-Bement-Pond Company, New York, N. Y., has issued the *Progress Reporter* for September, 1913, describing and illustrating its recent types of lathes, milling machines, surface grinders and vertical shapers.

General Electric Company, Schenectady, N. Y., has issued Bulletin No. A4137, describing and illustrating its Curtis steam turbines of 100-kw to 2500-kw capacity for driving sixty-cycle generators at 3600 r.p.m. These generating sets are of the horizontal-shaft, rigid-frame type, and either two or four impulse wheels are used, depending upon the capacity of the ventilator. Bulletin No. 4972 describes the K R system of voltage regulation, which can be successfully employed on systems having such large fluctuations of voltage that the standard method is ineffective. The K. R. system gives a broad range of excitation and the amount of voltage it can furnish the fields of the main alternators is not limited either by the voltage range of the main exciters or the amount of current flow interrupted by the contacts of the regulator.

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Convention Number

Electric Railway Journal

An Account of Recent Progress in Electric Railway Track Construction, Power Generation, Car Design, Repair Shop Methods, Fare Accounting, Freight Handling, Signaling and the Independent Propulsion of Cars

TRACK CONSTRUCTION

THERE is a marked difference of opinion among engineers as to the best form of track foundation. Some consider that absolute rigidity is necessary to durability, while others are of the opinion that some degree of elasticity is desirable for both track and rolling stock. While the exact causes of rail corrugation are unknown, it is generally admitted now that the rigid track construction is an important factor in its production. If this theory is correct, at least one element of durability in track will be obtained by an elastic foundation. In this chapter both methods will be described, and an attempt will be made to present in the text and by illustrations a summary of the recent progress made in solving other problems involved in the work of track construction in paved streets.

Neutral Strip for Suburban Track Construction, Memphis Street Railway

EXCAVATION AND DRAINAGE

No small part of the cost per linear foot of track is spent for excavation, and since the abandonment of the concrete beam most companies make a trench of uniform width and depth for the track. This is little, if any, more expensive than where the excavation is carried to a greater depth below the ties than between the ties, because such special excavation has to be done by hand labor, whereas the uniform trench can be made with power excavators. However, some companies have been successful in reducing the amount of excavation by the use of shallow rails and short ties (6 ft. 8 in. or 7 ft.) and reports indicate that this practice is satisfactory.

Closely connected with the subject of excavation is that of drainage, and before any design for track in paved streets is complete the subsoil should be carefully investigated so that its bearing qualities and its drainage characteristics may be determined. Some qualities of clay will retain water indefinitely and must be provided with a drainage system, especially where crushed-stone ballast is used in the place of solid concrete. The methods employed in providing artificial drainage for the track foundation are as follows: The tile is laid in a trench in the space between the ends of the ties in double track, or it is installed under the center of each track. In either case it is good practice to slope the subgrade to the drain and provide frequent outlets and a filtering medium around it. Some engineers make this filtering medium of cinders, some employ gravel and crushed stone, and still others use a form of roofing gravel.

An ordinary 6-in. clay drain tile is generally used for

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this purpose, but the experience of some engineers tends to show that it is practically impossible to keep such a drain clean, regardless of the care with which it is laid, both as to grade and provision for outlets. To obviate this difficulty either first-grade or second-grade vitrified tile provided with bell and spigot has been used. This kind of tile is laid with unsealed joints, each joint being surrounded with the filtering medium of cinders, crushed stone or roofing gravel. This type of construction has been found just as effective as the soft tile, and in addition it is self-cleaning and will withstand greater pressures without being crushed.

Another phase of the trench construction worthy of careful consideration is its preparation to receive the concrete or ballast foundation. One method frequently adopted is to roll the subgrade with a 10-ton or 15-ton roller to give it uniform bearing qualities. Other engineers have considered this method of preparing the subgrade unnecessary, particularly where the excavation is made through clay in its original state. In some localities the soil often contains soft spots or sink holes, and to obviate future difficulties these soft spots should be dug out and filled with concrete. When a trench is excavated through made ground its bearing power is a questionable quantity. To provide against failure at these points, the depth of the concrete base should be increased so that it will act as a floating foundation.

Standard Girder Grooved Rail Construction, Public Service Railway of New Jersey

CONCRETE FOUNDATIONS

In the early days, and in some instances at the present time, the use of concrete for foundations has been required by city engineers. In the past its quality has often been considered a secondary matter, but with the wider adoption of concrete for foundations in track construction, the proper materials as well as the proportions are now receiving more thoughtful consideration. As a rule, it is safe to say that bank-run gravel will not produce the best results in track foundations, as it is seldom free from foreign matter. The proportion of foreign matter in the ingredients has a direct bearing on the quality of concrete produced, and experience has shown that the best results are obtained where the quality of concrete is at least equal to that used in the better class of foundations. Doubtless the best results will be obtained when the aggregate is carefully analyzed to determine the percentage of voids, both as to sand and cement, washed materials being preferable to dry screened.

The proportions of cement, sand and aggregate employed by the various street railway companies throughout the country vary from a mixture of 1:3:7 to one of 1:2:4. The best practice is to regulate the mixture of sand and aggregate at some central point, preferably before it is delivered to the construction work. Where this method is adopted the foreman of the concrete mixing gang may devote his entire time to seeing that the concrete is properly mixed and then that it is laid in the proper way, rather than to be required to give a part of his time to seeing that the materials are mixed in the proper proportion.

As a rule a 6-in. concrete foundation placed under the tie or under a sand or crushed stone cushion immediately below the ties has been accepted as desirable. Some engineers have found this depth inadequate owing to local soil conditions and have increased the depth to 8 in., particularly where the resilient type of track construction is employed. In any type of construction where concrete is employed as a foundation the aggregate is

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usually deposited as wet as practicable and should be well puddled so that all voids are filled.

Where it is impossible to divert traffic from a track being rehabilitated some engineers have adopted the plan of installing crushed-rock foundations temporarily, to be followed by concrete. After the rock has been tamped thoroughly and the weak spots revealed by operating regular service over the open track, a rich grout mixture is poured into the voids. While this method has not been tested generally, and while the concrete has not been in service long enough so that conclusions may be drawn as to its practicability, it appears that in an emergency it is a desirable plan to follow.

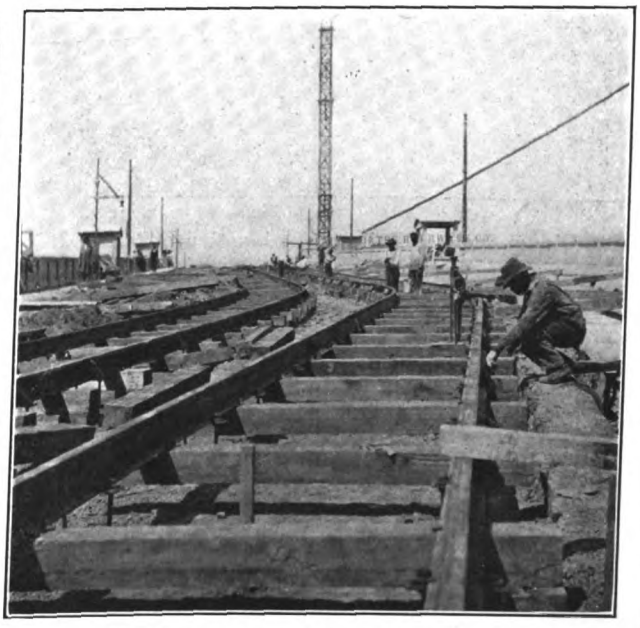
One of the difficulties in solid concrete track construction is to provide a perfect track surface. As a rule the track is lined and surfaced with wood blocks, and the concrete is poured in around the ties up to paving foundation level. As the concrete sets and the moisture evaporates from the tie, the concrete is apt to shrink away from the tie, particularly if it is untreated, and this leaves the track supported only on the blocks. When traffic is turned on to the track the blocking settles until the tie bears on the concrete. This starts a movement between the tie and the concrete which increases with age.

Another common error which engineers make when they have to hurry to turn over a section of track to the transportation department is the failure to give sufficient time for the concrete to set properly. From at least ten

Type No. 3 Track of Chicago City Railway After Tamping Ballast

Grouted Paving Along Rails with Space Between Ready for Asphalt Filling, Chicago City Railway

Plastering the Rail Before Paving Is Begun, Chicago City Railway



Track with Rail Anchors Ready for Concrete, Houston Electric Company

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days to two weeks should be allowed for this during the summer months and the time should be extended when the temperature is lower, particularly when track is being constructed in the late fall.

BALLAST

Ballasted track is used quite generally by some engineers for track foundations in paved streets where it is impossible to divert traffic while the construction is under way, and it is also used by other street railway companies in preference to a concrete foundation so as to obtain more resiliency. The procedure in Chicago is a notable example of the latter, as it is now using the ballasted type of track construction almost exclusively. Its general adoption in Chicago was largely the result of the difficulty which the street railways there experienced with the rapid development of rail corrugations and their efforts to eliminate this common but inexplicable phenomenon.

Girder Grooved Rail on Combination Ballast and Concrete Foundation, United Railroads of San Francisco

With this type of construction the most permanent results are obtained by the use of a crushed stone of first quality and of a size to pass through a 2½-in. ring. This stone is screened to remove the fine particles which, after the ballast is in place, tend to filter out with moisture, causing a shifting roadbed.

Construction of this character compares vary favorably with that where a concrete foundation is used if the installation has been thoroughly guarded. Where subsoil conditions give evidence of instability, however, ballasted track construction should not be employed. It is objectionable in instances of this character because crushed stone does not act as a unit in a way similar to a solid concrete slab, but the load on each tie is carried to the subgrade independently. Hence, if there is the slightest giving way in the subsoil, the track begins to pump, and this finally results in its utter failure to maintain a uniform line and surface.

As a rule, the depth of this crushed stone or gravel ballast is 6 in. Some engineers, however, have made the depth as shallow as 5 in., and others have increased it to 9 in. The question of draining this type of track construction does not appear to have received serious consideration, as comparatively few companies have provided tile drains either under the center of each track or in the space between the ends of the ties in double track.

In connection with the use of crushed rock or gravel for ballast under track in paved streets, the types employed by the Milwaukee Electric Railway & Light Company and the Twin City Rapid Transit Company, which are somewhat similar, have been found to produce as permanent a track as may be desired. Coarse crushed rock or gravel is employed in both designs and is placed in the trench to a depth of 6 in. and thoroughly rolled in place by a road roller. Over the top of this sub-ballast layer the Milwaukee Electric Railway & Light Company spreads 2 in. of No. 2 medium crushed stone, which is used in surfacing and tamping the track to finished grade. The Twin City Rapid Transit Company's design requires that a 2-in. layer of fine gravel be spread over the top of the crushed rock ballast, which also serves for surfaceing and tamping the track to a finished grade. In Baltimore 6 in. of ballast is used under the ties, and in many cases gravel is used between the ties.

To reduce the quantity of concrete necessary to construct its track in paved streets, the United Railroads of San Francisco, Cal., in addition to placing 9 in. of rolled crushed rock ballast under the ties, spreads mounds of crushed rock between the ties at the track center and between parallel double tracks. This mound or ridge of crushed stone is so placed as to permit the paving foundation concrete to form a beam under the rail of the same depth as the tie. The top of the ridge or mound of crushed stone projects approximately 2 in. above the top of the tie.

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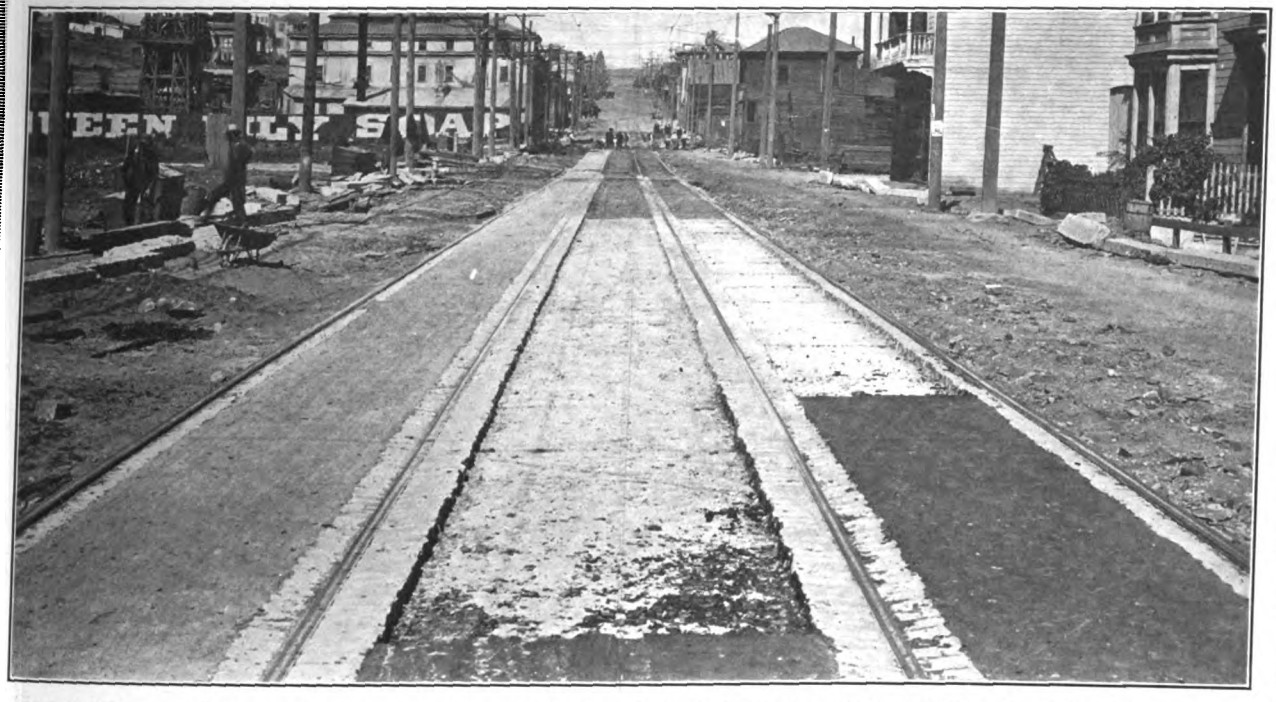
TIES

If the axiom that the life of the track is equal to the life of the joint is accepted, the next element of success entering into its make-up is the tie, which is subject both to decay and mechanical wear. Ties of various lengths and of various kinds of timber are being used in different parts of the country, namely, the chestnut and hard woods in the East, principally hard woods such as mixed oak and white oak in the Central States, long-leaf yellow pine and cypress in the Southern States and some of the Central States, and practically all yellow pine and fir in the Western States.

Reports from more than thirty of the principal street railway properties in the United States show that less than one-third of them are using treated ties. Some engineers have taken the position that the life of the tie should not exceed the life of the rail. Consequently they have adopted ties which will give this length of life in service, and usually the kind of timber selected is that most plentiful in the territory in which the street railway company's property is situated. On the other hand, some engineers have used treated soft wood, only to find its life limited by mechanical wear. Consequently they have abandoned its use, adopting a more expensive untreated timber which will give the same length of service. Where the selection of the kind of tie to be employed is not governed by either of these factors and the engineer is free to approach the problem with an open mind, he usually adopts either the treated hard wood or the white oak tie. In either case he is careful to see that the timber is properly seasoned before it is treated or before it is placed in the track. If the tie is untreated, usually the specifications limit the percentage of sap wood, and only sound timber up to specified sizes is employed.

There has been considerable discussion as to the advisability of using hewn or sawn ties either treated or untreated, and the problem still remains an open one. Doubtless for treated ties sawn timber will give better penetration in the treating process than hewn ties. When a stick of timber is squared the saw does not follow the grain but leaves the pores open to receive the preservative under either the pressure process or the dipping or painting process. To verify this statement one needs only to cut into a sawn tie and a hewn tie treated by the same process, and it will be found that the penetration in the sawn tie is much deeper than that in the hewn tie. The fact that a better rail bearing is obtained without adzing is another argument in favor of sawn ties. To provide an equal bearing area on hewn ties it is necessary either to adze them by hand after the rail is set in position, just before it is spiked, or do the surfacing with an adzing machine at the material yard. This latter method is practised by the United Railways of St. Louis in conjunction with the use of screw spikes and tie plates. All 6-in. x 8-in. x 7-ft. white-oak hewn ties are both machine-adzed and drilled for the plates and screw spikes at the material yard.



Girder Grooved Rail with Combination Granite Block and Asphalt Paving, United Railroads of San Francisco

Preservative plant engineers have been endeavoring to obtain a uniform treatment throughout the cross-section of the timber, but experience has shown that this is unnecessary, it being merely a theory based on the old adage "If little is good, more should be better."

Specifications for ties and their treatment should be prepared with care and strictly carried out. The best method of accomplishing this is for the purchaser to place a competent inspector at the tie yard or treating plant, preferably at both places. As a rule, neither the tie company nor the treating plant has the slightest objection to the company's inspecting the work under way. They would rather have a large percentage of ties refused be-

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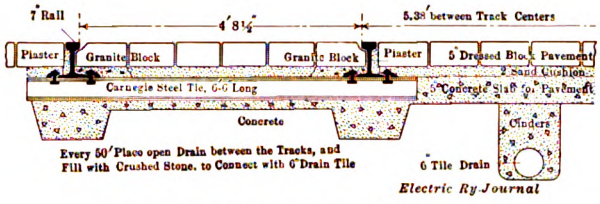
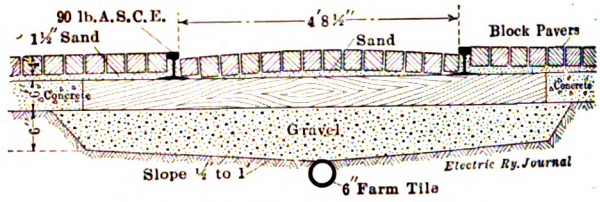
fore they have been transported to destination than a small quantity after they are delivered.

Usually the engineer for a street railway company is unaware, until a comparatively short time in advance, of just how much track he will have to construct during any year. In most instances the amount to be built depends largely upon the action taken by the city administration in regard to paving. If a new pavement should be ordered for any street, the street railway company will usually want at the same time to rehabilitate its tracks on that street. To do this promptly, however, it must have its track materials on hand, because if it waits before placing its orders until the material is actually needed it may be delayed in beginning the work owing to the slow delivery of rails and ties.

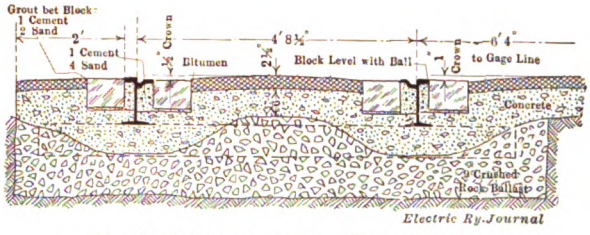
To cope with this problem, a number of companies have made it a rule to set aside a considerable area in their material yards for the storage of these materials. If the ties are purchased in large quantities regardless of the seasoning and sufficiently in advance of their use in track work, it is possible for the company to be certain of the seasoning by doing it in its own material yard. In addition to providing exact knowledge of the period of seasoning, the fact that the ties are purchased in large



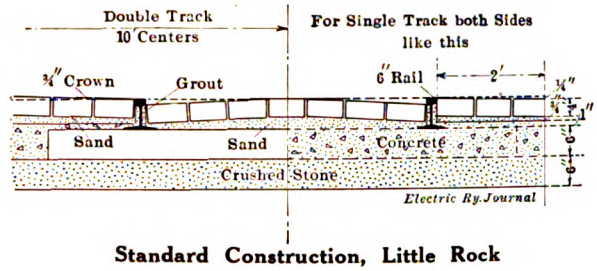
Standard Construction, Cleveland



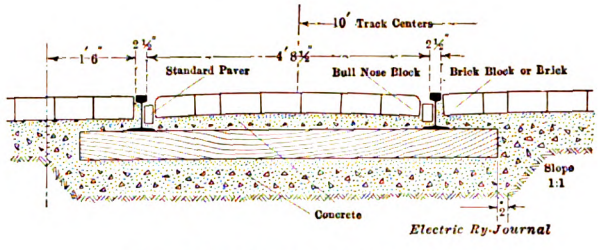
Standard of Illinois Traction System



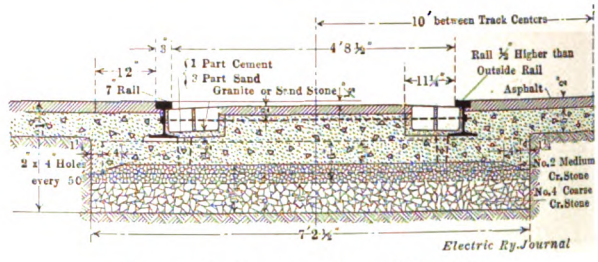
Standard Construction, San Francisco



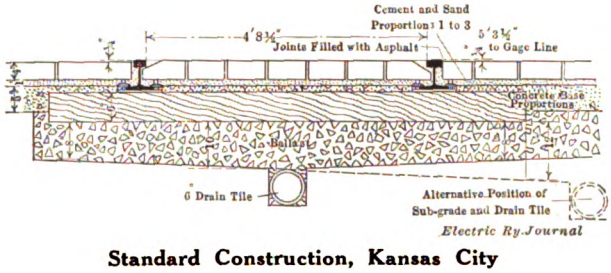
Standard Construction, Little Rock



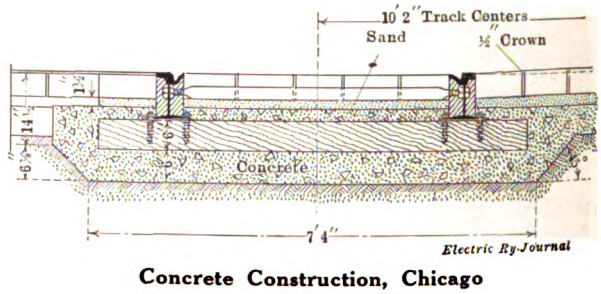
Standard Construction, Seattle



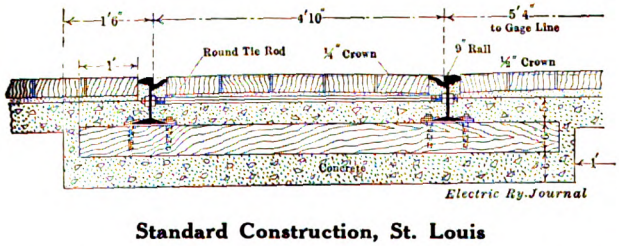
Standard Construction, Milwaukee



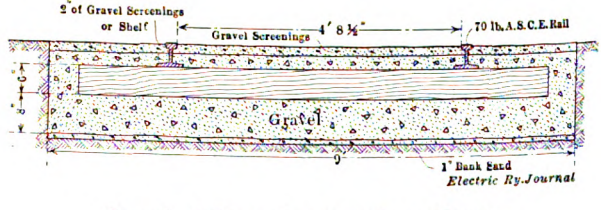
Standard Construction, Kansas City



Concrete Construction, Chicago



Standard Construction, St. Louis



Gravel Ballast Construction, Houston

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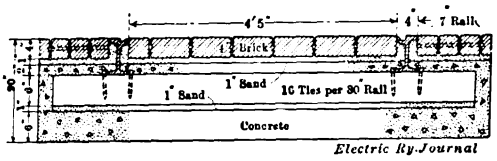
quantities in a field in which competition is sharp brings about a reduced price which, in many instances, offsets the fixed charge on the investment on ties lying in the material yard.

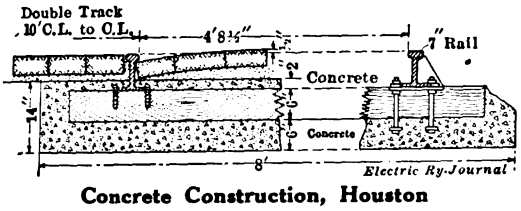
Many street railways have adopted the 6-in. x 8-in. x 8-ft. tie, spaced at 2-ft. centers in the track, as in standard steam road practice. On quite a number of street railways, however, a 7-ft. tie has been adopted in place of an 8-ft. one, and on the Detroit (Mich.) United Railways a 6-in. x 10-in. x 6-ft. 8-in. white-oak tie is used exclusively. It has been found that when odd lengths or sizes are purchased in large quantities usually the standard price holds. It is claimed for the tie with the 10-in. width used by the Detroit United Railways that it not only gives additional bearing area but increases the strength of the tie at the center, where it is desired.

Under special work, such as turn-outs and cross-overs, the ties in some cases conform to the standard, being 6 in. x 8 in. in section, but most street railways are purchasing them of special lengths so as to eliminate the difficult tamping experienced with the standard-length ties interlaid to meet track conditions.

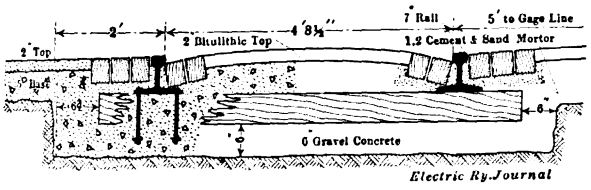
Several railways have adopted a close tie spacing on ballast foundations, while others have increased the in-



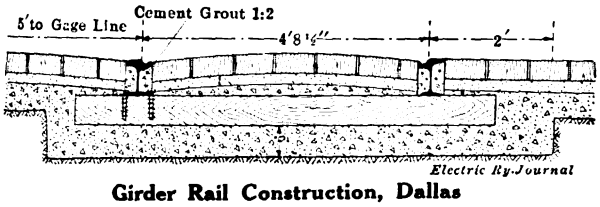
Standard Construction, Detroit



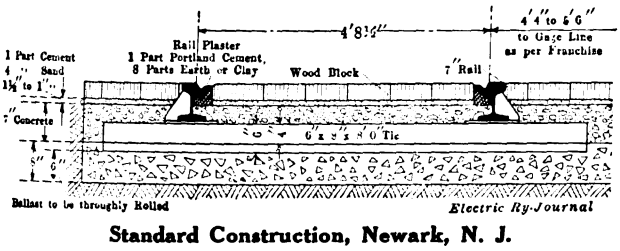
Concrete Construction, Houston



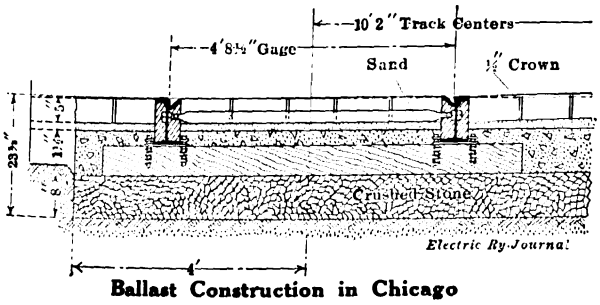
T-Rail Construction, Dallas



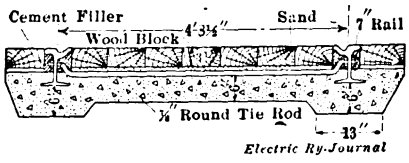
Girder Rail Construction, Dallas



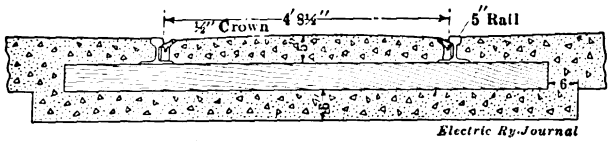
Standard Construction, Newark, N. J.



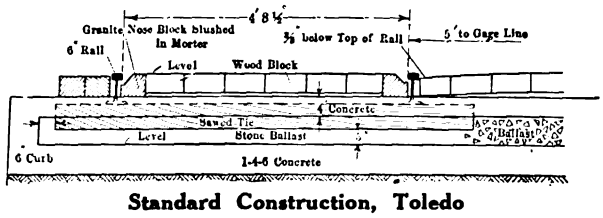
Ballast Construction in Chicago



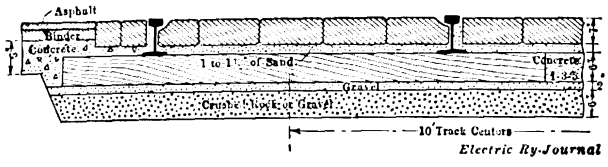
Girder Rail Construction, Memphis



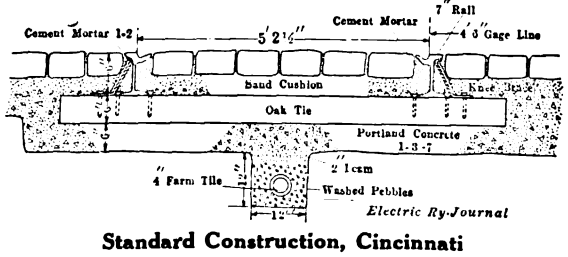
T-Rail Construction, Memphis



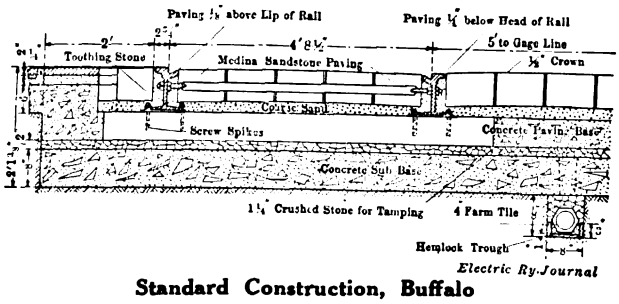
Standard Construction, Toledo



Standard Construction, Minneapolis



Standard Construction, Cincinnati



Standard Construction, Buffalo

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CHARACTERISTICS OF TRACK CONSTRUCTION IN PAVED STREETS IN THIRTY-SIX NORTH AMERICAN CITIES

City	Roadbed Under Ties	Ties			Rail		Spikes	Joints				Bonds	Tie Rods	Rail Braces and Tie Plates
		Spac'g	Kind	Size	Type	Wt.		Type	Drill'g	Lgth.	Bolts			
Baltimore	6″ ballast under ties	2′0″	Wood	6″x8″x8′	9″&7″ gird.gr've	103	Screw	Riveted-welded	10-hole	32″	1″ riv'ts	None	⅝″x2″, 6′ centers	Tie plates.
Birmingham	6″ 1:3:6 slag concrete	3′4″	Creosoted pine	6″x8″x7′6″	7″ T-rail	80	9/16″x5½″	Continuous	4-hole	24″	¾″	Com.ter.and ball	None	Tie plate and rail brace 6′8″
Boston	6″ trap rock—1:2:5 con., width 3½″, cr.-r'k cushion	2′0″	Long-leaf pine	6″x8″x8′	9″ girder 7″ girder	132 116	½″x⅜″x6⅛″ Screw	Electric-welded	None	.....	None	None	1″ r'd & 2½″x⅛″ flat, 5′centers	Tie plates on all ties
Buffalo	8″ 1:3:5 grav.—concrete with 2″ sand cushion	2′0″	Long-leaf pine	6″x8″x7′	9″ girder groove	124	Screw ½″x⅜″x6⅛″	Continuous	4-hole	24″	1″	2-4/0 compressed terminal	9/16″x2″, 6′ centers	Plates on all ties
Chicago	8″ crushed-stone ballast	2′0″	Yellow pine & creosoted oak	6″x8″x7′	9″ girder groove	129	Screw ½″x⅜″x6⅛″	Electric-welded	None	.....	None	None	9/16″x2″, 6′ centers	Tie plates ½″x6 x10″
Cincinnati	6″ 1:3:7 rock conc., 4″ farm drain in center	2′0″	White oak	6″x8″x8′	9″ girder groove	140	9/16″x5½″	Cast welded	.....	13″	.....	None	None	Rail brace at fourth tie
Cleveland	6″ 1:6 gravel conc. under tie & 12″ under rail	4′0″	Carnegie steel	6′6″ long	7″ T-rail	95	Bolt and clip	Clark joint	8-hole	30″	1⅛″	None	⅝″x2″, 5′ centers	None
Dallas	6″ 1:7 gravel concrete, 6″ 1:3:6 rock concrete	3′0″	Hd. pine, drop anchs.ev.2d tie	6″x8″x7′	7″ T-rail 7″ gird. groove	80 103	9/16″x5½″	Continuous	6-hole	26″	1″	2-9″ crown pin	None	Brace plates every third tie
Detroit	8″ 1:2:4 grav. conc., 1″ sand cushion under ties	3′0″	White oak	6″x10″x6′8″	7″ T-rail	91	9/16″x5½″	Cast welded	None	.....	None	None	⅝″x1½″, 6′ centers	None
Harrisburg	6″ cr. r'k ballast under ties	3′0″	Chestnut	6″x8″x7′6″	9″ tram	125	9/16″x5½″	Continuous	6-hole	26″	⅞″	Comp'd term'l	⅝″x2″, 10′ cen'rs	None
Houston	6″ 1:3:6 rock concrete	5′0″	Pecky cypress. Anc. bet. ties	6″x8″x7′	A.S.C.E. 7″ T-rail	80 80	Screw	Bonzano continuous	6-hole 6-hole	26″ 26″	1″ 1″	2-4/0 pin driv'n	None	Rail brace every 10′0″
Ill. Trac.	8″ grav. ballast	2′0″	Creo. white oak	6″x8″x8′	A.S.C.E.	90	9/16″x5½″	Continuous	6-hole	26″	⅞″	Comp. term.	None	None
Indianapolis	6″ to 10″ 1:2½:5 gravel concrete under ties	2′0″	White oak	6″x8″x8′	7″ T-rail 9″ tram	91 95	9/16″x5″	Cast welded and continuous	.....	.....	None	Brazed and comp. term'l	⅝″x2″	None
Kansas City	8″ to 12″ crushed rock ballast under ties. Tile drain	20″	White oak	6″x8″x8′	A.S.C.E. 9″ Trilby	100 109	9/16″x5½″ Screw ¾″x5½″	Continuous	4-hole	24″	1″	Comp. terminal and soldered	⅞″ round	Tie plates with screw spike
Little Rock	6″ crushed stone	2′0″	Creosoted pine, sawed	6″x8″x8′	6″ T-rail 7″ tram girder	72	9/16″x5½″	Angle-bar continuous	6-hole 4-hole	34″ 24″	⅞″ ¾″ ⅝″	2-4/0 soldered	None	None
Louisville	6″ crushed stone concrete	2′	Steel ties, oak ties	4½″x6′6″ 6″x8″x8′	9″ Trilby	106	9/16″x5½″	Bars	.....	.....	1″ but. h'd	2 flexible, comp'd term'l	Flat, 2″x⅜″ & ⅞″ round	None
Los Angeles	.....	20″	Redwood	6″x8″x8′	9″ Trilby 7½″ T-rail	116 87	9/16″x5½″	Continuous and thermit	.....	.....	.....	.....	.....	Every fourth tie
Milwaukee	6″ No. 4 crushed rock and 3¾″ No. 2 crushed rock	2′0″	Long-leaf yel. pine, wh. oak	6″x8″x7′	7″ T-rail	95	¾″x⅝″ Screw	Cast welded & bar	6-hole	28″	1⅛″	.....	2″x⅜″, 6′ centers	None
Memphis	6″ crushed rock concrete	5′0″	Creo.pine ties	6″x8″x8′	T and 7″ Trilby	80 105	9/16″x5½″	Cast and bar	8-hole	34″	1″	Com. ter. and brazed	⅞″ round	None
Minneapolis	6″ rock ballast with 2″ gravel under ties	2′0″	Oak or pine creosoted	6″x8″x8′	7″ T-rail	91	9/16″x5½″	Cast welded	1-hole	.....	None	None	⅝″x1½″, 10′ centers	None
Montreal	8″ 1:3:6 rock concrete, 1″ sand cushion under ties	2′0″	Pine and cedar	6″x8″x8′	7″ Trilby	116	9/16″x5½″	Continuous	6-hole	26″	1″	Electric brazed	⅞″ rod, 6′ centers	None
Newark	6″ crushed rock or slag under ties	2′0″	Long-leaf pine, creosoted	6″x8″x8′	7″ Trilby	116	9/16″x5½″	Bonzano continuous	4-hole	24″	⅞″	Compressed terminal	None	Tie plates on every 2d tie
New Haven	Natural gravel ballast in subsoil	2′0″	White oak and chestnut	6″x8″x8′	7″ T-rail 9″ gird. groov'd	95 125	9/16″x5½″	Continuous bar	4-hole 12-hole	24″ 32″	⅞″	.....	None	Only on curves
Philadelphia	18″x19″ concrete stringer	4′0″	Cast-iron chair	.....	9″ Trilby	141	Bolt and clip	Nichols joint	None	.....	1″ riv'ts	None	None	None
Pittsburgh	8″ stone ballast under ties	2′0″	.....	6″x8″x8′	9″ Trilby	125	9/16″x5½″	Bars with reamed holes	.....	.....	Machin'd	Comp. terminal & ther. welded	⅞″x2″	.....
Portland,Ore.	6 to 8″ gravel ballast under ties with tile drain	2′0″	Fir	7″x9″x8′ 6″x10″x6′	7″ groove 7″ T-rail 6″ T-rail	95 80 72	9/16″x5½″	Continuous	4-hole	24″	1″	Compressed terminal	None	None
Richmond	6″ concrete	8′0″	Carnegie	4½″x6′8″	9″ gird. gr've	114	Lugs and T-bolts	Electric weld	.....	.....	.....	None	None	Tie fast. and rail brace
Seattle	6″ 1:4:7 concrete	18″	Washington fir	6″x8″x7′	7″ T-rail	90	9/16″x5½″	Continuous	6-hole	26″	1″	4/0 and 500,000 c.m., soldered	On curves 8′cen. At j'ts 30″ cen.	6 8″x10″x⅜″ at joints only
San Francisco	9″ stone ballast under ties	2′0″	Redwood	6″x8″x8′	9″ Trilby	106	⅝″x5½″	Bars	6-hole	26″	1″	⅞″ comp. ter.	⅞″ rod, 10′ cen.	None
St. Louis	6″ 1:3½:6½ rock concrete under ties		White oak	6″x8″x8′	9″ T-rail 7″ Trilby	100 132	Screw	Nichols joint	.....	.....	.....	None	¾″ rods, 6′ cen.	Tie plate with screw spikes
Springfield	9″x22″ concrete beam	5′0″	Steel	4½″x6′8″	7″ T-rail	70	Lugs & bolts	Continuous	6-hole	26″	⅞″	None	None	None
Toledo	6″ 1:4:6 concrete and 3″ stone ballast	2′0″	Sawed white oak	5″x8″x7′	6″ Dudley	100	9/16″x5½″	Angle bars	4-hole	24″	1″	1-8″, 4/0, braz.	None	None
Toronto	6″ or 7½″ 1:3:7 rock concrete under ties	5′0″ or 2′6″	Carnegie steel, cedar & pine	7″ long 6″x8″x8′	7″ T-rail 7″ T-rail	90 80	Bolt and clip ⅝″x5½″	Continuous Continuous	6-hole 6-hole	26″ 26″	1″ 1″	Electric welded on rail head	7″ rods, 6′ centers	None
Vancouver	6″ 1:3:6 gravel concrete, 1″ sand cushion under ties	2′0″	Fir	6″x8″x8′	7″ T-rail	91	9/16″x5½″	Continuous	6-hole	26″	1″	Comp. terminal and soldered	⅝″x2″, 6′ centers	None
Winnipeg	3″ crushed stone, 6″ 1:3:5 concrete under ties	2′0″	Fir	6″x8″x8′	7″ T-rail	80	9/16″x5½″	Continuous	6-hole	26″	1″	4/0 soldered to rail head	None	None
Washington	5″ crushed rock.	30″	Chestnut	6″x8″x8′	A.S.C.E. titan.	80	9/16″x5½″	Continuous	6-hole	30″	⅞″	2-4/0 pin term'l	1½″x⅜″	None

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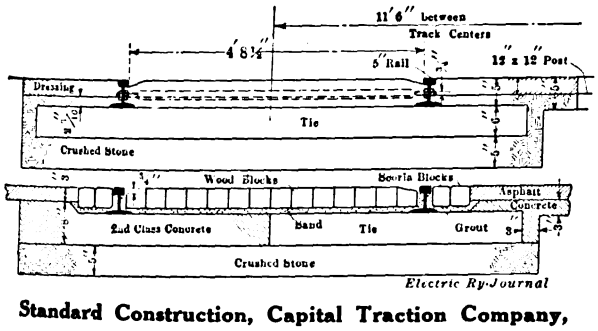
terval to 3 ft. and 3 ft. 4 in. on concrete foundations. The cities where street railways employ concrete track foundations and space wooden ties wider than 24 in. include: Detroit, Mich., with a 40-in. spacing; Washington, D. C., with a 30-in. spacing; Houston, Tex., with a 5-ft. spacing in combination with a rail brace and anchor plate between the ties; Birmingham, Ala., with a 3-ft. spacing for T-rail and 3 ft. 4 in. for girder rail construction; Memphis, Tenn., and Dallas, Tex., with a 3-ft. spacing.

Very few properties use steel ties extensively; some which experimented with them have definitely abandoned them for the wooden tie. The Cleveland Railway standard track construction in paved streets includes both the Carnegie and the International steel ties, the latter being used only at joints. The Virginia Railway & Power Company, Richmond, Va., is using the Carnegie steel tie spaced at 8-ft. intervals, and the Springfield (Mo.) Traction Company has adopted the Carnegie steel tie spaced at 5-ft. intervals. In Richmond, Va., the steel tie is used with a 9-in., 114-lb. grooved girder rail, and at Springfield, Mo., and Cleveland, Ohio, it is being used with a 7-in., 80-lb. and 7-in., 95-lb. T-rail respectively.

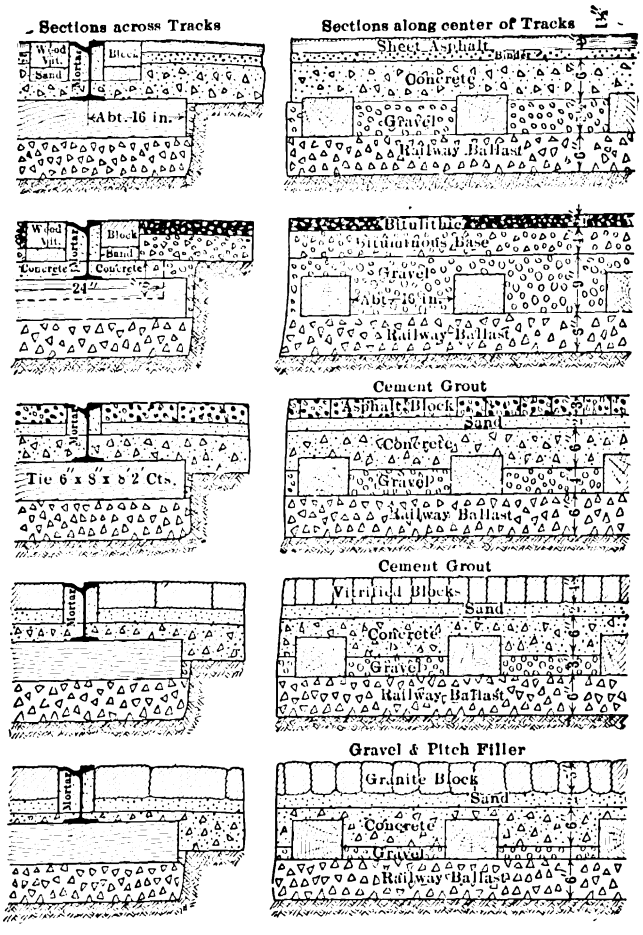
Considerable experimentation with steel ties has been conducted by the Board of Supervising Engineers, Chicago (Ill.) Traction. The first installation of this class of construction included a steel tie weighing 14½ lb. per foot and 6 ft. 9 in. in length. These ties were spaced at 4-ft. intervals, and the 125-lb. rail of the Chicago section was attached to them by a special fastening. After a careful study of this type of construction under operating conditions, it was decided that the tie spacing was too great, as it brought heavier loads to the concrete foundation than it could bear. Consequently the spacing was reduced to 3 ft. After a thorough examination of this revised type of construction under service conditions, it was decided that even this interval was too great, and accordingly it was decreased. With the last reduction in the spacing, the board was confronted with the question of the cost of steel ties as compared with treated wooden ties for a given length of track. Further to convince the



Standard Construction, Capital Traction Company, Washington

board that this type of construction was wrong, rail corrugations began to develop in the extremely rigid track. To meet both of these problems wooden ties on rolled ballast were adopted to obtain resiliency, and this form of construction is being used almost exclusively in rehabilitation work at the present time.

Some engineers continue to question the advisability of using a treated tie in the place of an untreated white-oak tie, as they believe that the physical life of the untreated white-oak tie is approximately the same as the mechanical life of the treated mixed-oak or yellow-pine tie. Practically no engineers report that they have attempted to use



Types of Track Construction and Paving Used at Baltimore

treated ties again after such ties have been removed from track in reconstruction. One company in reconstructing track for paving found it necessary to remove 75,000 treated ties before it was possible to obtain the maximum life. In some localities as much as eighteen years' service has been obtained from seasoned white-oak ties. This probably more than equals the mechanical life of treated ties, unless tie plates and screw spikes are employed, which will then make the physical life determine the time of the removal of the ties from the track.

RAIL SECTIONS AND ANALYSIS

Most street railway companies in the United States have adopted the 7-in. or the grooved girder rail. Reports from thirty-one of the principal companies show that only eight are employing a 9-in. rail for track construction in paved streets. In cities where normal traffic is not dense and the rolling stock not exceptionally heavy the 7-in., 70-lb. high T-rail is favored, except where the street railway is forced to use the girder rail or is of the opinion that this rail is more satisfactory than the T-rail. In such instances the 7-in., 90-lb. grooved girder rail is

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being purchased largely. The extended practice of the Connecticut Company with T-rail was described at length in the issues of this paper for Aug. 30 and Sept. 6, 1913. Where the density of traffic and the weight of rolling stock increases, the 7-in., 91-lb. or 95-lb. high T-rail has been used in many cases. The weight of the 7-in. girder grooved section generally adopted varies from 100 lb. to 116 lb. per yard.

On properties where the 9-in. girder grooved rail is standard the weight of rail employed varies between 125 lb. and 141 lb. per linear yard, with the exception of one which has adopted a 9-in., 114-lb. section. Of the eight street railway companies reporting the use of the 9-in. girder rail, none is using a 9-in. T-rail. In most instances on the cross-town or suburban lines carrying a comparatively light traffic the track substructure is not changed from standard unless it is in an unpaved street, but the weight of the rail is reduced, it usually being a 7-in., 70-lb. or a 9-in., 106-lb. grooved girder.

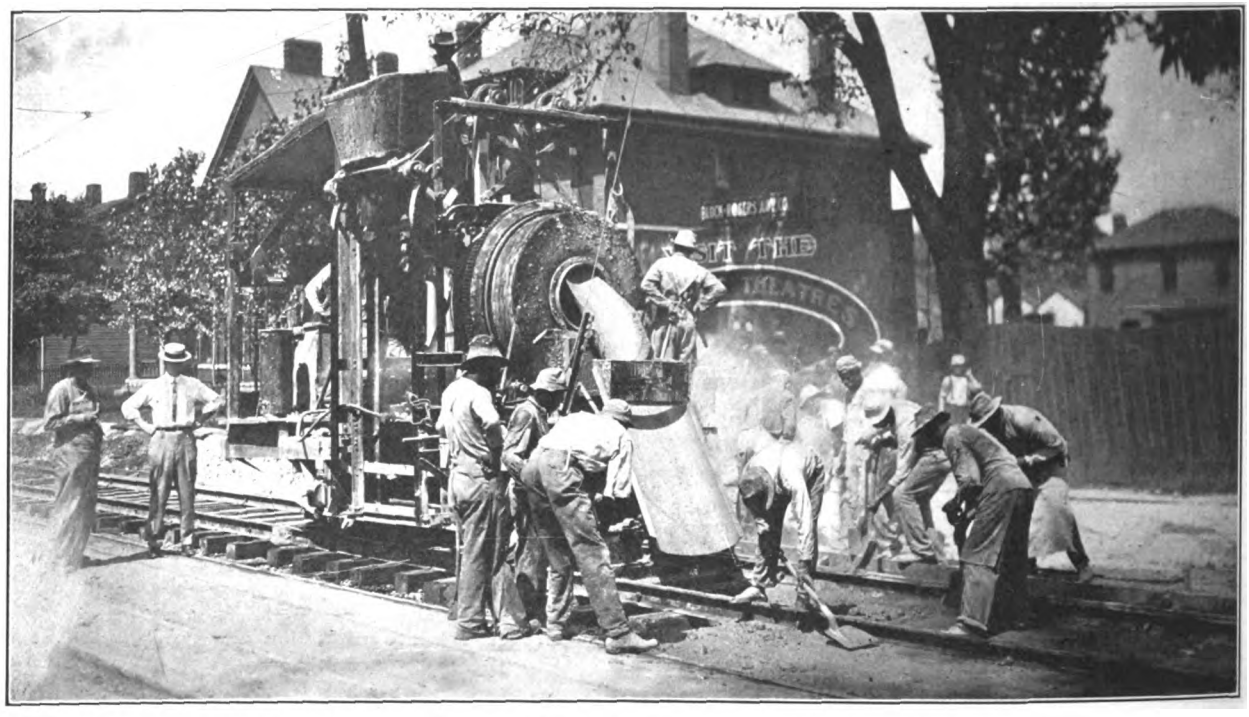
Practically all street railway companies making rail purchases specify 60-ft. to 62-ft. lengths. Thus they reduce the number of joints 50 per cent at a slight increase in the purchase price and in the cost of handling. At the present time rail manufacturers are quoting $39 per ton f.o.b. cars Chicago for girder rail in 60-ft. lengths and $37 per ton f.o.b. Chicago for girder rail in 33-ft. lengths, manufactured by the open-hearth process. Standard A.S.C.E. sections manufactured by the open-hearth process are quoted at $30 per ton f.o.b. cars Chicago for 33-ft. lengths and $32 per ton f.o.b. cars Chicago for 60-ft. lengths. To obtain the minimum price per ton, a minimum of 250 tons of girder rail or 500 tons of standard A.S.C.E. rail must be ordered.

From the foregoing figures it will be seen that an extra charge of only $2 per ton is added to the regular price when 60-ft. to 62-ft. rails are specified. The fact that the increase in price is more than offset by the reduction in the number of joints accounts for the general adoption of this length.

CHEMICAL COMPOSITION OF RAILS

Out of a total of thirty representative street railway companies in the United States, it is gratifying to note that about one-third are taking up the question of chemical composition of rail in purchases. A number are using either Class A or Class B of the American Electric Railway Engineering Association's recommended specifications, and several companies have purchased rails treated with various percentages of titanium alloy. The United Railways Company of St. Louis, Mo., has adopted a specification consisting of: carbon, 0.65 to 0.80; phosphorus, not over 0.04; silicon, 0.20; manganese, 0.60 to 0.90. This chemical composition is about half way between the Class A and Class B specifications adopted by the American Electric Railway Engineering Association, and it is being specified for all rail except guard rail in which the carbon content is from 0.60 to 0.75.

Considerable difficulty with rail corrugation recently led the United Railways Company to purchase 500 tons of T-rail treated with 10 per cent of metallic titanium. This rail was laid in 1912, and up to the present time corrugations have not appeared on it nor on the high-carbon rail which was also laid at the same time. In 1905 and 1906, however, about 40 miles of soft Bessemer steel rail was laid, and later this rail corrugated very badly. An analysis to determine the chemical composition of this rail resulted as follows: carbon, 0.55; silicon, not to exceed 0.20; phosphorus, 0.10; sulphur, 0.10; manganese, 0.80 to 1.20.



Concrete Mixer Placing Paving Foundation, Memphis Street Railway

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The British Columbia Electric Railway, Vancouver, B. C., employs the chemical composition for Class A rail as adopted by the American Electric Railway Engineering Association. At heavy traffic junctions cast manganese rail has been used for the past three years with excellent success.

Other companies specifying the American Electric Railway Engineering Association's composition, either Class A or Class B, include the Memphis (Tenn.) Street Railway, the Public Service Railway of Newark, N. J., the Capital Traction Company of Washington, D. C., and the Birmingham (Ala.) Railway, Light & Power Company.

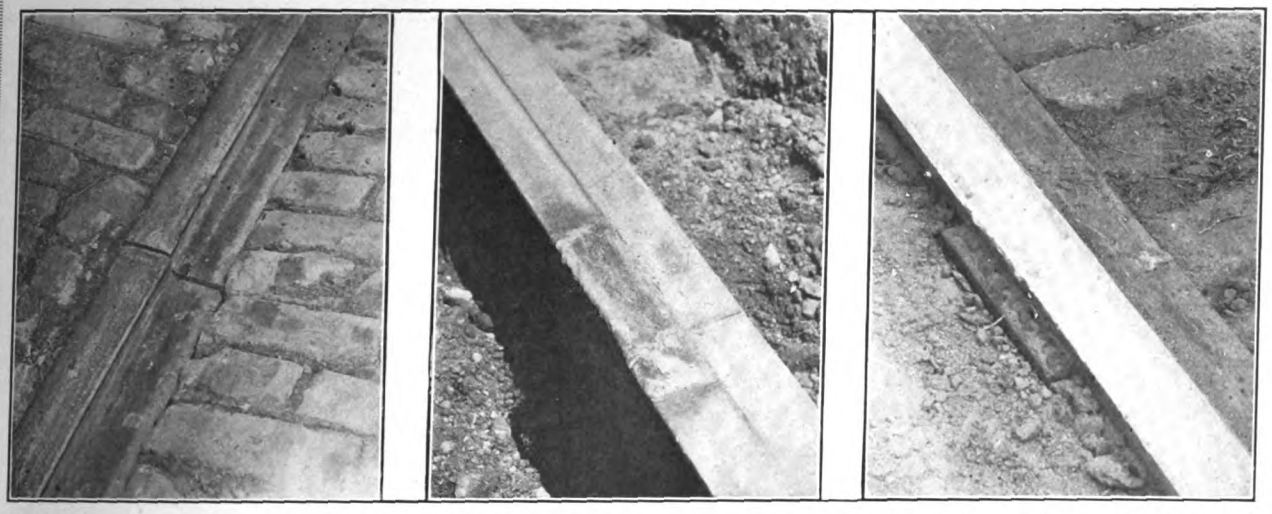
The Twin City Rapid Transit Company, Minneapolis, Minn., is specifying the following chemical composition for 7-in., 91-lb. T-rail: carbon, 0.75 to 0.90, average 0.83; sulphur, not to exceed 0.06; phosphorus, not to exceed 0.03; silicon, 0.25 to 0.40; manganese, 0.60 to 0.90. This company is purchasing rail with the high carbon and silicon content because it delays, if not entirely eliminates, rail corrugation, which developed after a short time in service when the lower carbon composition was specified.

The Metropolitan Street Railway of Kansas City, Mo., and the Cleveland (Ohio) Railway are using exclusively rail treated with one-tenth of 1 per cent metallic titanium. Both specifications are used in connection with 100-lb., 80-lb. and 70-lb. A.S.C.E. rail purchases.

OTHER FACTORS IN RAIL LIFE

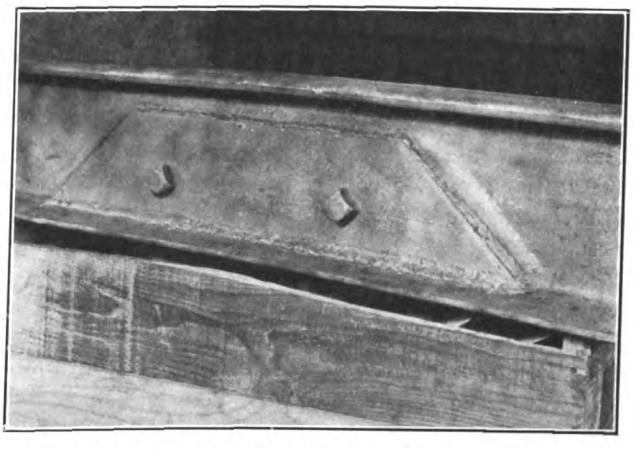
When the grooved girder rail is used the depth and self-cleaning qualities of the groove or flangeway are of prime importance if the maximum life in service is to be attained. Many grooved rail sections in use at this time are now designed so that when the allowable wear in the wheel tread is reached the flange will just about touch the bottom of the groove. In some sections there is a greater allowance for wear on the head than in the groove, or the groove is too shallow to permit the average allowable wear on wheel treads before turning. Consequently, the life of the rail is to a large extent governed by the life of the groove. When a groove becomes badly worn it ceases to be self-cleaning; the shoulders at the edge of the worn groove do not permit a solid substance, which might cause derailment, to be crowded out as the wheel flange passes along the groove.

The life of the rail is contingent on so many factors



Rail Joint Maintenance—Views Showing a Cupped Joint Before Treatment, After Restoration by Electric Welder and After Finishing by Track Grinder

Standard T-Rail Construction, Public Service Railway of New Jersey



Electrically Welded Rail Joint, Pacific Electric Railway, Los Angeles

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that it is practically impossible to draw any conclusions as to what the life would be under ideal conditions. In a large measure the life of the joint is the life of the rail, but even this saying is untrue when the foundations, particularly at the joints, have not been properly designed or their workmanship is inferior.

Detroit United Railway—Old-Style Maintenance with Joints Cupped and Paving Disturbed

Detroit United Railway—Result of Modern Maintenance of Rail Joints by Lifting and Grinding

Considerable attention is being given at present to reclaiming badly cupped or corrugated rail, which is either resurfaced by grinding or restored by a replacement of the worn metal by electric welding, the new metal then being ground to surface. Another method for renewing such rail is to cut off the worn portions of the ends of each rail and replace them with a short rail section which is held in place by two welded joints.

TRACK FASTENINGS

But few street railway companies have given serious consideration to the question of obtaining a longer mechanical life from ties through the use of screw spikes and tie plates. There is a wide variance of opinion as to the advisability or economy in adopting the screw spike in preference to the standard railroad spike. Some engineers hold that the additional cost is not warranted by the economies obtained, while others use them in all new construction as well as in rehabilitation work and are of the opinion that the benefits will warrant the extra expense. Local conditions have much to do with this difference of opinion, because in the case of some street railway companies the ties fail from decay before the mechanical life has been seriously affected.

The Houston Electric Company reports that it uses screw spikes in conjunction with standard spikes in all cypress ties in concrete work and exclusively whenever treated ties are used. The additional cost to install screw spikes probably has caused the lack of interest, although where they have been used they have proved entirely satisfactory. The Houston Electric Company also reports that it is next to impossible to line or gage track properly by the use of screw spikes. Whenever this work is necessary standard spikes are used to bring the rail to line and gage and a second gang follows the spikers to apply the screw spikes. This company also states that the screw spike, as now manufactured, has a head which does not fit well over the base of the rail and that a special clip is required. The company believes there is room for considerable improvement in this particular.

The United Railways of St. Louis, Mo., uses screw

Standard Construction of Northern Texas Electric Company

spikes of special design, 7/8 in. x 6 in. in size, for all concrete track construction. These spikes are driven with a portable electric spike-driving machine which has greatly reduced the cost of installation. Standard spikes

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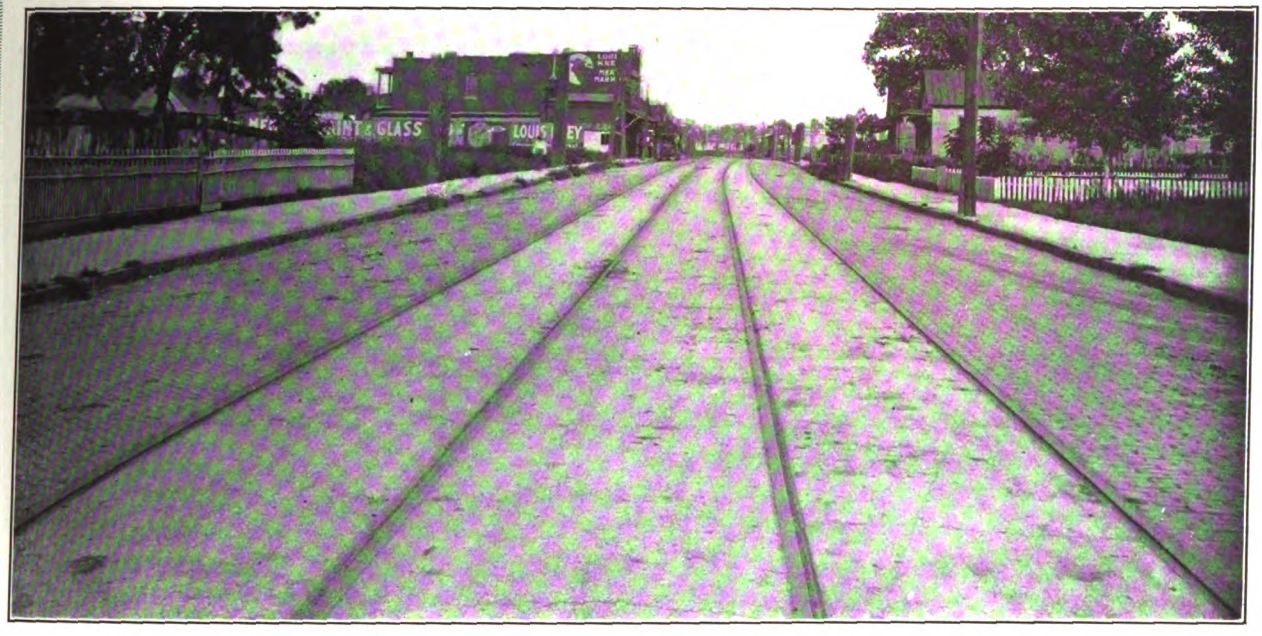
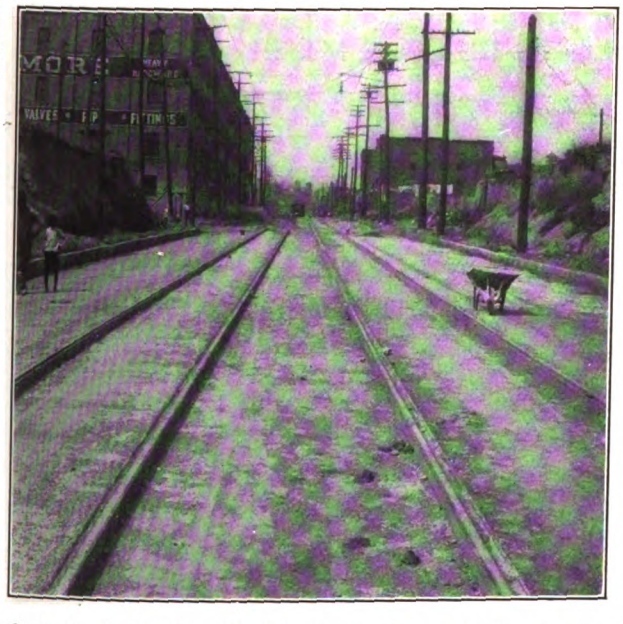
are used in all track in unpaved streets, and in some instances where they were driven in ties in concreted track they have been found to loosen after about three or four years. In instances of this kind the standard spike is removed from the tie and replaced with the screw spike.



T-Rail with Paving Protector in Concrete Paving After Five Years' Service, Memphis Street Railway

The British Columbia Electric Railway, of Vancouver, B. C., is seriously considering the adoption of screw spikes with a rail clip and tie plate. Its specifications will require a 300 per cent increase over the standard steam road screw spikes in the bearing area coming in contact with the base of the rail. The cross-section of the screw spike will also have to be increased, so as to provide additional strength against lateral movement in the rail. The company will also require that frictional wear be taken by the rail clip and not by the screw spike. It is believed that the adoption of the screw spike, together with the rail clip and tie plate, will tend to reduce the movement of the rail which damages the paving alongside of it.



Girder-Rail Track with Tie Rods Covered Ready for Paving, Memphis Street Railway

Undoubtedly, the greatest value from the use of screw spikes would be obtained in open-track construction where trains are operated at high speed. There is some question, however, as to the advisability of employing them in street railway track construction in paved streets, particularly with hard-wood ties. Unquestionably, however, they are valuable when soft-wood ties are employed or where treated ties are used with the expectation that the maximum physical life will be obtained if mechanical life is properly protected. Screw spikes in conjunction with tie plates not only protect the tie against side shear, but the spike may be removed without injury to the tie in case it is necessary to renew the rail.

TIE PLATES AND TIE RODS

Where tie plates are employed there has been a general receding from the idea that they should be corrugated on the side coming in contact with the tie. Tests have shown that the resultant mechanical injury materially assists in bringing about tie failure. There is some question, however, as to the desirability of purchasing tie plates provided with a shoulder, particularly if the screw spike and clip are used in conjunction with it. This objection is raised because the plate may be used only with one type of rail where, if the shoulder is removed and the clip and screw spike are used, the clip may be replaced at a nominal cost to fit practically any rail provided the variation in the width of the base is not too great. Where engineers have decided on standards for track construction in paved streets and strictly adhere to them, there can be no objection to the shoulder on the tie plate. In fact, such a shoulder should be advan-

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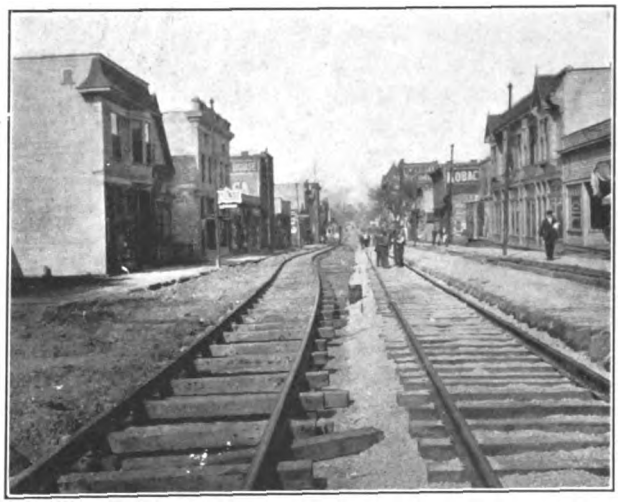
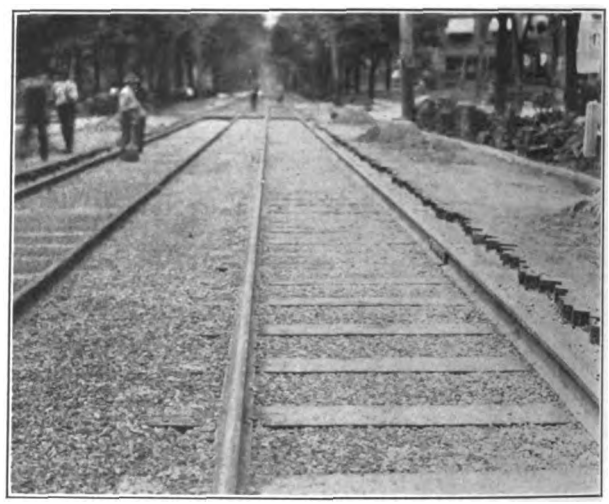
tageous because it removes the side thrust from the screw spike to the tie plate.

Tie rods are usually considered necessary to give the 9-in. rail stability, but some engineers doubt the advisability of using them even with the 9-in. or the 7-in. girder rail. The Cincinnati Traction Company uses a rail brace instead of a tie rod on its 9-in., 140-lb. grooved girder rail construction. This brace merely serves to prevent overturning. One spike is driven in the tie on the inside of the rail and two on the outside to prevent the rail spreading, in addition to the two spikes fixing the position of the rail brace. Several street railway companies use a round tie rod, either ¾ in. or ⅞ in. in diameter, set near the base of the rail so that it clears the surface paving material. Other companies employ a flat tie rod which varies from 3/16 to ⅜ in. in thickness with the different properties. These may be installed at the center of the web or slightly above it, and the thinness of the bar permits it to pass through the joints in the paving. With the flat rods, however, difficulty has been experienced in fitting the paving blocks between the 4-ft., 5-ft. or 6-ft. tie-rod intervals without clipping some blocks or making an exceptionally wide joint at each tie rod.

The Memphis Street Railway has departed from the usual methods and employs a ⅞-in. round rod offset at each end near the web of the rail. This allows the point of application to be well above the center of the rail, and the offset in the tie rod is sufficient to permit it to pass under the paving in the concrete foundation.



Toledo Railway—New Track Shown Resting on Concrete Foundation and After the Ballast Is Applied

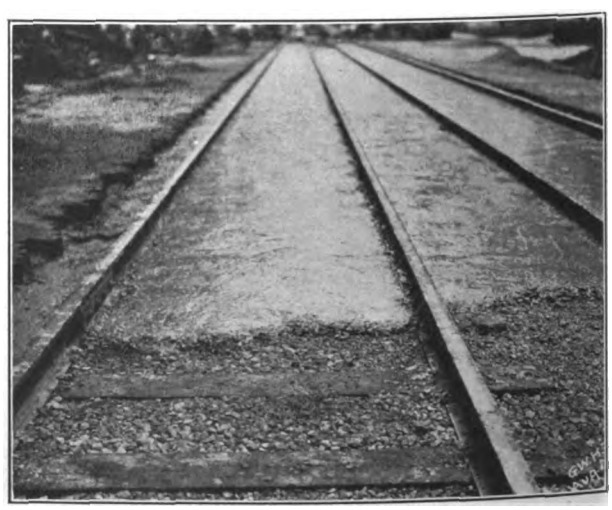


Toledo Railway—Standard Track with Ballast in Place Ready for Paving

RAIL JOINTS

In no department of track construction does practice follow such varied lines as in the solution of the joint problem. The fact that so many different types are being used is sufficient evidence that the problem is a pertinent one worthy of careful consideration by both engineers and manufacturers. There seems to be a general tendency, however, on the part of many of the larger companies to abandon the mechanical joint for a welded joint. Of a total of thirty street railway companies one-third already have adopted the welded joint in one form or another, and no doubt as soon as a simpler process is perfected other companies will fall in line, particularly the smaller ones where the number of joints on the system does not warrant the purchase of an expensive welding outfit. Many engineers are convinced that the welded joint produces approximately a continuous rail, and most engineers believe that a continuous rail, if possible, would greatly reduce their track maintenance as well as increase its life.

In addition to the cast weld, thermit weld and electric weld processes, two new types of combination welded and riveted joints have been developed by the Cleveland (Ohio) Railway and the United Railways & Electric Company of Baltimore, Md. The joint designed by the Cleveland Railway is known as the Clark joint, named for Charles H. Clark, engineer maintenance of way, who invented it. This joint is a combination welded and riveted rail connection which, in addition to being welded to the rail, also is welded to the steel joint ties. The



Toledo Railway—Waterproofing Coat of Concrete Laid on Ballast

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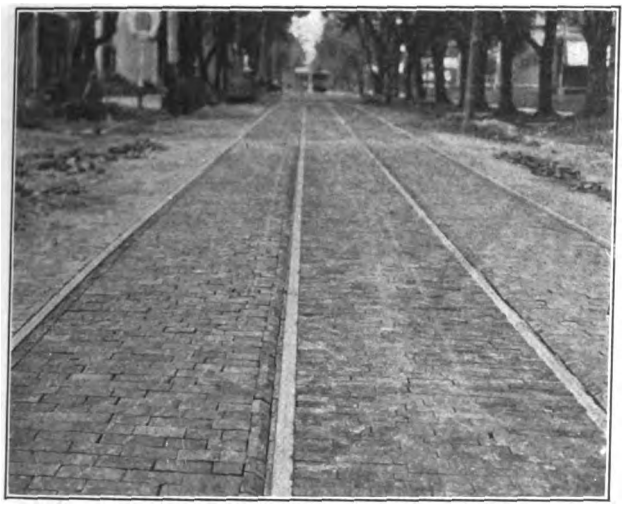
Baltimore joint differs from the Clark joint only in a few particulars.

The 26-in. six-bolt continuous joint appears to be the most popular mechanical joint. Some engineers have held to the 26-in. length but have increased the number of bolts or the size of them from 7/8 in. to 1 in. The Philadelphia Rapid Transit Company and the United Railways of St. Louis are now using the Nichols joint in their latest type of track construction. The Nichols joint is a form of riveted continuous joint which does not fit close under the head of the rail or around the base, and the open space is filled with molten spelter after the joint is applied to the rail.

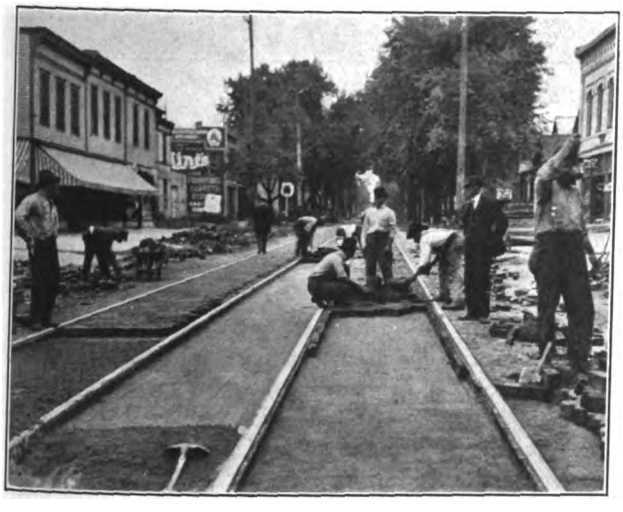


Toledo Railway—View Showing Pavement Before Filling with Sand

Toledo Railway—View Showing Completed Track and Paving

SPECIAL WORK

Recently there has been a decided tendency on the part of engineers to confine their special work purchases to two distinct types, each serving a particular purpose. Solid manganese switches and mates are being purchased quite generally, instead of the insert type. On the other hand, a number of street railways, after considerable experience with solid manganese in frogs and crossings where the angle was in excess of 11 deg., have returned to the renewable insert type as standard. Although there has been more or less complaint from engineers regarding the failure of inserts to remain tight under heavy traffic, no serious difficulty has been experienced in re-tightening them. In most instances crossings fail under impact at the intersection of the flangeways before any other repairs are necessary. If the renewable feature, characteristic of the insert type, should be abandoned, the entire crossing necessarily would have to be removed in case trouble developed at the intersection of the flangeways. No doubt many engineers are aware of the fact that solid manganese crossings and frogs of unusual angles are considerably more expensive than standard pieces such as switches and mates. The increased cost is due to the fact that a special pattern and crossing must be made for each order. The saving effected by using the insert type of special work is quite an item, as is also the renewable feature of the insert, from a track maintenance standpoint.



Toledo Railway—Laying Creosote Paving Block on Sand Cushion

The British Columbia Electric Railway, Vancouver, B. C., has adopted solid manganese switches, mates, frogs and crossings for all work where the traffic exceeds 1000 tons per hour. Since solid manganese was adopted, six years ago, this company has installed a number of pieces, one being at an intersection carrying approximately 5010 tons per hour, and not over $500 has been spent in renewals.

The Connecticut Company purchases practically all hard-center special work and solid manganese only to a limited extent for steam railroad crossings. The built-up type of special work is used in storage yards and in open-track construction.

Difficulties experienced in special-work maintenance by the Milwaukee Electric Railway & Light Company include loosened hard centers and broken as well as loose wing rails in the solid castings. It appears that these failures have been attributed to faulty foundations as well as bad drainage and not to the special work. This com-

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pany has endeavored to overcome these difficulties by the use of well-drained crushed-stone ballast thoroughly rolled and tamped under each piece and by fastening the special work down upon hard-wood ties with 7/8-in. screw spikes.

The Metropolitan Street Railway Company, Kansas City, Mo., has had considerable trouble with the cast-bound frogs and crossings, but has partially remedied these troubles by the adoption of the cast-steel type of construction. In many instances it has been necessary to remove the cast-bound work because it had broken or failed otherwise. Twelve years' experience with cast steel has been that when its removal was required it was not on account of failure by breaking, but because the flangeways and rail were badly worn at the intersections.

Concrete Paving with T-Rail, Birmingham Railway Light & Power Company

The Metropolitan Street Railway's most serious difficulty in maintaining special work has been caused by broken inserts and paving failures around special work, due to the impact blows of wheels passing over crossing frogs. Presumably these pieces of special work were manufactured for flange bearing, but in order to take the bearing at the intersection the wheel strikes a very heavy blow. This trouble has been removed in recent special work purchases by an increased length of the insert plates and the provision of a gentle incline to a shallow flange bearing. In this type the wheel flange takes the bearing with a slight angle of impact and the tread is raised clear of the ball of the rail, with the result that the impact blow has been eliminated. This type of construction is used in both crossings and frogs, and the expectation is that it will obviate numerous other difficulties and greatly reduce the cost of maintenance.

Bonds in track construction in paved streets are necessarily confined to types that can be applied under the single bar. This requires a type of compressed terminal or brazed bond unless the rail has been made continuous by the use of the electric weld, thermit weld or other types of welded joints. As a rule, the rail is bought punched to take one or two compressed terminal bonds so that it is necessary only to ream out the holes. Both water and oil are used as lubricants, but if the latter is employed the hole must be swabbed with alcohol. In some instances, where the traffic is dense and additional conductivity is required in the return circuits, copper cables are laid in the sand cushion under the paving with frequent connections to the rails.

PAVING

Paving is a subject which has been under much discussion and experimentation, and as yet few engineers agree as to what is the best method and what are the best materials to use in the track allowance. In a number of cities the type of paving employed is specified by the city's engineer, but in many instances the street railway company's engineer has presented such a convincing argument that he has been permitted to pave the track allowance in the way he deems best.

An examination of the different designs of track in paved streets in the accompanying illustrations shows that there are almost as many methods of laying the paving as there are types of construction employed. Owing to the diversified character of paving materials employed, few general rules may be drawn. Usually the paving surface is laid over a sand cushion on a solid concrete foundation and the irregular rail section is squared up in most instances with a cement mortar. Some companies, however, lay the paving and fill the interstices around the rail with sand or asphaltum or any other filler used in the paving.

Many engineers are of the opinion that granite rock used either with T-rail or grooved girder rail is the best

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material to employ in the track allowance when vehicular traffic is heavy. In the residential section, where light traffic predominates, the paving material should be brick with a special stretcher and filler for T-rail or else wood block.

The question of waterproofing the paving surface is an important one and has received careful study. Asphaltum filler is used with all types of paving to accomplish this, but in a great many instances cement grout receives preference. Arguments favoring the latter filler are that it is not only impervious to water but is as hard as the paving. This quality protects the edges of brick, wood or granite block and results in longer life and a smoother pavement. Most of the street railway companies using granite block where vehicular traffic is heavy also use it to a limited extent in residential or light vehicular traffic sections. The usual method is to lay a header course along the flangeway and a stretcher course along the outside of the rail. The rest of the paving conforms to that specified by the city.

Recent experiments with a solid concrete paving surface in the track allowance have been quite successful, and the cost of paving this strip has been materially reduced. This paving surface is applied at the same time that the foundation is put in place and does not require a special class of laborers to do the work. The fact that the concrete gang can complete the paving not only results in economy in material and labor but also expedites the completion of the work.

Creosoted wood block is gaining in favor as a paving material in the track allowance, both for heavy and light vehicular traffic. Some engineers, however, have met with difficulty because they failed to provide sufficiently wide expansion joints. Consequently during periods of high temperature the paving has buckled. This has been overcome, however, by an increase in the space allowed for expansion, and some street railways allow as much as ¾ in. between the rails in standard-gage track.

One objection to both brick and creosoted wood block as compared with granite block is that much of it is broken when it is necessary to make repairs. Hence a larger percentage of new material is used than is required when similar repairs are made in granite block pavement. To offset this advantage in granite, other engineers claim that the fact that wood block may be cut to fit around special work is worthy of consideration.

A common form of pavement failure encountered in the Northern States is from upheavals during periods of low temperature. No doubt this is due to flaws or leaks in the filler or the paving surface which permit water to reach the sand cushion. Several engineers, in coping with this difficulty, have replaced the old sand cushion with a sand-cement mortar. This is laid in place comparatively dry and formed to the paving contour with a templet. After the mortar has set around the paving block and the filler has been applied, the paving is absolutely impervious to water. No special trouble has been found when repairs are made to pavement of this character, first, because the number of repairs is reduced and, second, because the bond between the paving block and the concrete is not so great as to make it difficult to separate them.

Other usual forms of paving failures are found at the joints and are due to the impact blow, which causes a slight movement in the rail. It appears that the only way to overcome this difficulty is to adopt a joint which will make the rail as nearly continuous as possible and thus remove the cause of this trouble.

Laying Granite Block Paving on Mortar Bed, United Railroads of San Francisco

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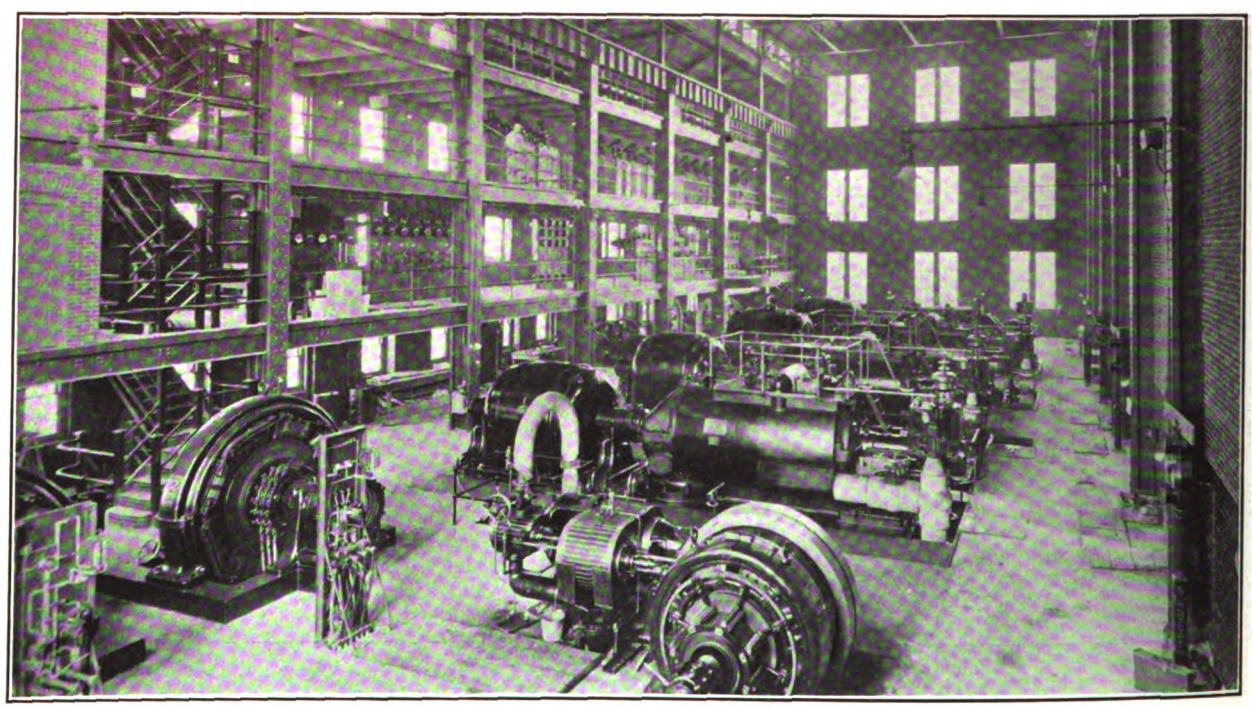
POWER GENERATION AND TRANSMISSION

TWENTY years ago mechanical and electrical engineers looked upon electric power generation and distribution as in their infancy and subject to very great improvement. If they ventured to think two decades ahead, they must have expected that standardization would be accomplished by that time. Yet never in the history of the industry were more important and radical changes being made than at present. Hardly had the Corliss engine been perfected than the steam turbine arose to displace it, and to-day some of the finest examples of this type of engine in first-class condition are a "drug on the market."

In the electrical field, by the time that the problems of d.c. commutation had been solved, the d.c. generator was forced from the power house by the alternator, which was so much better adapted for steam-turbine driving. Even before this, however, the necessity for high-voltage transmission had virtually brought about the same change. In the alternator itself the endeavor of designers was at first to produce good inherent regulation of voltage. As soon as this was accomplished it was found after all not to be what was wanted on account of the serious effects of short-circuit.

A few years ago small generating units were used,



Turbine Room in Georgetown Power Station, Capital Traction Company

Although in the engine room radical changes have been effected, there was for a long time little progress in the boiler room. Boiler units gave efficiencies satisfactory for the period and, as far as the construction of the boilers themselves was concerned, the practice was fairly well standardized. Now, however, all of this is changing rapidly, for the use of large turbo-generators resulted finally in enormous power-generating density, as shown by small area of floor space per kilowatt, and this emphasized the disparity between turbine and boiler room sizes. The result has been a tendency to equalize these by an increase in capacity of boiler units—to a slight extent by increasing the heating surface but to a greater one by the use of forced draft, superheaters and economizers. At the present rate of progress it will not be long before the boiler room will have resumed its normal proportionate size and three times as much steam per square foot of floor area as formerly will be generated in standard practice.

partly because the problems connected with the design of large ones had not been solved, partly on account of the desire of operators to keep the connected generator capacity carefully adjusted to the load, partly to insure high efficiency and partly to prevent the danger of great reduction in capacity when a break-down occurred. Now the tendency is toward larger and larger units to obtain the benefit of their lower steam consumption and lower first cost, and as large units are made to yield high efficiency over a wide range of load there is not the same need as formerly for careful attention to loading.

In the field of electrical transmission and distribution the same conditions appear. The increasing use of central-station power for railway purposes and the corresponding widening of the area of distribution have necessitated the use of voltages which a few years ago were considered almost impracticable. Corresponding to this has necessarily come radical change in design of insulators, towers, transformers and auxiliaries. Protection from lightning

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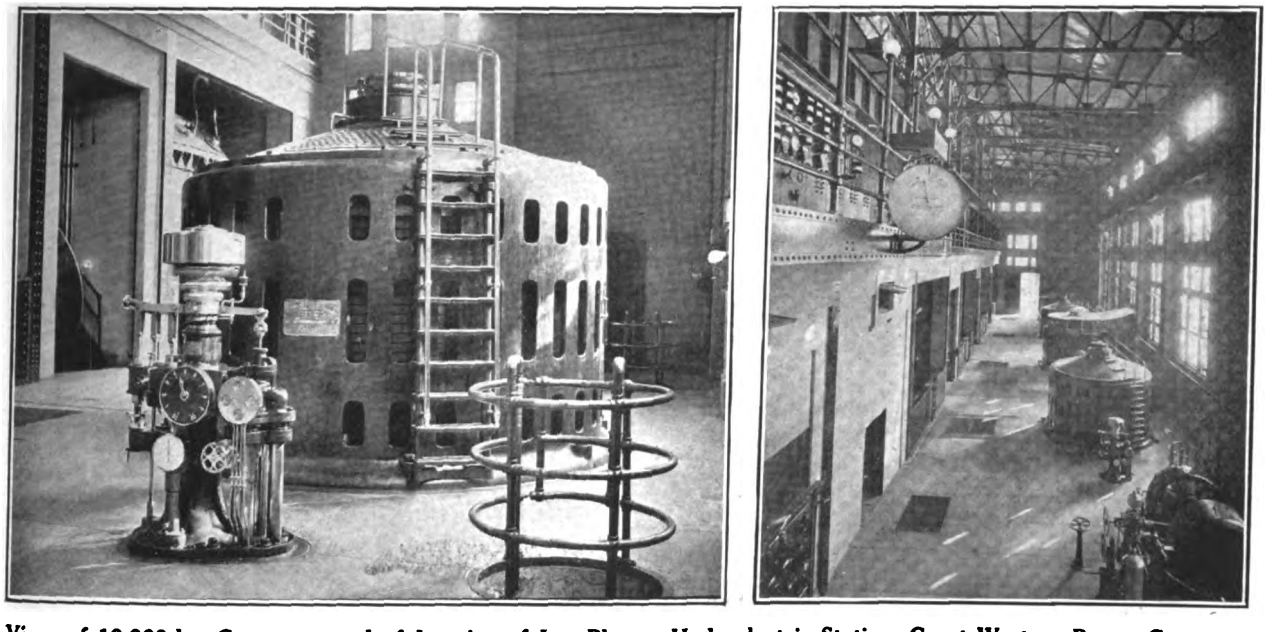
at these high voltages was indeed the bugbear of the transmission engineer until the comparatively recent advent of the electrolytic arrester relieved him of much anxiety.

In the substation the same law of increase was followed by the rotary converter until the units became very bulky. The practical application of the commutating pole to them as well as to generators is now, however, resulting in the use of increased speed; and this, combined with improved ventilation and better materials, has brought down the size of the rotary in a remarkable manner. The commutating pole has also made possible the use of 60-cycle current with large rotaries and hence has made easier the combination of railway and central-station loads.

While the above-mentioned changes and many more have been taking place and power generation has become more and more complicated there has developed a movement in the direction of throwing over this highly specialized engineering end of the business and purchasing energy from specialists in that line. In an increasing number of localities this can be done to advantage. Primarily the business of a railway is transportation, and the manufacture of electrical energy is no more a direct part of this business than the manufacture of cars, a field in which the railways have hardly ever been able to compete successfully. During the early days of electric railways most of them were operated as parts of a general business which included electric lighting and, later on, the furnishing of industrial power. The production of electricity was, in fact, the main part and the operation of cars a subsidiary part of the business. However, with the general development of the use of electricity and the standardization of the methods of producing it, in addition to the enormous growth of the street railway systems in the larger cities, the positions of the two parts of the business have been reversed. Owing to the opportunities for economy possessed by the specialist in any industry it has been found that electric power may in many instances be profitably sold by a power company at a price which is lower than the cost of production by a street railway.



Views of 10,000-kw Generator and of Interior of Las Plumas Hydroelectric Station, Great Western Power Company

THE BOILER PLANT

In the past the inherent efficiency of the boiler equipment has been less than a reasonable value, owing often to imperfect adaptation to the available fuel and water supply. Quite recently, however, the boiler room has been receiving more careful study, as is evidenced by the many changes made and being made in the design of boilers, grates and superheaters and by the introduction of all sorts of auxiliaries.

The agitation for smokeless power plants also has furnished an incentive for the study of more perfect combustion. It has, in addition to the desire for more efficient boilers, led to changes in the arrangement of combustion chambers, fire arches, baffling and other boiler elements, and has assisted in popularizing automatic stokers, automatic flue dampers and the like.

BOILER RATING

The irrational method used for rating boilers in horsepower has long been a source of irritation to power plant engineers. When the present unit was chosen a boiler horse-power represented approximately the rate at which steam was required to develop a brake horse-power at the engine. As engine performance was improved this condition no longer held. In fact, one boiler horse-power can now be made to produce more than three brake horsepowers, and boilers are to-day actually rated in terms of heating surface, although nominally the rating is still specified in horse-power, most builders using about 10 sq. ft. as a unit.

That this nominal rating is absurd is evidenced by the ability of any good boiler to deliver at least twice its rating with high efficiency. In recent tests by the Narragansett Electric Light Company, a boiler was operated for eight hours at 250 per cent of rating and with an equivalent evaporation of 10.51 lb. of water per pound of combustible. In this case the firing was excellent, as

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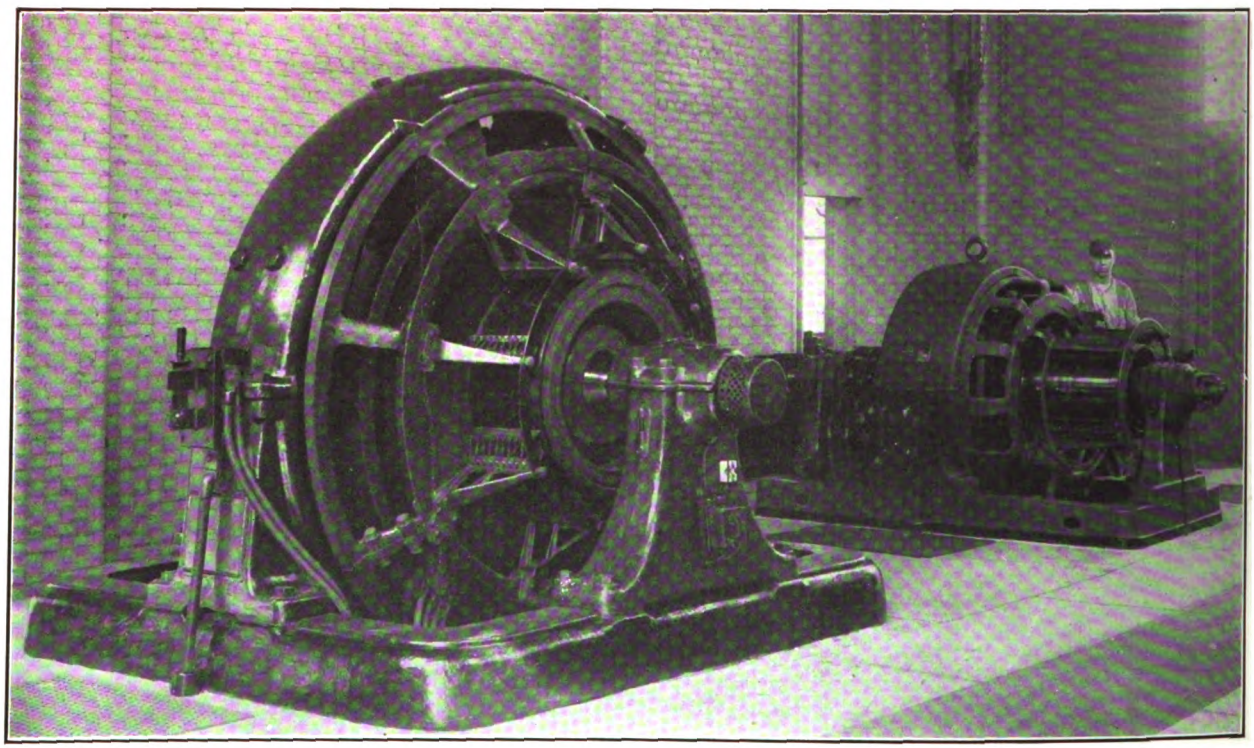
shown by the presence of 16 per cent of CO_2 in the flue gases. Tests made by the Union Light & Power Company of St. Louis show that its boilers also can be forced to 250 per cent of rating without difficulty, and several recent specifications call for ability to operate at over twice the rated capacity.

There is, however, a demand for a heat output rating and the technical societies concerned have approved the suggestion of a new unit of heat power, the myriawatt. This, it is hoped, will be accepted in place of the old boiler horse-power, to which it is nearly equal, the horse-power being the equivalent of 33,479 b.t.u. per hour, and the myriawatt of 34,150 b.t.u. per hour, so that a boiler of 1000 myriawatts capacity might still have about 10,000 sq. ft. of heating surface. The advantages claimed for this unit of heat power are the simplification and interchangeability of electrical, mechanical and thermal terms.



View Showing Relative Sizes of Old and New Rotary Converters of 1000-kw Capacity, One 375-r.p.m. without Interpoles and the Other 750-r.p.m. with Interpoles

INCREASING BOILER CAPACITY

Since the use of forced draft and automatic stokers has made it possible to operate boilers at loads much above the rating and with only slightly reduced efficiency, this provides for peak loads without excessive reserve equipment. In large boilers the use of grates at both ends has been very successful, and when this arrangement is impracticable oil burners can be used to supplement the coal grates. While the oil costs more than coal its use is justified by the saving in first cost of equipment. The Consolidated Gas & Electric Company of Baltimore found that a boiler giving 1188 hp with coal gave 702 hp with oil alone and 1445 hp with oil and coal. In this case the oil burners were at the rear of the boiler. The forcing of boilers has no detrimental effect on the tubes, as the rapid circulation of water is really beneficial. The wear and tear on the brickwork is increased, but this is not serious.

The size of boiler unit is not, however, changing to correspond with that of the turbine. The latter is being used in as large units as the load on the station will permit, and in some extreme cases a single unit comprises the entire turbine equipment. Just what has delayed the progress of the boiler is not evident, especially in view of the very satisfactory results obtained with the 2500-hp boilers at Detroit. A unit with about 6000 sq. ft. heating surface still seems to be the most popular.

The 4-in. tube has been standard in large water-tube boilers for many years, but good results can undoubtedly be secured by using smaller tubes. In fact, experiments conducted recently by the Interborough Rapid Transit Company with small tubes placed in the upper rows of a horizontal tubular boiler produced satisfactory results, although on account of the expense the existing boilers will not be so equipped.

The enforced use of superheaters with boilers for turbine installations has resulted in a considerable increase in the capacity of the boilers, and experience has settled upon a superheater forming part of the boiler as superior to the separately fired type.

STOKERS AND PRESSURE REGULATORS

The use of automatic stokers even in small plants is practically general. The possibility of the use of automatic control of draft and fire supply in connection with them to meet varying load demands is a logical step toward the reduction of the cost of boiler room labor.

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Further, as the output and efficiency of the boiler room depend so much upon the enlightened interest of the firemen, it pays to reduce the amount of manual labor required of them. The newer railway boiler plants of a capacity in excess of 2000 hp are, in general, provided with one or more types of the several satisfactory available machines. On account of the differences in load requirements and in fuel characteristics, each stoker installation presents its own problems and there is no one general solution of them.

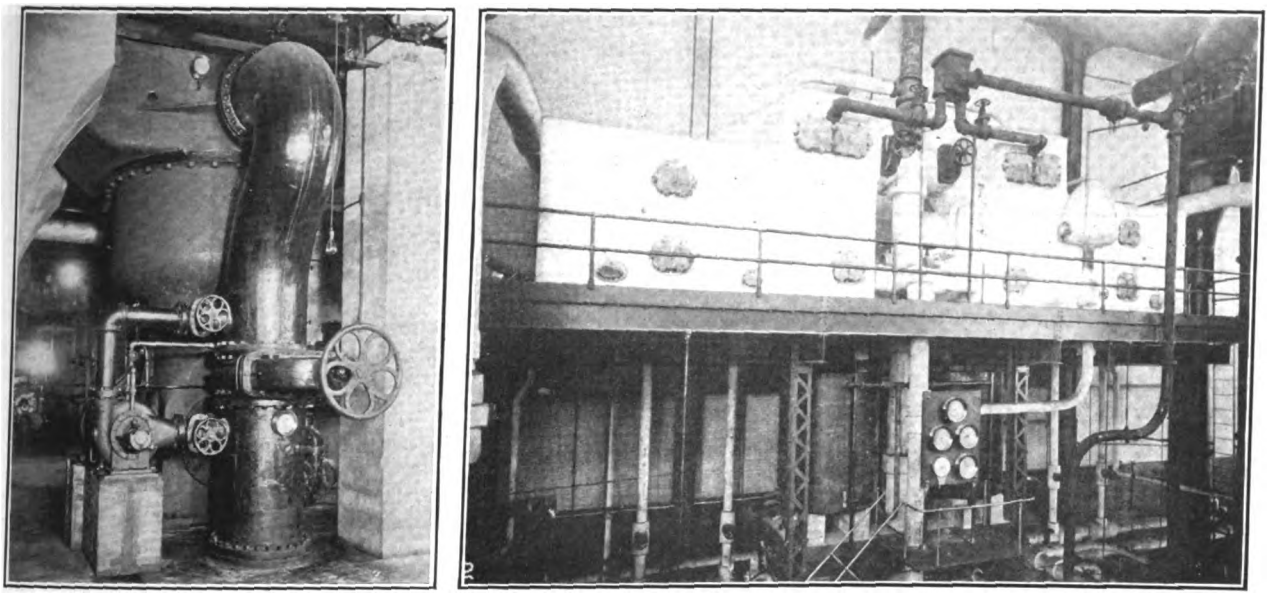
For bituminous slack the chain grate has become very popular, as it is simple and can be operated continuously. It is now being successfully adapted for use with coking coals. In the new plant of the Cleveland Illuminating Company an illustration of this is furnished. At the front of the furnace is an inclined agitating fire plate of two leaves, the lower one resting upon the grate. To these leaves a reciprocating motion is given, and as the coal flows over them the large lumps of coke are broken up. The grates have an average travel of 10 ft. per minute. They burn from 20 lb. to 40 lb. of coal per square foot of grate per hour and have reached a maximum rate of 65 lb.

The underfeed stoker now appears to be making rapid progress. As it is better adapted to forcing than the chain grate, a combination of the two types in a boiler room would have certain advantages, the underfeed stokers being brought in for peak loads. In many of the larger plants more than one type of stoker is in use, as the present development is so rapid that constant experimenting is necessary to keep pace with it.

Closely related to the automatic stoker is the automatic pressure regulator, because rapid forcing of the furnace makes it difficult for the attendant to manipulate his fires, especially when the load is fluctuating. There is a proper prejudice against automatic apparatus on account of its complexity and of the danger that, relieved from direct responsibility, the attendant will neglect his duties. This objection is probably valid in the case of automatic feed-water regulators, but does not hold in the case of pressure regulation.

FEATURES OF BOILER OPERATION

An inspection of recent boiler rooms impresses one with the increasing attention being given to measurements of various kinds. Coal-weighing hoppers, Venturi and other types of water meters, steam-flow meters, CO_2 recorders, recording pressure gages, draft gages and the like are the order of the day. This is a sign of the appreciation of a principle which has long been useful in the engine room, namely, that better service can be secured when the operators can see the results of their efforts. In the engine room these results are more evident and the quantities involved are more easily measured. Users of CO_2 apparatus testify to an increase in output due to careful watching of the flue gas composition, as a high percentage of CO_2 can always be secured with intelligent handling of fuel and draft.



By-Pass Priming Pump on Jet Condenser—Twin Feed-Water Heater of the Open Type with Meter

These measurements are useful only as they lead to increased care. To encourage this some incentive may well be given, such, for example, as the bonus provided for the boiler room attendants by the Des Moines Electric Company. This company increases by 1 per cent the wages of all boiler room employees for each 0.1 lb. of coal per kw-hr. saved during a month. The standard for each month is set by the chief engineer. The St. Joseph Railway, Light, Heat & Power Company encourages careful operation by a system of water meters in the boiler-feed lines, the make-up supply pipe and the return lines from the turbine and engine units. All devices of this kind, whether reinforced with pecuniary rewards or not, instil pride in good performance and tend to develop skilful operators.

ECONOMIZERS AND FEED-WATER HEATERS

The use of forced draft has brought into prominence the advantages of the economizer, which was formerly looked upon somewhat as a luxury and an unnecessary

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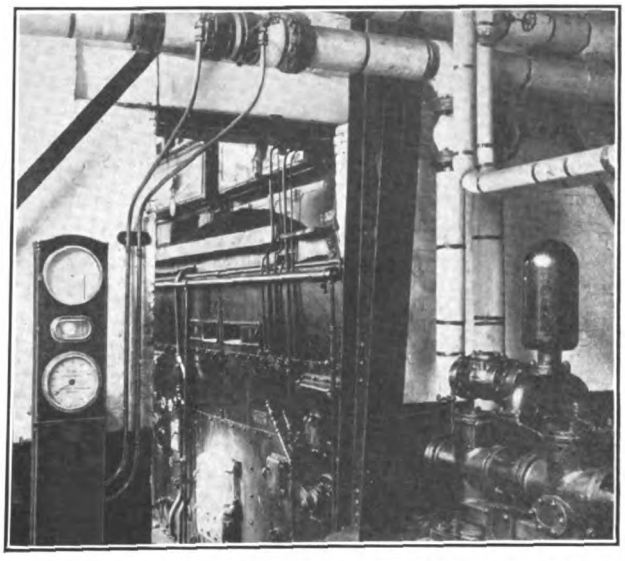
refinement. With the former conservative boiler practice the flue-gas temperature could be kept down to a reasonable value, but with forced draft, even with liberal superheater surface, the flue-gas temperature is bound to increase. In consequence, the old nominal heating surface rating of boilers must in future be made to include the auxiliary heating surface as well. It has been suggested that the following is a fair division of surface for a nominal boiler horse-power: boiler surface, 4½ sq. ft.; superheater surface, 1½ sq. ft.; economizer surface, 6 sq. ft. With this arrangement the gases should leave the boiler at about 800 deg. Fahr. and the superheater at 700 deg. The economizer should remove, say, 400 deg., leaving the flue-gas temperature at 300 deg. This arrangement will yield about 100 deg. superheat as required in American practice.

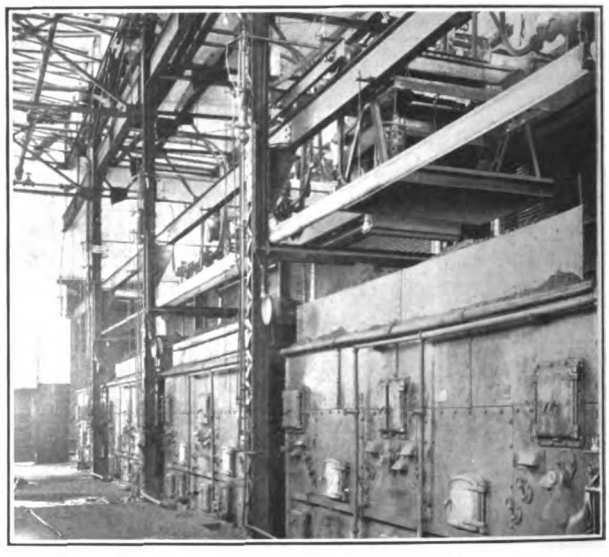


Recording Venturi Meter in 6-in. Boiler Feed-Water Line

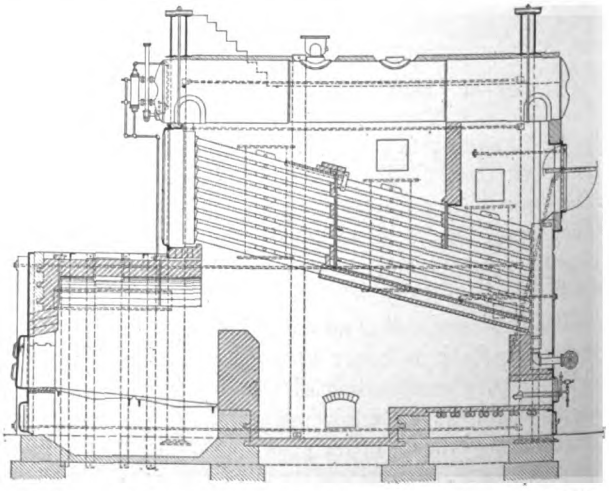
A recent development in feed-water heaters during the past year has been the application of the water-metering principle to the feed-water heater when it is of the "open" type. One well-known manufacturer has developed a simple measuring box which is separated into two parts by a partition in which is a V-notch weir. By means of the height of water in the notch the flow of water is recorded on a dial mechanism. Thus an accurate record of the water fed to the boilers is easily made. Installations of this kind are now being made by the Rochester Railway & Light Company and the Kansas City Terminal Company.

COAL STORAGE AND TRANSFORMATION

The coal-handling equipment is probably the part of the power plant in which most individuality and originality can be displayed to-day. The coal supply is so vital that ample storage must be provided, but for economy of handling the routine supply must be delivered as directly as possible from the cars to the boiler bunkers. The arguments in favor of automatic stokers can be extended to conveying apparatus, for a plant large enough to use one economically can afford the other. H. J. Edsall recently described a case in which unusual facilities were afforded for comparing the cost of hand and mechanical transportation of coal. Two boiler rooms in the same plant had similar equipments of sixteen 260-hp boilers and in each case twelve were in service. One section had coal delivered direct from cars on the firing-aisle floor between two rows of boilers facing each other. An electric telpher was used in removing ashes. The second section had crusher, elevator, coal conveyor, overhead bins and ash conveyor. The first section burned 1092 tons of coal per week at a cost for labor and energy of $625, while the second section burned 1260 tons at a cost of $445. The saving was sufficient to pay for the conveying machinery in five years and to yield a net saving of several thousand dollars per annum thereafter.



Traveling Coal Hopper Over Murphy Stokers, Worcester & Blackstone Valley Railway



Boiler with Wood-Burning Furnace at Front and Oil Burner at Rear, Portland Railway

The most economical manner of delivering coal to the boilers is some form of gravity feed even if the firing is to be done by hand. If ground area is expensive, bunkers over the boilers or the firing aisles are usually employed. These can be filled by small cars or belt or bucket con-

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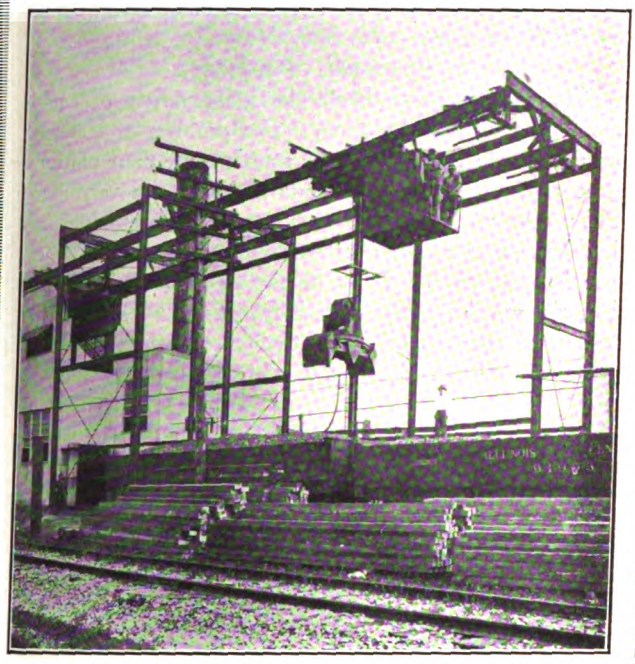
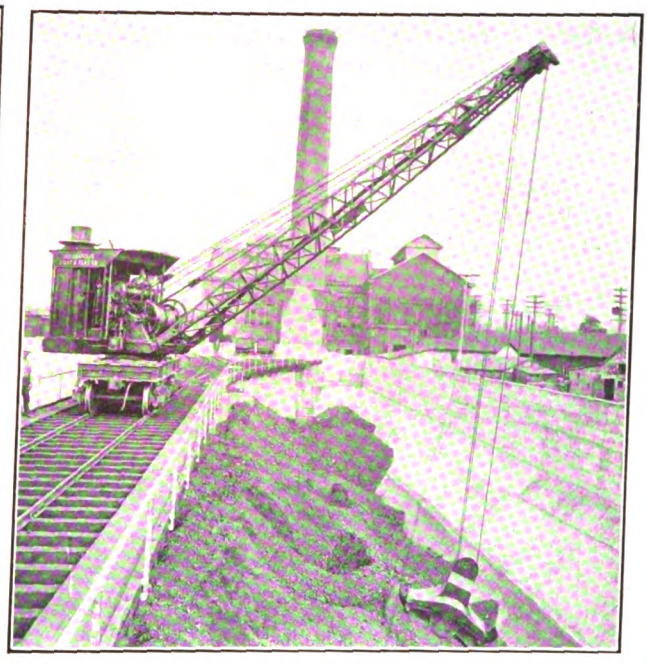
veyors. The capacity should be at least a day's supply. These deliver the coal through spouts to the stoker hoppers or to piles on the floor for hand firing. A cheaper plan and one which is convenient for weighing purposes is the use of a traveling bunker or "larry" from which the coal is spouted to the hoppers one at a time. When there is room and the firing aisle is against an outside wall the bunkers can be outside of the boiler room and the coal spouted through the wall. This construction is cheap both because a less expensive bunker can be used and because less headroom over the boilers is required. In view of the variety in coal-handling practice it is impossible to make general statements. A few familiar examples will serve, however, to recall to mind some recent installations.



Handling Coal Direct from Cars with Trolley and Grab Bucket



Handling Coal from Storage Pit with Locomotive Crane and 2-yd. Grab Bucket

Coal Trestle Built Over Boiler Room, George Power Station, Northern Ohio Traction

One of the simplest boiler plant plans is that used by the Southern Power Company in its steam relay stations. In this there is a concrete trestle located outside the boiler room wall and covering a storage space 25 ft. wide. The coal flows through openings in the wall, forming piles from which it is shoveled into the hoppers. In addition, there is a track in front of the boiler and around the storage space on which flat firing cars can be run for use when the fuel pile is low. In the Des Moines plant there is a traveling hopper for each of the four 400-hp boilers, moving on overhead rails placed perpendicular to the line of the boilers. A storage pit over which coal cars can be run occupies a space at one side of the boiler room. Close to this is a traveling crane and grab bucket by means of which the hoppers are filled either from the cars direct or from the pit. The Lexington Traction & Terminal Company's boiler room has a 700-ton storage pit with track above. From this a crane with grab bucket serves the hoppers either direct or through the crusher. The operation of charging the hoppers of four 500-hp stokers requires but twenty minutes. The Cleveland, Painesville & Eastern Railroad Company's plant is located in a depression close beside a trestle over which one of its lines runs. In this trestle a 500-ton parabolic-bottom, concrete hopper has been built. Beside it is an auxiliary track for small push cars which convey the coal direct into the stoker hoppers. In the Hoosac Tunnel plant of the New Haven Railroad a receiving track hopper is connected with an elevated storage bin by a bucket conveyor. coal being crushed before it is dropped into the bin, which is at one end of the boiler room.

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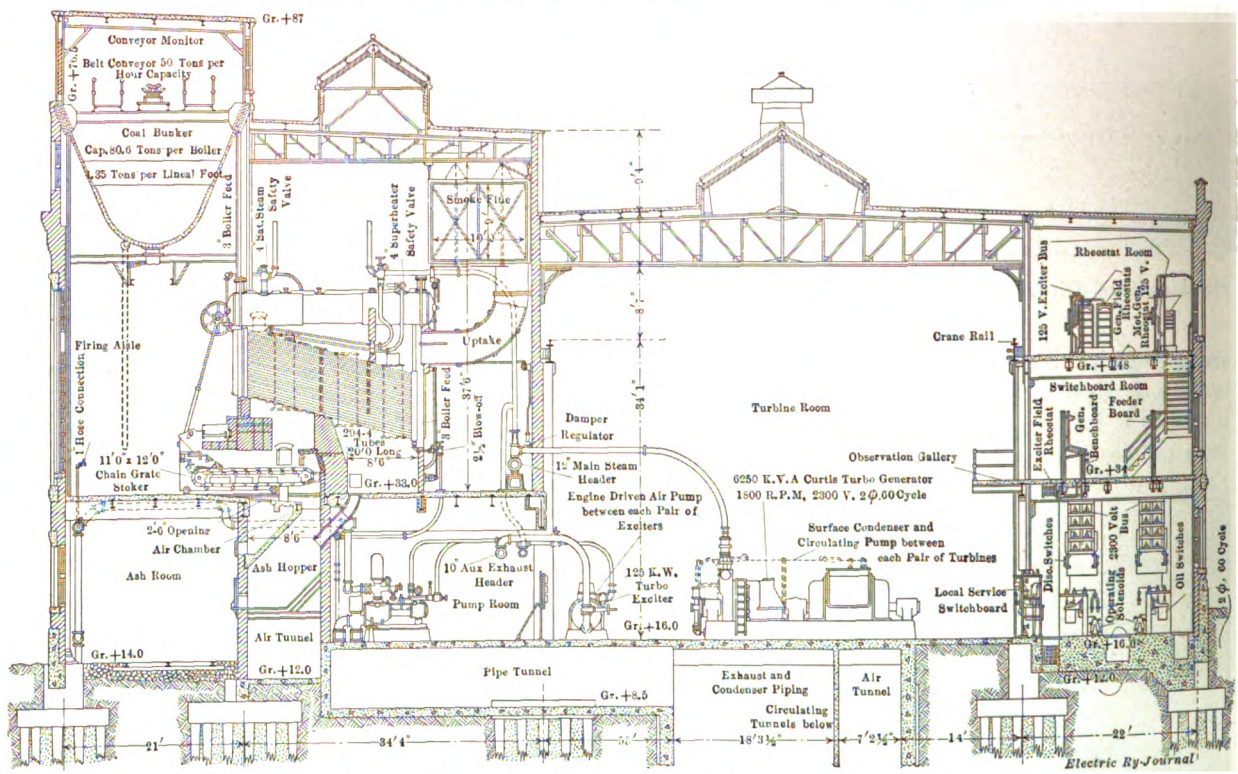
From this a weighing larry delivers it to the stoker hoppers. In the Public Service Electric Company's Perth Amboy plant a 400-ft. belt conveyor in a runway leads from a wharf to a 1500-ton concrete coal bunker above the boilers. Spouts fitted with weighing devices connect this with the hoppers. Each 1600-lb. charge is tallied on a registering clock.

The above plants are all of small or moderate sizes. In larger ones the labor item is proportionately reduced by greater investments in machinery. For example, the Cleveland Illuminating Company, which supplies power to the Cleveland Railway Company, has an elaborate coal plant. A storage yard of 23,000 tons capacity contains an unloading trough 540 ft. long. The yard is served by an electrically driven gantry crane with a 2-ton clamshell bucket. When coal is to be used directly boiler floor and is unloaded either by dumping into hoppers direct or by means of a clamshell-bucket crane. These hoppers discharge into the crushers below. The conveyor is electrically driven and is made up of 36-in. by 36-in. buckets.

DISPOSAL OF ASHES

The illustrations indicate the great variety of equipment used in coal handling. The problem of removing ashes is much simpler and the solutions are more uniform. The ash hoppers below standard stokers are very much alike and all can be adapted to discharge into small hand-operated cars on industrial railway tracks. These are located on the floors below the boiler rooms or in tunnels specially constructed for them. The abrasive action of the ashes is such that cars give better results than conveyors, and as the weight of ashes to be handled



Cross-Section of Savannah Power Company's Riverside Power Station

it is loaded on hopper-bottom cars and, after being weighed on track scales, is crushed and picked up by an inclined belt conveyor. Over the boilers are concrete-lined bunkers of 1000 tons capacity for a single row of boilers and 2000 tons for a double row of boilers, equivalent to 100 tons per boiler, or five days' supply. These bunkers are fed from a distributing belt conveyor connecting with the inclined one. From the bunkers the coal falls into 5-ton weighing hoppers and then is delivered to the spreader chutes. In the Commonwealth Edison Northwest station boiler room, described in last year's convention issue, each unit of twenty boilers is supplied through a conveyor forming a rectangle of which the vertical sides are 104 ft. high and the horizontal sides 120 ft. long. The lower horizontal stretch is in a tunnel in which is a movable crusher mounted on rails. The coal is brought in cars into a large receiving room under the is small compared with that of the fuel, there is no difficulty in taking care of them in this way.

TRANSFORMATION OF THERMAL INTO ELECTRICAL POWER

In sifting out the elements of progress in the engine or turbine room of the power plant it is impossible to separate the steam and electrical units, as each imposes fundamental specifications on the other. This is particularly true in the case of the turbo-generator, and as few power plants are now putting in reciprocating-engine generators, the design of which has been well standardized, attention can be concentrated upon the former.

A noticeable feature of the newest plants is the predominance of horizontal turbines, whereas a few years back the vertical type was very much in evidence. This may be explained by the increased speed which is the order of the day in all rotating machinery. Cast steel can now

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be obtained of a quality required in the highest speed machines, and speed has, therefore, been pushed up to the limit set by other conditions. At very high speed the horizontal type of turbine and generator is preferred on account of the comparative freedom from vibration.

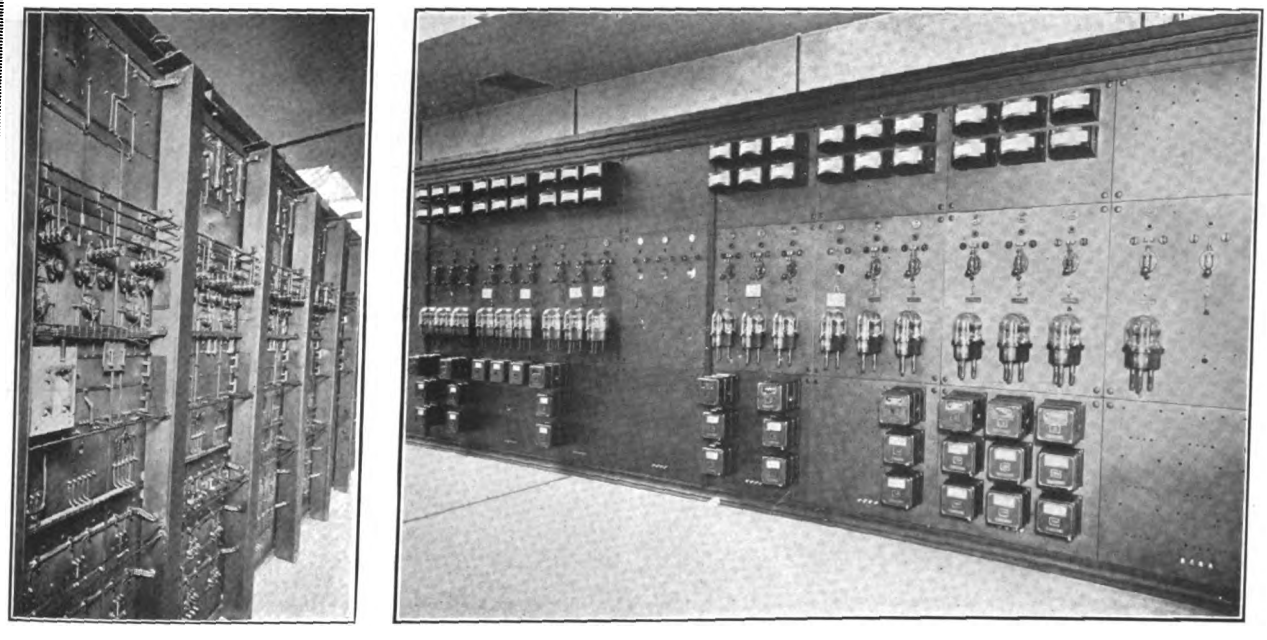
The conditions which now limit speed are the ventilation of the electric generator, which becomes more difficult as its capacity per unit of weight is increased; the provision of ample steam passages in the turbines, especially in the low-pressure stages, and the frequency of the current output of the generator. In machines up to 5000 kw the last-named predominates. At twenty-five cycles a two-pole generator can, obviously, not go faster than 1500 r.p.m., which is a very low speed for a turbine of moderate size. Fortunately, sixty-cycle current is coming into use more and more, even for railway purposes, and in this case the speed limit is set at 3600 r.p.m. At this speed generators of 5000-kva capacity can be built, and as improved methods of ventilation are developed the two-pole alternator will be adapted to still higher capacities. As far as the turbine is concerned, in moderate capacities the speed limit has not been reached. In very large sizes, however, the limit set by frequency cannot be attained. When high and low stage buckets are on the same shaft a speed which is most economical for one is not best for the other. In many recent reaction turbines the high-pressure stage wheels have been furnished with impulse blading, greatly reducing cost and bulk and rendering the use of material more economical. In this case the high-pressure impulse wheels have about the same diameter as the low-pressure reaction wheels, and a given speed therefore suits both. The latest development in relating speed to economy is in the turbo-generators just ordered for the Interborough Rapid Transit Company. Each of these 30,000-kw units will consist of two parts, a 1500-r.p.m. high-pressure and a 750-r.p.m. low-pressure section, the generators having, therefore, two and four poles respectively, as the frequency is twenty-five cycles per second. In this solution of the speed problem the speed of the high-pressure unit is limited by frequency, that of the low-pressure unit by mechanical considerations.

The tendency in turbine design seems to be toward a common type, as the advantages and disadvantages of the different elements are tried out in practice. As higher speeds are used the horizontal type with combination of impulse and reaction blading will apparently be the rule.

SIZES OF TURBINE UNITS

The size and number of units for power plants of different capacity seem not to follow any known law. The general rule formerly followed was to use as few units as would permit operation at high efficiency and yet enough to insure reliability. The early turbines gave, in general, a better economy with the largest possible load, hence it was necessary to keep them well loaded. In later practice the machines are designed to give the best results at average load and good economy over a wide range. It is less necessary now than formerly, therefore, to adjust capacity to demand so carefully. The very large plants contain the largest obtainable units to secure the benefits of small water rate, as there are always enough units for reliable and efficient operation. In the smaller plants large units should also be used, but in general fewer than two would not be safe practice. To indicate present tendencies in this direction a few familiar illustrations may be cited.

The newly completed "Gorge" plant of the Northern Ohio Light & Traction Company contains three 6000-kw, 1800-r.p.m., sixty-cycle units. The Missouri River Power Company's plant, which represents the growth of several years, has two 750-r.p.m. vertical turbines, one 15,000-kw and one 5000-kw, and a 10,000-kw, 1500-r.p.m. horizontal turbine, in addition to several reciprocating engines totaling 15,000 hp in capac-



Front and Rear Views of Feeder Panels, Northwest Station, Chicago

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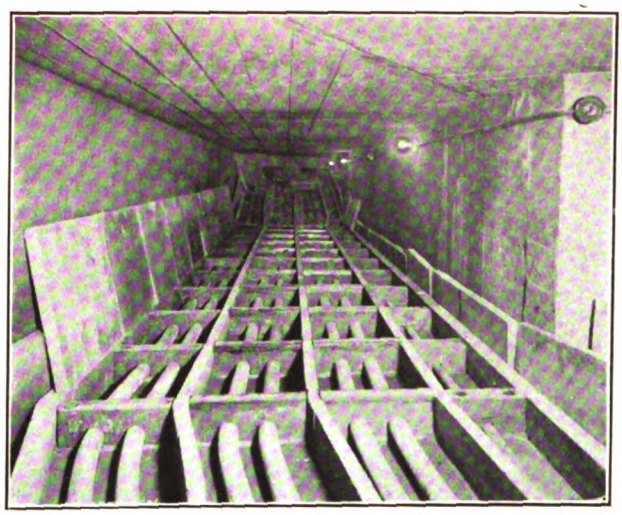
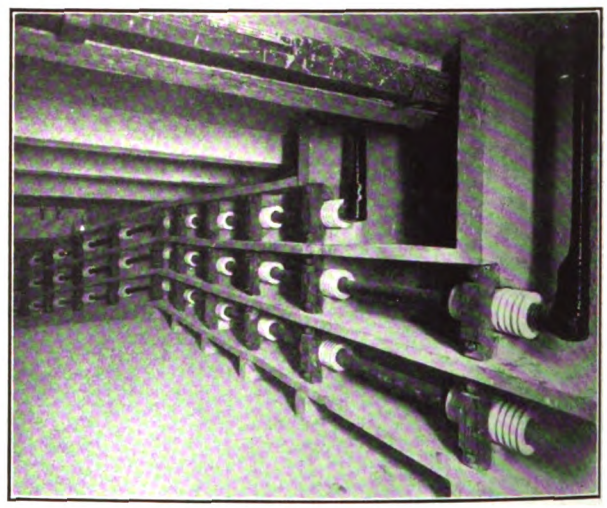
ity. The Twin City Rapid Transit plant contains two 15,000-kw, one 14,000-kw and one 5000-kw, 700-r.p.m. vertical turbine. In the new Perth Amboy plant of the Public Service Electric Company there are two 5000-kw, 1800-r.p.m. horizontal turbines. Only two 2500-kw, 1800-r.p.m. horizontal units are used in the new plant of the Kentucky Traction & Terminal Company at Lexington, Ky. The Waterbury station of the Connecticut Company, which forms part of an interconnected system, contains equipment to supplement the output of a large water-power plant. There are four units, all horizontal, two of 1500-kw capacity with a speed of 3600 r.p.m., the others of 3000-kw and 4000-kw capacity respectively and both making 1800 r.p.m. The reserve plant of the Southern Power Company, mentioned earlier, contains one 8000-kw, 1800-r.p.m. horizontal turbine. These examples simply show the existing diversity, due largely to the rapid progress of the art already sufficiently emphasized.



Cable Vault Between Transformers and Turbines, Northwest Station, Chicago



Generator Leads in Cable Vault, Northwest Station, Chicago

LOW-PRESSURE AND MIXED-PRESSURE TURBINES

In the rapid changes which have occurred many plants have in use reasonably efficient engines which cannot be replaced to advantage. On such cases the low-pressure and mixed-pressure turbines offer an efficient means of expansion. A turbine on the exhaust of a non-condensing engine doubles the output without increasing boiler capacity, while one used in connection with a condensing engine may increase the output 40 per cent. By raising the boiler pressure and forcing the firing the combined capacity can be readily doubled. Many such plants are in satisfactory operation, of which the best known is in the Fifty-ninth Street plant of the Interborough Rapid Transit Company in New York City, which contains five 15,000-kw engine-turbine units. In the San Diego Electric Railway Company station the operation of a 1000-kw horizontal low-pressure turbine on the exhaust of a 1200-kw engine unit was so satisfactory that another has recently been added. The turbine carries approximately the same load as the engine and often exceeds it. This is a d.c. plant and the turbine operates at 3600 r.p.m. and drives the generator through a reducing gear. In this plant, by the way, the record for July was 3.83 kw per gallon of fuel oil, the load factor being 48 per cent.

The Wisconsin Traction, Light & Power Company has a 1250-kw turbine in the exhaust of two 1000-kw Corliss engines. In this connection an exhaustive analysis reported by M. H. Bronson, chief engineer of the Rhode Island Company, on the installation of low-pressure turbines is of interest. A plant consisting of six engine units of a combined capacity of about 12,000 kw needed to be enlarged. As the fuel economy to be secured by the application of exhaust-steam turbines to the engines was attractive, the plan received careful consideration but was finally rejected (see ELECTRIC RAILWAY JOURNAL, Sept. 23, 1911), the reasons being limited space, the probability of soon outgrowing the plant and the expense of repairs to existing reciprocating units owing to their increased loading.

In the end the engine-turbine unit can be considered only as an excellent means for tiding over the present transition period in power plant history.

CONDENSERS AND PUMPS

Closely connected with the development of turbines has been that of the accompanying condensers. The design of the jet condenser has been improved to such an extent that very high vacuum can be maintained with it. In fact, claims are made that, with suitable pumps, a perfect vacuum can be obtained, the expression "perfect vacuum" being used for a space in which the pressure corresponds to the temperature of the condensing water. Jet condensers are compact, and in view of the rapidly decreasing size of turbines per unit of output this feature is being utilized. Where the quality of water is or can be made suitable for the use of jet condensers their simplicity of construction, low price and low cost of maintenance are leading to their adoption.

The construction of surface condensers, like that of boilers, has been considered fairly well standardized. The demand for large units, however, forces a fresh

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study of the fundamental principles of design. As the circulation of steam and condensate and the design of pumps are improved the rating can be increased. It is possible now to absorb 500 b.t.u. per hour per square foot of surface. In St. Louis recently 12,000-kw turbines were substituted for 5000-kw turbines without change in condensers and the same vacuum was maintained during the winter, being only slightly reduced in summer. As the supply of condensing water available for many large plants is either salt or dirty, the surface condenser obviously will continue to hold its place.

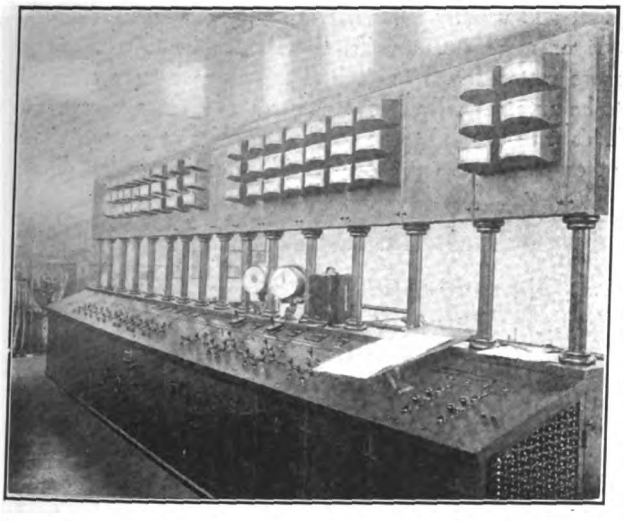
An interesting commentary on the superiority of the surface to the jet condenser for use with dirty water is found in the remodeling of the Twin City Rapid Transit Company's plant. Four 3500-kw engines installed in 1905 were furnished with four jet condensers, including one of the barometric type. The feed water was filtered by means of a complete mechanical sand filter plant capable of removing 98 per cent of suspended matter for 1200 gal. of water per minute. This foreign matter included the debris from the Mississippi River and the oil contained in the condensate. The turbines which have replaced all but one of the engines have had surface condensers, it having been proved to be more economical to use them rather than to enlarge the filter in accordance with the increase in capacity of the plant. The filter now purifies only the make-up water and the house supply. The absence of oil from the turbine exhaust renders unnecessary the filtering of the condensate.

In the matter of type of air pump used with condensers the reciprocating pump is superior from the standpoint of steam consumption, and if no economizers are installed so that more steam is produced from the auxiliaries than is required for heating purposes this economy may be important. The turbine pump is inherently simple and when all exhaust steam can be utilized it would appear that turbine pumps will be increasingly used.

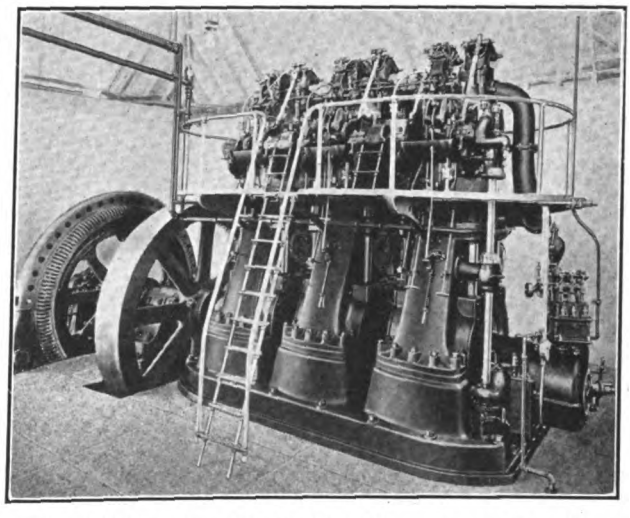
ALTERNATOR DESIGN PROBLEMS

At the generator end of the turbine unit the problems are now largely those of keeping down the temperature and improving insulation to resist the effects of higher temperatures. From the mechanical standpoint the rotating field core can be designed for as high a speed as 3600 r.p.m. in sizes up to 5000 kva. The peripheral speed may be 25,000 ft. per minute or more. Steel plates about 2 in. thick are frequently used in building up the cores, as a very uniform quality of material can be thus secured. Owing to the high speed of the modern machines the number of poles required is small and the mechanical construction of the rotor is reasonably simple.

Both radial and parallel slots are used in rotor construction. Cores made with the latter give better support to the end turns and can be much more easily wound. The radial slot cores use the material more economically, as more surface can be covered and better ventilation is provided. The selection of the proper type is a designer's problem and does not concern the operator unless one is more durable than the other, which it apparently is not.



Benchboard in Turbine Room, Twelfth Street Power Station, Richmond



Diesel Oil Engine with 375-kva Generator, a Possible Rival for Small Steam Turbines

In armature design the great difficulty has been to keep the winding reasonably cool. In the old slow-speed alternators there really was no ventilation problem, attention being concentrated on regulation. In the compact turbo-generator ventilation furnishes a large part of the problems owing to the small space over which the heat must be liberated. Where a 5000-kw engine-driven alternator might have had a rotor diameter of 26 ft. the same capacity can be secured now with 26 in. The armature windings have corresponding diameters, and the amount of air which must be forced through the armature winding is very great. In a recent paper B. G. Lamme estimates that a 150,000-kw machine requires 50,000 cu. ft. of air per minute. To perform its function this air must come into intimate contact with the winding and cores, and the forced circulation involves increased loss due to air friction in the passages. The circulation may be secured either by fans mounted on the ends of the rotor or by separate blowers. The latter method is increasing in favor because of its higher efficiency and the possibility of control which it affords.

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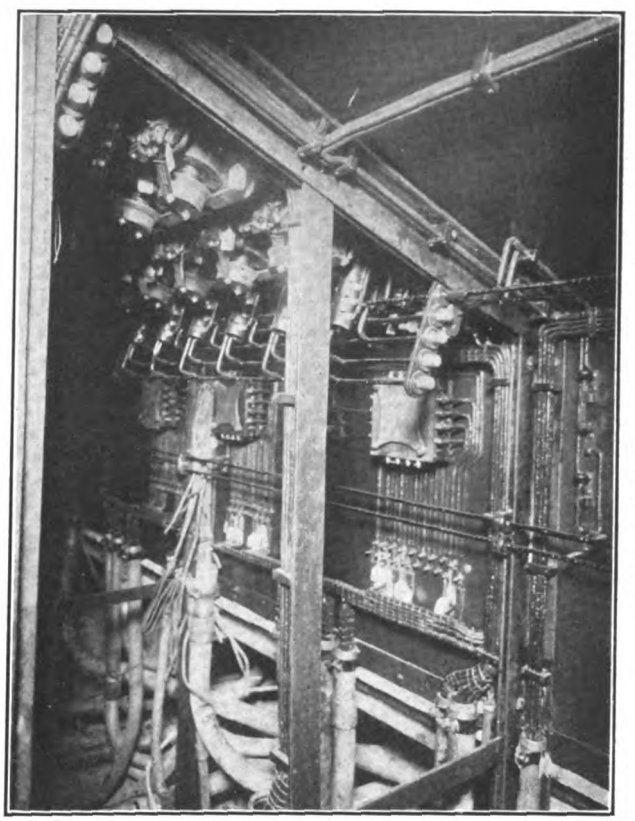
Axial ventilation ducts under the armature teeth with one large radial duct in the center for the exit of air are also being used in place of numerous radial ducts.

Artificial cooling of air has lately received some attention especially in connection with washing. This seems



Rear View of Benchboard, Northwest Station, Chicago

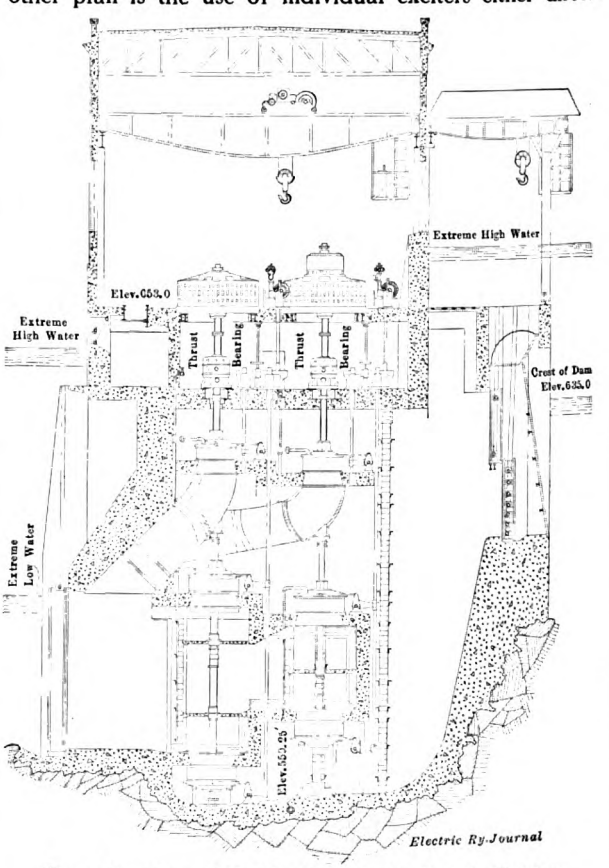
to furnish a most promising means for improving ventilation. As generators are rated on the basis of temperature, their capacities are greater in winter than in summer. A reduction of 20 deg. in temperature with a fairly high humidity such as is produced by a washing device will equalize the capacity between winter and summer. Cooling devices would have made more rapid progress in connection with generators but for the fact that power plant loads are heaviest in mid-winter. The straining or washing of the air is more important than cooling it, as the accumulation of dirt in the ducts cannot but produce overheating. These refinements must have more attention in the near future.

With all of the improvements in ventilation, internal temperatures are bound to rise. The present A.I.E.E. rating is based upon the properties of cotton, paper and shellac. In modern machines mica and asbestos are largely used. The use of these will allow windings to be run hotter, and thus generators will be cheaper per unit of output. Insulation practically fireproof can now be applied to high-tension windings and a higher rating can well be allowed with its use. It must be said, however, that the actual tendency on the part of purchasers seems to be in the direction of conservative rating.

The mechanical support of armature windings is closely connected with their electrical reactance. A few years ago the reactance was kept reasonably low, not, of course, as low as possible, because even with slow-speed alternators reactance was depended upon to protect the windings from the effects of short-circuit. These effects were principally electrical. The reactance value used was a compromise between a low value for good regulation and a high value for protection. Now protection against the mechanical effects of short circuit is considered most important and reactance is made as large as the design will permit, supplemented, if necessary, with extra reactance in the transformers or even in special reactance coils connected in the circuit. If better regulation than is given by the generators is required, it can be readily provided by automatic regulators in the alternator or exciter field circuits.

EXCITATION

In the matter of excitation there is great diversity and much mobility of practice. From one point of view the exciter plant can be looked upon as an auxiliary station from which absolutely reliable service must be had. This plant will usually contain two or three sources of power, one or more steam units, usually turbine-driven, one or more motor-driven units, and a storage battery arranged to be automatically thrown into action if other sources fail. This may be said to be general practice at present. The other plan is the use of individual exciters either direct-



Cross-Section of Hale's Bar Hydroelectric Station

driven or motor-driven. There is evidence of the increasing popularity of the latter plan for very large units. The first plan is economical of equipment and insures reliable service. It does not permit regulation by adjustment of exciter voltage and the size of conductors to

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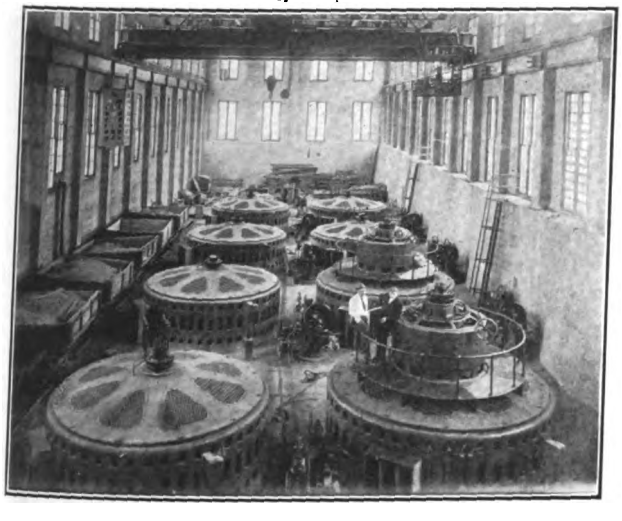
large alternators is considerable. To offset these features the direct-connected exciter is doubly expensive from the fact that it must be made extra large to permit it to care for the load of another machine should it be disabled. A complicated system of interconnection is also necessary.

The standard voltage for exciters for moderate-size machines is 125. Double this is used in very large units to obviate the use of very large field conductors, field switches, field rheostats and busbars. In such cases the higher voltage equipment is cheaper.

WATER POWER FOR ELECTRIC RAILWAYS

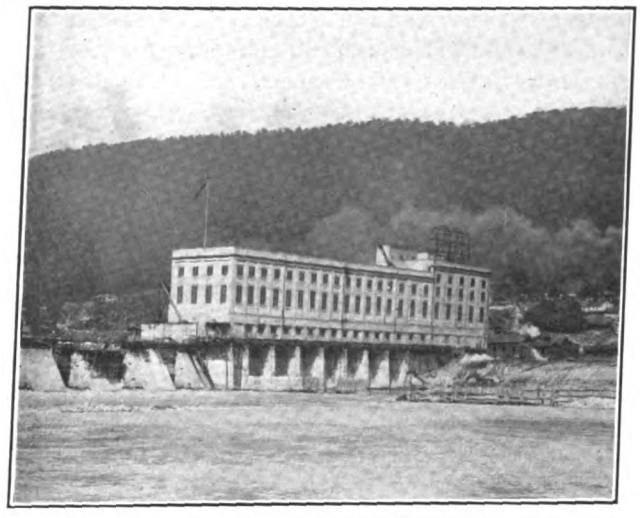
Few electric railways are so fortunate as to have water power near enough at hand to make its utilization possible, so that water powers are of secondary interest to railway men. At the same time an increasing amount of power is being served to electric railways by companies making a specialty of power generation and transmission from waterfalls. Notable recent instances of this are found in St. Louis, Baltimore, Portland (Ore.), Atlanta, Syracuse (Beebe lines) and many other places. On account of the lower speeds used in hydraulic machinery the problems of ventilating electrical generators are much simpler than those connected with steam machinery. Otherwise the electrical situation is the same as in steam stations. The prime movers in the hydraulic station are much simpler in every way. As, however, every plant imposes different specifications, no general statements as to tendencies are possible. A conspicuous fact, however, is the excellent efficiency now being obtained both with the horizontal and the vertical wheels.

With fuel so increasingly expensive in many parts of the country water power should be able to compete with steam for railway purposes if it can be furnished reliably. That it can be is indicated by the fact that Niagara power has long been successfully operating cars in Buffalo, Toronto, Rochester, Syracuse and elsewhere. Among



Generator Room, Hale's Bar Hydroelectric Station

more recent examples is the delivering of power in Baltimore from the Pennsylvania Water & Power Company's plant at McCall's Ferry on the Susquehanna River. There are in operation in this plant now six units of a total capacity of 44,500 kw, and plans are already being made for extension. The generator voltage is 11,000, which is raised to 70,000 for transmission, and at Highlandtown, a suburb of Baltimore, it is lowered to 13,200 for local distribution. This plant operates under a head of about 60 ft. and the speed of the vertical turbines is



Power House and Part of Dam, Hale's Bar Hydroelectric Station

94 r.p.m. A still more recent newcomer in the supply of hydraulic power to railways is the Mississippi River Power Company, which now has its lines operating into St. Louis. One of the most recent plants is that of the Chattanooga & Tennessee River Power Company at Hale's Bar. In this, as shown by the accompanying illustration, the unusual arrangement of three waterwheels on each shaft has been adopted. During periods of low water, when the effective head is large but the available flow is small, the upper wheel on each shaft is shut off and its casing drained, thus permitting it to turn free in air.

One factor in the development of water powers is the increasing use of networks of transmission lines fed at different points from water and steam plants. Most water supplies are so variable that if the full low-water capacity of the stream is utilized the power is at times quite uncertain. Further, as water-generated power is transmitted over long-distance lines, troubles may interrupt service. Multiple-station supply tends toward continuity, especially if plants are located on different streams and if one or more steam plants are included in the scheme. Even in such an extensive chain of plants as that of the Southern Power Company it has been found necessary to provide an auxiliary steam supply. The Niagara, Lockport & Ontario Power Company is rapidly pushing to completion an auxiliary water-power plant on the Salmon River near Syracuse. This is not so much to provide a reserve, the supply of Niagara power being unlimited up to the capacity of the transmission lines, as it is to supplement the Niagara power used in rapidly increasing amounts in central New York. It will, however, furnish additional assurance of continuous service. The Mississippi River Power Company will utilize existing steam plants in St. Louis as a reserve. The Twin

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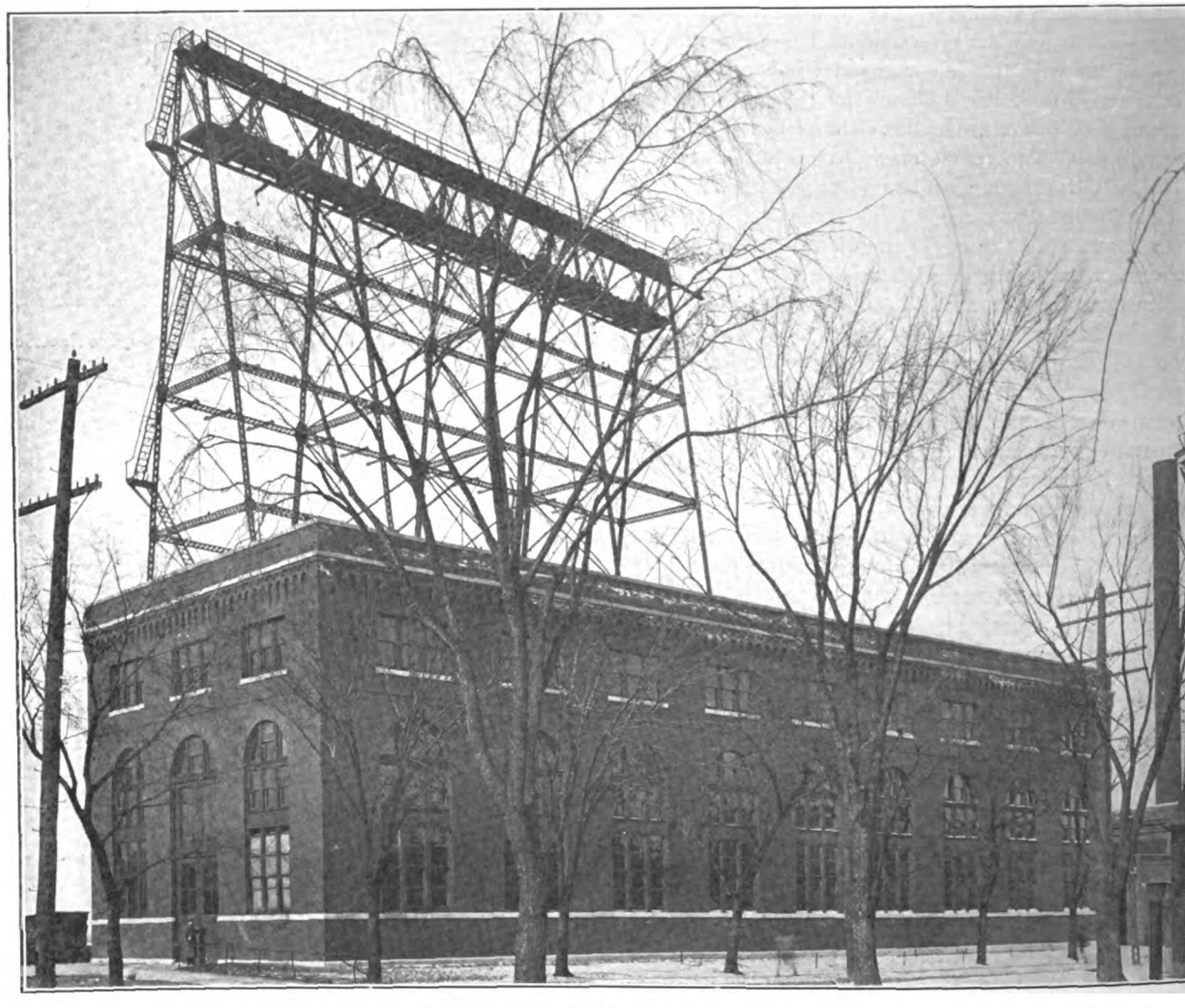
City Rapid Transit Company has in Minneapolis two hydraulic plants, one utilizing the full flow of the Mississippi River up to the capacity of the plant, the other the surplus water not needed by the flour mills. In conjunction with these is a steam station taking the surplus load, which is small when the water supply is good. The Portland Railway & Light Company has completed its 25,000-kw Bull Run plant, 30 miles from Portland, to supplement its other supply sources. This contains three 514-r.p.m., 3750-kva, 6600-volt, sixty-cycle units operating under a 325-ft. head. The voltage is stepped up to 60,000 for transmission. All of the above examples are cited simply to suggest that, while hydraulic plants are apt to be remote from the experience of most railway men, this source of cheap power is having a continually closer relation to the railway business.



Terminal House of Cataract Power & Conduit Company with Tower for 1700-ft. Span Across Niagara River

TRANSMITTING POWER FROM GENERATOR TO SUBSTATION

In traction work simplicity and reliability are the important factors in the transmission of electric power. Standard apparatus is therefore largely used. The newer and more fascinating developments and experiments are largely connected with very high voltages, and these, in general, do not directly concern the electric railway operator. There is, however, a great deal going on in high-tension transmission, voltages up to 150,000 being now in commercial use.

Usual generator voltages in railway plants are now 2200, 6600 and 13,200, the last-named being on the increase. For transmission purposes 33,000 is still sufficiently high for the areas over which railway power is usually distributed.

The oil-cooled type of transformer with water coils seems to be preferred for the power house end of the line. These transformers are made with high reactance to keep down short-circuit current. While it is probable that the three-phase unit is increasing slowly in popularity, separate transformers are still preferred, especially where there are but one or two banks. The lower cost and smaller floor space required for the three-phase type should eventually lead to its use.

Whether delta or star connection of transformers is best is still open to debate. For the generator side the delta seems the natural connection, as the argument for the use of three units is that they can be operated in open delta if one is injured. The star connection is cheaper,

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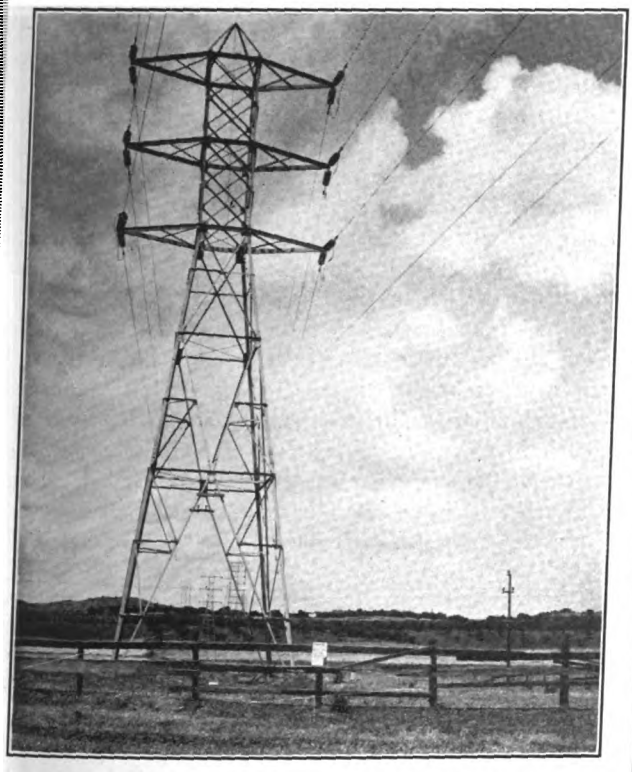
as the windings are insulated for lower voltage and there are fewer turns. On the line side the star connection is convenient for grounding the neutral, but, on the other hand, with grounded neutral the grounding of a line short-circuits a winding, so that this argument in favor of the star connection is by some not considered important. On the whole, it is probable that a delta high-tension and a star low-tension connection is average practice. In Minneapolis, where many of the transformers have delta-delta connections, a large grounding transformer with star primary and delta secondary is connected to the busbars and the neutral is grounded through a resistance of 12 ohms. This device has eliminated troublesome surges and has also served as a ground detector, the ammeter of an



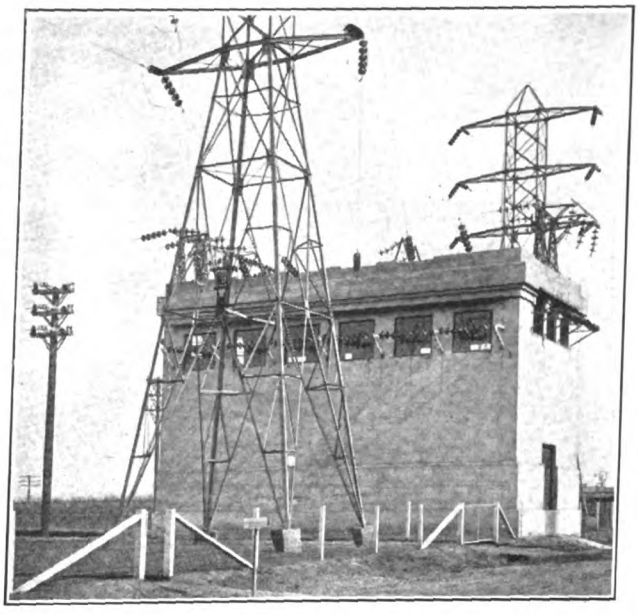
Typical Dead-End Construction on 100,000-Volt Line, Great Western Power Company

offending line promptly showing that extra current is flowing in it.

SWITCHBOARDS AND SWITCHES

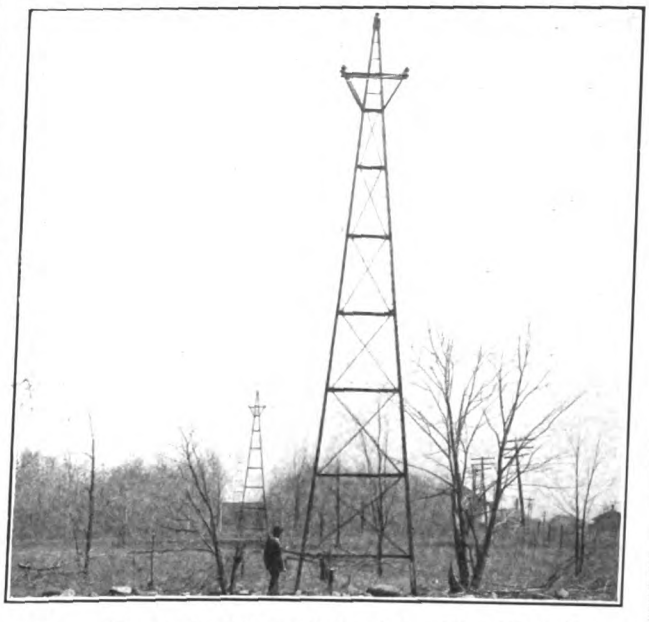
The simplicity of the bench type of switchboard, especially for generator control, seems to be appreciated. Properly placed in a centrally located gallery the bench-board permits the operator to see instruments, generators and switches without turning. The oil switches controlled from this board can be located anywhere, even in separate buildings if desired. For the control of line oil switches panelboards are satisfactory. In spite of a recognition of the general principles of the selection and placing of switchboards, there is much diversity of practice in this line, as each station appears to present a peculiar switchboard problem. Obviously, if standard forms of equipment can be used it is better to conform the requirements to the available supply than to insist on special design. There is an evident tendency to do this.

The use of remote-control switches gives excellent opportunity for the application of automatic relays and much ingenuity is being displayed in this direction. There is no difficulty in opening circuits of moderate voltage automatically, but very high-tension lines must be opened more



Sectionalizing Station, Great Western Power Company

cautiously to avoid surges. Inverse time-limit relays are in general use for protecting generators and reverse-power relays are the latest development in the protecting of defective machines from rushes of current. A curious result



A-Frame Tower for Transmission Line, New York State Railways

of careless arrangement of oil-switch auxiliaries was described in the technical press recently. In the plant described the relays, speed-limiting devices and turbine-speed control were all supplied with power from the exciter system. A piece of a casting dropped into the

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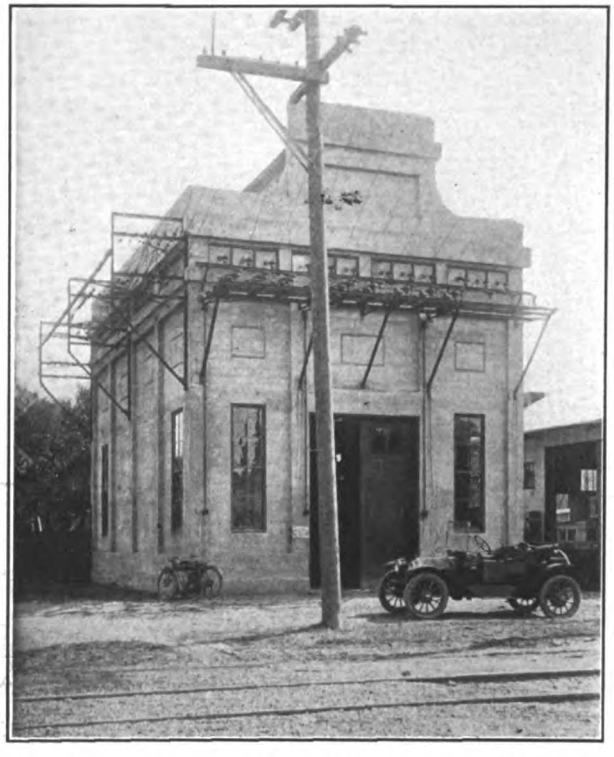
generator air gap of one of the units, wrecking and grounding the field winding and putting the exciting system out of commission. As a result the oil switches failed to open and the turbine governor opened up, allowing the unit to run away. The high voltage produced as a result



Substation at Sacramento, Great Western Power Company

did much damage, and this was aggravated by the substation storage batteries, which, not being protected with reverse-current relays, operated the rotaries inverted. This was an extreme case, but it indicates the results which may occur from the lack of proper relays and explains the great activity displayed by designers in the improvement of the automatic control of switching equipment.

TRANSMISSION LINES AND CABLES

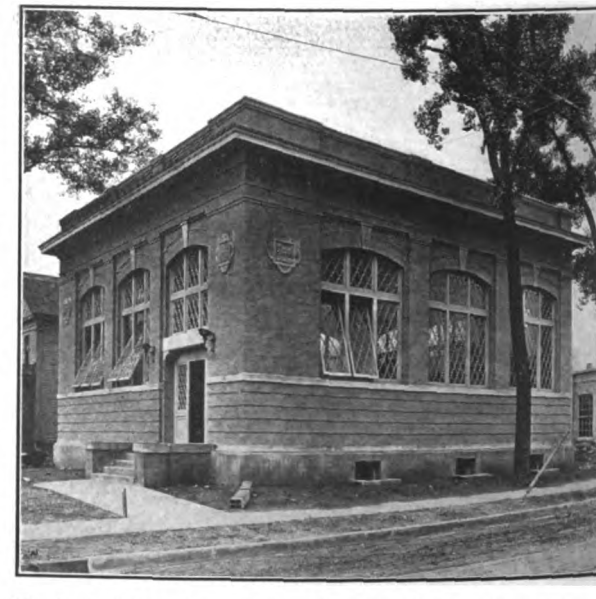
In transmission lines the tower construction is used in most of the large systems supplying electric railways over long-distance lines. These usually belong to power transmission companies having water-power plants, hence interest railway men only indirectly. There are many lessons to be learned, however, from some of these installations.

As an example representing very recent practice we may cite the Pennsylvania Water & Power Company's line into Baltimore, in which four-legged galvanized steel towers, spaced about 500 ft. apart, of a standard height of about 44 ft. to the lowest cross-arm, are used. The aluminum wires of the double three-phase line are suspended 15 ft. apart in vertical planes by means of five-unit suspension insulators. The Canadian Light & Power Company also uses steel towers 52 ft. high and with 500-ft. span, but prefers pin-type insulators. A cheaper form of tower which will undoubtedly be used in railway work more and more is the A-frame or flexible steel tower. One of the first installations of this kind was made by the New York State Railways. This frame construction requires anchoring along the line but has the advantage of flexibility as well as cheapness. As one of the points in favor of the suspension insulator is the flexibility which it gives along the line, the same argument should apply to the use of the flexible tower of the A-frame type.

At present when railways own their own transmission lines, wood or concrete poles are found more economical than towers, as lower voltages are used and less power has to be transmitted. There has not been any important change in wooden-pole construction, but much progress has been made with concrete poles. The New York State Railways, for example, is using these in sizes up to 45 ft. with good satisfaction.

In protecting lines from lightning the electrolytic arrester now holds the field. It is used for the highest line voltages as well as for the lowest d.c. distribution voltages. For the high-voltage lines the cone type with series horn gap is used, the cell type being adapted for the other. The cone-type arrester requires care in its operation, but in return it gives protection. Formerly the lightning arrester was supposed to take care of itself and the result was dissatisfaction all around. At present much less is heard about lightning disturbance.

Underground cables are being insulated for higher voltages, although the details of the processes of manufacture are kept as secret as possible by the manufacturers. Cables insulated entirely with rubber are not recommended for high voltages, as rubber deteriorates rapidly under the action of the ozone generated by the potential in the air and moisture in the jute fillers or material used in rounding up the cores. The composite insulation is made up of



Typical Substation, Twin City Rapid Transit Company

rubber and varnished cloth with the former next to the core. In connection with the cables improvements are being made in pot-heads and other forms of terminals, which formerly were very troublesome parts of the equipment.

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SUBSTATIONS

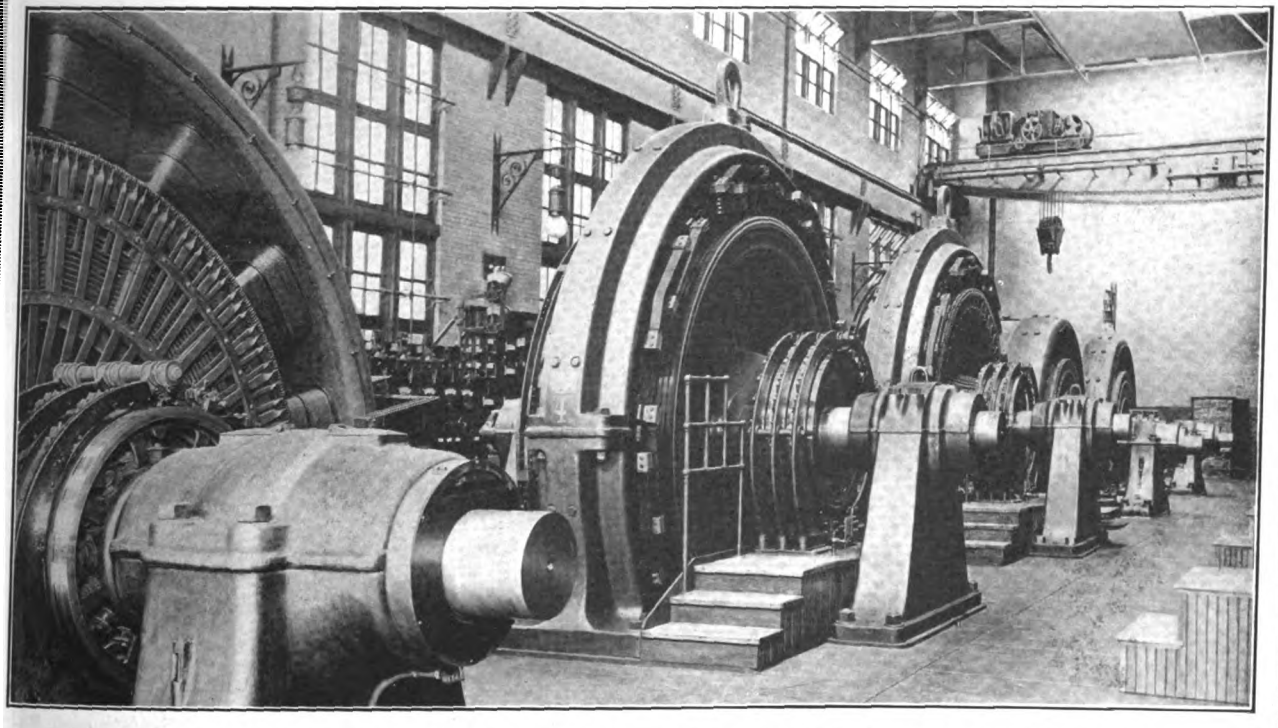
Two important factors have operated to produce changes in substation construction in the past few years. The application of the commutating-pole principle has permitted the increase in speed and the corresponding reduction in size of rotary converters. At the same time the spread of central-station power in the railway field has tended to encourage the development of sixty-cycle converters, which can be constructed much larger with the commutating pole than without.

The present two-frequency situation acts as a barrier to the taking on of railway load by central stations and the securing of light and power business by railway companies. It has all been brought about by the low-frequency rotary converter. Either two kinds of generating equipment had to be maintained or frequency changers used, or in some cases both of these conditions existed.

result was entirely satisfactory, proving that high speed would not interfere with good commutation.

The situation outlined above is being changed rapidly, rendering impossible the determination of any standards, as engineers cannot predict what is coming next. That the sixty-cycle substation is the coming thing is, however, practically certain. Practically all small converters are now sixty-cycle and larger sixty-cycle machines are being built continually. Capacities up to 2500 kw at 500 volts, which is the equivalent of 3000 kw at 600 volts, are entirely successful.

Due credit should be given the Cleveland Railway Company for its confidence in the sixty-cycle converter as shown by its adoption on a large scale last year. While the important electrical manufacturing companies were willing to undertake the construction of the machines, the operating company had much more at stake in this



Interior View of Substation, Chicago Railways, Showing 3000-kw Rotary Converters

Low frequency was necessary because the danger of "flashing-over" set a lower limit to the distance between brush studs, while the allowable commutator speed, 3000 ft. to 4000 ft. per minute, limited the rotative speed of the armature. Sixty-cycle converters were built in small sizes many years ago with fair success even before commutating poles were introduced, but it was the commutating pole that revolutionized converter practice. It has done this by improving commutating conditions, thus rendering unlikely the disturbances which cause flashing. It has also made possible the use of higher commutator and, therefore, higher armature speeds, thus permitting a reduction in size as well as an increase in frequency. Before adopting the sixty-cycle converter on a large scale the engineers of the Cleveland Railway Company conducted some experiments with twenty-five-cycle converters run at an abnormal speed to produce sixty cycles. The

decision, as it had to determine whether to build a new power house or to purchase energy from the Cleveland Illuminating Company. In deciding upon purchased power the matter of frequency came into prominence, as sixty-cycle is the standard frequency of the lighting company. By adopting this frequency the railway company obviated the use of motor-generator sets at a great saving in cost and power loss. In selecting these converters the purchasing company specified unusually liberal allowances of iron and copper, partly to provide a heavy armature, and the result is an armature weighing 10 tons. The purpose of this great mass is to provide a flywheel effect to pull the machine through heavy sudden overloads, but it is probable that with the experience gained in this and other installations the converters can be made much lighter and cheaper.

An important condition which favors the high-frequency

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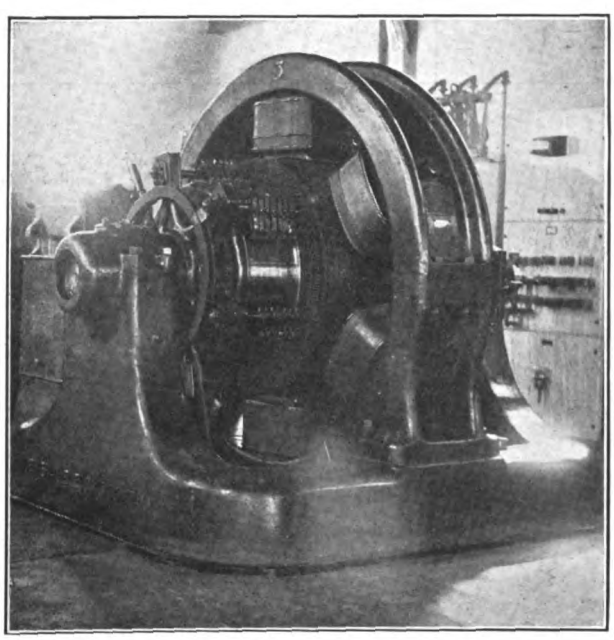
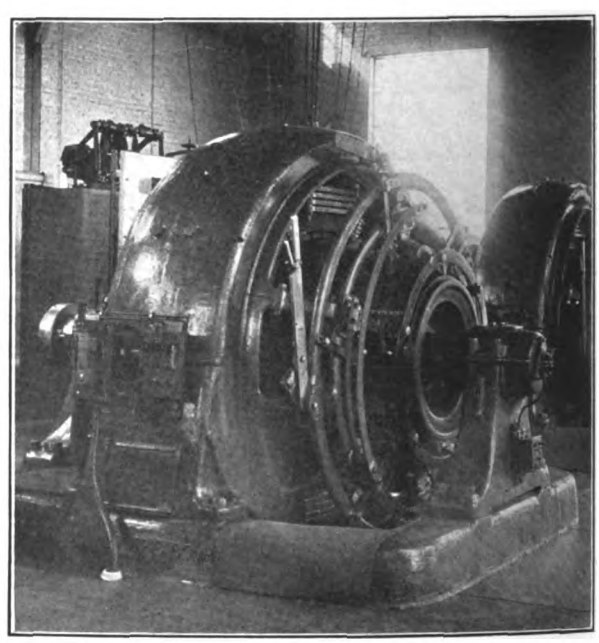
converter is the steady nature of the output of the steam turbine. Its speed is so nearly constant that the frequency is not subject to sudden variations, hence the absence of shifting of the phase position of the rotary armature currents and the consequent disturbances of commutating conditions.

ROTARY CONVERTER SPEED AND CAPACITY

In the reduction of size one of the interesting machines of the year is a 1000-kw, 750-r.p.m. converter installed in the Townsend Street substation of the New York State Railways at Syracuse. This stands about one-half as high as its 375-r.p.m. neighbor of the same capacity and representing the standard practice of a few years ago. The two machines are shown side by side in the illustrations on page 544. The difference in size is due not only to the high speed but to the improved methods of ventilation and the reduction of losses which have necessarily accompanied the reduction in size. That this is true is shown also in the substation of the Buffalo Railway Company, where a 400-kw, twenty-five-cycle converter, a large machine ten years ago, stands by the side of a 1000-kw converter of the same speed. The heights of the two are approximately the same.





Views of 1000-kw Rotary Converter with Commutating Poles and of 400-kw Old-Style Machine of Same Speed, Reproduced on Same Scale to Show Approximately Equal Size

Accompanying the reduction in size of converters of a given capacity is the use of larger units. When 2000-kw units were adopted principally in the very large cities they were considered remarkable. Now 4000-kw machines are considered the standard in Chicago at least, and although as yet the actual number installed is not large, it is being largely increased. The reason for this is that, as the efficiency of conversion is very high over a considerable range of load, economy of floor space, switching apparatus, foundations, building transformers and attendance dictates the use of as large units as can be economically loaded. The arguments are exactly the same in this case as in that of the power house. In fact, they are stronger because substations are usually located on more expensive real estate than are power plants.

In substation transformers the air-cooled type is popular on account of its compactness. A recent improvement has been the elimination of the outside case, exposing the core. This gives increased space economy and better radiation. Transformers of this type of 1050-kva capacity were recently installed in the Snelling Avenue substation of the Twin City Rapid Transit Company.

SUBSTATION LAYOUT

The requirements in substation layout are fairly uniform throughout the country, and in spite of changes in rotary converters and in details of equipment the general plan is affected principally by the form of the site. The station is planned to operate with a minimum of labor; that is, one man to a shift if practicable. In general there is a row of converters near the center line of the room with axes perpendicular to its length. Behind these are the reactances and starting panels, next a row of air-blast transformers and another row or two of motor-operated oil switches. The busbars may be on the main floor or in the basement, practice in this feature being divided. The a.c. control board and the d.c. generator and line panels are along the wall facing the line of converters, with ample space behind. The building is usually of brick with roof supported on light steel trusses and a crane is provided for handling apparatus.

In the basement are the high-pressure air chamber under the transformers connected with the fans by underground ducts, the inductive shunts for the converters, in some cases the bus chambers, usually with the high-tension flat bars or tubes separated by brick and concrete barriers, a storage battery room for the switch-operating battery, an electrolytic lightning arrester cabinet, a ground bus, a compressor equipment for supplying air for cleaning machinery, and the usual locker and toilet rooms.

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If numerical data are added, this description will cover a large proportion of the newer substations used for railway purposes.

STORAGE BATTERIES

In the above outline no provision is made for storage batteries for heavy duty. Where such are used they are housed in separate buildings if possible. The function of such batteries is largely to act as a reserve, but they also assist in reducing load peaks, an important consideration where energy is purchased. The status of the battery in the substations of the future is in some doubt on account of the expense of maintenance on the one hand and the increasing reliability of direct supply on the other. In many cases the battery is practically necessary even if scarcely ever used. If discharged only frequently enough to insure healthy condition, as is the practice of the Commonwealth Edison Company of Chicago in the treatment of its lighting batteries, the maintenance cost is very low. If, on the other hand, daily heavy discharges are the rule, the deterioration is rapid.

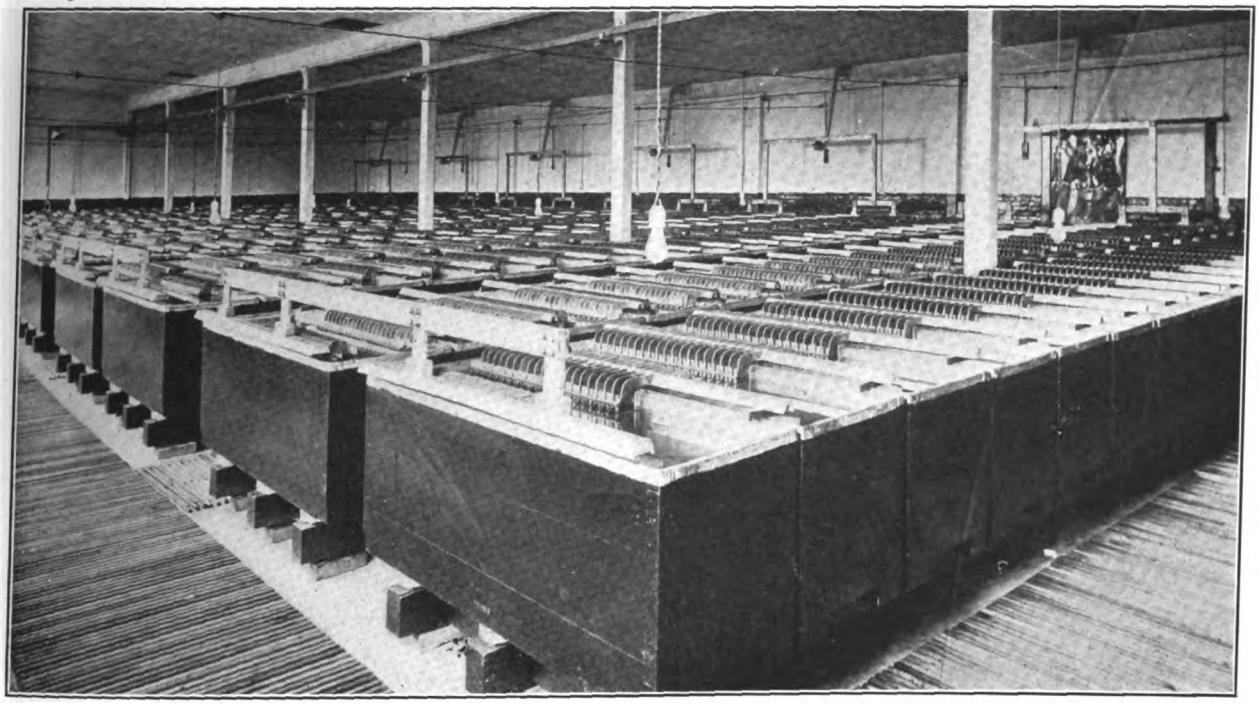
The International Railway was a large and early user of storage batteries and now has a large equipment in daily operation with excellent results. These batteries are used to assist in keeping down the peaks of the load on the Niagara Falls Power Company's lines, resulting in a reduction in the cost of the energy amounting to more than the battery maintenance and loss costs. They are discharged every day, excepting holidays and Sundays, at a high rate.

These batteries have now been in use about ten years, so that the cost of maintenance per kilowatt-hour can be determined in the light of long experience. The cost figures for the three Buffalo batteries for three years are given in the following table. The high cost for the year 1911 is explained by the fact that during that year it became necessary to move one of the batteries and reinstall it owing to the condition of the battery room floor. This entailed an expense of $5,000. The cost per kilowatt-hour output given below does not include fixed charges. The original cost of the battery was approximately $265,000, to which must be added the cost of buildings, etc. The battery is now, however, in a condition equal to new, as required by the maintenance contract between the manufacturer and the railway company.

TABLE SHOWING OUTPUT AND COST OF OUTPUT PER KILOWATT-HOUR BUFFALO STORAGE BATTERIES

Year	Kilowatt-hour Output	Cost per Kilowatt-hour Output
1909	2,369,539	$0.0105
1910	2,240,785	0.0108
1911	2,426,665	0.0131

In case the battery can be made partly or wholly to pay for itself, as in the above instance, the insurance against breakdown is secured cheaply. The old argument for the use of the battery, that it enables the load to be held at a uniform value and thus effects improved economy, no longer holds. In the first place, modern machines operate at high efficiency over wide range of load; second, the losses in the battery are so great that they more than offset any possible saving. As a regulator of voltage the battery undoubtedly does have some effect, but voltage regulation can now be secured more cheaply in other ways.



Interior View of Typical Storage Battery Room, with Batteries Floating on Line, International Railway Company, Buffalo

SPECIAL SUBSTATION TYPES

In the lighting field the outdoor substation is making progress, the extra expense for transformer insulation being small compared with the cost of buildings. This practice has not yet been extended to railway work except in a few isolated cases of portable substations. There would seem to be many reasons in favor of the use of outdoor trans-

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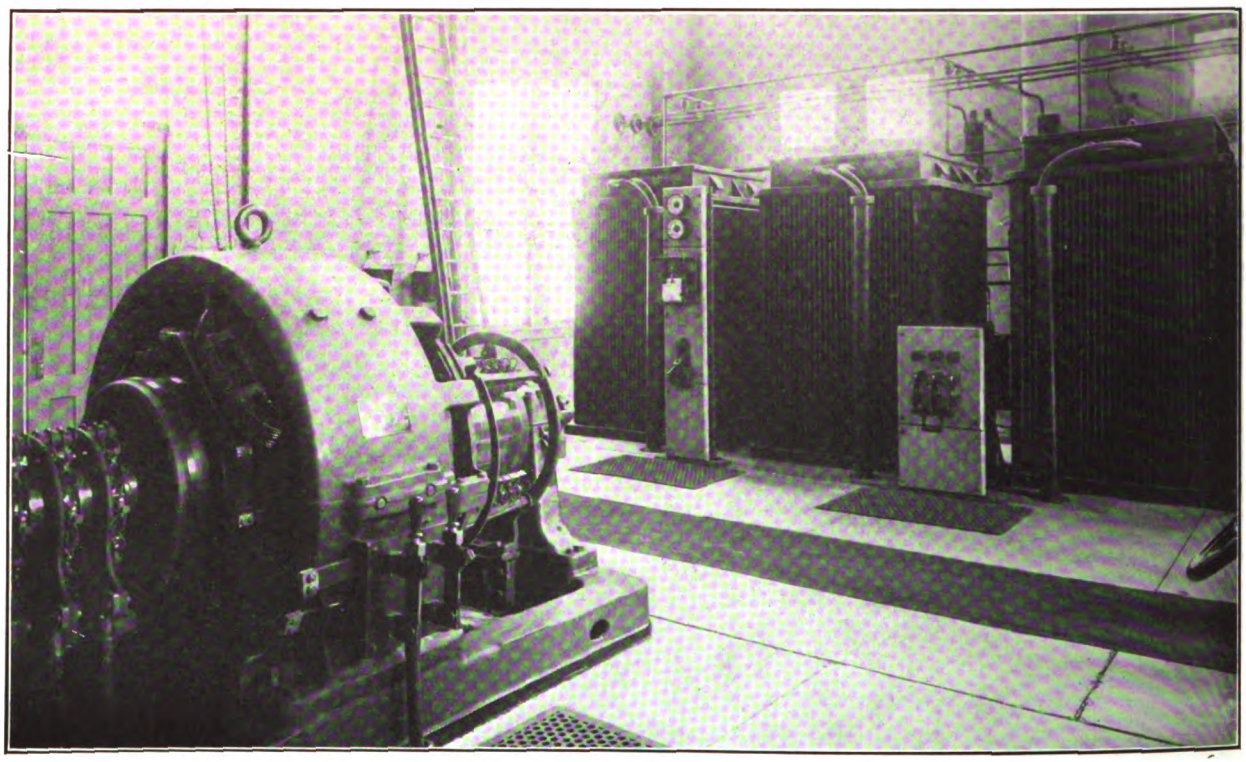
formers in connection with rotary-converter stations, which could thus be made smaller and simpler. All blowing apparatus, high-tension entrances and other details could be eliminated and the buildings reduced to much smaller dimensions.

The portable substation is finding an increasing field of usefulness in temporary service. The high-speed, high-frequency rotary will make larger units portable, and by the use of specially cooled transformers portable substations can be made of almost any desired capacity. A recent car designed by the Northern Ohio Traction Company was described in the issue of the Electric Railway Journal for Aug. 16, 1913. The use of a sixty-cycle, 900-r.p.m., six-phase rotary here results in a high space efficiency, a density of 1.73 kw per square foot of loading space being obtained.



View Showing Small Floor Space Occupied by Modern Rotary Converter in Comparison with Its Transformers, New York State Railways

THE EVOLUTION OF THE POWER PLANT

Occasionally a railway company has the opportunity to put up an entirely new plant, and in this can be realized the ideals of the designers provided they involve reasonable expense. In most cases, however, the plants existing to-day have "evolved" from earlier ones bit by bit. In the first paragraph of this article indirect reference was made to the stubborn fact of obsolescence. It takes courage as well as money to retire a machine still in its physical prime simply because another one can do its work so much more cheaply that the capitalized saving more than offsets the depreciated value of the other. This replacing process, however, is necessary. It is taking place on a larger or smaller scale all over the country. The 5000-kw turbines which were placed in the Fisk Street station of the Commonwealth Edison Company eleven years ago were replaced almost immediately with units of more than twice the capacity on the same floor space.

Now the same company is putting 25,000-kw turbines in approximately the same space. Hence these early machines play their expensive part in following the laws of obsolescence, and one stands in the yard of the General Electric Company to-day as a monument to progress in power-generating methods.

A most conspicuous illustration of the operation of this law is found in the changes in the power plants of the Interborough Rapid Transit Company of New York City which are being partly made over to provide power for the new subways. Splendid Corliss engines have been sold to make way for the new 30,000-kw cross-compound turbine units which will be installed in the same buildings as their predecessors. In a recent article Dr. Louis Bell gives an example of obsolescence in a much smaller plant which in twenty years has had practically three equipments. This is probably true of most railway plants of the same age, or it will be by the time that impending changes are inaugurated. In the first stage there were slow or high-speed engines with belted d.c. generators. Then came direct-connected d.c. generators or, in some cases, alternators. Now these are rapidly being retired and turbines, mostly of the horizontal type, are taking their places.

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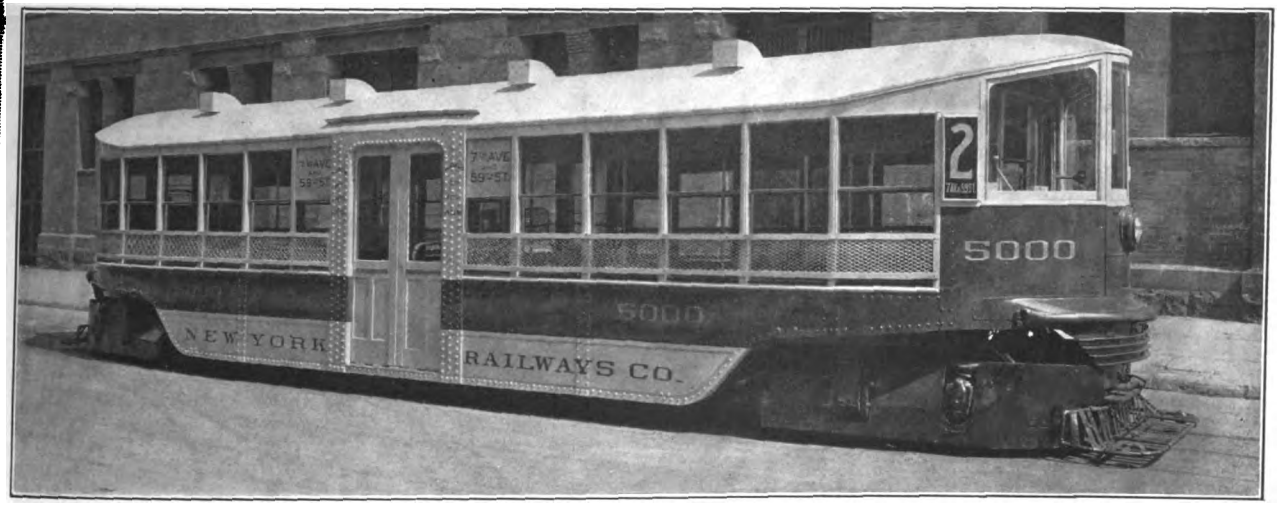
DESIGN OF CITY CARS

JUST a decade ago, in the 1903 convention issue of the STREET RAILWAY JOURNAL, the principal city cars of that period were described under the heading of "Standard Practice in Rolling Stock for City Service." The semi-convertible and convertible drop-platform types had then been developed to a high standard of efficiency, while more localized designs like the California open and closed compartment, the Ohio open and closed side and the Denver side-entrance cars were practically at a standstill. The double-deck car had become a memory. The most startling novelties of the day were vestibuled platforms, the Detroit rail for the segregation of smokers and the accelerator door to save one step between the street and the car body. Discussion of car design was confined almost wholly to the long car versus the short car, and the significant objection which was urged against the use of the former was the loss in missed fares during the rush hours. Such economic questions as weight reduction were hardly considered. As for operating problems, the folding gate of the Twin City Rapid Transit Company represented the only device then in use for the prevention of platform accidents.



Stepless Car of the New York Railways Company

While matters were in this stagnant state, the Montreal Street Railway Company, through W. G. Ross, then managing director, and Duncan MacDonald, then superintendent of the company, was quietly working out a system of pay-as-you-enter fare collection which was destined to revolutionize city car design, construction and use. The prepayment system was inaugurated at Montreal in 1905 with little change in the original cars except the provision of longer platforms, passenger-dividing rails and front exit door under the motorman's control. Its success in reducing platform accidents and increasing traffic receipts was soon brought to the attention of American street railway operators, and the year 1907 marked orders from Buffalo, Chicago, New York and Newark for equipment with prepayment features. From that year onward, changes in car-body construction, platforms, doors, steps, etc., occurred with such amazing rapidity that the following review must be considered only as a snapshot of conditions as they are in September, 1913.

The principal advances in rolling stock, as hereinafter described, may be summarized as follows: wooden underframes superseded by plated wood, composite wood and steel, all-steel structural members or side girders with bottom members for floor support only; wooden superstructure superseded by sheathed sides, steel posts and carlines; wooden veneer inside finish and headlining superseded by composition and metal; wooden floors replaced by monolithic material; monitor and steam coach roofs changed to single-arch design; the introduction of an endless variety of railed platforms and of doors and gates manually or automatically operated by the crew in connection with folding or sliding steps; monitor sash ventilation superseded by exhaust and forced ventilation; incandescent lamp lighting replaced by metallic filament lamps, and the introduction of push-button and door signal systems.

THE USE OF STEEL FOR CAR FRAMING

The advance in car framing may be appreciated from a description of the bottom framing of a Brill semi-convertible car with 30-ft. 8-in. body, as presented in the STREET RAILWAY JOURNAL for Nov. 28, 1903. In this car the side sills were of 4-in. x 7¾-in. long-leaf yellow pine with a 12-in. x ⅜-in. sill plate on the inside. The center sills were 3½ in. x 4¼ in. and the end sills 5¼ in. x 6⅞ in. The center platform timbers were reinforced by 4-in. x 3-in. x ½-in. angle irons. The posts and carlines were also of wood. This construction was almost universally standard in 1903, but two years later the Twin City Rapid Transit Company built some trial cars with all-steel underframes.

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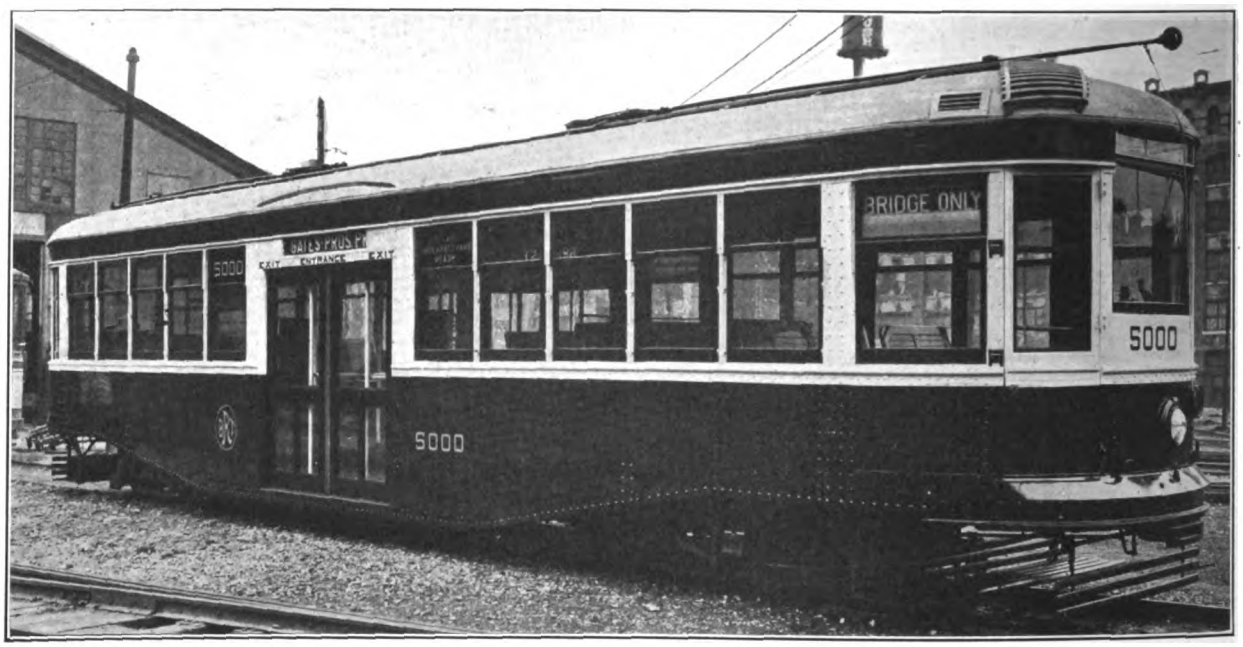
The first Eastern city car with all-steel underframe was built the same year by The J. G. Brill Company for the Ocean Electric Railway, Long Island, N. Y. Like the wooden semi-convertible car previously mentioned, it was 30 ft. 8 in. over the body. Its side sills were composed of two flanged members with the flanges meeting, castings being placed between the members to serve as spacers and also as sockets for the tenons of the grooveless posts. Structural steel was also adopted for the other members of the bottom framing of this car owing to the fact that it was to operate over a third-rail line for part of the way. The reduction of the fire hazard was also a strong consideration in the choice of steel for the subway cars built about this time for Boston, Philadelphia and New York. Pressed-steel cars were furnished to San Francisco and Montreal during 1907.

MODERN UNDERFRAMING DESIGN

Among cars with all-steel underframes may be noted the following: Connecticut Valley Railway, 1910, 6-in. Z-bar side and end sills and 12-in. channel center sills; Chicago City Railway, 1910, structural material except cast bolsters; Chicago & Joliet Railway, 1911, 8-in. Z-bar side sills, 10-in. channel end sills and 5-in. channel crossings; Reading (Pa.) Transit Company, 1912, steel underframe with convex and concave No. 12 gage sheet steel panels; Stone & Webster design for Jacksonville, 1912, side sills of 5-in. x 3-in. x ⅜-in. angles, 3/16-in. x 15-in. steel plate for lower panel, upper panel of No. 16 gage steel with T-iron posts and carlines; Augusta-Aiken Railway, 1912, steel underframes with 3/16-in. x 18-in. sill plates, reinforced at the top with a ½-in. x 3-in. plate and at the bottom with a 2½-in. x 2½-in. x ⅜-in. angle, 10-in. channel end sills, diagonal braces of ⅜-in. x 3-in. steel plates, with channel center stringers and crossings.

Combinations of wood and steel are still the most popular for the bottom framing of all classes of city cars with drop platforms. Among these the following may be cited as characteristic: Bangor (Me.) Railway & Electric Company, 1910, wooden bottom framing with a 15-in. steel plate on the inside of the sill with the seat ends secured to the sills between the posts directly over the sill plates to give extra inside width; New York State Railways, Rochester, 1910, single-end cars, a 4-in. x 7¾-in. continuous yellow-pine side sill extending the full length of the devil-strip side, and reinforced between the vestibule corner posts with ⅜-in. x 15-in. steel plate with the step-entrance side reinforced by a similar plate between the body corner posts, also reinforcement of ⅜-in. x 8-in. plate riveted to the bottom edge of the sill plate and extending from the inside of the end sill at each corner of the car to a point 3 ft. beyond the bolster; Omaha & Council Bluffs Railway, 1911, 5-in. x 7-in. side sills reinforced on the inside with ⅜-in. x 15-in. plate with 2½-in. x 2½-in. x ½-in. angles riveted top and bottom to give the general characteristics of a Z-bar and end sills of 5¼-in. x 7-in. white oak reinforced with ½-in. x 6-in. plate—no inside longitudinal members, as crossings and diagonal braces were designed to resist lateral and corner stresses, while side members were to take vertical load and strains; Rome (Ga.) Street Railway, 1912, wooden underframe but with plate of ¼-in. steel for the lower side panel extending the full length of the body and brought around to the doorpost at each end, upper panel of No. 14 sheet steel covered with oval iron at the juncture of the sections; Metropolitan Street Railway, Kansas City, Mo., 1912, single-end cars, side sills of yellow pine plated on the outside with 3/16-in. x 32-in. steel plate, end sills and crossings of oak reinforced with steel angles and plates, center platform knees of 4-in. x 3-in. x ⅜-in. angles, platforms supported on step side with 7-in. channels and on the closed side with 3/16-in. x 42-in. plates which form the outside sheathing of the vestibules and are



View of Brooklyn Center-Entrance Car Showing Motorman's Door at Corner of Cab

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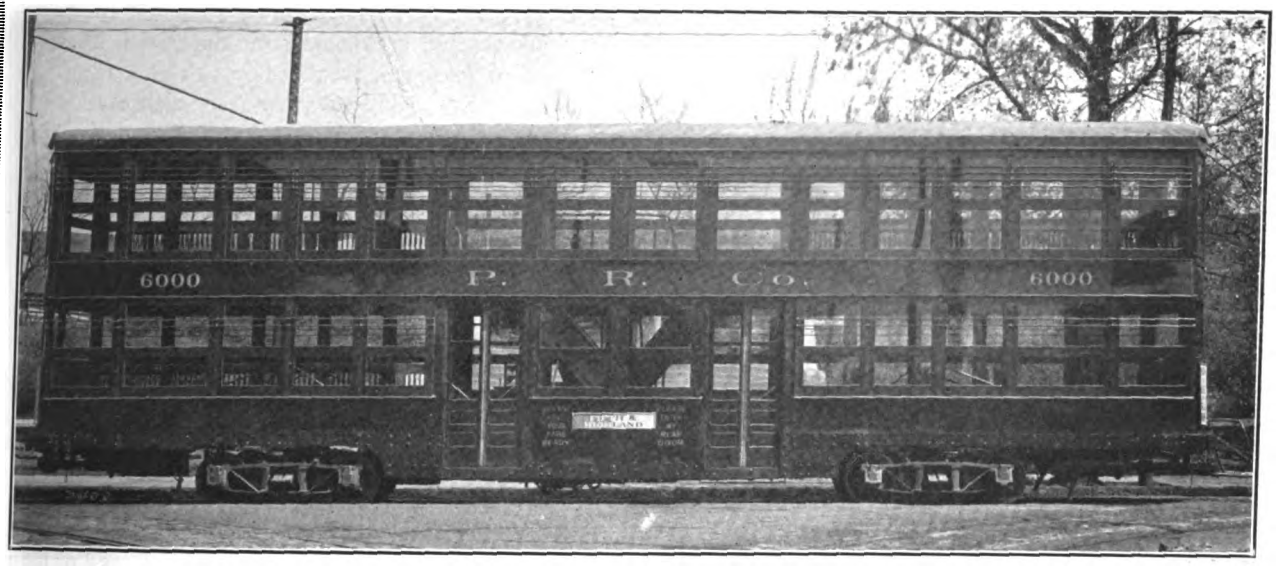
spliced to the car body to dispense with the usual underframe knee at that point.

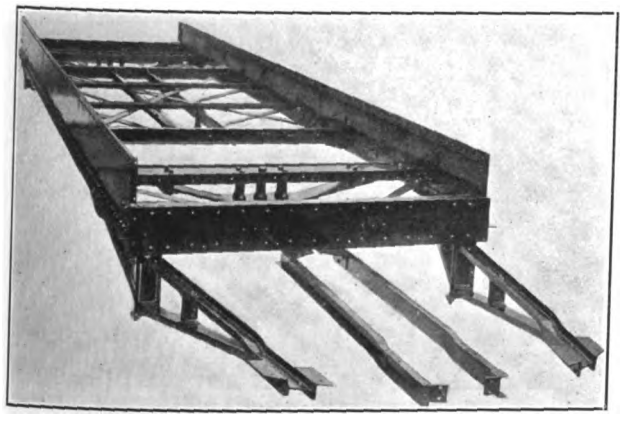
During 1912 the Memphis (Tenn.) Street Railway built some cars with 9-in., 21-lb. I-beam side sills set 9½ in. inside the inner face of malleable-iron side posts which were supported by pocket brackets attached to the main sill. The posts and roof were of wood. This unusual construction was described in the ELECTRIC RAILWAY JOURNAL for March 2, 1912.



Pittsburgh Double-Deck Car with Separate Entrance and Exit Doors

SIDE GIRDER CONSTRUCTION

In a form of all-steel construction which is used largely for center-entrance cars, the weight of the car is taken by the sides acting as girders, while the underframe serves merely to carry the flooring. The side girder construction appears well adapted for low-step center-entrance cars, as it avoids the use of the heavy special under framing which would otherwise be required by the center-



Typical Steel Underframe of Side Girder Construction

well construction; it also insures maximum clearances between the bottom framing and the pavement. The Pittsburgh trailer of 1909 and the Pittsburgh motor car of 1911 are early examples of this construction. In these cars the load transmitted from the bolsters is carried by the side frames. The bottom sill forms the tension member of the plate girder, the belt rail the compression member and the 3/32-in. continuous side sheathing the web. The posts form the vertical stiffening of the web. Heavy reinforcements at the center doors transmit the compressive stress in the belt rails up over the doorway and down to the opposite belt rail. The first group of Pittsburgh cars had wooden posts which were held between light channels, the second had wooden posts held between angles to insure easier removal of damaged plates, while the third group of cars had hollow posts of pressed steel weighing about one-half of the other design. Needle beams are used as floor members.

The center-entrance cars of the Brooklyn Rapid Transit Company built in 1912 also have a frame of pressed steel. Each side of the car forms a girder consisting of the side plates, belt rail, letterboard and side posts, all of which are riveted to each other, to the side sills and to the carlines. This side girder has a maximum depth of 8 ft. at the center of the car. The sides below the window line and the letterboard sheathing are 3/32 in. except at the ends, where 1/16-in. steel is used. The side sills are angles which are reinforced at the center with other angles. They are riveted to the channel-iron bumpers at the ends to form a continuous line around the car. The cross sills are channel-shaped pressings and the center sills are Z-pressings, both of 3/16-in. plate. Channels are used for the longitudinal floor members.

ROOFS, VENTILATION, INTERIOR FINISH AND FLOORING

A very important change in all types of cars, wood, composite or steel, has been the rapid substitution of the single-arch roof for the monitor and steam coach types within the last three years. To-day the arch roof is the rule and the monitor roof the exception in newly constructed cars. As early as April, 1891, an article in the STREET RAILWAY JOURNAL pointed out the disadvantages of the monitor design. Nevertheless, street

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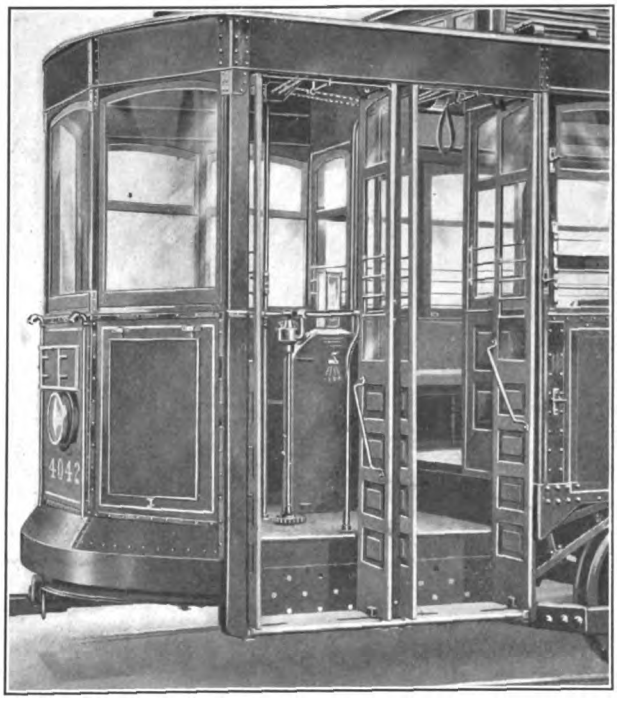
railway operators clung so tenaciously to the monitor roof that it continued in use even on open cars where, of course, ventilation was not a factor. The real drawback of the single-arch roof, namely, adequate ventilation, has been met by a large variety of natural, exhaust and forced



Platform Steps Inclosed by Doors, Pittsburgh Railways

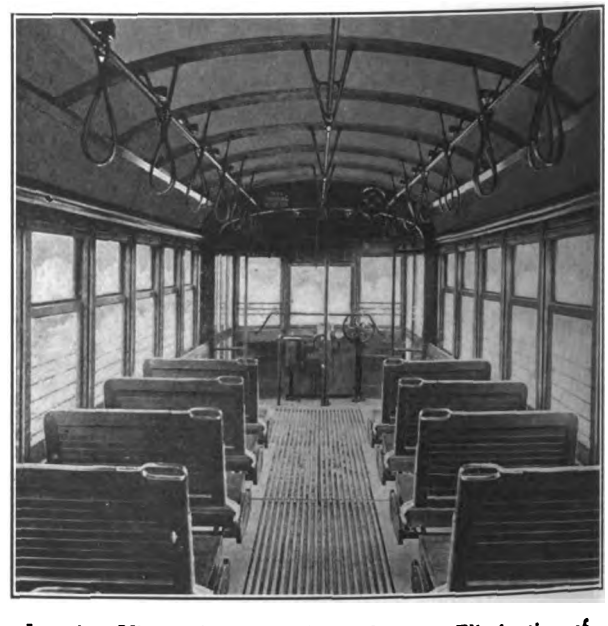
draft ventilators. In some installations the intakes are located near the floor line so that in winter the incoming air will be warmed by the adjacent electric heaters. In others the intakes have been placed higher in order to get cleaner air, and in still others forced draft is furnished by a blower placed over a coal stove or in the hood of the car. The fancied objection to the arch roof was that of appearance, but familiarity with both types generally leads to the acknowledgment that a simple natural curve is more pleasing to the eye than the unnatural combinations of the monitor. Among the positive advantages of the single-arch roof are greater headroom, stronger yet lighter construction and availability for larger window areas. Thus in one car the single arch permits the windows to be 5 in. higher, while in a car only 30 ft. 1 in. over all this design effected a saving of 400 lb. in weight as compared with a monitor roof.

Almost coincident with the development of the arch roof has been the use of composition and metal linings for ceilings and other interior finish. The old headlinings were usually confined to birch, maple, cherry, mahogany or oak veneer. The newer linings are fireproof and give no trouble from warping or shrinkage. While they can be made to match any finish desired they are most serviceable when treated with a light-colored enamel, which gives the car a more cheerful appearance and materially improves the lighting. The heat-insulating qualities of some composition materials make them desirable for the inside lining of side sheathing, posts, etc. In some instances the entire roof has been made of such compositions, the inner side being tinted or painted as a ceiling and the outer side being covered with canvas.

Another innovation in car construction is the use of monolithic floors, which are fireproof, durable and easy to clean. The flooring is spread as a plain or reinforced cement on a base of galvanized sheet iron and special shapes. It is usually inclined toward the center to facilitate drainage, and occasionally the thickness is increased at places of maximum wear. For cars with ramps the composition may include a gritty material like carborundum so that the entire floor is practically an anti-slip tread but not sufficiently so to impede passenger movement. These floors lend themselves readily to ramp construction.

RAILINGS AND STEPS

In 1903 the most common length of the platforms of double-end city cars was, curiously enough, the same as the standard track gage, namely, 4 ft. 8½ in. In the Middle West, however, where many single-end cars were operated, the rear platforms were as long as 7 ft. These platforms were provided with railings of the Detroit design, which did not separate incoming passengers but simply formed a "pen" for smokers. The end body doors of most cars were either of the centered double-sliding type or of the offset accelerator design. Vestibules had come into use for several years past, but most of them were inclosed on one side only, and in mild climates gates were employed instead. No apparatus controlling the movement of passengers was used, except that on the single-ended cars of the Twin City Rapid Transit Company the gate on the rear platform was under the control of the motorman. Although this gate had been in use since 1895, its principle appears to have been adopted



Interior View of Seattle Car, Showing Elimination of Bulkhead

by a few companies only, as at Des Moines, where a wooden gate was employed for the same purpose.

The simple Detroit railing was succeeded by the Montreal double railing on those systems where it was thought desirable to leave space for smokers in addition to separate

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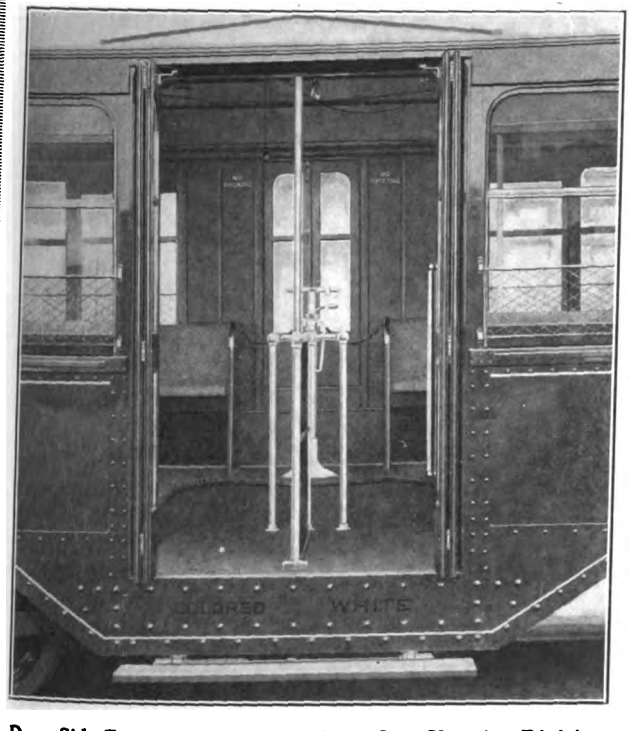
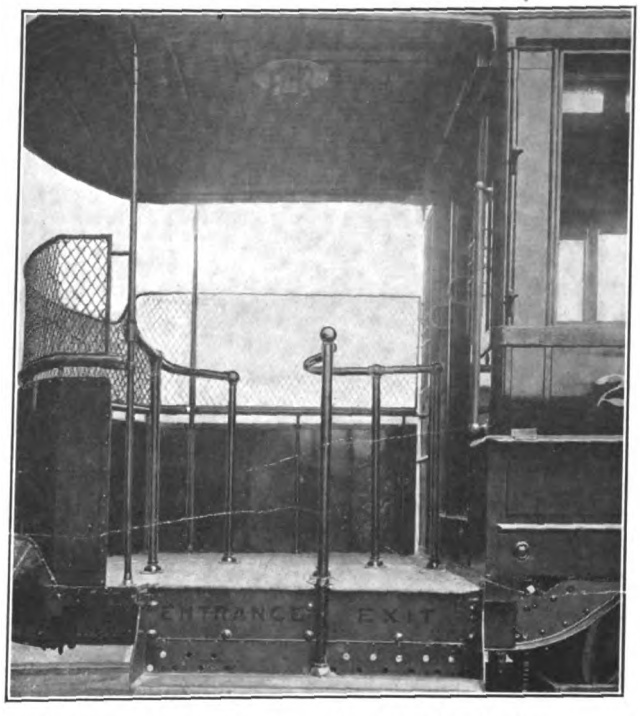
aisles for entering and departing passengers. The railing which incloses the smokers is usually curved inward against the vestibule posts so that no one can enter or leave without passing the conductor. These railings show an unlimited variety in curvature, depending upon the operating company's idea of the best location for the conductor. The prepayment railing of the Detroit United Railway is of straight pipe almost entirely and includes within the center line of the car a three-sided inclosure for the conductor. On some systems the railing extends from the intermediate door posts or stanchions of the vestibule to a similar supporting point between the body end doors. Several companies have found, however, that a very short railing will serve to divide effectively the two currents of travel. For example, the railing of the Third Avenue Railway, New York, does not extend all the way to the bulkhead. On single-end cars the railings are fixed, but on double-end cars it is customary to raise them out of the way when the platform changes from front to rear and vice versa. On many cars a short railing is also used to protect the motorman from jostling by departing passengers. The platform railing as a whole is undergoing simplification mainly because the "safe" type stationary fare boxes, which were quite common at the beginning of the prepayment period, have been largely abandoned in favor of small portable boxes. In the pay-within type of prepayment cars railings are hardly necessary because the bulkhead doors are omitted to enable the conductor and his stand to form the dividing line between incoming and outgoing passengers. Most prepayment platforms are provided with grab handles and vertical stanchions both to insure convenience to passengers while entering and alighting and to afford means of support should the car be started suddenly while passengers are on the platform.



Drop-Side Entrance for Birmingham Car, Showing Division for White and Colored Passengers

Among the first city cars in which provision was made for the simultaneous operation of doors and steps were those built in 1905 for the East Boston tunnel service of the Boston Elevated Railway. As these cars were built with flush platforms, a double step was used. When the door was closed pneumatically the lower step folded against the upper one. Toward the end of the same year the Chicago City Railway installed some cars with a sliding step. Many other mechanisms have since been devised in connection with door and step operation, but in most cases the step is of the folding type and a delay movement in the operating levers is sometimes provided so that the door does not open far enough to permit passage until the step is horizontal. In several cars furnished to the Omaha & Council Bluffs Railway and other companies during 1911 the steps did not fold, but when the doors were closed their upper surfaces were covered by sloping projections hinged to the doors. Another variation is found in the cars of the Pittsburgh Railways, where the steps are within the line of the car body so that they are completely concealed as soon as the doors are closed. The subject of steps is, of course, intimately connected with that of low entrance height. In a few cases this end has been attained by the use of a double step like that of the 1905 Boston car, which, however, had no platform, but the most popular method is likely to be the construction of sloped floors or ramps. The ramp used in the near-side car is a very moderate one and is intended only to reduce the height between the floor and pavement from 39¾ in. to 36½ in. In some center-entrance cars the low step is obtained by means of a ramp between the depressed platform and the bolster line at each end. In the stepless car of the New York Railways a well is formed at the ends by dropping the floor between the wheels. The Metropolitan Railway Company,



Inclosure for Smokers on Topeka Car Platforms

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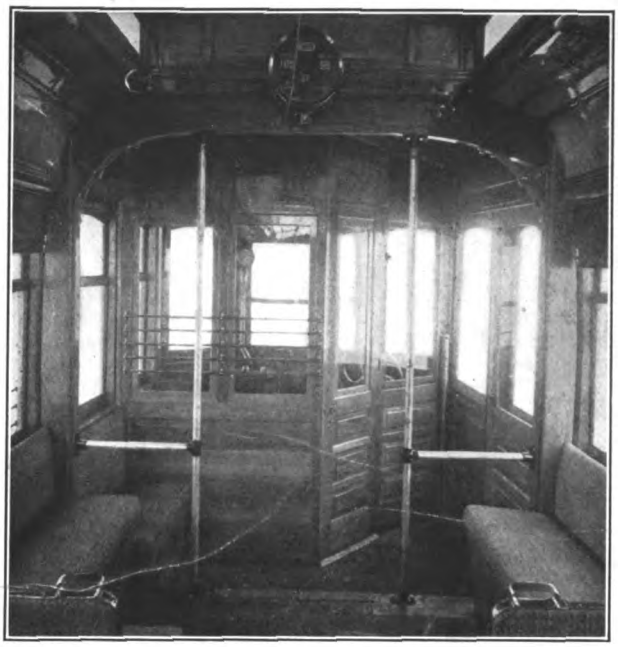
Kansas City, uses a platform runway which rises 12 in. between the floor at the entrance door and the main floor of the car.

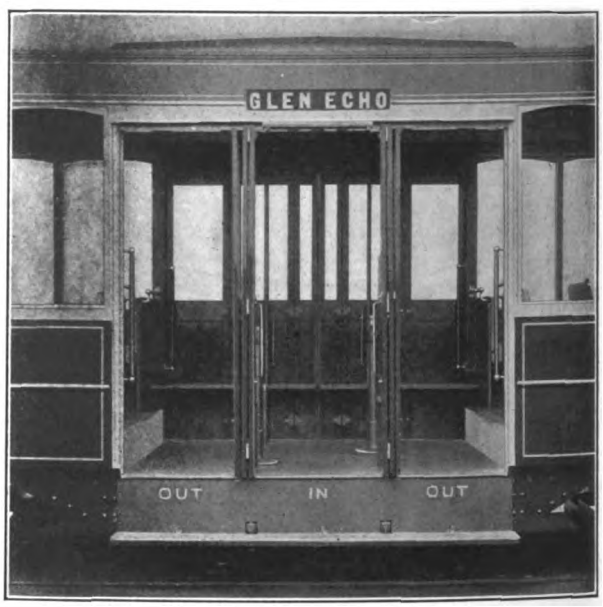
PLATFORM ARRANGEMENT

The first prepayment cars were characterized by the great length of their platforms. Thus the pioneer cars at Montreal had 7-ft. platforms which were intended to accommodate thirty passengers at one time. The pressed steel car built for Montreal in 1907 had a platform measuring actually 9 ft. 4⅜ in. inside length. These excessive lengths were due in part to the desire to accommodate smokers, but their principal purpose was to avoid congestion on the platform when the passengers were paying fare. The same motive was responsible for the 6-ft. 1-in. platforms of the Chicago Railways in 1908 and the 7-ft. 5½-in. platform of New York built during the same year, although both cars were for double-end operation. As the public became better acquainted with prepayment, however, operating men took a saner view of the platform situation. As a result, most of the cars of recent construction have been provided with shorter platforms. In fact, on some systems, like the Third Avenue Railway, New York, the unchanged 4-ft. 6-in. platforms of cars converted for prepayment are used with entire satisfaction.

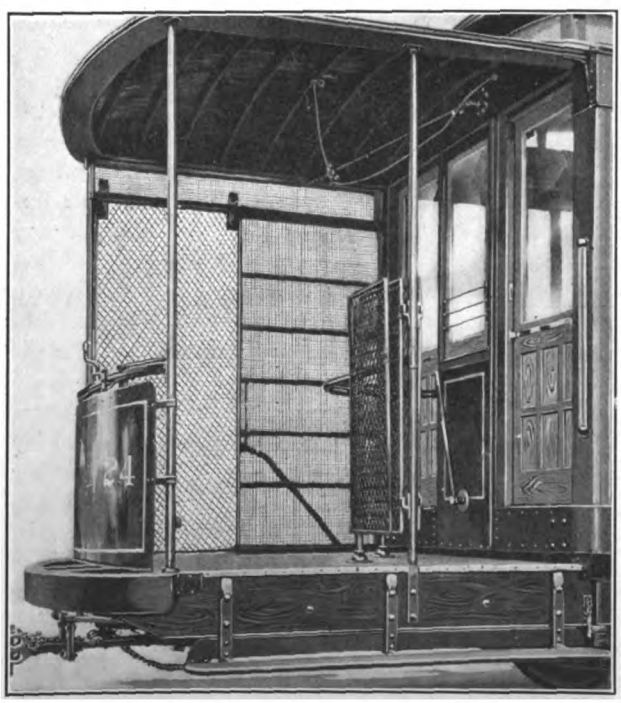


Motorman's Cab in Single-End Spokane Car

Diffidence with regard to the public reception of the prepayment system led also to the use in some designs of more doors than necessary, and it is a surprising fact that the original Montreal single-end cars are among the simplest prepayment cars in use. Despite the cold winters in that city the rear platform is entirely open on the operating side, and no body doors are provided at the front. The step at the rear platform is fixed, but a folding step is used with the sliding exit door of the inclosed front vestibule. This front door and step arrangement is the one characteristic now common to practically all prepayment cars except the near-side type. In Quebec, where the winters are even more severe than in Montreal, the rear platform is also open on one side. The success of this construction shows that a fully inclosed rear vestibule is unnecessary with single-end cars, unless body doors are omitted.



Folding Doors of Washington Center-Entrance Car



Screened and Hinged Gates Used in Wichita

In order to save weight and expense, the cars built for the United Railways of St. Louis in 1909 were not fully vestibuled at the rear, but a small cab was furnished to protect the conductor. In the Rochester cars of 1910 protection was furnished to the conductor by inclosing the exit at the platform step with a single swing door. The rear platform of the Columbus (Ohio) Rail-

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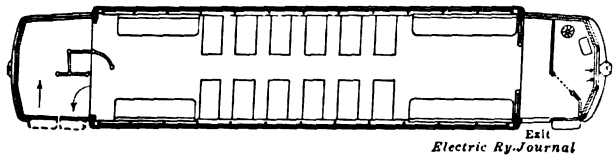
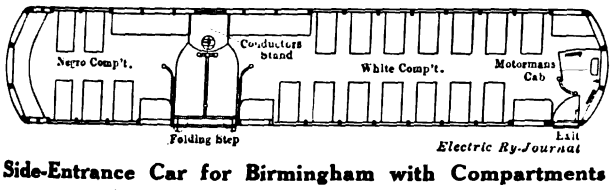
way & Light Company's cars of 1910 was provided with exit and entrance doors which were hinged to a center post on the side of the vestibule, while another post on the platforms formed a stop for the doors and a terminal for the dividing rail. In the Wichita cars of 1911 the



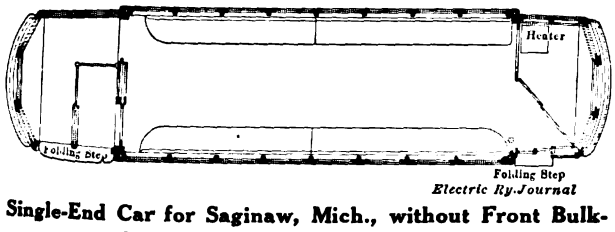
Detroit Single-End Car with Rail Inclosure for Conductor and Partly Inclosed Motorman's Cab

sliding door at the front platform differed from the usual arrangement in being placed next to the bulkhead. This location saves a step when passengers leave the car, but it obliges the motorman to turn his head when watching the departing passenger. The rear platform of the Wichita car had a conductor's cab only, instead of the full vestibule. The cab extended from the vestibule step to the sliding entrance door of the body, being so placed that two of its sides were formed by the body exit door and a two-section vestibuled folding door under the control of the conductor. In 1911 the Washington Water Power Company purchased for operation in Spokane some 51-ft.



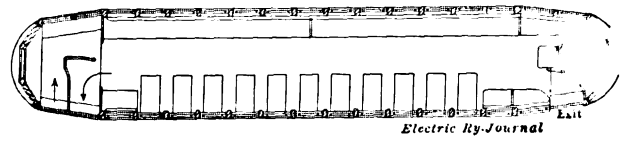
Side-Entrance Car for Birmingham with Compartments for Two Classes of Passengers

cars, the 6-ft. 5¾-in. rear platform of which was novel in that the exit and entrance doors at the vestibule were arranged to slide into an intermediate pocket. An emergency exit door was also furnished on the opposite side of the vestibule. Provision for changes in weather is afforded by the practice of the Illinois Traction System, which uses doors and gates according to the season on some of its cars. In the car developed in 1910 by the Stone & Webster Engineering Corporation for Jacksonville, Fla., and other Southern properties the rear bulkhead is moved in from the end sill far enough to give standing room for the conductor on an open platform.



Single-End Car for Saginaw, Mich., without Front Bulkheads but with Motorman's Cab

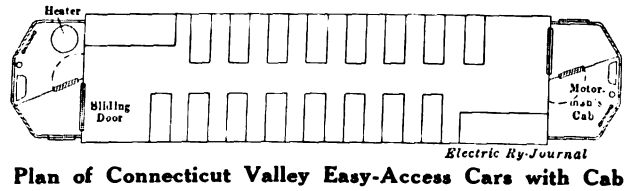
The most recent form of single-end cars is the near-side design in which practically all operation is at the front, although a small door at the rear may be used if necessary. This car was introduced in Buffalo early in 1911 and has since been adopted in Philadelphia, Chicago and several other cities where the near-side stop is used. As in other prepayment cars the folding vestibule doors and steps operate together. No body doors are used. The conductor is stationed either on the platform or at a corner just within the bulkhead line at one side.



Pittsburgh Single-End Car without Bulkheads, Arranged with Longitudinal and Cross Seats

ONE-MAN CARS

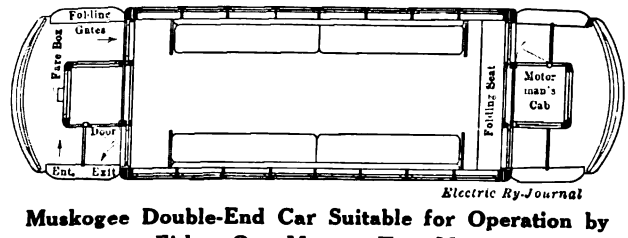
Modern one-man cars are necessarily operated on the near-side principle, because all passenger movement is at the front, whereas in the bob-tail horse car the passenger entered at the rear through a door which was under the control of the driver. In the one-man electric cars of today it is customary to keep the rear doors or gates locked, except in emergencies. These cars are built both double-end and single-end. Among the smaller cities where one-man cars are now used are the following: Brunswick, Ga.; Missoula, Mont.; Waco, Tex.; Muskogee, Okla.; Selma, Ala.; Sheridan, Wyo., and Freeport, Ill. How-



Plan of Connecticut Valley Easy-Access Cars with Cab at Each End

ever, the experience of the International Railway Company, Buffalo, with one-man cars at Lockport has shown that there is also a field for this car on the weak traffic lines of large systems. A summary of the one-man car situation from an operating standpoint was published in the ELECTRIC RAILWAY JOURNAL for March 29, 1913. The small storage battery cars which are run in New York could readily be handled by one man on some lines during certain hours, but an old municipal ordinance which has never been repealed forbids the operation of cars with less than two men.

The one-man car used by the City & Suburban Rail-



Muskogee Double-End Car Suitable for Operation by Either One Man or Two Men

way, Brunswick, Ga., since 1910 has a folding exit and entrance gate at the front platform with a similar locked gate at the rear. The motorman-conductor of these cars is provided with a portable cash box, and at Waco, Tex., he has a transfer-issuing machine. The cars of the

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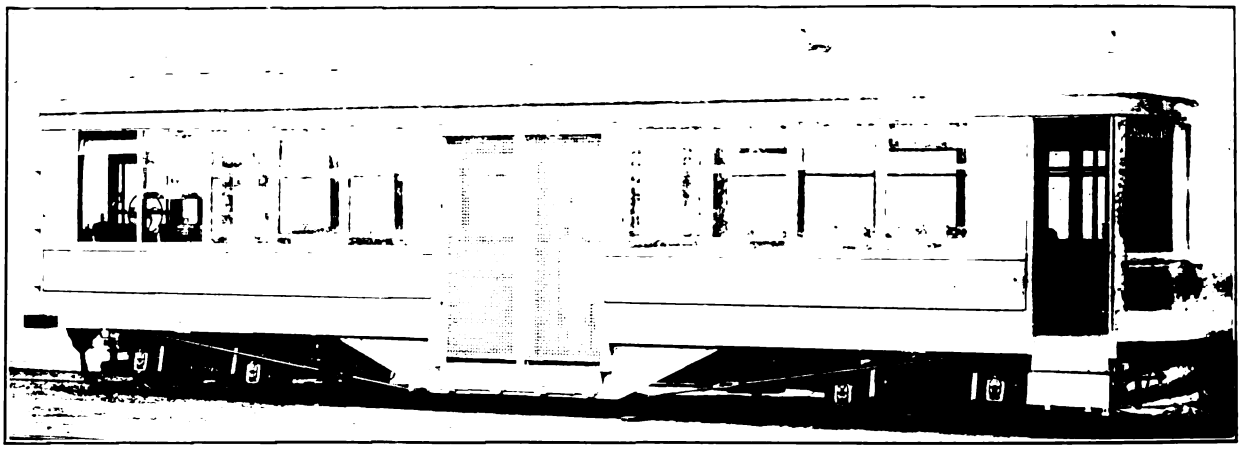
Muskogee (Okla.) Traction Company, built in 1910, have no vestibules, but a cab is placed in the center of the platform against each bulkhead. The cab is only 3 ft. square and is furnished with a folding entrance door at the side. In the Freeport (Ill.) Railway & Light Company's cars, built in 1912, the step openings at both sides of the platforms are inclosed with two-part folding doors, one part being hinged to the corner post of the car body and the other hinged to the corner post of the vestibule. Both doors are operated together by a lever within convenient reach of the motorman-conductor. Inclined sheet-metal guards are secured to the lower part of the doors to cover the steps when the doors are closed. A sliding entrance door and a hinged exit door are used in the bulkheads.



Santa Barbara Center-Entrance Car with Hinged Gates in Place of Doors

DOOR ARRANGEMENT

The door systems of modern cars show a great many variations, but a sliding exit door is almost invariably used in the front vestibule. The body doors comprise either a sliding entrance and swinging exit door, a pair of doors sliding into a central pocket in the bulkhead or double doors sliding into end pockets. Sometimes the doors are separated by a post, but in practice it has been found that such posts are a hindrance rather than a help, as the dividing rail is sufficient. In the pay-within car introduced in Philadelphia in 1908 the body has no bulkhead and the vestibules are therefore fully inclosed either with folding or sliding doors. This arrangement was adopted to avoid long platforms because the conductor stays within the body of the car. The vestibule doors at the rear and front are under the control of the conductor and motorman respectively.

If double-ended cars are provided with body doors the use of a fully inclosed vestibule is unnecessary except where severe weather conditions prevail. Where vestibule doors are used on such cars they are ordinarily arranged to fold back to back in the middle of the vestibule, or each half folds against the bulkhead and vestibule post respectively. On the Public Service Railway gates instead of doors are used to control the entrance and exit of passengers.

Various cab and railing constructions are in vogue on double-ended cars to isolate the motorman from the passengers. One of the earliest folding cabs on city cars was that of the easy-access car built since 1908 for the United Traction Company of Albany, the Boston Elevated Railway and other Eastern companies. In this type a diagonal partition extends from the center line of the car body at the bulkhead to the front of the vestibule. Many other forms of cabs have been devised. It is questionable, however, whether it is necessary to build such partitions on drop-platform cars when a simple railing and curtain will serve the same end at a much lower cost and at a great saving in weight. Studies of the dimensions of some cabs indicate furthermore that no provision has been made in them to leave room for a motorman instructor.

Operating Platform, Waco (Tex.) One-Man Cars

Before the subject of doors is left, note should be made of the tendency to use both wired and clear glass for both upper and lower panels to enable the motorman and conductor to keep better watch on the passengers

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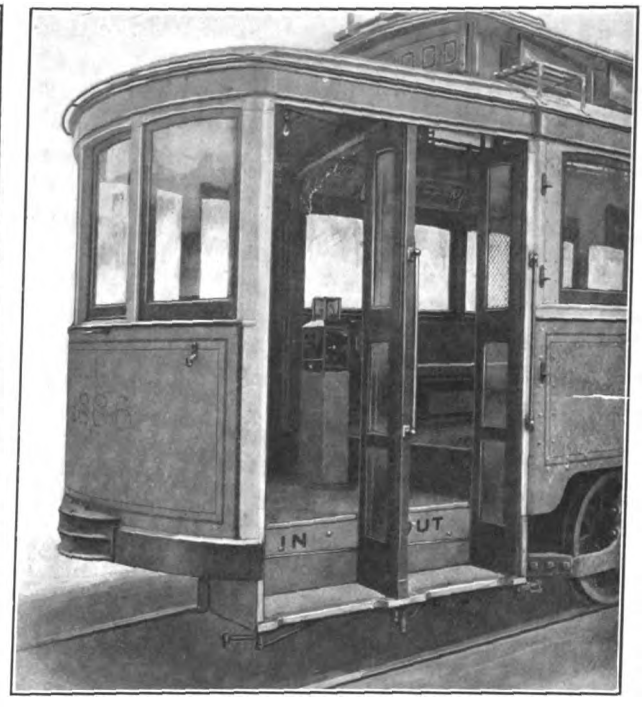
at the steps. Such doors are now used at Montreal, Boston, Milwaukee, Rochester, Syracuse and many other cities. Doubtless clear glass would be preferred uni-

Operating Cab on Open Platform, Muskogee One-Man Car

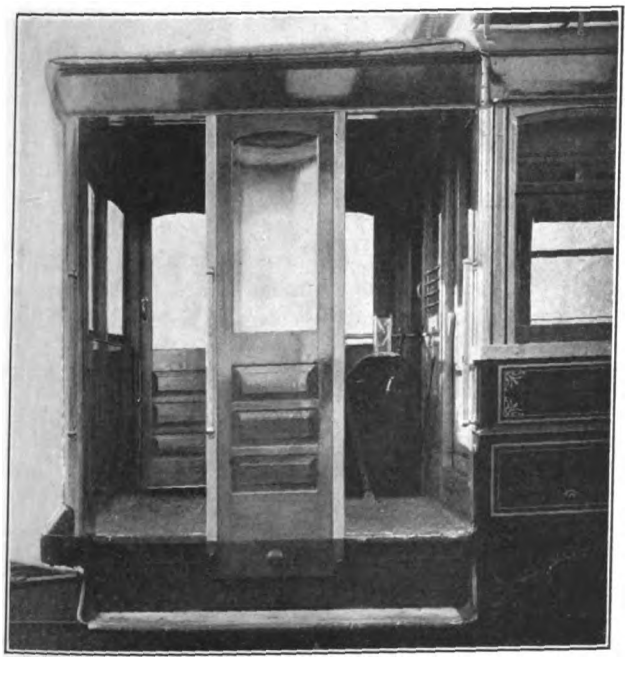


Vestibule Doors with All Panels Glazed, Cincinnati Traction Company

versally if it were not for its greater liability to breakage.

SPECIAL TYPE CARS

As previously noted, the Ohio and California type cars



Pocket for Sliding Vestibule Doors on Spokane Cars

had been in use for a number of years previous to 1903, but no improvements of any importance had been made in them until lately, when a number of companies on the Pacific Coast have begun to adopt the California car for prepayment operation. Both of these designs, in fact, have been found well suited for this purpose and have been equipped with the usual combinations of doors, folding steps, etc.

A much more important development is the rejuvenation of the side-entrance car. This car has long been used in Denver and in some other Western cities, but with the exception of the side-entrance car built for Des Moines, in 1903, and the double-entrance car for Portland, Ore., in 1904, little new work was done with this type until 1911. In that year arch-roof trail cars were built for the Emigration Canyon Railway, Salt Lake City, with a center opening 8 ft. 2 in. wide and some center-entrance cars were put in use on the Renton line in Seattle, but with the Pittsburgh trailer of 1911 and the New York stepless car of 1912, a new era was opened for the center-entrance car. Center-entrance trail cars of new design are now used not only in Pittsburgh but in Cleveland, St. Louis and other cities.

The most radical feature of the Pittsburgh center-entrance car was the low floor obtained by the use of 22-in. wheels. Since it was built the railway company has designed a small high-speed motor which permits the same wheels to be used under a center-entrance motor car. In the New York stepless design the feature indicated by its name is obtained by the use of a central well, ramps and end wells, as previously noted. The Brooklyn center-entrance car of 1912 is less radical in design than the New York car, a considerable reduction in height being obtained by the use of a ramp between the well and the bolster line and wheels of 28-in. diameter instead of 33-in. The Washington car of 1912 is the most conservative of all the center-entrance designs, as it has no

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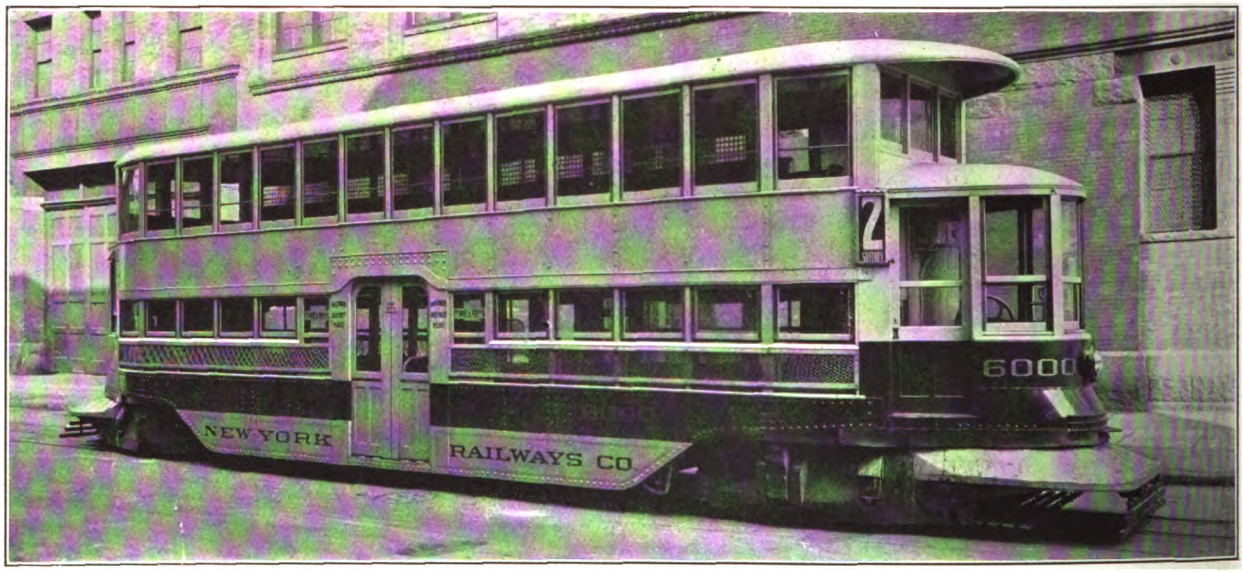
ramp or power-operated doors. Among other cities where center-entrance motor cars of recent design are used are San Diego, Cal.; Santa Barbara, Cal.; Butte, Mont.; Montreal, Que., and Birmingham, Ala. In the Montreal and Birmingham cars the opening is not at the center so that two compartments of unequal size are furnished. In the Montreal car, which is used for suburban service, the purpose is to provide a smoking compartment and in the Birmingham car to furnish separate accommodations for white and colored passengers. The largest center-door opening for a motor car, namely, 6 ft. 6 in., is used by the Brooklyn Rapid Transit Company in order to secure a 34-in. entrance aisle and two 22-in. exit aisles. The Brooklyn company has 101 cars of this type in operation, and the New York Railways has in service or on order 176 stepless cars.

The double-deck car, which was temporarily revived in 1906 by the Twin City Rapid Transit Company for its lake excursion service, has been brought forward again during the past two years in Pittsburgh, New York and Washington. These double-deck cars are developed directly from the latest single-deck cars of the companies named. The Pittsburgh Railways, after one year's experience, has ordered five cars more, but in New York and Washington only one car each is operated at present. These double-deck cars represent an immense improvement over the primitive types so far as loading and unloading ability are concerned, but as these features have also been improved in single-deck cars, the principal field for the modern use of the double-deck car seems to lie in its ability to handle a larger load at shops and other points where great masses of passengers must be accommodated in the shortest possible time rather than on lines with very short headways.



Double-Deck Car of the Stepless Type, New York Railways

MISCELLANEOUS IMPROVEMENTS

One of the accompaniments of the prepayment system has been the closer attention paid to seating arrangement because the provision of exit and entrance aisles has made it necessary to improve clearances wherever this is possible.

The most common seating arrangement is the use of transverse seats in the middle of the car and longitudinal seats opposite the doors. A great variety of folding seats is in use both in the car body and on the platforms to avoid idle seating space. Seat materials are much the same as in former years except that pressed steel pedestals have been introduced during the past two or three years. In the Rochester cars of 1913 additional clearance is secured by supporting the seats at one end on shelves under the windows.

Several companies have shown a tendency to eliminate the unsanitary leather strap either by using vertical rods or by covering the lower part of the strap with a sanitary sleeving. In fact, the desirability of improved sanitation has been generally recognized by the designers and manufacturers of all recent cars.

On account of the location of the conductor on the platform the use of push buttons operated either from a battery or from the trolley through resistances has become universal on prepayment cars. Push buttons were introduced many years ago, but in some instances they were abandoned owing to the vandalism of passengers. Several center-entrance and other cars built during the last year or two are also provided with signal circuits which either warn or prevent the motorman from starting the car until all doors are closed.

Another important step along electrical lines in car-body equipment is the use of tungsten lamps. The prepayment system has not in itself affected car illumination to any extent except that more lamps are placed in the vestibule and in several instances one or more lamps are installed over the steps. A favorite plan where several lamps are used in this location is to place each step lamp on a separate circuit. In this way if any single lamp circuit is interrupted from any cause the step is not left in darkness.

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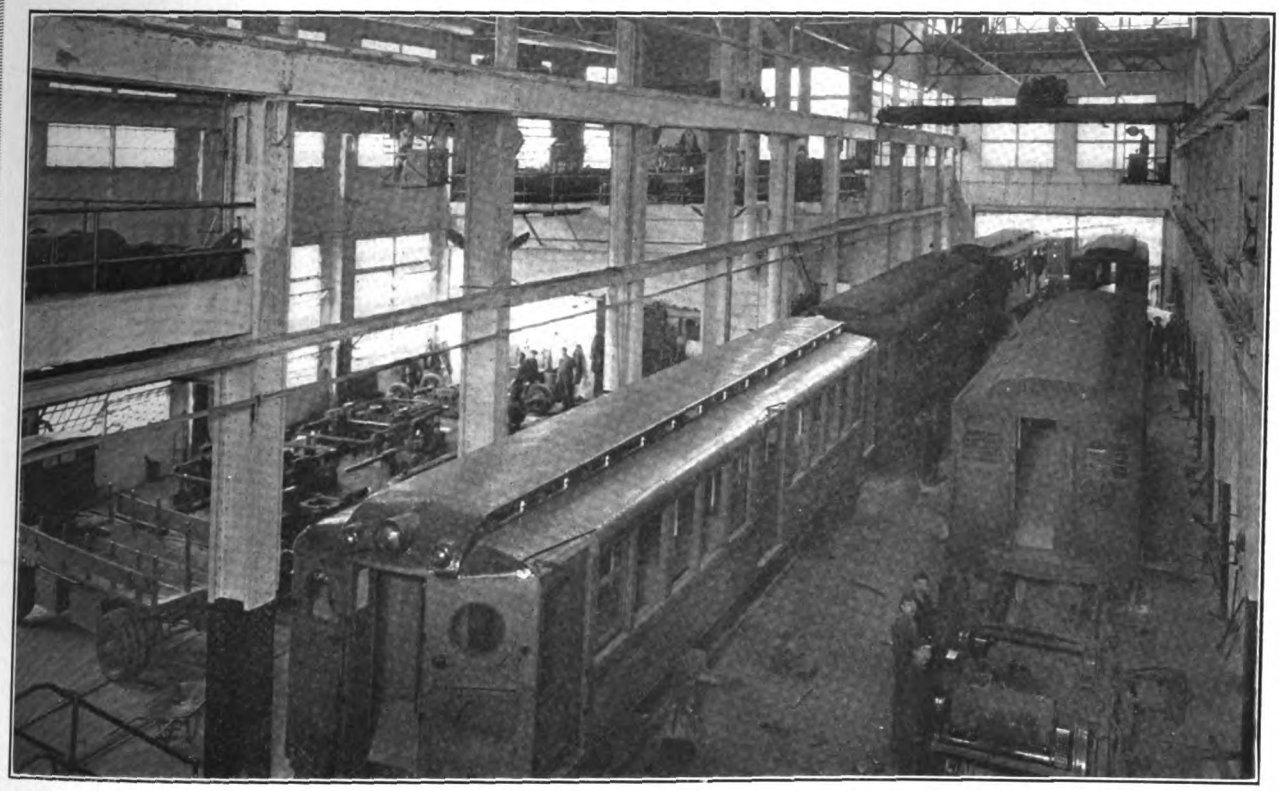
REPAIR SHOP DESIGN AND OPERATION

IN the general arrangements of the latest repair shops to be built by electric railways the most noticeable feature is compactness. This quality obtains in the design regardless of the plan of operation, and in every one of five shops which have been built within the last two years and which may be classed as representative it appears prominently, notwithstanding wide divergences which are displayed in other respects.

REPAIR SHOPS FOR STEEL CARS

Of these five shops two are intended for steel or semi-steel cars, and this fact is shown in the accompanying diagrammatic layouts by the relatively small space devoted to car-body repairs. The shop of the New York, Westchester & Boston Railway, a New York suburban line, possesses special interest because it is the second shop for all-steel equipment to be built within a short period of time. In the cars for this line, in fact, there is no wood of any description except for the seat arms and the sash, and in consequence the usual carpenter shop and wood mill are eliminated completely. In addition, it is expected that car-body repairs, aside from the possibility of wrecks, will practically never be needed, so that the space usually provided for car-body repairs is also eliminated. This condition, in turn, has very naturally developed the procedure of renewing the damaged or worn car parts instead of repairing them in place. As a result the cars are never taken to the shop for general overhauling but are ready for service practically 100 per cent of the time. As the shop has been in operation for more than one year, sufficient experience has been obtained with this scheme to demonstrate its perfect practicability, and the most satisfactory results are reported by the operating officials.

From the diagrammatic layout of the shop it will be noted that no provision has been made for painting. The paint shop was left out in this case because at the time the shop was built all of the cars were new and in consequence would not need painting for at least one year. At present the use of the baked enamel process for painting, which will be later referred to, is under consideration, as the paint shop may thus be replaced by a kiln or oven only large enough to hold one car. At the same time the cars may be painted complete in two or three days instead of having to be held for a period five or six times as long.



Truck Shop for All-Steel Cars, Hudson & Manhattan Railroad

The other recently built steel-car repair shop to be considered is that of the Hamburg Rapid Transit System in Germany, which was designed to serve cars with steel frames and side paneling but with wooden floors, seats and roofs. The arrangement of departments has been characterized as an exceptionally good one for reducing the lost motion often involved in the handling of repair parts, and for a European shop an unusual number of labor-saving devices in the form of cranes and hoists have been installed.

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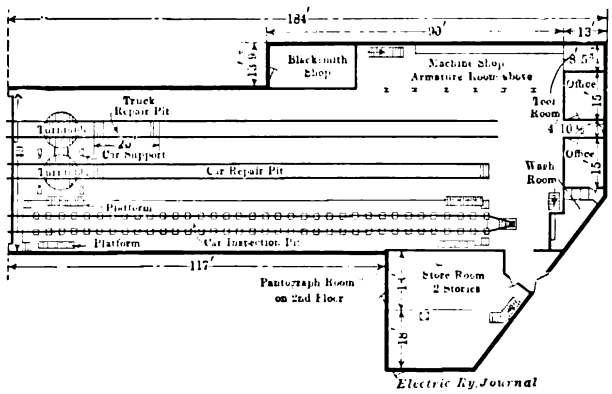
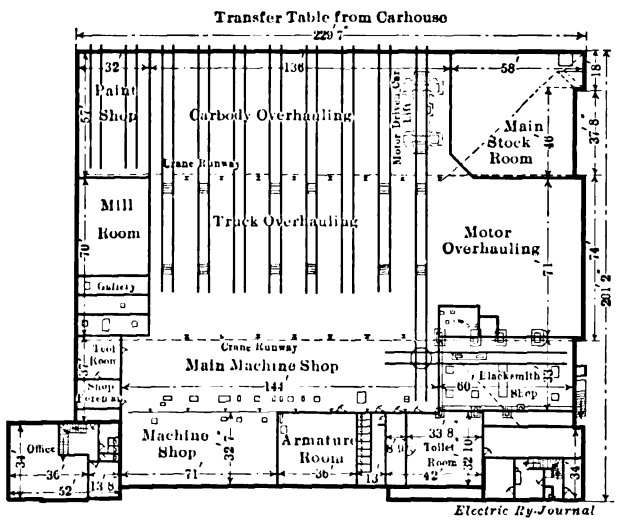
In this case all departments have been housed under the same roof, although this involved a building about 200 ft. x 230 ft. in outside dimensions and necessitated special provisions for roof lighting in the central portions on account of the distance from the windows in the side



Steel Car Repair Shop, New York, Westchester & Boston Railway

walls. This feature is of obvious advantage not only in providing a compact arrangement but also in making shop operations entirely independent of weather conditions, a serious matter in some localities.

The principle of this arrangement is somewhat similar to several which have been used in this country, the cars being lifted by a car hoist for the removal of the trucks and then being moved by a transfer table to adjoining pits for car-body repairs. The trucks are then passed on into a truck shop just back of the car-body repair shop, and the repair parts are taken to a machine shop in back of the truck shop and having the blacksmith shop at one side. Miscellaneous departments are located along the walls around these three main shop spaces. The



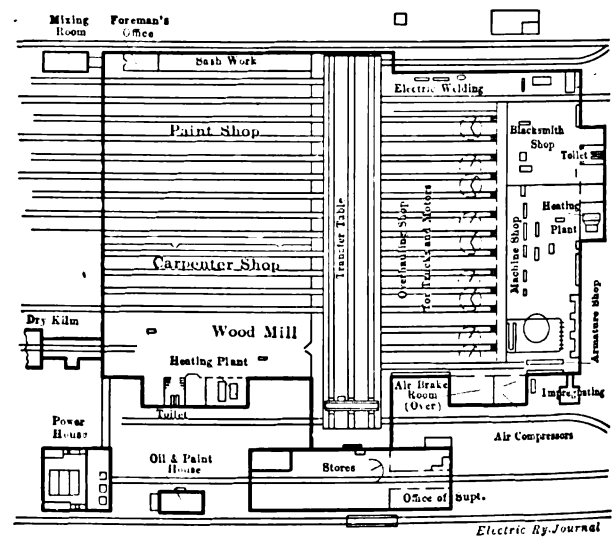
Repair Shops of Hamburg Rapid Transit System

portions which are used for blowing out equipment with compressed air and for the dipping of trucks and motor shells in lye vats are completely inclosed, thus avoiding discomfort to employees and maintaining cleanliness in the main shops.

REPRESENTATIVE SHOPS FOR SURFACE CARS

The repair shop at Montreal, Canada, which has only just been completed, is another example of housing all departments under one roof, the object being obviously to offset the severe winters characteristic of the Canadian climate. This building is even larger than the Hamburg shop, having approximate dimensions of 425 ft. x 285 ft. for the main building, not including additions. The leading feature of the design is the covered transfer table in the middle of the building. This separates the departments handling the carpentry work or car-body repairs from those devoted to the iron-working which is involved in truck repairs. Cars and trucks are handled on transverse tracks, which on the car-body side extend through the building wall to the yard and on the truck shop side extend only part way across the building and leave a wide space for machine tools and for floor work.

It is probable that in no other shop has so much attention been given to the effect of temperature on paint



Repair Shops of the Montreal Tramway Company

and varnish as in that at Montreal. The space inclosing the transfer table is thoroughly heated so that freshly coated cars can be handled to and fro, absolutely protected against ruinous variations in temperature. In the heating and ventilating system of the paint shop, a water trap has been installed in the outgoing air duct to catch any dust which may have been taken in by the fans. In the iron-working portion of the building the natural and artificial air currents are so regulated that the down-draft forges in the blacksmith section keep the shops free from smoke and noxious gases.

The new Detroit shops, of which about one-half of the complete layout is constructed at the present time, are, in all probability, the most compact shops of the separate building type which have yet been built. The design is characterized by a liberal installation of transfer tables, each end of each of the four buildings which will constitute the final layout being served by a separate table. In addition, these tables are unique in being a revival of the "flush" type, no pits being installed to hamper communication between the various buildings.

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The arrangement of departments is unusual. The iron-working shops, including blacksmith, machine and truck departments, are housed under one roof, and the car-body repair departments, the wood mill, carpenter shop and lumber storage are in another building. The paint shop, however, is in still another building, separated from the first two by a wide alleyway, and it has no immediate connection with the carpenter shop, either by transfer table or by a direct track. In consequence, car bodies have to go through a comparatively elaborate switching operation when moved between the carpenter shop and the paint shop.

The new shops of the Portland (Ore.) Railway Light & Power Company were completed but a few months ago and represent in their equipment a number of novel features. However, the general arrangement of the buildings and departments follows, to a large degree, a form of layout which has been sometimes used in the past, namely, the division into three main buildings—a paint shop, a carpenter shop and wood mill, and a truck and iron-working shop—all of the buildings having transverse tracks and being separated from each other by transfer tables. The storehouse is, however, located some 300 ft. away from the nearest main building, so that this department lacks the mutual convenience of access possessed by the others.

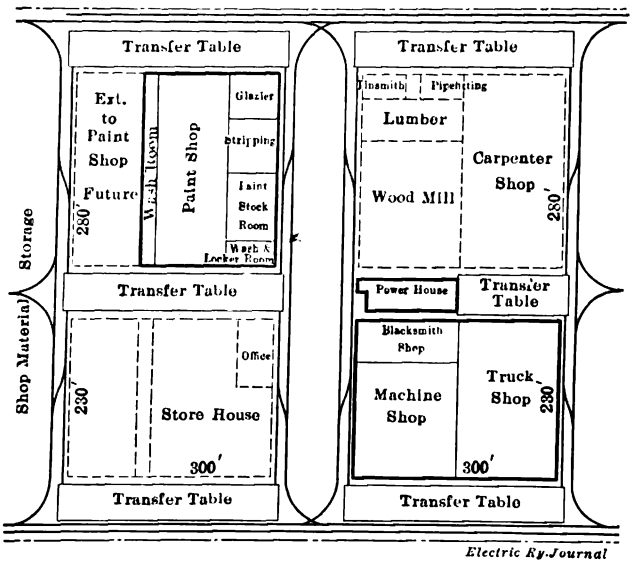
UTILIZING OLD SHOPS

Among the older shops, especially in the case of those in large cities, the consolidation of properties has in many cases placed the car equipment department in possession of several shops of which none is really suitable for all-around maintenance work on modern apparatus. The ideal solution for such a problem would be, of course, to erect one new building as a successor to all of the old ones, but as this is not always practicable another way out of the difficulty has recently been widely adopted. This is to single out each shop for a particular class of work, and the practice has proved so successful on one road that the actual shop area is less to-day than it was ten years ago. Thus air brakes are handled at one place, curtains at a second, wheels and axles at a third, etc. When the several shops on this road were complete in themselves there was much needless duplication of machinery, waste in supplies and unskilfulness in operation. The specialized shop, on the other hand, has insured more uniform use of all equipment, has avoided the necessity of carrying excessive stores, and has made it profitable to employ specialists for departments which would otherwise be too small for such direction.

One great economy which follows from the practice is that all old material, no matter what its condition, must be sent to the shop for the inspection of a responsible shop official. This eliminates the careless disposal or wilful mishandling of such material by carhouse men, who naturally prefer brand-new to refurbished supplies. Shop specialization does not mean that a car which is in for overhaul or repairs must be taken to each plant in turn. On the contrary, a great deal of mileage is saved because the replacing equipment is carried to each car maintenance center by a few supply cars, on the principle that it is cheaper to bring the parts to the cars than the cars to the parts.

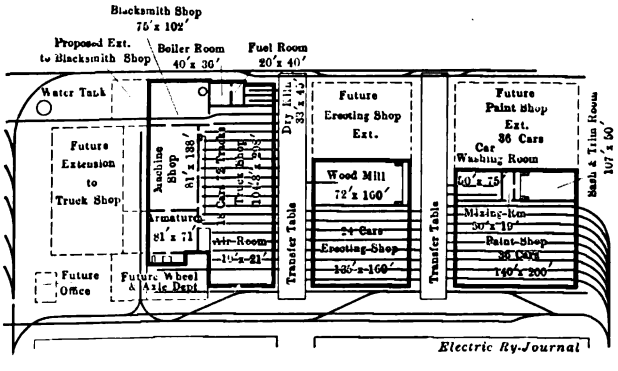
REPAIR SHOP OPERATION

It is obvious from a consideration of the layouts of recently built repair shops that existing practice in shop



Repair Shops of Detroit United Railway

design is by no means approaching a standard and that a very distinct endeavor is being made at the present time to secure the advantages which accompany improved methods of arranging shop buildings. The same statement may be made in regard to repair shop operation, as a really large number of new and improved methods of doing work are being constantly introduced. That there has been room for improvement in electric railway repair shop practice must be generally admitted, and the recent agitation with regard to the possibility of introducing any of the systems of "scientific management" or efficiency



Repair Shops of Portland Railway & Light Company

engineering is evidence of a desire to eliminate wasteful and inefficient processes.

EFFICIENCY ENGINEERING

However, few of the methods peculiar to the modern efficiency engineer have actually been introduced in electric railway repair shop practice. One reason for this is undoubtedly the fact that the operations involved in the maintenance of electric railway cars are in no sense com-

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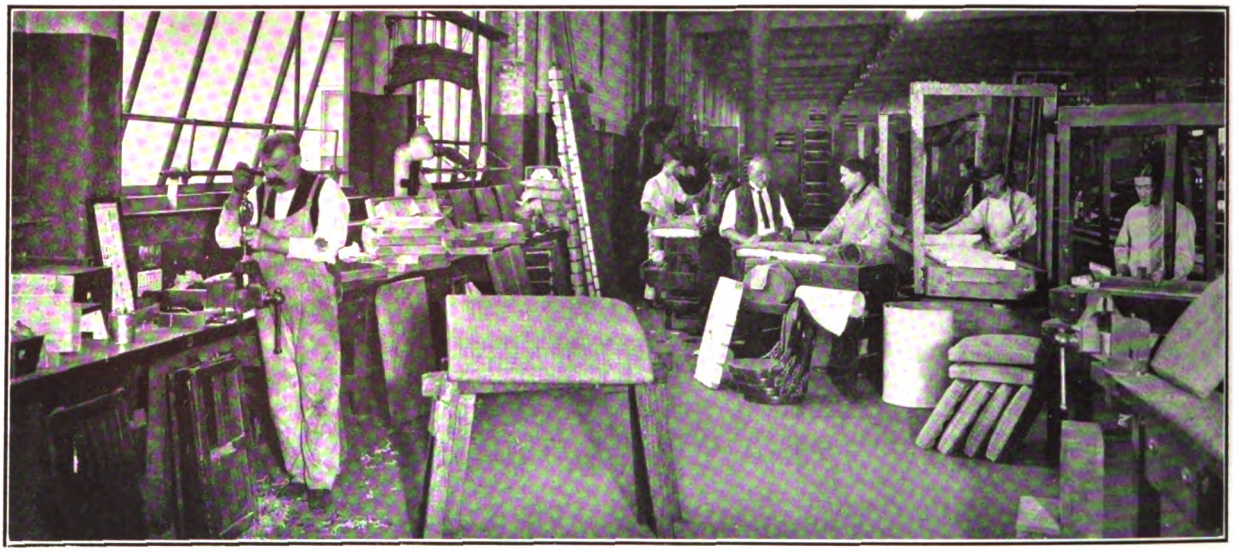
parable to manufacturing processes, and in consequence there does not exist the exact daily routine of operations which is so necessary if a comprehensive analysis of each workman's movements is to be made. Another reason, possibly of more influence than the foregoing, is the bitter controversy which has arisen within the ranks of the efficiency engineers themselves regarding not only the relative importance but even the actual value of some of the methods applied in some of the more elaborate systems of efficiency engineering.

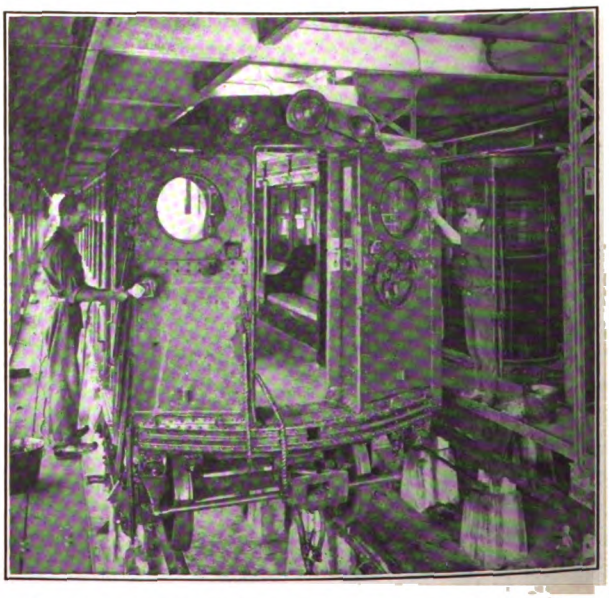
Most of this controversy has arisen through attempts to confine the field of efficiency engineering largely to methods whereby the individual output of the workman is greatly increased, such as are generally accompanied by special systems of payment for rewarding skilful or industrious employees, and to a large extent the belief that scientific management is thus limited has come to be the understanding of manufacturers and shop officials generally. Judged by the weight of opposition among efficiency engineers, this impression appears to be incorrect, and, indeed, it now seems to be the consensus of opinion that a very highly systematized method of operation together with a complicated scheme of remuneration may actually prove detrimental rather than advantageous to the over-all cost of manufacturing.

Indeed, it may be safely said that where work is as variable in character as it is in an electric railway shop any success attained will have to depend largely upon the personal element, and not, as in the theoretically ideal scientific management, upon a rigid system which lays down in advance rules for the guidance of every employee in every operation and under every circumstance. This does not mean that none of the operations in an electric railway shop is capable of being benefited by systematization. Nor does it mean that operations wasteful of time and material cannot be discovered and eliminated. On the contrary, several electric railways are making detailed studies along these lines, although in no case apparently has any outside firm of specialists been employed.

Thus, on the Boston Elevated Railway the improvements in shop operation, as outlined at the last A. E. R. A. convention, have been continued during the past year with gratifying success. These consist in what may be termed "common-sense" engineering, the practice being to plan the work in advance, wherever this is possible, and to provide for its accomplishment the proper labor and tool equipment. In addition, a man has been assigned to the sole duty of studying shop conditions and methods with a view to making changes in any direction which would promote efficiency. Piece work has been introduced in the armature room, the foundry and the paint shop, while in the machine shop a part of the work is paid for on the same basis. When repairs are planned, an endeavor is made to bring into the shop all trucks and car bodies of any one type during one continuous period,



Department in East New York Shop, Brooklyn Rapid Transit System, Where All Seat Repairs Are Made



Cleaning Cars with Motor-Driven Brush, Hudson & Manhattan Railroad

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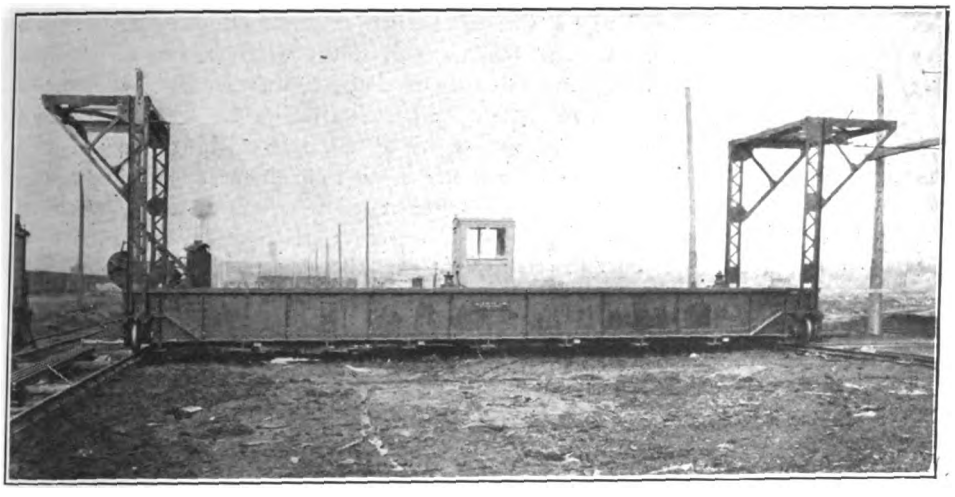
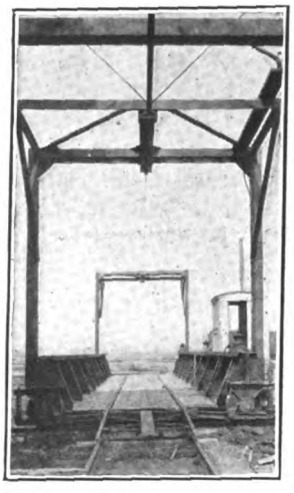
and thus specialization in the work is permitted. To the same end, pieces which require a special setting for the machine tools are always put through in large lots, and the supplies are kept well ahead of the normal requirements to eliminate costly rush jobs.

and to provide him with proper tools. This, it may be said, is a prominent feature in the design and equipment of the new Montreal shops, where it appears in such ways as the ample natural lighting, the perfect drainage, the adequate ventilation and heating, the mastic as-





Views Showing Flush Transfer Table Used at New Detroit Shops

Such methods are, of course, greatly different from the efficiency engineering which insists upon the use of stop-watch investigations for the establishment of an exact "standard time" for performing every operation in the shop, the payment of large bonuses for work done in less than standard time, the allowances for unavoidable delays, and the creation of elaborate planning departments, speed bosses, tool bosses and dispatch boards for routing material and scheduling operations. Yet it undoubtedly is along lines of such simple and flexible methods as those used in Boston that the most effective improvements in

Sash Room at End of Paint Shop, Montreal Tramways

electric railway repair shop practice have been and will be made. Indeed, more than one shop designer has appreciated the fact that there are many methods for increasing productive efficiency. One of the most obvious of these is to place the workman in favorable surroundings

phalt floor which makes walking easy, and finally the abundance of transporting machinery and air-operated hand tools which eliminate heavy physical labor entirely.

PREMIUM PLANS FOR WAGE PAYMENTS

As before mentioned, the problems of true scientific management, which should include every link in the chain of production from the design and equipment of the shop buildings to the handling of the finished product, have to a great extent become obscured by the importance which has been popularly assigned to special forms of payment for the workmen. A really vast amount of attention has been devoted to the introduction of piece work, and, indeed, it is obvious that in certain departments of the repair shop such a system of payment may be introduced to good advantage.

On a number of roads wheel turning has been placed upon a straight piece-work basis, and in other cases this class of machine work is being paid on a bonus system which assures the workman's day rate in any event but provides a premium or "bonus" in case more than a certain amount of work is completed. On the Hudson & Manhattan Railroad an ingenious premium plan for turning steel wheels has been in use for several years with thoroughly satisfactory results. This provides a bonus for keeping down the weight of metal removed, the system of payment having been described in the ELECTRIC RAILWAY JOURNAL for June 24, 1911.

In the paint shop also the work is not only definite in character, but with comparative ease it can be planned in advance to follow an exact schedule. The variable factors of unknown value are negligible, and payments which are based upon the finished job may be made in every case with justice to employer and employee. The same condition exists in the armature room. Here the work involved in stripping an armature will remain practically at a constant average for any given type of motor, and all subsequent operations, such as laying in and connecting

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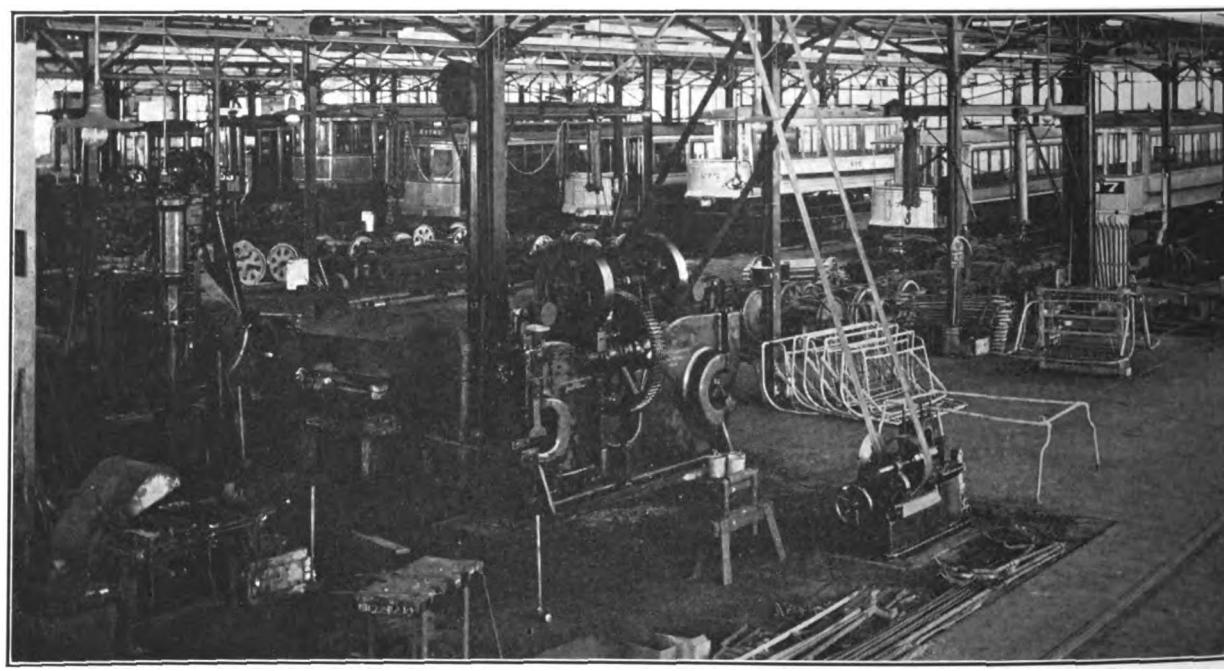
coils, banding and the slotting of commutators, involve new work which is invariable in amount and may be paid for by the piece without penalizing the workman through his ill luck in getting an unusually difficult job. In many of the other departments, however, equivalent conditions do not hold, and here the inability of knowing in advance the exact extent of any piece of work places difficulties, which, however, may not necessarily be insurmountable, in the way of premium plans for payment of employees. To be reasonably successful, these plans must be always just, and in addition must be stable, so that the establishment of a satisfactory premium system is no easy matter even under the most favorable circumstances. Indeed, it is obvious that all operations should be made as efficient as possible under an existing system of payment before the adoption of a new system becomes in any way a logical step. Efficiency of operation and the elimination of lost motion alone are matters which may, in fact, be studied to excellent advantage in any shop even if there is to be no change in the wage system.



Electrical Shop Section of Main Repair Shop, Montreal Tramways

IMPROVING OPERATING EFFICIENCY

Such a course has been followed by a company whose management has been characterized to a remarkable degree by an untiring search for improvement in every department, and an efficiency campaign was inaugurated in its mechanical department several years ago.

The first step in this work was to segregate the shops into various divisions, with the lines drawn very sharply. That is to say, in the general shops, certain parts of the machinery in each department were set aside for the hit-and-miss operations, the rest being turned into practically a manufacturing organization. The operating or depot crews were thereby entirely divorced from connection with the shop repair division and manufacturing division.

From data gathered it was found possible to set aside also certain pieces of machinery in the shops for distinct classes of work, and these certain machines were equipped with the most improved devices for securing a high degree of production. All repairs of whatever nature to the various parts of the car equipment were taken out of the hands of the operating or depot crews, and sufficient stock of the various classes was furnished in a complete condition, so that the only duties which had to be performed by the operating or depot crews were those of inspection and the oiling and renewal of parts. The inspection was carried out largely by the use of limit gages, and if the parts were found in such condition as to require replacement, the carhouse employees merely made the renewal and returned the worn part to the storeroom.

To illustrate, an 18-in. engine lathe in one of the shops was fitted up with special tools, jigs and gages and placed in the hands of an experienced operator on turning and chasing. This particular machine now makes all armature shafts and similar shafting for the complete system. Another machine furnishes all of the armature and axle bearings for the complete system. Where formerly trolley wheel, harp and pole repairs were made at the various carhouses or operating depots, under the plan adopted by the efficiency committee a drill press and various other pieces of machinery for handling trolley wheels, cotters, trolley spindles, trolley poles, etc., were set aside in one of the shops, and the operator was trained in quick methods for repairing and assembling these parts. This one man now does all of this work, and when a trolley inspector finds that a trolley bushing or trolley pole is worn out all that he has to do is to remove the complete harp and wheel and replace it, returning the worn-out one to the storeroom on the supply car.

The manufacturing division furnishes practically no material directly to the operating division of the me-

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chanical department. All supplies are furnished from the storerooms under the supervision of the general storekeeper. When equipment parts are returned from the operating depots they are returned to the storeroom. The storeroom places an order on the manufacturing division of the shops either for the new parts or for the repair of old parts furnished by the storeroom. The manufacturing division then completes the order and furnishes the material to the storeroom, and the maintenance accounts are credited accordingly. The maintenance accounts are charged at the same price when the material is delivered to repair or to operating divisions.

One of the latest additions to the efficiency scheme on this same road is the purchase of a special machine for high-speed, heavy-duty drilling, used for truck parts particularly. This machine is so constructed that it will drive a 1¾-in. drill through crucible cast steel at the rate of ½ in. per second, and it is being equipped with jigs fitted to every type and class of casting which will be handled upon it. It is expected that this one machine with one operator will machine all the truck castings used on the system, replacing three machines and three operators, yet it will be busy for only part of the time. To illustrate the advantage gained by this scheme, it should be noted that a brake hanger bracket used on a certain type of truck was drilled under the old method at the rate of one every fifteen minutes. Under the new arrangement, these will be completed at the rate of thirty per hour.

Wood Mill in New Shops of Montreal Tramways, with Concealed Shavings-Exhaust Pipes

IMPROVED METHODS IN THE ARMATURE ROOM

Several years ago this railway had three winding rooms. To improve the operating efficiency an extension to one of the winding rooms was made, and all armature winding was brought to this one place. When the position of the machinery, the workbenches and other apparatus in the building was re-arranged, special care was taken that the part to be repaired should never make a backward move. The course of an armature through this room is now as follows: It arrives in the supply car and is placed on an inspection platform, at which point the inspector determines what repairs shall be made. All armature winders are specialized on certain types of motors and certain classes of repairs, and if a particular armature is to be rewound and receive a new commutator, it goes to a stripper whose duty it is to remove the coils and the commutator and straighten the core and its laminations. It is then picked up by crane and placed on a machinist's bench, where the commutator, end bells, etc., are applied. It is then moved to an insulator's bench by the same crane, and he applies all slot and core insulation. From that bench it goes to a winder, who applies the coils and connects the leads to the commutator only; then it passes to the solderer's bench, where the armature coil leads are soldered to the commutator; then to the banding machine, where the armature is banded, and then to the turning lathe, where the commutator is trued. From the turning lathe it goes successively to the grooving machine, to a testing bench and to a machinist's bench again, where the bearings and pinion are applied, and finally it arrives in the storage rack at the other end of the shop, next to the supply car track, ready for shipment. The men have become specialists and have reduced the time required for winding a 60-hp armature from eighteen hours to eight hours, in addition to applying the bearings and pinion, which had not been done before this new scheme was put in effect. Half of the extension originally made to the building is now being used by another department.

TENDENCIES AND RECENT DEVELOPMENTS IN SHOP PRACTICE

In addition to the improved methods which have been developed in repair shop operation, the past year has seen the crystallization into thoroughly approved practice of several comparatively recent innovations in methods

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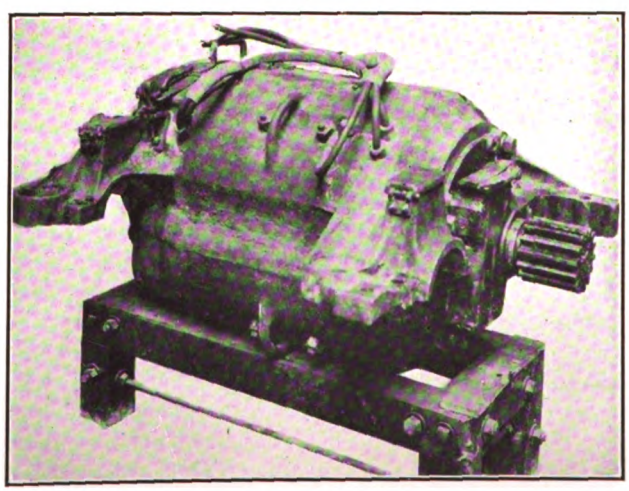
of doing work. Among these are a number quite revolutionary in character but which give evidence nevertheless of an ability to effect considerable savings in maintenance costs, such, for instance, as the substitution of baking enamel in place of air-drying paint and the use of welding

Electric Heaters Hung in Car for Baked Enamel Painting, Hudson & Manhattan Railroad

by means of the electric arc or other special methods which eliminate the forge and permit the building up of metal as well as the joining of two broken parts through the application of intense local heat. At the same time, the tendencies displayed by electric railways toward greater conservatism in home manufacture, as well as a greater amount of system in handling manufactured articles, and also toward the universal establishment of the mileage basis for making inspections and repairs, will



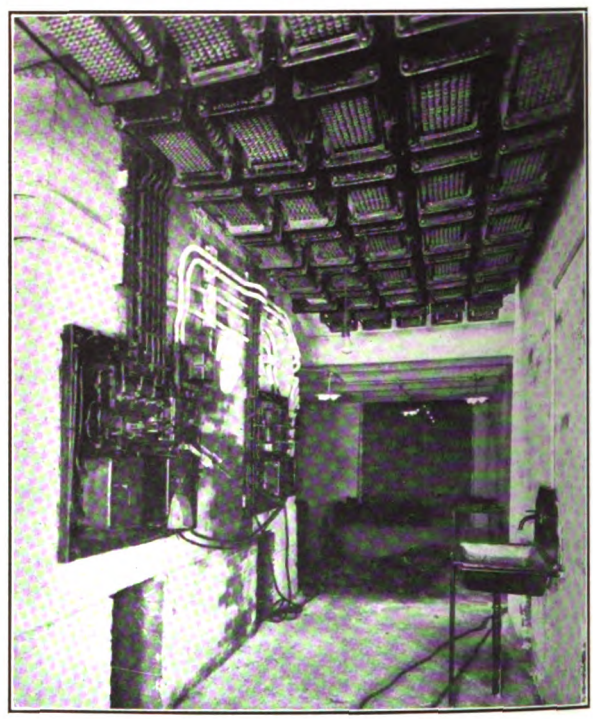
Solid Frame Motor Made from Old Split Frame by Electric Arc Welding

undoubtedly play an important, although less spectacular, part in the reduction of maintenance expense.

BAKED ENAMEL PAINTING

Baked enamel as a substitute for air-drying paints and varnishes has been in use for a long period in the automobile industry, but it is only within the past year that it has been applied to railway cars. With air-drying paints the most elaborate methods of application have become customary, and in consequence the adoption of this new and simple process constitutes one of the most radical innovations in the history of shop practice. On the Hudson & Manhattan Railroad, where it was introduced last winter, it has been adopted as standard, and since then it has been taken up by the Pennsylvania Railroad for its steel passenger coaches. Details of operation on both railroads were given in the ELECTRIC RAILWAY JOURNAL for Jan. 25, 1913, and April 12, 1913.

Briefly the process consists in the substitution, for the customary paint made up of pigment ground in linseed oil,



Old Grid Resistance for Reducing Line Voltage for Electric Arc Welding, Third Avenue Railway, New York

of baking enamel composed of pigment ground in varnish and prepared with special reference to rapid drying under artificial heat. The most important feature of the process is the extraordinary rapidity of the work, for the baking of a single coat requires but about three hours, and four coats can be put on with a reasonable allowance of time for application in about two days. This naturally effects an enormous saving in time and shop space and, unless a "flat finish" is desired, in labor as well.

On the Hudson & Manhattan Railroad only the interiors of the cars are thus treated, the exteriors on account of the tunnel service receiving only enough attention to keep them from rusting. The high temperatures required, ranging from 130 deg. to 200 deg. Fahr., are obtained through the novel expedient of hanging three extra equipments of electric heaters from the hand rods in the car, and the desired temperature is maintained by turning on and cutting off current from them in accordance with the

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requirements as indicated by a thermometer inside of the car.

On the Pennsylvania Railroad a kiln has been constructed of a size sufficient to contain a standard steel coach. It is heated by live steam at approximately 100 lb. pressure, supplied to pipes hung on the walls. This gave a direct radiating surface of about 2000 sq. ft. Four 8-in. Globe ventilators in the roof provide a mild circulation of the air in the kiln. Cars are run into the kiln with doors and windows removed after having received a coat of enamel both inside and out, and they are baked at temperatures ranging from 120 deg. to 250 deg. Fahr. The results both for exteriors and interiors are reported to be most satisfactory, not only through the quickness with which the work can be done but also in the improved appearance of the cars both inside and out and in the superior hardness and ability to resist the abrasive action of dust possessed by the enamel.

The cost of the process, including the expense incidental to the heating of the kiln or car interior, is about equal to that of high-grade painting as ordinarily carried out, so that on account of the greater durability of the covering the baked enamel process effects a net saving over the common method exclusive of the benefit obtained through the 75 per cent reduction in the time spent by the car in the paint shop.

SPECIAL WELDING PROCESSES

The practice of prolonging the life of worn or damaged equipment by welding promises to become widespread now that the causes for initial failures have been learned and corrected. The process came into practical use only about 1910, and among the early companies to adopt the system of arc welding for this purpose were the Philadelphia Rapid Transit, the Pittsburgh Railways, the United Railroads of San Francisco, the Third Avenue Railway of New York and the Montreal Tramways. The earlier welding was limited to armature shafts and other small work, but the descriptions of the San Francisco and Third Avenue installations, as published in the ELECTRIC RAILWAY JOURNAL of May 17 and June 21, 1913, respectively, show the amazing versatility of electric welding, not only on truck frames, axles and shafts, but for the complete reconstruction of motors for oil instead of grease lubrication, for filling dowel-pin holes, patching gear cases and similar building-up operations.

It is customary to step down the line voltage to from 50 volts to 80 volts through grid or water-barrel resistances, as all railway companies do not seem to think that motor-generator sets would save enough to warrant their purchase. Oxy-acetylene welding is used to a limited extent for small work, and particularly where cutting is desired, but it does not equal electric arc welding for heavy work.

Welding with Electric Arc, Third Avenue Railway, New York

The principal expense involved in electric welding is for current, which is usually taken between the rush hours and charged against the welding jobs at ¾ cent to 1 cent per kw-hr. Flux powder is very cheap, the Third Avenue Railway paying only 8 cents per pound for it, while the Montreal company makes its own compound of 28 per cent sodium carbonate, 70 per cent crystalline borax and 2 per cent red ocher. Alumino-oxide welding has also been used successfully for a wide variety of conditions, the principal objection to it being the cost of the reaction powder.

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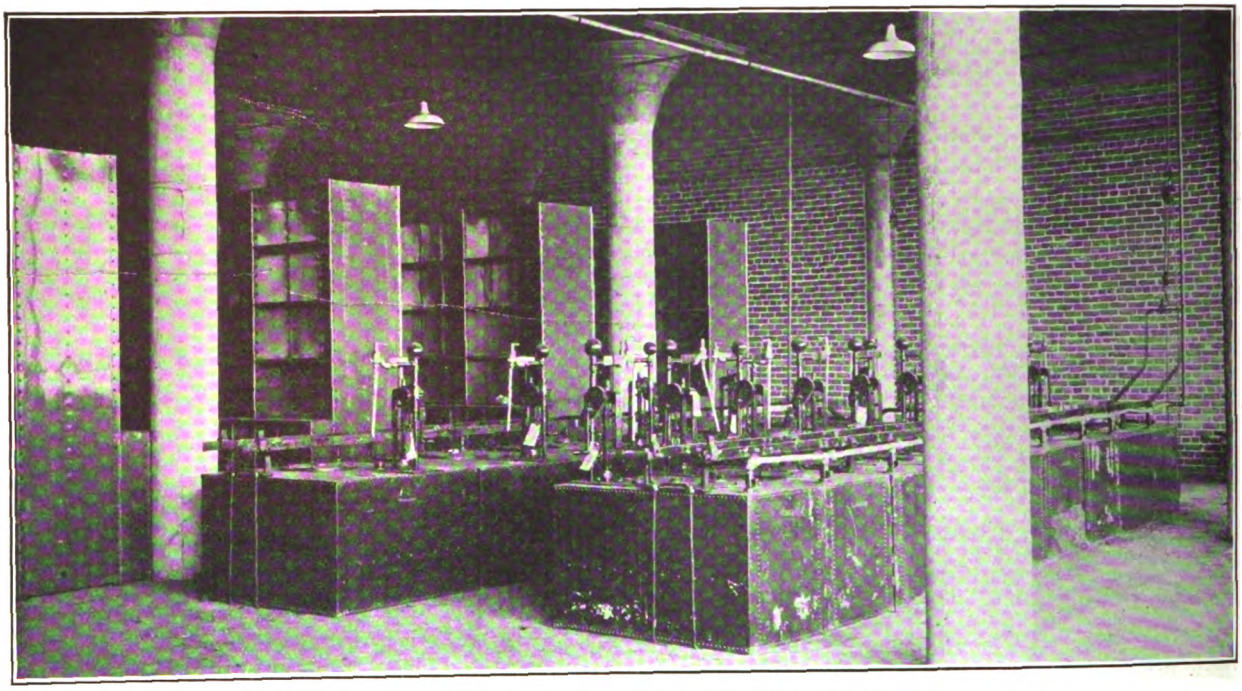
HOME MANUFACTURE

Home manufacture varies considerably in extent, depending upon the size of the property and its nearness to the supply market. In some cases, like that of the Public Service Railway of New Jersey, part of the rolling stock is built at the shops complete, not to save money on individual cars, but to maintain a high-grade shop force by minimizing the fluctuations which are common to straight maintenance work. The Brooklyn Rapid Transit Company was the first company to do similar work with steel cars, for all of its new center-entrance cars were completely equipped from the skeleton up at its own shops. In this instance the company felt that the novelty of the design and the large number of cars made it advisable as well as profitable to assemble the equipment at the home shops.

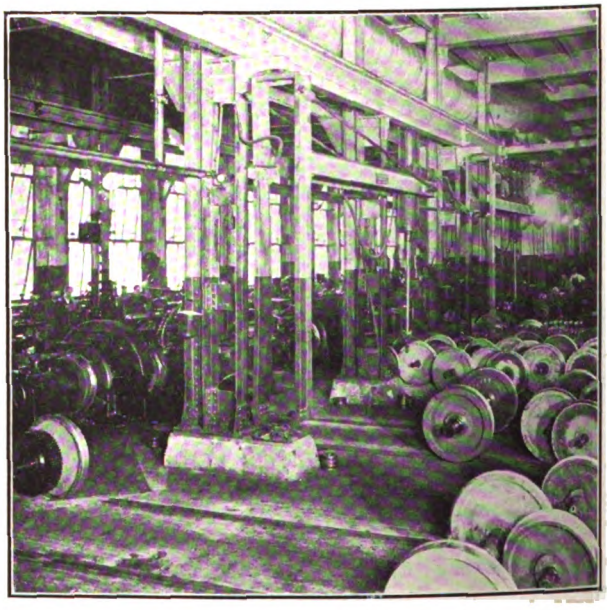
So far as the home manufacture of small parts is concerned, a decided tendency toward more businesslike methods is apparent. In former years such work was done in an inefficient, hand-to-mouth way, but now it is more customary to keep some stock on hand and refuse to undertake the manufacture of less than a specified minimum. On some systems the purchasing agent calls for competitive outside bids, and the shops do not get the work if their prices are higher after, say, 15 per cent has been added for overhead charges. Recourse to such bidding has been found very useful in discovering weak spots in manufacturing methods, and it has shown especially that work for other departments should be considered with caution when the parts wanted call for unusual skill in manufacture.

The methods of distribution of manufactured or new parts have of late displayed a distinct tendency toward standardization. On the Montreal Tramways the car maintenance department is responsible for all supplies which are capable of re-use from the time they leave the stores department new until they can no longer be economically repaired. For guidance, every carhouse is supplied with a list of renewable parts. The supply car



Bins and Pumps in Paint Stock Room, Portland Shops

of the stores department is employed for collecting and distributing such materials, but their actual stocking, repair and circulation is a purely internal affair of the car



Jib Cranes and Hoists for Handling Wheels to and from Wheel Lathes, Brooklyn Rapid Transit System

maintenance department. All other supplies, however, are ordered from the stores department direct. The most advantageous feature of this system is that the head of the car maintenance department has much closer super-

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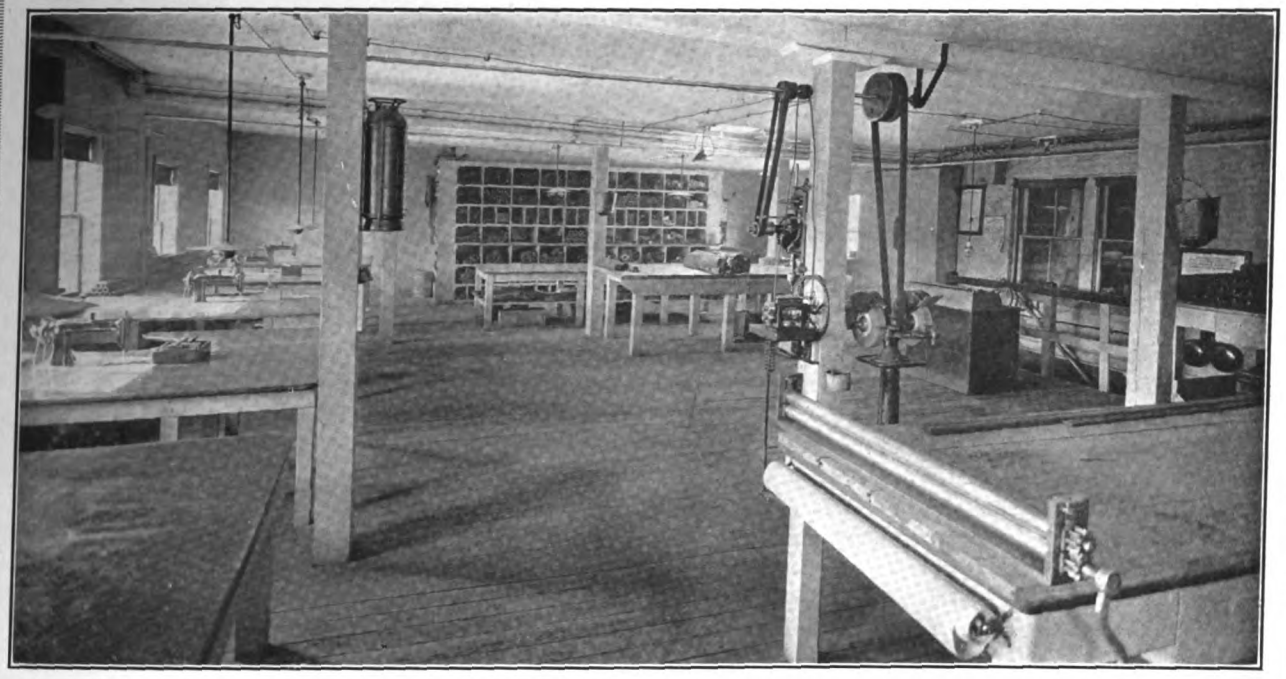
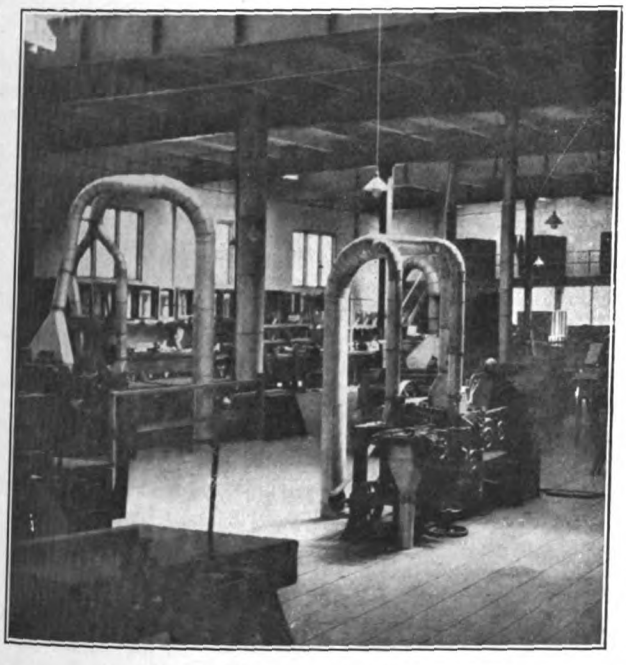
vision over the use and return of materials than if the goods were handled through the general stores. The carhouse foremen have no voice in deciding what shall or shall not be scrapped. They must send their dis-



Department for Curtains and Hand Straps, Brooklyn Rapid Transit System

carded material to the main shops, where two men distribute it into piles of renewable, doubtful and scrap material. In addition, before final disposition is made,



Wood Mill, Portland Shops

the general foreman examines the doubtful collection himself. The parts are then sent to the shop for renewal and upon repair are turned into the stores of the car maintenance department. There they are subject to requisition from the carhouse foremen, who in general must return a worn part whenever they apply for a replacement.

The usual sub-stores are, of course, provided at all car stations, and their operations are checked monthly to make adjustments for lost articles, etc. Sub-stockrooms are also installed at the main shops under care of the respective sub-foremen. About 90 per cent of the material used by the men is brought to them by boys.

MILEAGE MAINTENANCE

Very few objections are heard nowadays against the maintenance of car equipment on a mileage basis. The companies which still stick to definite time intervals for doing this work do not generally deny the superiority of the former, but they appear to be afraid of the cost of record keeping. It has been abundantly shown, however, that except on the smallest railways the wage of a mileage clerk is a negligible amount compared with the advantages of a more exact knowledge of what each class of equipment can do.

On one system which is operating without mileage records, for example, the manager proudly asserted that his oldest motors were seen on the defect sheet no oftener than his modern equipments, but a question put to the master mechanic brought out the fact that the ancient equipments were not in service for more than an hour or two morning and evening. Even a straight mileage system is not a fair criterion of the comparative merits of the equipment unless the character of service is substantially the same in all cases, and in consequence companies which operate a variety of equipment are no longer fixing the same inspection and overhaul mileage periods for all classes indiscriminately but are instead determining by experiment the critical figures for each type of motor and controller.

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FARE ACCOUNTING

THE collection of the fares of an electric railway company and the establishment of proper and complete protective measures to safeguard the revenue constitute one of the most serious problems that confront the companies.

When the operation of street railways began the methods adopted for the collection of fares were crude and simple and they involved few, if any, of the safeguards that have been introduced in later years. The operator of the car or the conductor was responsible for the collection of the fares, but few steps were taken to make it certain that all the fares were collected and that they all reached the coffers of the company.

As the companies have progressed in the adoption of new standards and practices in other departments, the subject of the collection of fares and the accounting therefor has aroused increased interest. Less progress, however, has resulted from the attention given to this subject than from the efforts made in the departments that have to do with the physical railway operating property. The reason why a complete, satisfactory system has not been adopted universally lies in the complexity of the problem and in the fact that it involves questions partly or wholly out of the control of the management, such as the honesty of the traveling public and of the conductors.

The collection of revenue of a street railway company operating in a city involves a problem that is different from that concerned in any other form of business having as large earnings or capital investment. Of course, the railway has an advantage in the fact that every transaction between the company and a customer is a cash one and that substantially no credit need be extended. This very advantage, however, opens the way to risks against which the company must protect itself, because it means that money or its substantial equivalent in tickets must be handled in every transaction. The amount of each fare unit is small in the case of a city company, and it is not large even with the interurban companies. The small size of the fare unit is a disadvantage because it reduces the amount of the expense for protective measures which the company can afford to pay. If, for instance, a company receives a fare of 5 cents from each passenger, it cannot afford to pay out a large part of the fare in order to make sure that it receives the balance. On the other hand, it must take some protective measures. If, however, it has to pay too much for protective measures, its cost of operation is too large.

A trunk-line steam railroad requires every passenger to buy a ticket before he boards the train. A long-distance passenger will spend so many dollars for transportation, berths, etc., that a company can afford to have an elaborate scheme of numbered tickets, together with reports, making a complete protective system. The same plan is carried out ordinarily on the passenger trains which are operated for short distances and on railroad lines of medium-size mileage. Even in cases where passengers board steam railroad trains without having purchased tickets in advance, the number of such passengers is small in comparison with the total number on the train. The amount of possible loss, therefore, is light in comparison with the amount of revenue which the company is certain to secure from passengers who comply with the rules by buying their tickets in advance. The collection of fares on long-distance steam railroad trains has been developed to such a point that, between the Pullman conductor and the conductors of the railroad company who are responsible for the operation of the train in the various divisions, no chance is left open to the dishonest passenger, while the number of persons that would have to be involved if the employees should try to withhold revenue is so large that the company is reasonably certain to obtain the rightful fares.

This condition, of course, does not apply to the denser commuter traffic of the steam railroad companies. In some cities companies have had to take vigorous steps to guard themselves against the practices of both dishonest passengers and dishonest trainmen.

In all forms of business which involve public dealings the companies concerned introduce carefully devised systems for the extension of credit and for the protection of their revenue and interests against possible dishonesty, and in so doing they do not experience the same kind of difficulty which is usually met by the street railway company. Many of these forms of protection are based on some sort of a prepayment scheme or advance which is in the nature of a trust. A depositor in a bank, for instance, surrenders his funds to the entire control of the bank save for an entry in a book or a certificate, and he receives the benefits of the accrual of interest thereon when it is credited at the end of the period stipulated. A patron of a penny-in-the-slot machine surrenders his coin before he gets what he wants. The user of a telephone who wants an instrument placed in his home or office has to contract for it for a fixed period and ordinarily pays a rental in advance. One steam railroad company which has a large suburban business found that it was being defrauded of part of its revenue and introduced an elaborate scheme providing for the surrender of the tickets of all pasengers within an inner zone on the traffic movement outward from the central terminal. This scheme provides also for the partial cancellation of tickets at the terminal before passengers on all movements to an outlying zone board the train.

Some of the various protective methods that have been introduced in other forms of business involve much more inconvenience to the public concerned than any of the steps for safeguarding the revenues that have been established by street railway companies. So far as the passenger is concerned, all that the advanced method of city railway operation asks is that the fare shall be paid at the time of entrance to the car. This is asked by the companies in pursuance of a principle that has received wide acceptance in the industry. This principle meant reform in two directions. It meant that the passenger would

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have no means of evading the payment of his fare unless he did so through collusion with the conductor, and it meant that the conductor would have more of his time free for watching the passengers board and alight from the car and could therefore have a great influence in the prevention of accidents. It made collusion between the passenger and the conductor who wanted to defraud the company of a fare much more difficult because it made the collection of the fare or the failure to collect the fare a conspicuous act. It deprived the passenger who was willing to be dishonest of the opportunity which he used to have of burying his nose in the daily newspaper when the conductor was trying to collect fares. It deprived the dishonest passenger of another and more brazen type of the opportunity which he used to have of trying to browbeat the conductor into the belief or the fear that he had paid his fare previously. Therefore, where the prepayment system of fare collection has been adopted, it may be said to have disposed almost entirely of the problem of fare collection so far as it relates to the willingness of passengers to avoid the payment of fare if possible.

No solution has entirely answered all questions concerning the attitude of conductors on this important point. Some employees object to any protective measures that the company takes. They regard such measures as a reflection on their honesty and good intent. When they do so, however, it is doubtful if they stop to consider the rigorous degree of the measures adopted in other forms of business where money matters are concerned.

It is in banks that ordinarily the most stringent provisions against possible dishonesty are adopted. There, of course, the money is the commodity on which all the transactions of the institution are based. The amount of actual revenue derived from the loans, dealings in securities, etc., is very small as compared with the actual volume of transactions, and, furthermore, it is represented generally by bookkeeping transactions on paper rather than by actual cash. The bank usually bonds its employees. It has systems of checking and re-checking both cash and securities, and while defalcations occur on the part of both minor employees and leading officials, they occur in spite of the safeguards introduced and not because no safeguards have been established. By most bank employees the protective measures are regarded as safeguards for themselves as much as for the bank.

The street railway company which has not adopted improvements over the primitive system of fare collection still has before it opportunities of bettering its position in regard to income. Many accountants are considering the problem which this matter involves; they are handicapped in their efforts by the fact that they have practically no recognized control over the men on whom the company is forced to depend. These men are in the transportation department and are therefore responsible to another official. However, the extension of the prepayment principle has led to the development of other safeguards in the form of fare boxes, as well as to more careful supervision and training of trainmen, with the result that the companies generally are obtaining a larger proportion of the revenue due them than ever before.

That there is room for further study and improvement is realized by accountants generally. Some of the accounting officials of city and interurban lines have discussed present practices and advanced ideas for further improvement in letters written to the ELECTRIC RAILWAY JOURNAL. These are published below.

CHICAGO

F. E. Smith, comptroller Chicago Railways Company, expressed the following opinion:

"It seems to me that so far as the accounting for cash fares is concerned there is little room for improvement, but that the ideal method of collecting all fares is the serious problem with which we have to deal. As our method of accounting may vary somewhat from that in general use, I will explain it briefly.

"Each night, after all cars are housed, a night clerk, with a list in numerical order of all the registers kept at that station, makes the rounds and examines each one and notes on his slip the closing number. A copy of this is sent direct to the accounting department. These closing numbers are listed on adding machines, and from the total is subtracted the total taken from the list of the previous day. Reports are sent in, showing the number of fares rung up for testing or other purposes, and the total of these is deducted from the day's total as shown by the subtraction of the closing numbers for the two days. The balance is what we expect the station receiver to account for so far as 5-cent fares and tickets are concerned. If the receiver's report agrees, we consider the station is checked; if there is a discrepancy, a check of the several routes is made and the discrepancy located by routes. Then the registers used on those routes are checked to locate the conductors at fault.

"A daily station register report is made and sent direct to the accounting office. This is kept by routes; it shows the 'register number,' 'run number,' 'line,' 'out,' 'in' and 'difference.' This repeats five times across the sheet, and then are shown the 'total' and 'remarks.' So far as is possible an effort is made to keep a register on the same line throughout the day, and to have them go out in numerical order. This facilitates checking, as we can take them in blocks. As each line on the form permits of the use of a register five times, it is very seldom another line has to be used to get the total for the day.

"Each time a car is pulled into the station a record is made on this sheet of the register reading, and the clerks see that the next conductor takes it out with the same reading. When conductors are relieved on the street our rules require the one leaving the car to see that the one that takes it shall enter upon his trip sheet the same number as 'opening number' that he has used as 'closing number.' For these runs the station clerk copies these opening and closing numbers on his sheet from the trip sheets. The night clerks make the subtractions and the totals for the day. These sheets are then turned over to the receivers to compare with their totals, and many errors are discovered by them and shortages made good out of their 'bank.' This materially reduces the number of 'over or short' reports to be made in the accounting department, but enough errors are detected and collected by the accounting department to more than pay the salaries of the clerks engaged in the work.

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"The 3-cent or half fares are checked as follows: Each trip sheet has a slip that is detached by the receiver when a settlement is made at the close of the day's work, on which the conductor is required to punch the number of such fares collected. These punch marks are counted both by the receivers and the accounting department. This company does not register transfers.

"In my opinion the ideal device for the collection and registration of fares has yet to be invented. This company has had on trial several devices, and none of them has given the satisfaction that had been anticipated. Why cannot some inventor devise a machine along the following lines:

"Have plates with depressions in them in which the various denominations of coins may be placed so that the coins may be inspected by the conductor before he trips the plate; make the tripping device do the registering after the manner of the comptometer, i. e., in order to trip a quarter the pressure of the key would register five fares, to trip a dime would register two fares, etc. It seems to me that slots could be devised that would grip a ticket or transfer, and the operation of the device would draw it into a receptacle and register them one at a time. It would seem as though the transfers could be carried to a box where they would remain in the order in which they were collected. It all sounds so easy that I warn inventors that if they don't hurry and bring out such a machine, I am likely to devote an evening to doing it myself."

MEMPHIS

W. H. Burroughs, secretary and treasurer Memphis Street Railway, writes as follows:

"The methods of the different street railway companies in accounting for fares, from the time they are collected by the conductor until they are deposited in the bank by the treasurer, are so varied that a suggestion that will apply to all is somewhat difficult.

"The adoption of the prepayment plan in the collection of fares by conductors by many, if not most, of the companies has eliminated to a large extent the necessity of educating the public in the matter of fare collection, except to have the exact fare ready when boarding the car. The great problem, as we see it, is to be assured the fare will reach the hands of the treasurer and ultimately the coffers of the company. We believe the fare box, when perfected, will be a great factor in securing to the company a correct accounting for its revenues.

"The fare box will not, however, eliminate the human factor. We find it necessary to check our conductors frequently to see that all fares collected are properly registered. For this reason we would not consider the abandonment of the use of fare registers even though we should adopt the fare box, for any system in which the use of the fare register is abandoned and in which the company has no means of checking its conductors thoroughly we consider necessarily bad. The combination of a good type of fare box with a first-class fare register, followed up by a thorough system of inspection, should produce good results. We use both open and secret inspection and have secured good results.

"The accounting for fares, after collection and registration by the conductor, should not be a difficult matter. The reading of the registers and the receiving of money from the conductor in the settlement for the day should be done by different men, the register reader reporting to the auditor of the company and the receiver to the treasurer. The auditor, after balancing the trip sheets of the conductors with the register readings taken from the cars, should give the treasurer a statement showing the total amount of money due the company. This will enable the treasurer to check the money turned in by the receiver. Everything should be made to balance with the readings of the registers.

"In conclusion, we might add that we think the loyalty of its employees has much to do with the company receiving a just accounting of its revenues. The adoption of the latest and best improved mechanical devices, unless operated by satisfied, loyal employees, will in no wise achieve the desired result."

SPOKANE, WASH.

George B. Colpas, auditor Washington Water Power Company, Spokane, Wash., said:

"We use the International register and pay-as-you-enter cars. Conductors ring up on the cash side of the register cash fares and pay tickets; on the transfer side conductors ring up transfers and passes. We charge 5 cents each for cash fares and sell twenty-two tickets for $1, also sell tickets to school children of proper age at 2½ cents each. Carhouse employees take the register reading of every car in the morning and again at night when the cars are returned to the barn. These readings are checked against the conductors' trip sheets. Transfers and passes taken up are placed in an envelope, and at the end of each trip this envelope is deposited in a glass box in the car. When the car is returned to the carhouse at night, the carhouse employees take the envelopes out and forward them to the audit office for checking.

"On the face of the envelope is printed a blank report which the conductor fills out before depositing it in the box. The report gives the following information: Date, line, car number and time, also the numbers of transfers issued and the number of fares collected. In the audit office transfers are counted and the time punched is compared with the running time, and conductors are advised of irregularities.

"A comparison of the present earnings per passenger (which includes all pay passengers and transfers) with the earnings per passenger before we commenced checking the time on transfers shows that our earnings per passenger have increased about seven-tenths of 1 mill. If it is the check we have placed in effect on transfers which makes this increase, the small additional amount expended in clerical help is well repaid."

INDIANAPOLIS, TERRE HAUTE & EASTERN TRACTION COMPANY

L. T. Hixson, auditor Terre Haute, Indianapolis & Eastern Traction Company, said:

"There has probably been less progress in the matter of accounting for fares than in any other branch of the railway business. When tickets as well as cash fares are accounted for by conductors a register of some kind is generally used. In case the conductor is required to

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account only for cash fares, when such fares are collected, the usual practice is to use either a register or cash fare receipts of some kind. None of the systems appears to be entirely satisfactory. If the proper amount of statistical information is shown, the conductor is overburdened.

"The item of first importance is the collection of all fares and the proper accounting for such fares to the company as to value. Statistical information is of secondary importance, although it is quite necessary to a certain extent. Therefore, in order to get the best results, the first step is to make the collection of fares as easy as possible and require the conductor to make only such records as it is impossible to get from some other source.

"There is no argument as to tickets being more easily collected than cash fares. Such being the case, it should be the first duty of the company officials to induce passengers to purchase tickets. A passenger would naturally prefer to pay a cash fare on the car, unless he has some inducement for purchasing a ticket. If he has baggage to check at an agency point, it will be necessary for him to get a ticket, or, if the rules of the company require a passenger to show a ticket before boarding the car, the passenger would purchase a ticket. But in a great majority of cases he has no baggage to check, and the rules of the company do not require a ticket to be presented before he boards the car. In fact, the latter rule could be enforced only at a few large stations, and even in such cases city ordinances usually require cars to stop at street crossings to take on and let off passengers. Therefore the only practical solution would be to make the ticket rate slightly lower than the cash fare, as the greatest inducement to the public is a matter of dollars and cents. This reduction in rate could be very slight and still have the desired effect, although it would be necessary to have a cash fare which would allow of this reduction and still give the company a fair return.

"In order to avoid the point of discrimination which might be brought up by some patron who lives near a fare point at which no agency is maintained, such tickets might be in the form of single tickets good between certain stations and also good for a year from the date of purchase, and in that way they could be purchased in considerable quantities at an agency point. There would be no difference, so far as discrimination is concerned, between these tickets and the ordinary interchangeable mileage book.

"Assuming that a company has followed the plan above suggested, there will always be a few cash fares, principally 5-cent fares, on which there would be no reduction in the ticket rate and fares paid by strangers. It is generally conceded that a conductor can collect cash fares more rapidly by the use of a register which shows only the amount of the fare and does not show the boarding and destination stations. A register of this nature will not give statistical information of any value. There have been some experimental registers designed to show all classes of statistical information covering both tickets and cash fares, but these registers, with the possible exception of one, have not proved to be a success. So far as statistical information covering cash fares collected is concerned, the cash fare receipt in one of the forms now in use is probably the most satisfactory.

"The principal objection to this cash fare receipt is that the work of the conductor is increased, and that the interests of the company are not sufficiently safeguarded. However, there has recently been put on the market a receipt consisting of auditor's stubs in duplicate and a passenger's receipt. When the cash fare has been punched, the passenger's receipt is detached and given to the passenger, and the auditor's stubs are sent in to the auditor without being torn at the side perforation. It is impossible to split this cash fare receipt without detection, and the passenger's portion is in such form that it is very difficult to manipulate.

"The objection usually made to allowing conductors to turn in tickets without showing value or stations from and to is that a conductor might very easily substitute tickets of smaller value for those of greater value. While this is true, the same thing could be done if he were required to make a record on a register, although in the latter case the passenger would have some check (if he desired to take the trouble to make this check). The surest way, however, is to have secret service men make the on and off check on various runs at different times.

"Summing up the matter, I am in favor of the following:

"First—Give the passenger some inducement to purchase a ticket.

"Second—Until such time as a register is produced that will give the necessary statistical information, a receipt should be given for cash fares collected, such receipt to be of the three-part type mentioned above.

"Third—Cash fare receipts should be used for cash fares only, and not for destination checks.

"Fourth—Printed hat checks showing station names and bearing consecutive numbers should be used, such hat checks also to be used for destination checks, in case of swing runs, etc.

"Fifth—Tickets should be reported by the conductor in total without classifying.

"Sixth—As a general proposition, a conductor should be required to make only such records as are absolutely necessary and which cannot be obtained from any other source."

UNION TRACTION COMPANY OF INDIANA

Walter Shroyer, auditor Union Traction Company of Indiana, has written the following:

"Accounting for fare collections on interurban railways offers many problems which have never been satisfactorily solved. All of the various methods now in vogue undoubtedly have some merit serving to attain the desired results, but none seems to be perfect.

"One of the interurban lines operated by this company was among the first, if not the first, operated in Indiana, and it may be of interest to outline the methods of fare collections employed from time to time. The first plan in vogue was to collect by zones, requiring each passenger to pay a 5-cent fare for each zone traveled over, each fare being rung up separately on a small portable register. A through passenger traveling between terminals, a distance of 34 miles, was required to pay his fare seven times, the fare at that time being 35 cents. If this system was still in effect, a passenger traveling on one of our

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through limited trains between Indianapolis and Fort Wayne would be required to pay his fare forty-five times. This system proved impracticable and was soon discarded.

"The next system put into practice was the torn ticket. This ticket had all stations printed across the top, also down the left-hand margin, the tearing being regulated by a metal square, which would leave the amount paid by the passenger upon each portion of the ticket in the angle of the square. One portion of the ticket was handed to the passenger and the other was sent to the auditor. Tickets were consecutively numbered and conductors were required to account for all that were issued to them. The principal difficulty with this system was the inaccuracy of the conductors in tearing the tickets, and in a great many cases it was impossible to determine the correct amount of the collection made. This system was operated without registration. The tickets were very slow of audit and this system was soon discarded.

"The next system used was the collection of the fare from each passenger through to his destination and registration on a portable register, once for each 5 cents collected. This system was in effect until March 1, 1902, at which time the Ohmer register was installed on all cars. At that time this register took care of six classes of fares, viz., 5-cent, 10-cent, 15-cent, 20-cent, cash fare receipts and passes. Conductors issued cash fare receipts for all fares above 20 cents. Agencies were later established and tickets were placed on sale. This necessitated some changes in the register and was followed by other changes from time to time, due to improvements in the device itself, until at the present time we are using the latest model, which takes care of any fare from 5 cents to $1.50, our largest fare for any single collection being $1.45. All tickets are registered according to their one-way value.

"The merit system is used, a percentage list showing the standing of the men being furnished monthly to the division superintendents at the various terminal points, who advise them of their standing and administer the proper discipline for unsatisfactory grades. Secret inspection has also been found a necessary adjunct of mechanical safeguards.

"In an effort to educate the public to buy tickets, this company posted notices in all ticket offices some months ago, which read, 'Buy tickets before boarding cars.' Just what results were realized from these notices I am unable to state, but there is no doubt as to the small expense being fully justified.

"In my opinion the greatest progress toward safeguarding fare collections can be made in educating the public to buy tickets."

ILLINOIS TRACTION SYSTEM

B. E. Bramble, general auditor Illinois Traction System, outlines his ideas as follows:

"This topic is perhaps the cause of more thought and worry by officials of all roads than any other. Different ideas have been used by all companies with which I have come in contact in order to try to minimize the amount of revenue which unfortunately does not come into the treasury of the company. The many discussions that I have been in usually close with the same old story, that people do not believe it is possible to get all the revenues but must work toward holding down the amount lost as much as possible. I have given this subject a great deal of thought and feel convinced that theoretically the following idea would work to advantage:

"Tickets, mileage strips, transfers, stickers and other forms of transportation are to a railway as merchandise itself is to a merchant or industry of any kind, i. e., they have the value and represent what the company has to sell. This being the case, in my mind they should be dealt with as dollars and cents. Each ticket or form of transportation should have printed on it the actual value to the company, and the conductors in lifting this transportation should register the money value of these tickets collected, either through a concealed register or concealed hand duplex box. This would leave only the cash fares and passes still to be accounted for. All tickets would show the destination and points between which the passengers traveled, as would the passes. In the collection of the cash fares there would be a record either through a conductor's report and a cash fare register or through the tearing of the concealed duplex of the money collected; the duplex should show the point of origin and the destination of the passenger.

"In the auditor's office the value of all tickets in dollars and cents, plus the cash fares collected, represents the train earnings, a feature which every successful company should follow closely. By deducting the value of the tickets from the total the auditor would arrive at his charge against the conductor for the daily cash; and, through knowing the point of origin and destination of all the passengers on each train, one would be enabled to check or verify any inspector's report of this train as to the number of passengers boarding at each station and leaving the train at each station. This method of inspection and report seems to be the most complete to enable officials to know whether the conductor is turning in all his collections. By keeping each conductor's turn-in intact it is possible to call him in and show him his own work as against the inspector's report."

CONNECTICUT VALLEY STREET RAILWAY

D. P. Abercrombie, Jr., clerk and treasurer Connecticut Valley Street Railway, writes as follows:

"I believe that the largest factor in safeguarding the passenger revenue is the personnel of the employees who take up the fares and, while I appreciate that in a larger system the personal equation is not as much of a factor as it is with us, I belive that very careful consideration should be given prior to the employment of men for the position of conductors.

"From my observation, the ordinary type of car register where all kinds of fares are registered is, of course, easily subject to criticism, and with the adoption of more elaborate types, as advocated by the Ohmer company, I am not familiar enough to express a definite opinion. In our office accounting we analyze the conductors' sheets very carefully and check our volume of business each day against the difference in totals of the total registers."

MOBILE, ALA.

M. W. Glover, secretary and auditor Mobile Light & Railroad Company, expresses the following views:

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"The subject is one of the most important matters now occupying the attention of officials. The following observations refer particularly to city operation.

"The fact that over 70 per cent of the new cars ordered for city service during the past year provide for the collection of fares on the platform shows this type of car is fast becoming the standard for city operation, and any system devised for improving the present methods of collecting and accounting for fares must be adapted to the pay-on-platform type of car. Many city lines have adopted this system of fare collection and are remodeling their old equipment to meet the requirements, and in this way the public is being educated to have fares ready and to pay on entering the car. The many advantages of the prepayment system of fare collection are so apparent that it is needless to mention them here.

"Accepting the prepayment system as the best so far devised, the only pertinent question is: What system of fare collection is the best? The fare boxes with locked compartments, inaccessible to the conductor, have proved unsatisfactory. Their use requires a vast amount of change to be furnished to conductors, and additional accounting results therefrom. As the contents of the box are not counted in the presence of the conductor, this leaves a question of veracity between the conductor and the money counter when any difference is discovered. Mutilated or counterfeit coins when placed in the box cannot be properly examined by the conductor, and therefore the company cannot require him to make good such coins, as he has no access to them. It requires a large increase in the force of money counters to handle the receipts from these boxes, and, in fact, there seems to be no good reason for desiring a box of this character.

"The registering fare box which gives the conductor access to the money after registration seems to be superior to any other form of box. Loss through mutilated and counterfeit coins is avoided, as they can be returned to passengers and good coins obtained. It is not necessary to supply change to conductors and the expense of accounting and additional money counters is reduced.

"It is just as important to safeguard tickets as cash fares, and a fare box should handle both tickets and cash. Another item to be considered is the cost of maintenance, and this can be determined only by experience. While the fare box is an important adjunct to prepayment operation, proper accounting for fares collected requires an additional check which can be provided by the car register. This register may be operated by a foot ringing device, thus giving the conductor the use of both hands for operating doors, making change, issuing transfers, accepting and examining transfers, etc.

"The use of the registering fare box alone for registration of the fares is not satisfactory, and 'cash fares' and all 'other fares' should be recorded on the car register to enable inspectors or others to check properly the load on a car at any time. At first glance it might be thought useless to provide a double check system on fare collections, but actual practice shows this system to be the most efficient yet devised for properly accounting for all fares.

"In order that any system may prove a success the education of trainmen must not be overlooked. Motormen as well as conductors should have the necessary instructions to enable them to handle properly the system to the satisfaction of the public as well as the company. Public opinion has delayed many a reform simply because some trainmen had not been properly instructed in the operation of the system in use. To please the public must be considered a part of the duty of each employee.

"After extensive investigation, this company adopted the Johnson registering fare box, handling both 'cash' and 'tickets,' and the International cash register, showing both 'cash' and 'other fares,' and this system of collecting and accounting for fares has worked in a most satisfactory manner. The Johnson fare box registers in fares or in dollars and cents, as desired.

"The car register is operated by a foot ringing device, enabling the conductor to use both hands for other purposes and, as the fare box is self-registering, it imposes no extra work on the conductor; in fact, the use of the fare box lessens his work, as 85 per cent of the passengers have the exact fare or tickets which are deposited in the box, and the conductor has to handle only 15 per cent of the fares, where formerly he handled 100 per cent.

"The double-check system, while causing a small increase in accounting, more than pays for itself. From an accounting standard, one of the best methods of accounting for fares collected is provided by the Ohmer fare register equipped for prepayment cars. This register provides a printed record of each class of fares collected and saves much work in the accounting office. The Ohmer register may be used with or without a fare box, as desired, and for city operation a combination of the Johnson registering fare box and the Ohmer fare register would be 'hard to beat' in more than one sense."

PORTLAND, ORE.

C. N. Huggins, treasurer Portland Railway, Light & Power Company, said:

"After using fare boxes for several years we abandoned them entirely. We use double-end pay-as-you-enter cars, with Ohmer registers arranged for cash fares, tickets and transfers, separately.

"Beginning with the introduction of this type of car and continuing for about three years, we used four-compartment non-registering fare boxes, but about a year and a half ago these were removed for reasons which all users will readily comprehend. We experimented in a limited way with the registering box, but as this device offers no adequate protection against transfer manipulation, we have not felt any keen interest in it.

"We use the merit system and pay special attention to thorough inspection, using our own staff of men almost exclusively. We seek to educate our men in proficiency and endeavor to build up in their minds the principles of fair play and co-operation. They have knowledge of our constant oversight of the work and of the fact that we are as free with compliments as with reprimands. Experience thus far has justified the confidence placed in our employees, and it is rarely that we find any irregularities in the handling of fares. So long as the present satisfactory conditions continue we feel no need of any change."

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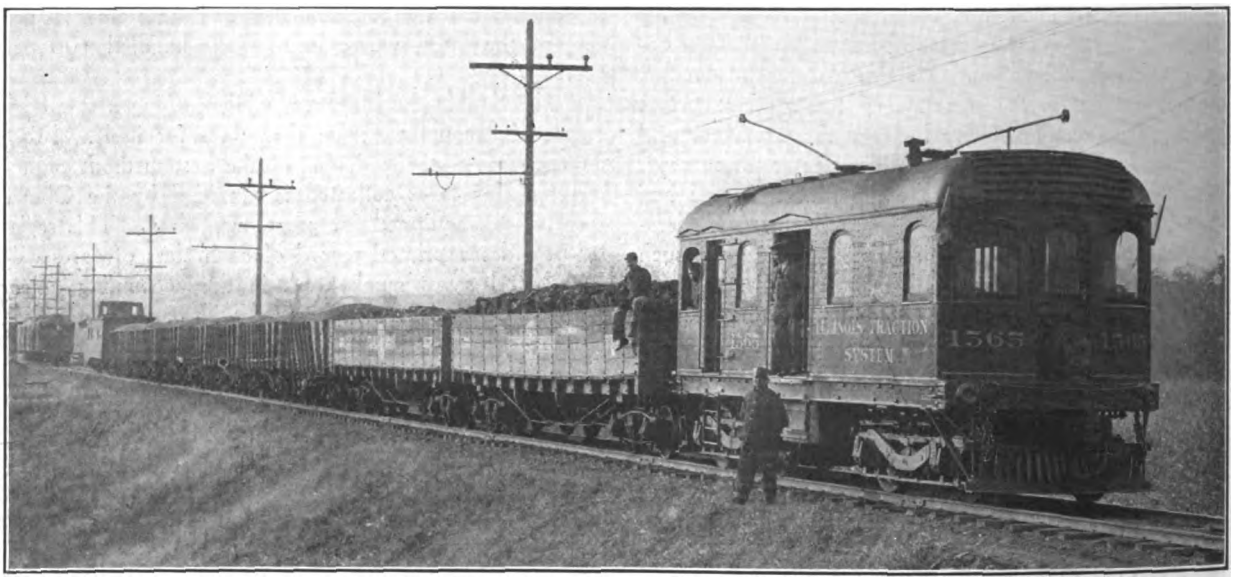
TRANSPORTATION OF FREIGHT

WHEN interurban electric railways began to transport freight in a modest way a little more than a decade ago, the steam railroad men in the territories traversed were inclined to regard their competition as of no importance. But as the traffic on the electric roads grew this complacent attitude gave place, at least in certain instances, to one of keen business rivalry, and every obstacle was placed in the way of the extension of the freight facilities of the electric roads. Since then, however, these same steam railway men in general have come to realize that the interurban railway, while a competitor in a small way, has created a new class of freight and express business which the steam road is unable to handle profitably.

West of the Mississippi River many steam road traffic departments have changed their attitude toward electric roads, and a general interchange of traffic is now in force. In a number of instances electric railroads are not only making deliveries and originating freight for foreign lines in their own territory but also participate in the freight revenue from through carload business where they are in a position to offer a short haul to destination. In Illinois this change of attitude is also apparent. Some of the larger electric roads are now members of the American Railway Association as well as of the state freight committee, and they are parties to all freight tariffs and participate in joint rates with all steam roads. In the Central and Eastern States, however, as well as in the Far West, there has been practically no change in the attitude of the steam roads. In some districts freight associations appear to have an unwritten understanding which prohibits the steam roads from entering into negotiations with the electric lines for the interchange of freight. This feeling does not exist with a number of the smaller steam roads, as apparently they do not feel that there is much to be gained by adhering to this policy. They are only awaiting some legitimate excuse to recognize traction lines as common carriers entitled to through rates, divisions and interchange of equipment.

In Ohio reciprocal relations may be brought about by the passage of a law forcing interchange of freight between all common carriers, but in Indiana and other states where such a law exists its enforcement devolves upon the shippers.

In a number of instances interurban railways in the pursuit of interchange contracts with steam roads have been too aggressive, believing that the issue should be forced and brought to a head in a short period of time, when in reality a systematic campaign of education would have accomplished the desired result. Others have realized the error of this procedure from the start and have made little or no effort to court relations with the steam road carriers, leaving the problem to be solved by the shippers. The latter method has been of educational value to the steam road traffic managers, and they now feel that electric roads are not attempting to enter their field of activities but intend to operate a purely local freight service and do such interline business as their connections with other electric lines will permit.



Standard Coal Train with Latest Type of Locomotive Adopted by Illinois Traction System

Quick delivery of freight is a class of competition which the steam road cannot meet. At the same time, it is a service which tends to develop rapidly the territories which it serves. As the communities grow through this means, the steam road is certain to share in the long haul and bulk freight business. Thus the electric road has been instrumental in creating traffic in which both may participate and prosper alike. Fundamentally, the

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electric road consists of quick-moving small units and the steam road of slow-moving large units. These qualities put each in a distinct class, and each meets certain demands of shippers in this commercial age where economy and facility go hand in hand. Each offers a special class of service which, regardless of competition, will receive its due proportion of freight traffic.

Another condition which has tended to eliminate electric roads from interchange relations with steam roads has been their lack of freight-handling facilities, such as warehouses, trackage and equipment. Primarily interurban roads were built to transport passengers, but the frequent service they render has forced them to a greater or less extent into the handling of freight for suburban and urban communities. Small urban stores or shops do not want to carry a large stock, and it is for their interest to wait until the last minute before placing an order for a new supply. Hence an opportunity to obtain delivery of freight or merchandise in any quantity within twenty-four hours means for the small store or shop less capital invested in stock, less insurance and less storage charges than if it had to depend on steam road deliveries.

The chief obstacle to a continued increase in this class of business now on many roads is not the amount of new business in sight but the physical difficulties of expansion. In a great many cities the location of interurban passenger and freight terminals has rapidly increased real estate values until adjoining property is now held at prices prohibitive for freight terminal extension. The fact, too, that electric railways operate over public streets offers an opportunity for city administrations to demand concessions when ordinances authorizing the installation of new tracks leading from the public street into a proposed freight terminal are sought. As a direct result of this in many instances, freight terminals have not been enlarged even to meet existing traffic requirements, as the cost of installation and concessions would not be warranted by the probable increased revenue.

Shortage in rolling stock, or the fact that electric lines do not care to equip their lines to handle properly an interchange of bulk freight, also has been a handicap to them in the development of their freight business, especially that of a steam road interchange character. But few of them offer exclusive delivery or receipt of freight from industries which are not already served by steam roads, so that this makes their outbound traffic about ten times as large as their inbound business. It requires but little time to compute the result of a general interchange contract with only a sufficient number of cars to handle the local traffic. In fact, general interchange has been attempted by some electric roads which, after being deprived of most of their freight equipment, found it necessary to cut off steam road relations until new cars could be purchased or their own returned from foreign lines. The only possible way to work this out satisfactorily is for the electric roads to transfer all freight at junction points or else make arrangements with the steam roads whereby the foreign line deliveries are made in foreign cars. Both of these methods are in use on a number of electric roads throughout the country.

Joint Freight Terminal for Interurban Lines at Indianapolis, Ind.

A careful study of the relations of steam and electric roads at the present time, with a view of determining what the possible future relations may be, points very strongly toward the conduct by the electric roads of a purely local freight and express business. To operate long through freight trains during the day, when the frequent passenger service is on the line, only adds to the hazard of passenger train operation and materially delays one or the other class of traffic. A better plan, in the opinion of many managers, is to confine the freight traffic to small

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trains, which may readily be operated between passenger trains during the day, or else to limit the haul to such an extent as to make it possible to handle all freight traffic during the night time, when the passenger trains are practically all off the line. An important advantage urged in favor of night operation is that it not only assists in raising the sag in the power house load curve but increases the gross business without adding materially to the fixed charges.

Another stumbling block which prevents interurban roads from handling all classes of freight, and thus carrying on general interchange with steam roads, is franchise limitations. Reports from a large number of interurban roads operating throughout the country show that very many of them are restricted to trains of limited lengths and that, in many instances, the operation of standard steam road freight cars on city streets is prohibited. Since the beginning of the era of interurban roads this restriction has materially interfered with the handling of freight traffic.

In negotiating for franchises in virgin territory, however, attempts have been made to eliminate these restrictions from the franchise agreement. But it was found that the old idea still prevailed and that the communities through which the line proposed to build would not permit the operation of a general freight business. The only solution of this problem seems to lie in the construction of electric lines around villages or through them on a private right-of-way. Passenger lines may be extended into the business centers of the larger cities and belt lines for the handling of through freight and passenger business may be built around these larger traffic centers. Some electric roads have solved the problem in this manner.

Certain managers have no objection to restrictions of the kind mentioned in regard to the class of freight to be hauled through city streets. They believe that freight traffic should be confined entirely to what may be termed dispatch freight, for which a charge can be made approximately twice that of first-class freight rates. Although it may appear that this dispatch freight business offers a certain amount of competition to the old-line express companies which now are largely operating over interurban lines, experience has shown that these companies have no objection to it.

A marked difference between the steam and electric railway freight business is that on the electric road the passenger traffic is the most important and the freight business may be considered a by-product, while on the steam line the passenger business may be considered to be the by-product. In either case, however, it assists in developing the territory to conduct both classes of business, even if one seems practically to be unprofitable. Thus, there is no doubt that the tremendous passenger development on the electric lines about Los Angeles is in large part due to the attention which the Pacific Electric Railway Company has given to the freight business, although it is doubtful how much of it is directly profitable.

Unloading Shipments in Street Opposite Station at Quakertown, Lehigh Valley Transit Company

POSSIBILITY OF INCREASING INTERURBAN FREIGHT RATES

The Detroit United Railway, having engaged in a little pioneering, has demonstrated that it is possible for interurban roads to increase their freight rates in many instances without materially affecting the quantity of freight handled. Until recently the rates on a 10-gal. can of milk or cream over the different divisions of the Detroit United Railway entering Detroit have been variable. In one instance 6 cents was charged for a 10-gal.

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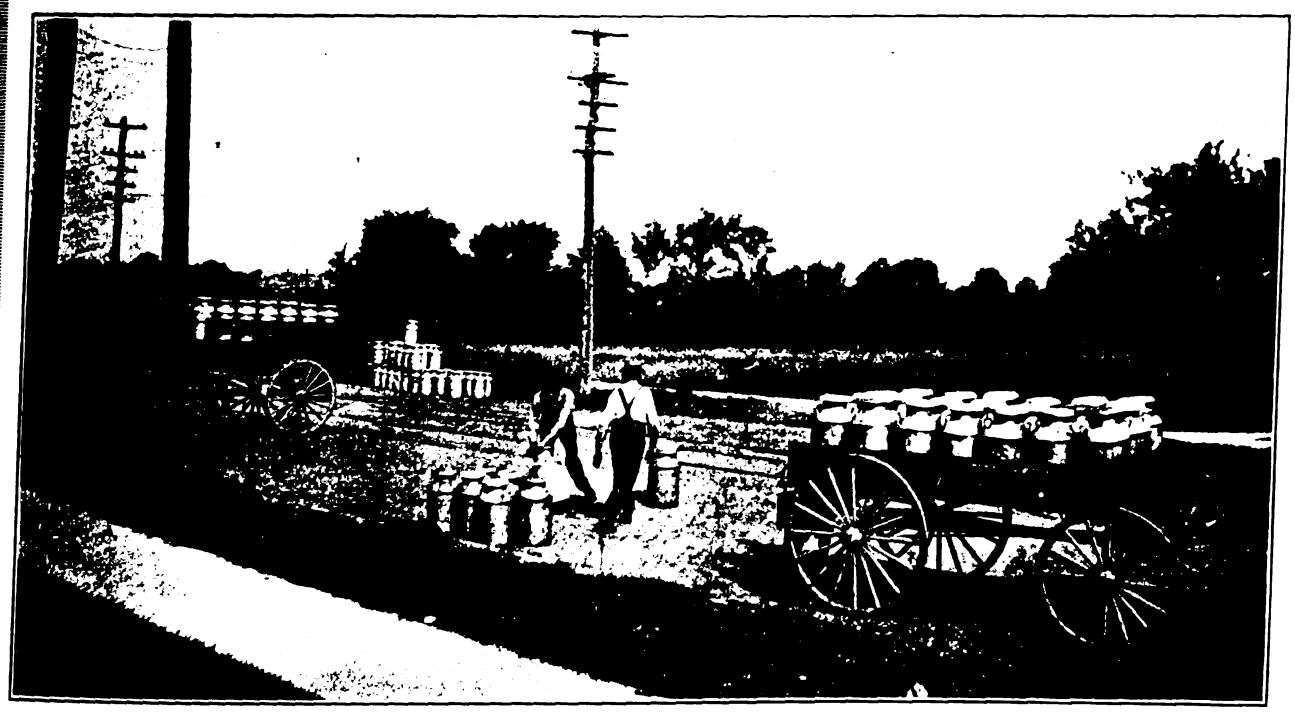
can for a distance of 12 miles, on another 8 cents was charged for a 10-gal. can for a distance of 18 miles, and on another a rate of 10 cents per 10-gal. can was made for a distance of 78 miles. Incidentally it might be stated that these rates had been in existence for several years, having been applied on the various divisions by the predecessors of the Detroit United Railway before they had been purchased and merged into a single system.

Inconsistencies of this character made it impossible for the company to justify the rates when comparisons were made by the milk and cream shippers on the various divisions. To remove this apparent discrimination, the general express and freight department prepared a new tariff based on a zone system scale of rates, one rate applying on milk and one on cream. The suggestion for such a move came from the Interstate Commerce Commission, which at that time was hearing a case in which one or more of the steam roads were involved. The final result of this case was that that body made a rate of 20 cents per 10-gal. can for a haul of 1 mile to 25 miles on either milk or cream and a rate of 21 cents per 10-gal. can for a haul of from 26 to 30 miles, with a graduated scale for greater distances. Rates also were specified for a 5-gal. and an 8-gal. can based on a prorating of the 10-gal. can charge.

These rates were immediately adopted by the Detroit United Railway, and not long after, upon complaint of several shippers, a request was made by the Michigan Railroad Commission to suspend their application until a hearing for the interested parties could be held. This request was observed as it was the desire of the Detroit United Railway to co-operate with the commission and to place before it the inconsistencies with which the company had to contend in the establishment of traffic charges. It might be mentioned that it was only a short time before this case came up that the Michigan Railroad Commission had disposed of a similar case in which the steam roads of Michigan were involved. In this case the commission practically adopted the same rates as those ordered by the Interstate Commission, the only difference being that the Michigan commission made a rate of 15 cents on a 10-gal. can of milk and 20 cents on a 10-gal. can of cream for from 1 mile to 25 miles, with a graduated scale for greater distances.

The differences between the shippers and the Detroit United Railway were heard in detail, and after a period of two or three months the Michigan commission rendered its decision. It provided that the rates for interurban roads should not exceed 12 cents per 10-gal. can for either milk or cream for 1 mile to 20 miles, and 15 cents per can for a distance of from 21 to 30 miles, the empties to be returned to the point of shipment free. The Detroit United Railway then gave notice to the shippers and the Michigan Railroad Commission that the expense of carrying this commodity was such as to prohibit compliance with the order. It also asked that the order be suspended so that further evidence could be produced to substantiate this statement. The commission acceded to this request, and after more than a year, during which several meetings were held and information submitted, the Michigan Railroad Commission rescinded its former order and adopted the following scale for interurban roads: 15 cents per 10-gal. can for a distance of 1 mile to 30 miles on either milk or cream and 22 cents for 31 to 35 miles, with a graduated scale beyond similar to that in effect under the order issued by the Interstate Commerce Commission.



Milk Shipments Unloaded in Front of a Creamery on the Lines of the Cleveland, Southwestern & Columbus Railway

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HIGHER RATES DESIRABLE

Several electric roads have filed exceptions to the official classifications, which were intended either to eliminate a portion of the undesirable freight or place it in a class where the revenue returned would make it profitable for the company to handle it. These exceptions to the official classification have been adopted without obtaining permission of the Railroad Commission, which usually does not object to or reject a tariff so long as the rates are published and filed. If complaint comes from a shipper, he must present convincing evidence showing that the rates should be reduced; consequently very few complaints are filed. A fact which justifies a higher rate for electric service than for steam service is that, generally speaking, deliveries are made with the same dispatch as old-line express companies. The flexibility, frequency and dispatch of the service which can be rendered by electric lines under proper conditions, and for a great number of commodities, entitles them to a higher revenue, and they should have a separate classification.

Under the list of exceptions to the official classification shown in an electric joint class tariff and class rates between certain stations, filed with the Railroad Commission of Michigan by the Detroit United Railway Company, this statement appears: "All shipments of a fragile or perishable nature can be accepted at owner's risk only and must be so receipted for." This list of exceptions also includes a large number of items, some of which will not be accepted at all for shipment; on others the regular rate is applied with a minimum charge, while on some commodities a higher rate is applied than that in the official classification. Another requirement under the list

Unloading Milk at Cleveland, Southwestern & Columbus Terminal Station in Cleveland

Views of Elevator and of Farmers Shipping Corn, Illinois Traction System

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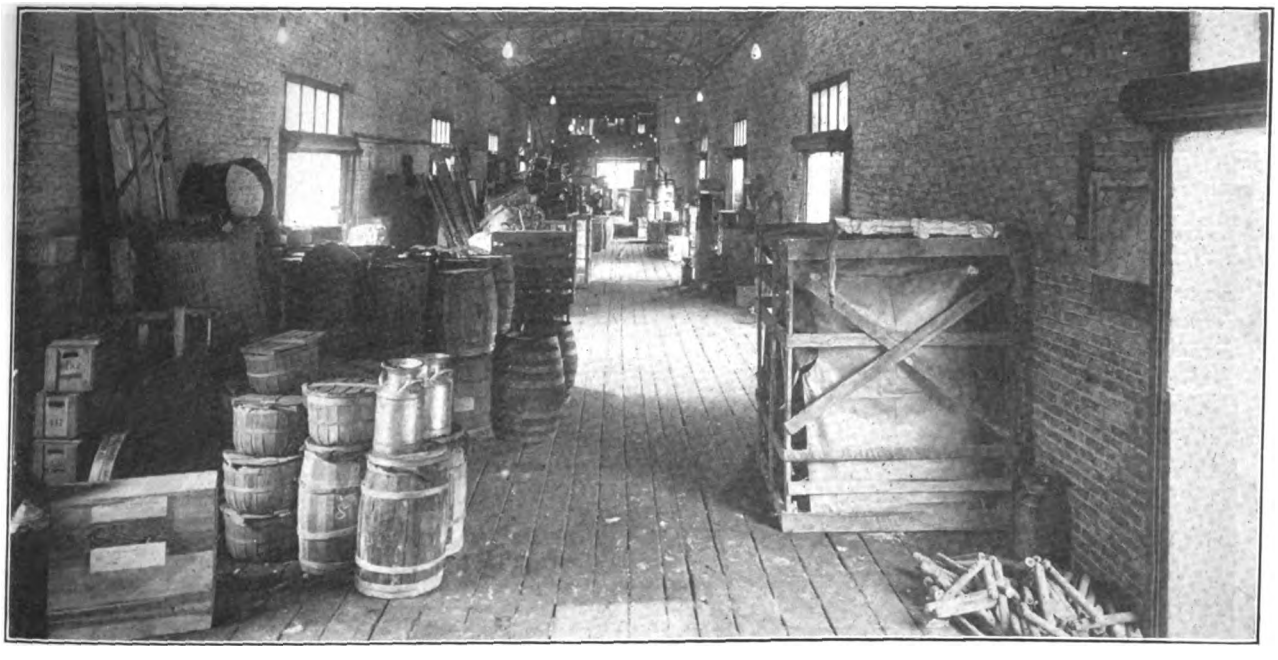
of exceptions, which brings with it a reduction of claims, is a description of how certain shipments must be crated or wrapped before they are accepted for transportation. In each of these instances the change in the wrapping and crating specifications from the official classification is based on the experience which this company has had in handling the commodities named.

ORGANIZATION OF THE TRAFFIC DEPARTMENT

The size and character of a freight traffic department organization depends upon the quantity of business handled as well as the method in which it is handled. So far as freight and express traffic are concerned, the electric roads of the United States divide themselves into six different classes. The first includes the purely passenger service lines. The second are those lines on which an independent express company operates on a percentage basis and offers a wagon collection and delivery service at rates slightly above those fixed by the steam roads. The third condition is where several electric roads enter into an agreement whereby an express package company is organized and operated as a separate department, with a wagon collection and delivery service and rates practically equal to those of old-line express companies, each railway company sharing in the net revenue in proportion to the business it handles for the express company. The fourth class includes those roads operating a less-than-carload and carload freight business at steam road rates, with a dispatch freight service at approximately twice first-class rates. The fifth class are those roads operating a general freight and express business in all classes both less-than-carload and carload, with interchange relations, carrying through rates with steam roads but exclusive of a through freight business, and the sixth class embraces a few lines operating a general freight business on exactly the same basis as steam roads, being accepted as such. Each of these classes, except those transporting only passengers or operating their express and freight business as an entirely separate department, requires a special kind of organization to handle the freight traffic.

For electric roads operating a strictly local freight and express business the ideal organization would include a general freight and passenger agent in charge of the proper handling of freight to and from cars as well as the stimulation of business. It seems unnecessary in defining his duties to separate the freight from the passenger business, except in so far as routine matters are concerned, and these may be handled by the clerical force. This general freight and passenger agent should be the court of last resort as regards all traffic matters and should direct the movement of all division agents, issue all tariffs and advertising matter and be in close touch with all industrial and trade associations.

Being the recognized head, he should familiarize himself with the transportation department in so far as the handling of regular and special trains over the line is concerned. His general acquaintance with the shippers as well as with the methods of billing and handling in transit should enable him to give excellent counsel to claim investigators, who may work either under his supervision or under that of the auditing department.



Interior of Joint Freight Station at Indianapolis, Ind.

The general freight and passenger agent should appoint a sufficient number of district freight and passenger agents properly to cover the territory. These agents should cultivate their respective districts intensely. They should become personally acquainted with the larger shippers throughout the territory and have a general knowledge of all prospects. The duties of these district agents should include a certain amount of original work in the way of solicitation, but in the most part they should act in an advisory capacity to the local or way station agents. Usually, the way station agent knows his public's whims and fancies, and, if the right man has been selected, he is better able to deal with them. All matters regarding the handling and delivering of freight through the ware-

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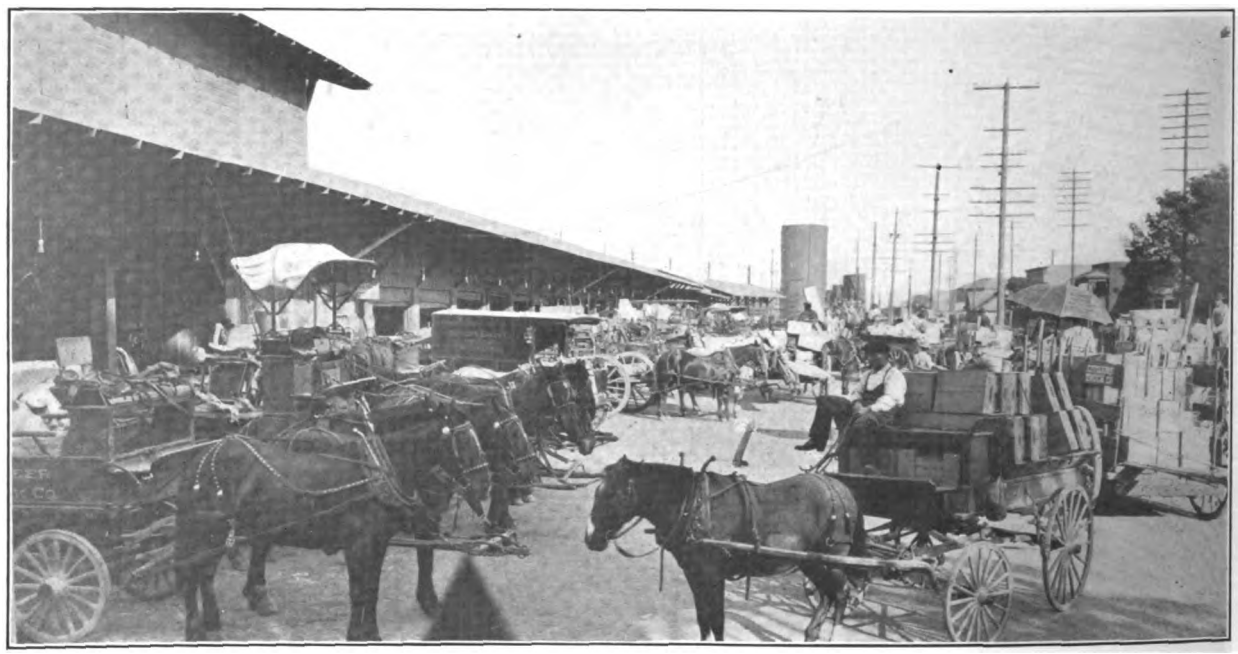
house and way stations should come under the district agents' supervision through the local agent. The fact that their jurisdiction includes a number of station agents permits of comparison of their relative efficiencies, with a final result that all may be brought up to the same standard so far as freight traffic is concerned.

Little need be said regarding the clerical help in the general agent's office, except that it should be sufficient to handle all the details of departmental work promptly and efficiently. Too much stress cannot be laid on the care which should be exercised in writing a letter to a shipper in reply to either complaints or inquiries. It is common to judge a man by the character of letter he writes, and the same rule applies to a railroad company. In a number of instances ill-advised composition in a railroad freight office has resulted in the loss of shippers, especially those in the territory of a competitor.

ment of a freight business. That is to say, if he is enabled to make deliveries and obtain his receipts promptly, and if there are paved driveways to the freight house doors and canopies over them so that he is protected when loading or unloading freight in bad weather, much may be accomplished. In many instances it is practically impossible for the representative of the manufacturer or shipper to call personally to investigate certain complaints on the part of his teamster and he is forced to accept what is told him as fact.

The necessity for a certain amount of tact in employees dealing directly with the teamsters or shippers is not confined to the warehouse foreman. It should be required from everyone in the warehouse organization who has dealings with the public. This is especially true of receiving clerks and checkers, as well as of the cashier who supervises the credit list.



Team Side of Receiving Shed at Los Angeles Freight Terminal, Pacific Electric Railway

Where the quantity of freight and express business warrants, the best practice is to appoint a local freight and express agent in addition to a passenger agent. This is an era of specialization, and the man who is properly equipped to discuss matters with his patrons produces far better results than one who has so many things and subjects to handle that he is capable of discussing none intelligently. At the larger stations, besides the agent and clerical help, the force usually includes a day and a night foreman, who have supervision over the checkers, receiving clerks and truckers and report direct to the local agent. The warehouse foreman should be a man with sufficient executive ability to handle the men under his charge and should also be a man who can handle teamsters tactfully. One not familiar with the trials and tribulations of a warehouse foreman cannot know how important it is that this particular person should possess tact. Finally, the treatment accorded to the teamster of the shipper and the facilities afforded to him are important factors in develop-

The warehouse floors should be sufficiently large so that the receiving doorways may be kept clear, thus obviating congestion and enabling teamsters to deliver their shipments promptly. Certain rules strictly adhered to will bring about this result, such as setting aside doors on the team side for receiving shipments for certain destinations, or requiring teamsters to unload their freight on the warehouse floor with the destination marking in plain sight so that the receiving clerk may check the way bills promptly and receipt for them.

Too much stress cannot be laid on the care to be taken when freight is moved through the warehouse into the cars. As a general rule, when the men are paid less than the scale effective in steam railroad warehouses, a large number of over and short shipments as well as damaged merchandise will result. This not only makes a dissatisfied customer but creates claims which, in a great many instances, are much larger than the freight revenue collected. The addition of a stevedore or an experienced

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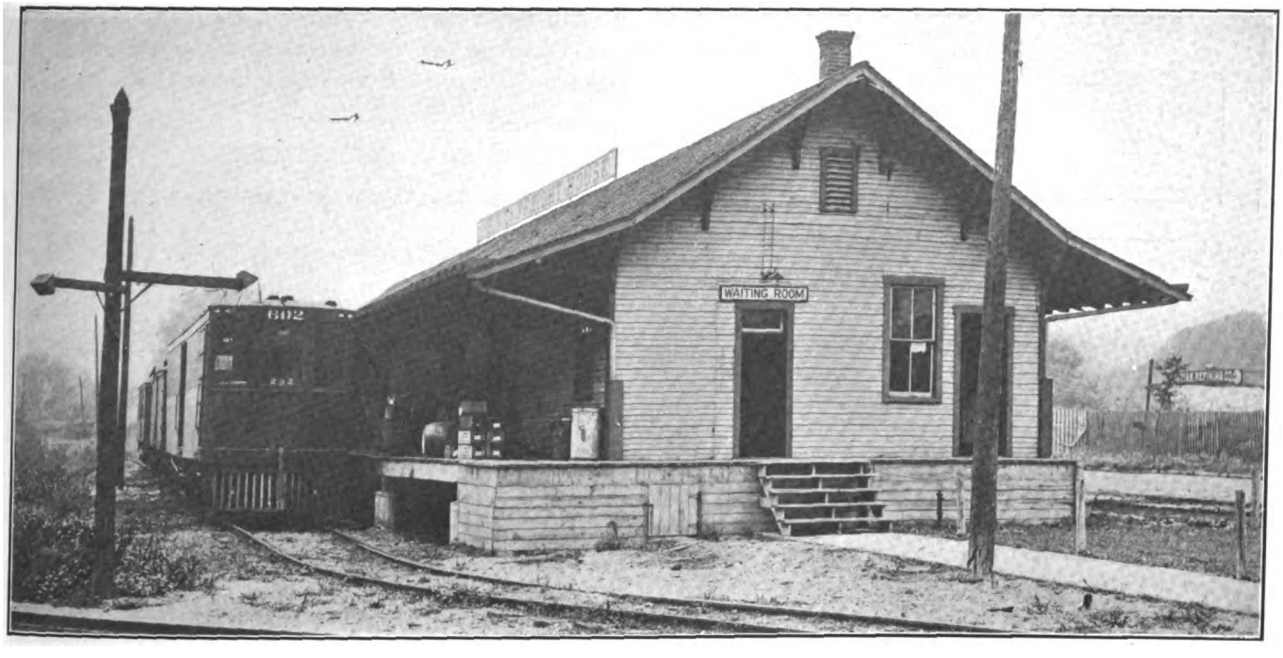
man in loading shipments into the cars, as regards both station order and the quality of the packages, is an important factor in reducing the quantity and amount of claims. If the quantity of business handled is not too large, the local agent may supervise the loading of freight himself. Being held responsible for the traffic handled through his warehouse, he will take much more interest than the ordinary checker or trucker who does not assume any responsibility.

In general, the way station agent reports to all departments so far as matters coming under the supervision of each is concerned. In other words, he is the football of all departments of the railroad, just as he is on a steam road. In all instances he should, if possible, be equal in ability to the steam road agent in the same locality. It is useless to expect first quality results from an inferior man. The agent for each station should not only be competent to handle the business already there, but he should also be capable of developing into a man who will handle the future increase in freight traffic either from solicitation or through the natural increase in the business in a growing community.



Freight House and Transfer Station of Union Traction Company of Indiana, at Anderson, the Junction of Three Divisions

Usually at the way stations, where the company either owns or rents its station building, the agents receive a salary. But at those stations where the business is insufficient to warrant the payment of a fixed salary a storekeeper whose place of business is near the track is appointed agent and receives a commission based on the quantity of business handled. The fact that the way station agent's business is almost wholly confined to the handling of freight and passenger traffic necessitates smaller salaries than those paid on steam roads where the agent also must be a telegraph operator.

Many electric roads have made it a rule to combine the duties of substation attendant, where possible, with those of way station agent. Unless the quantity of business handled is small and there is a lack of competition, this arrangement is not very satisfactory. The agent's first duty is that of an attendant in the substation. Although it may not be necessary for him to be on duty at all times, the fact that an emergency may arise at any instant makes his constant presence imperative. In view of this, it is impossible to expect him to solicit freight or make collections or adjustments away from his station unless he has an assistant. With the addition of a helper to the substation agent this arrangement is quite satisfactory.

Some roads have devised novel methods of meeting competition and providing way station agents where the business does not warrant the building of a station or the maintenance of sufficient help to operate it. Thus, to meet a competing collection and delivery service, it has been found practicable for the local agent to be a local teamster who makes it his business to meet all trains and make collections and deliveries of freight. In fact, he acts as the way station agent in every sense of the word except that he does not have a station and has nothing to do with the sale of tickets to passengers. As a rule, the collection and delivery service which he performs for the traction company does not require his entire time, and he is able to carry on a general teaming business in addition. Where considerable care has been exercised in the selection of the teamster to act as local agent, it has worked out quite satisfactorily so far as the traction company is concerned.

As the quantity of freight traffic increases and the simple organization—namely, the general freight and passenger agent, assisted by district freight and passenger agents—is not sufficient to handle the details coming to the traffic department, additional help must be taken into the organization to meet the requirements. Usually the first commodity to receive special attention is the dairy traffic. The dairy traffic agent usually does not confine

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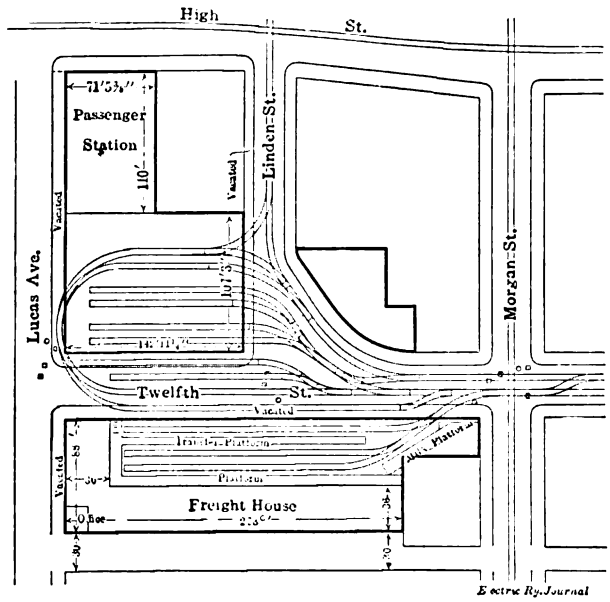
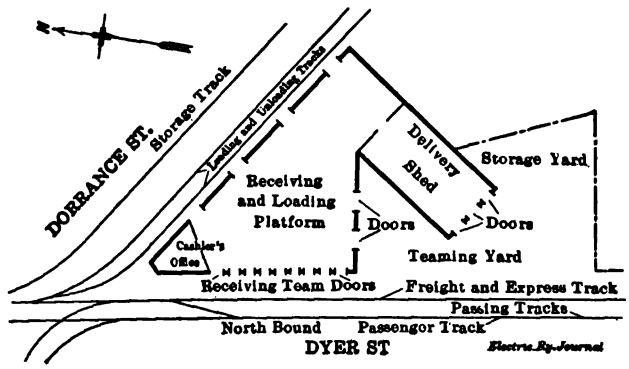
his time wholly to caring for his shippers and consignees, but when not otherwise engaged he calls the farmers together in various communities and organizes central milk stations, and from time to time he arranges for lectures by experts along the line of increasing efficiency in producing dairy products.



St. Louis Freight Terminal, Illinois Traction System

The next step in an organization appears to be the adding of an industrial agent to the regular organization. His duties may be directed in several channels, but they are usually confined to organizing the farmers of rural communities into elevator companies, to interesting manufacturers to locate factories on interurban lines, or to inducing those already near the right-of-way to have industrial tracks built to their works.

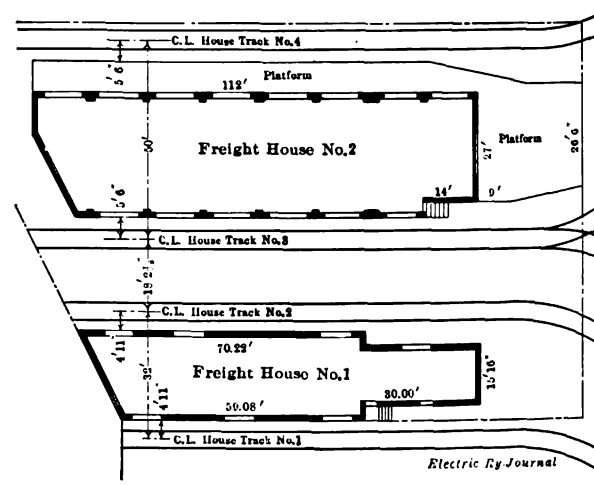
Recently there has been considerable discussion as to the employment of a soliciting freight agent covering a wide territory. There can be little doubt as to the value



Plan of Dyer Street Freight House of the Rhode Island Company

of such a man, if he makes it his business to become personally acquainted with the larger shippers and confines his efforts to soliciting their business. There is some question, however, as to his ability to increase less-than-carload business in local communities. Some traffic heads are of the opinion that if the way station agent were to have an assistant he might have sufficient time to make outside solicitation, or that if the personnel were raised by increasing the agents' salaries, it would attract men with more intelligence and energy for obtaining the desired results. Generally, the local agent is better acquainted with his community than an outside man, and, like the trainman, the local agent is the personal representative of the traction company and it is judged according to the standard he sets.

With an increase in the quantity of business, it becomes necessary to enlarge the department for investigating and settling freight claims. As already mentioned, where the number of the claims is small they may readily be handled by the auditing department or under the supervision of the general freight and express agent. But when a large volume of freight traffic is handled best results may be obtained by organizing a separate department, the duties of which are confined to the disposing of claims. The head of this department—namely, the freight claim agent—should report to the general superintendent or general manager, because the results of his investigations often require that employees in other departments than the traffic be reprimanded.



Fort Wayne Terminal of Fort Wayne & Northern Indiana

The freight claim agent's organization should include a sufficient number of investigators to expedite the handling of claims through correspondence or personal investigation. In order that investigation may be started in the shortest possible time after the filing of a claim, the local and way station agents should report all matters coming under the jurisdiction of the claim department direct to the claim agent, sending a copy of the report to the head of the traffic department.

FREIGHT-HANDLING FACILITIES

Freight terminal trackage and warehouse arrangements are important factors in the expeditious handling of freight, both from the warehouse and the transportation standpoints. In most instances, electric railways have used excellent judgment in the location of their freight terminals, but many have failed to give proper consideration to the possible future development of the business, having purchased sites which would take care only of immediate demands. As a result of this short-sightedness, property in the vicinity has rapidly enhanced in value

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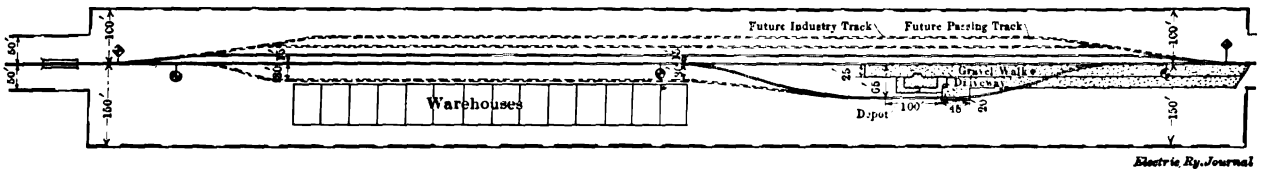
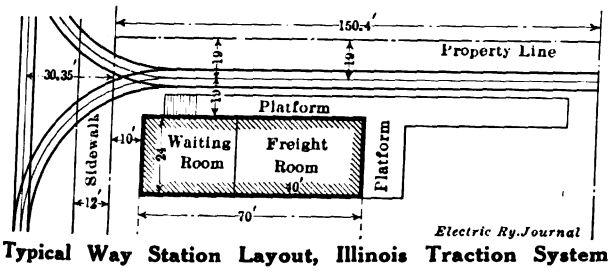
until it is now held at prices prohibitive of the purchase of land for additional freight-handling facilities. Too much care cannot be exercised in estimating future demands at long range and making purchases accordingly. Undoubtedly, the general rule will hold in almost all cases, namely, that property purchased and not required at the time for freight terminals will increase in value to such an extent as to equal the charges necessary to carry it until it is required.



Oregon Electric Railway—Plan of Typical Way Station Grounds, Showing Freight Sidings and Warehouses

The wide experience which steam roads have had in handling freight has resulted in the adoption of a design which provides for a long warehouse 36 ft. to 50 ft. in width, with numerous doors from 8 ft. to 10 ft. in width on the team side and doors arranged on the track or car side so that cars may be set with their doors opposite those in the warehouse.



Typical Way Station Layout, Illinois Traction System

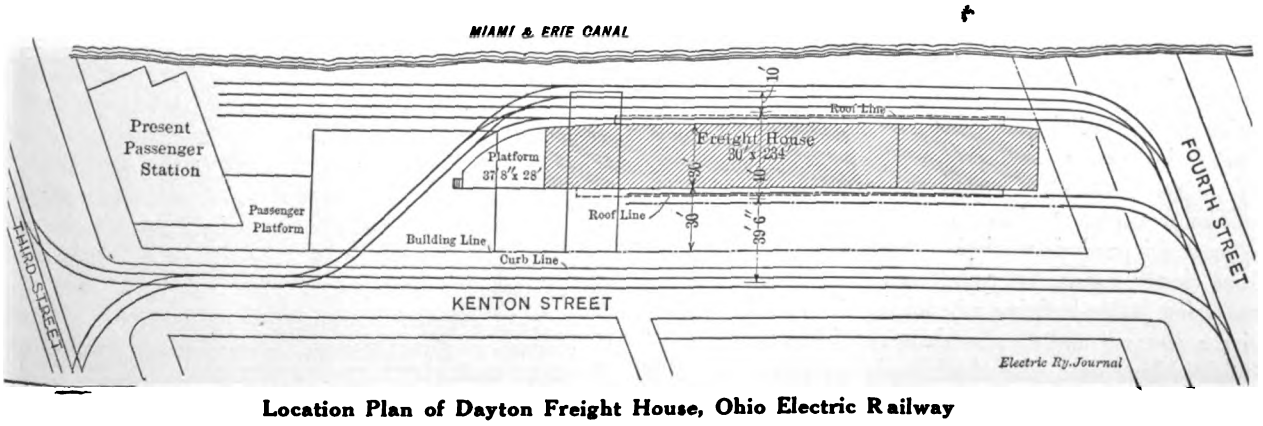
The driveway on the team side should be at least 30 ft. wide, or wider where possible, and paved with brick, wood block or granite block so that teams will not be stalled, thus causing congestion in the driveways and annoyance to the teamsters.

Careful consideration of the elevation of a freight-house floor above the driveway has resulted in the general adoption of a height of from 3 ft. 6 in. to 4 ft. On the track side of the warehouse as many tracks, up to four, paralleling the building should be installed as the quantity of business may require. Rather than increase the number of tracks to relieve congestion in the warehouse, it is better to extend the warehouse and the tracks to accommodate the increase in business. More than four tracks at the warehouse have been found to increase congestion rather than relieve it.

Another factor which tends to expedite the movement of less-than-carload freight from the warehouse into the cars or the reverse is the provision of a 6-ft. to 8-ft. platform on the track side between the warehouse and the first track. This arrangement permits truckers to pass out of any door and move along the platform to the car in which they propose to place the freight. A protecting awning over this platform is also advantageous in that it offers protection to the truckers and freight which is subject to damage by water. A similar projecting awning on the team side also has been adopted in many cases.

Usually it is unnecessary to provide heat in the warehouse, but a certain amount of space should be set aside and inclosed for a hot-storage room during periods of low temperature. Every warehouse should be supplied with a sufficient number of platform scales located so as to cause as little delay as possible in the movement of freight through the warehouse when weighing of shipments is necessary. Preferably these scales should be automatic, making it possible to deduct the tare by adjusting the scale. Weighing on an automatic scale is facilitated if the same type of truck is used in handling all shipments, as the tare adjustment will then remain fixed.

The arrangement of the typical way station facilities generally included a freight room adjoining the way station agent's office of sufficient size to handle the less-than-carload business and a team track for carload freight business. There is a difference of opinion as to the proper elevation of the floor in the freight room, as well as of the platforms in the open which parallel the track at way stations. Some traffic managers are of the opinion that less-than-carload freight may be handled



Location Plan of Dayton Freight House, Ohio Electric Railway

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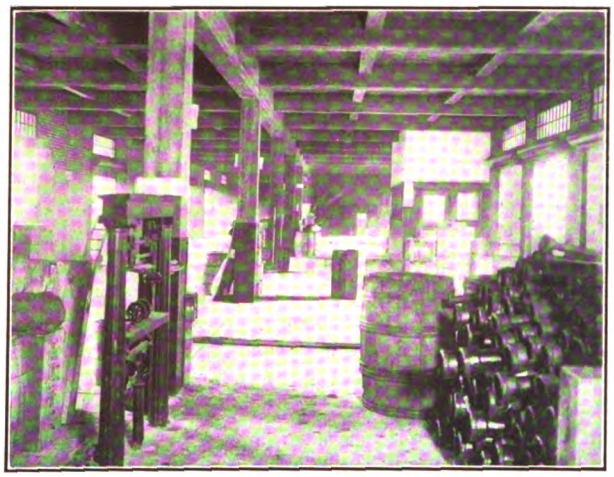
more expeditiously from a platform at the track level than from one at the height of the car floor. Way station freight generally is unloaded from the main track, and if the freight-house floor and platforms are at the height of the car floor, it is necessary to truck the



Interior of St. Louis Freight Station, Illinois Traction System

freight a considerable distance to the building, as the freight platform must be located away from the station building in order not to interfere with the handling of passengers. If the way station platform and freight-room floor are at the track level, as is the general practice on steam roads, freight may be unloaded from a car standing on the main track immediately in front of the building, thus permitting the shortest possible movement from the platform to the freight room.

Side tracks at way stations should always be double-end or in the form of a wye, so as to make switching unnecessary. These tracks should be so located as to make it possible to use them both as team tracks and as house tracks. Some traffic managers have decided that the house track is unnecessary at way stations, believing that, if the less-than-carload freight is sufficient to make a carload, the freight may be delivered or received to and from a car more economically than through the freight house. This eliminates one handling by the agent and assists materially in keeping down fixed charges by making small freight rooms practicable.

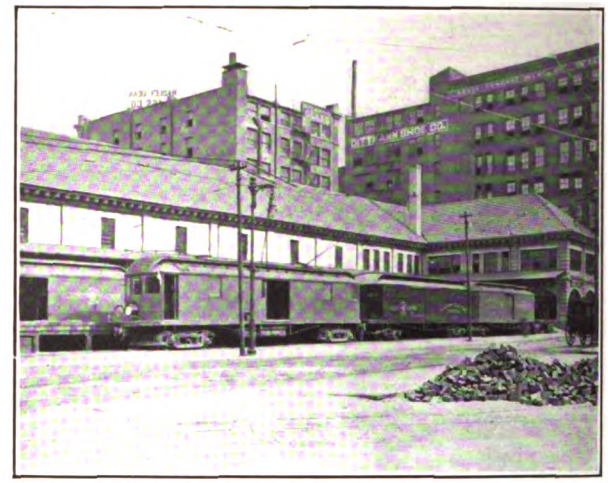
EXPRESS TRAIN OPERATION

The arrangement of express and freight train schedules to meet shippers' demands has received consideration on some electric roads, but operating economy usually is the governing factor in fixing schedules. A great many lines give a morning and evening delivery of less-than-carload freight shipments. Almost all roads engaged in handling shipments of milk have found it necessary to arrange their schedules to meet the demands of the consignee.

The best practice in operating through car service is to avoid all interference with the regular passenger business. Through express trains as well as bulk freight are usually moved between midnight and 5 o'clock in the morning, as the promise of an overnight delivery usually meets steam road competition.

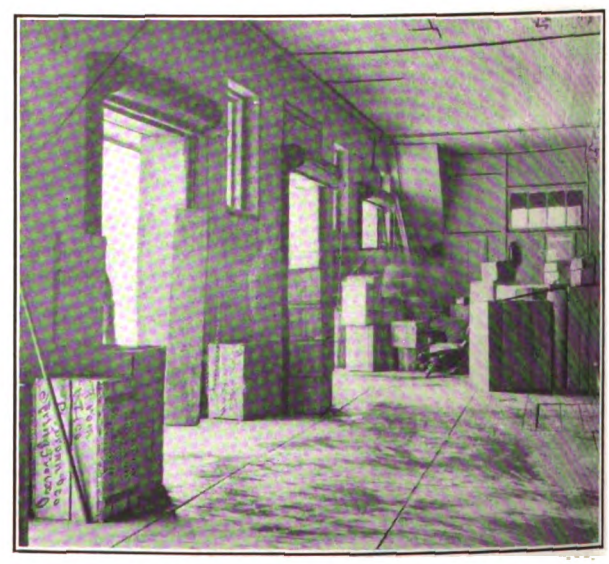
LEASING RIGHT-OF-WAY AND BUILDING INDUSTRIAL TRACKS

Owing to the narrow right-of-way on which a great many of the older interurban lines were built, the surplus area is too small to lease a portion for industrial purposes.



Cars at Transfer Platform of St. Louis Terminal, Illinois Traction System

Some roads, however, have a sufficient width of right-of-way at various locations to make leasing possible. The method of leasing right-of-way for industrial purposes is practically the same as that practised by steam roads. Leases are made to elevator companies, retail coal dealers and the like, and the charge made for right-of-way leased is so fixed that it will represent a 6 per cent return on the valuation. Usually the life of the lease is made



Team-Side Doors, Ohio Electric Freight House at Springfield

indeterminate, the lease stating that if the company should require the property at any time it shall be cleared within ninety days after notification. There have been very few instances, however, where railroad companies have found it necessary to enforce this clause, as the location of the

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leased property is carefully considered before the contract is made.

One way by which a railway may stimulate freight business is to accommodate shippers by building side tracks to industries. As a general rule, sidings of this

Team Side of Springfield Station, Ohio Electric Railway

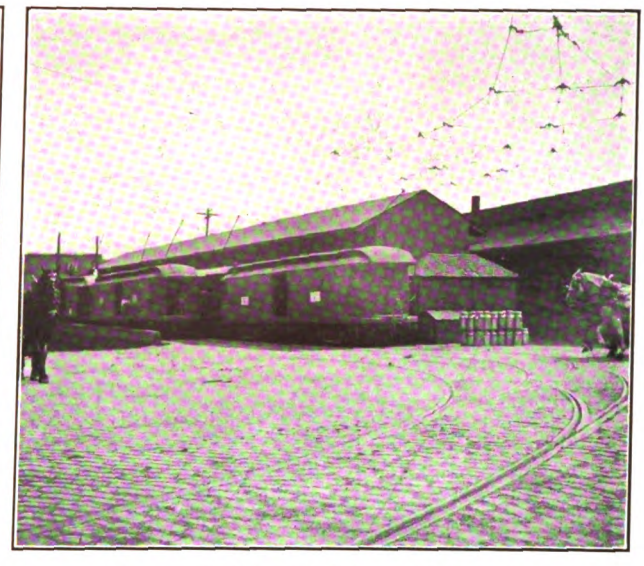
character are not constructed until the firm has been thoroughly investigated and has guaranteed to ship a certain number of cars per month or year over the railway company's lines. Until a decision was rendered recently by the Interstate Commerce Commission, it had been the custom for railway companies to furnish all labor and materials for a side track at the expense of the industry. The industry, however, was reimbursed later by a rebate

Combination Passenger and Freight Station, Lehigh Valley Transit Company

of $1 or $2 per car of freight moved to or from the plant.

WAGON PICK-UP AND DELIVERY

Reports from more than 100 interurban railways in the United States indicate that very few of them maintain a wagon pick-up and delivery service. Some are operating with this extra service, charging practically steam road freight rates plus an additional charge for the wagon service. There are, however, several instances where electric railway companies have transferred their



Cars at Rough-Freight Shed, Detroit United Railway

entire express and freight business to an independent express and freight company which also operates a collection and delivery service, for which it collects practically old-line express rates. In general, the railway companies appear to consider the wagon pick-up and delivery service undesirable, particularly when it is handled by the company's own organization. It means an enlargment of the organization and places the electric railway in a field of transportation with which most traffic men are not familiar. In a few instances the railway company has been forced to resort to wagon collection and delivery service. These are where the franchise limitations do not permit the operation of freight cars of any type in the city streets. Hence it has become necessary to locate the freight station outside the corporate limits and collect and deliver freight by wagons.

STIMULATING EXPRESS AND FREIGHT TRAFFIC

The development of a freight business on electric lines depends largely on the same fundamentals which control freight traffic on steam roads, namely, adequate station and track facilities located as advantageously as those of competing carriers. In this commercial era shippers deal entirely on an economical basis, and only in a few instances will sentiment divert a shipment from a road offering the quickest delivery, particularly after reliability of service has been established.

Numerous forms of publicity have been used by electric roads for stimulating freight traffic, including folders, painted signs and posters, maps, etc., but in the end the real results were obtained through personal solicitation. There was a time when solicitors could bid for traffic against competing roads by reducing rates or rebating, but that method is a thing of the past. Service is everything to the shipper in this day and age, and where two competing roads are on an equal basis so far as the shipper

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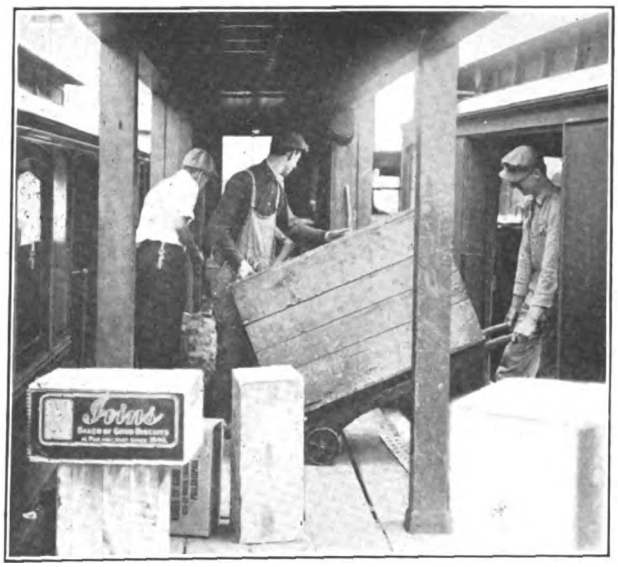
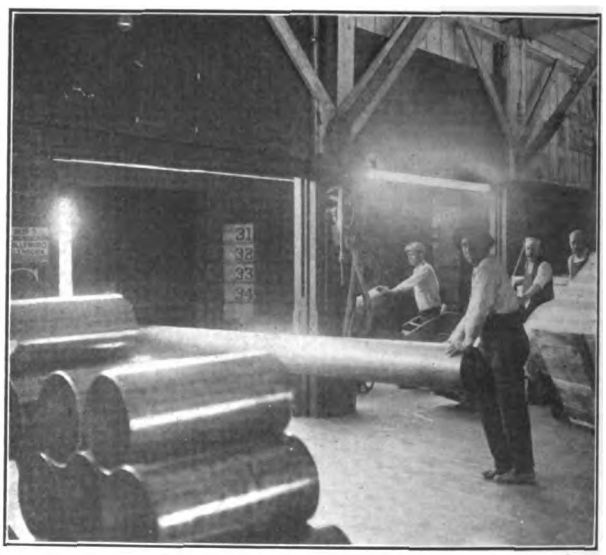
is concerned personal contact at the proper instant usually brings results. To be in touch with the large shippers at the psychological moment is in truth the all-controlling factor when other things are equal.

Freight solicitors also must carefully scrutinize the newspapers in their territory with a view to anticipating shipments of materials for large construction jobs. Frequent personal visits of solicitation usually result in much good. Although the shipper may not have anything to route by the electric line at the time the solicitor visits him, if a convincing argument has been presented and the shipper is satisfied that the electric road can transport his freight with facility equal to other competitors, when shipments are forwarded the electric road has an equal opportunity to obtain the business.



Transfer Platform at Chestnut Hill, Lehigh Valley Transit Company



Loading Freight by Block System at Los Angeles, Pacific Electric Railway

HANDLING SHIPMENTS IN THE WAREHOUSE

Most modern practice in the methods of receiving, checking and billing less-than-carload shipments at terminal stations must of necessity conform in a general way to steam road practice. Freight offered for shipment is checked from dray to warehouse and is carefully examined as to condition and weight by comparison with the shipper's bill of lading, which, if found correct, is signed by the receiving clerk.

Some of the factors which enter into the expeditious handling of freight on the team side of the warehouse are the understanding which the local agent has with teamsters so as to bring about an orderly movement of teams through the driveways beside the warehouses and the manner in which certain doors are designated for the receipt of shipments for certain stations. Many attempts have been made to employ the latter plan on electric roads, but it is not very satisfactory. Usually teamsters do not care to wait to have their shipments received at a certain door when other doors and receiving clerks are free to relieve them. The work of the receiving clerks is greatly facilitated if teamsters are required to place their shipments on the floor with the destination markings in plain sight. The relative location of the cashier's office where the credit list records are kept and all cash is received on prepay and inbound shipments deserves careful consideration. If it is central in relation to the receiving doors on the team side, less time will be required to complete the transaction, thus enabling the dray to move away from the station quickly.

While the loading of outbound freight may appear to be a simple process, too much care cannot be exercised in placing all shipments in the cars in station order and so loading them that the fragile shipments will not be in a position to be damaged in transit. With many roads the O. S. & D. report form must be made out frequently, owing in a large measure to incompetent handling of freight from the warehouse into cars.

Preparing Unit Way Bills, Indianapolis Traction & Terminal Freight House

Two systems of billing freight to destinations are em-

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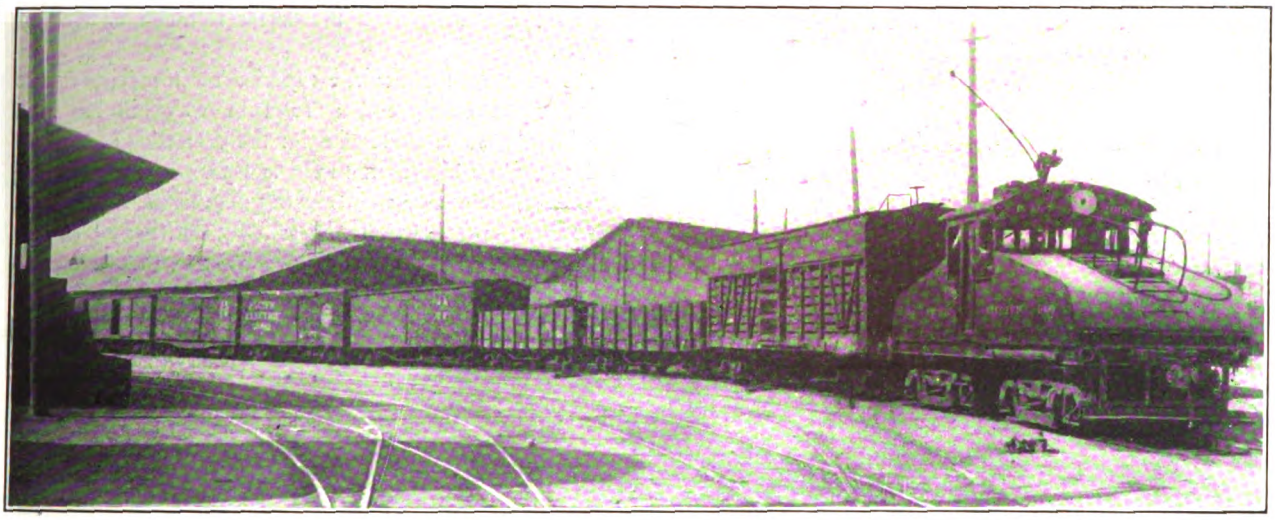
ployed by the various electric roads throughout the country, namely, the individual or unit way bill and the blanket way bill. When the unit way bill is employed, a sufficient number of copies may be made to furnish the receiving agent with his receipt and expense bill, as well as



Switching Various Classes of Electric and Steam Railroad Equipment at Los Angeles, Pacific Electric Railway

those required for the forwarding agent and auditor. This reduces the amount of clerical work necessary at both receiving and delivery stations and, at the same time, permits a quicker delivery after the freight has arrived at its destination. The unit or individual way bill has been in satisfactory use on a number of electric roads where the volume of business handled is quite large, and although not used by steam roads, its general adoption by electric lines is being seriously considered. When the freight business reaches such proportions as to compare

Double-Section Milk Platform, Detroit United Railway

favorably with steam roads, the blanket way bill appears to give best satisfaction, as it is said to relieve the receiving clerk of the responsibility of fixing rates, these being computed by rate clerks. It also forms a simpler record of the day's business handled by each station.

PERISHABLE FREIGHT

Practically all electric lines in the freight and express business are transporting perishables of all kinds under certain restrictions. Fruits and vegetables usually are not accepted in less than carload shipments unless they are in baskets or crates fully protected with solid or slatted wood covers. Shipments of fresh meat and some fruits and vegetables are only received at a time which will permit their delivery before it is possible for the shipment to spoil in transit.

Some companies are operating a refrigerator service in conjunction with the local express but receive only long-haul shipments of perishables for shipments in these cars. Usually this service is established between certain division points where the quantity of perishable shipments is sufficient to justify the service. At the division points the perishables may be transferred to local express trains for delivery to local destinations.

A number of the Indiana lines operate a dispatch freight service which enables them to give prompt deliveries of all perishables, thus reducing the liability of claims arising for damage in transit. This dispatch freight is transported in the baggage compartments of passenger cars, and a rate approximating two to two and one-half times first-class is charged for this service. If considerable care is exercised in the handling of perishables as to time in transit and in investigating the method of bagging or crating, it is considered a desirable commodity, as it brings a high rate and is not subject to claims when transported promptly and properly.

LIVE STOCK SHIPMENTS

Owing to franchise restrictions in a number of cities, many interurban roads are not able to handle live stock shipments. Others have attempted to handle this class of traffic but have found it was necessary to provide special equipment for everything but horses or live stock in crates. Consequently many roads have abandoned further efforts to transport all classes of live stock and limit it to horses. If special rolling stock is provided to handle all classes of live stock and loading facilities such as stock chutes and pens are installed at the way stations, it

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becomes a profitable and very desirable class of business.

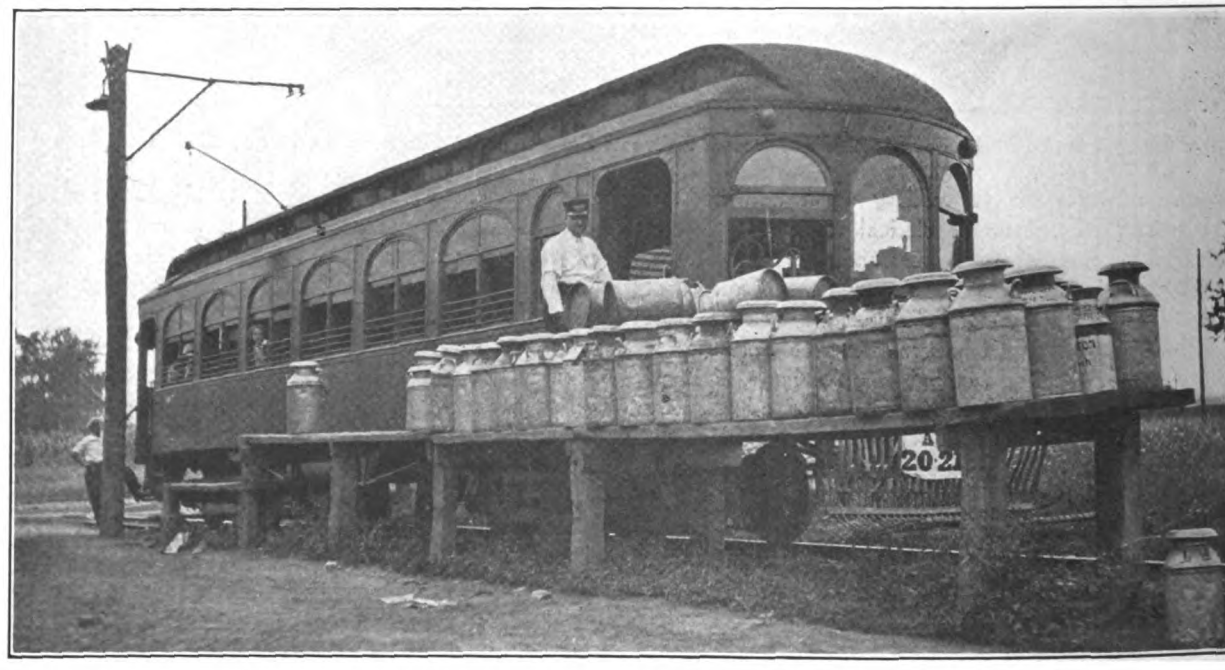
Most electric roads accepting horses for shipment have equipped themselves with inclines at the freight stations and provided side windows in the express cars so that a single or full carload of horses may be transported. These shipments are received, however, only at stations properly equipped and are delivered at destinations where the horses may be unloaded without injury. Certain electric roads have attempted to pick up stock at cross-roads by employing portable stock chutes, but in some cases this method has been found impracticable, as too many injuries occurred in loading or unloading.

MILK SHIPMENTS

Most of the electric roads with terminals in large cities operate a special milk train service with trains scheduled so that milk may be picked up in the early hours of the morning and transported to destination in time for the retailers to make deliveries. In many instances this special service is operated in connection with a large milk depot to which the farmers in the surrounding territory deliver their milk to be pasteurized and cooled before shipment. Generally cans of milk are received at any point on the railway system where a platform conforming to the railway company's specifications has been built. If the business warrants, the company will furnish a milk platform; otherwise the shipper must bear the expense of constructing one conforming to the company's specifications. On many lines the quantity of milk shipped does not warrant the operation of special trains, and on divisions where this is the case the milk is picked up by the local express and passenger trains and delivered to destination.

It appears that the general rule in shipping milk on electric roads is by prepayment of the freight. Each local agent is supplied with a quantity of milk tickets, or tags, which are attached to the cans when they are left on the platform to be picked up by the train crew. Some companies require a round-trip ticket, usually in the form of a tag with an attached coupon, the latter being detached for the movement in one direction, and the rest of the tag for movement in the opposite direction. Other traction lines use a single ticket which also is attached to the can, and the return movement is made on the can initials.

As a result of difficulties experienced in making correct deliveries to consignees, a form of way bill has been provided by some companies for the protection of the conductor responsible for the milk in transit and for the protection of the company in making deliveries. As the cans are picked up at the different railway stations, the number received from each shipper is recorded on the conductor's way bill, as well as the names of consignor and consignee. Upon arrival of the milk train at destination, the consignee is required to sign for each shipment or for a number of consignments shipped to him. Some electric roads have experienced no difficulty in making correct deliveries at destination. Consequently, they adhere to the old method of permitting the going and return ticket to form the only record of shipment.



Milk Platform at Grafton, Ohio, on the Cleveland, Southwestern & Columbus Railway

CRATING AND WRAPPING

The question of properly crating and wrapping different classes of merchandise is much discussed, having received considerable attention from the General Claim Agents' Association for a number of years. Certain instructions have been issued in the official classification, and the regular shippers have learned to conform to these specifications, knowing their shipments will be refused if improperly prepared for transit.

The necessity for exercising extreme care in this particular direction, however, has not been obviated by these instructions, and it is often necessary to refuse shipments

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of merchandise coming from infrequent shippers. If agents and receiving clerks are advised as regards the character of crating and wrapping required for various shipments and the rules are strictly adhered to, a considerable reduction in claims will result.

MARKING REQUIREMENTS

Where a large quantity of freight is handled through a single warehouse, it is necessary to enforce rigidly the rules pertaining to the proper marking of less-than-carload shipments of freight. Not only is it necessary to require that packages be marked, but these marks should be affixed in such a manner as to prevent, so far as possible, their becoming detached or effaced. This rule should be especially enforced where the consignee is a private party or is not generally known in a business way, as with freight of this kind the name and destination are not sufficient but the street address also is positively necessary and should appear on both the package and the billing.

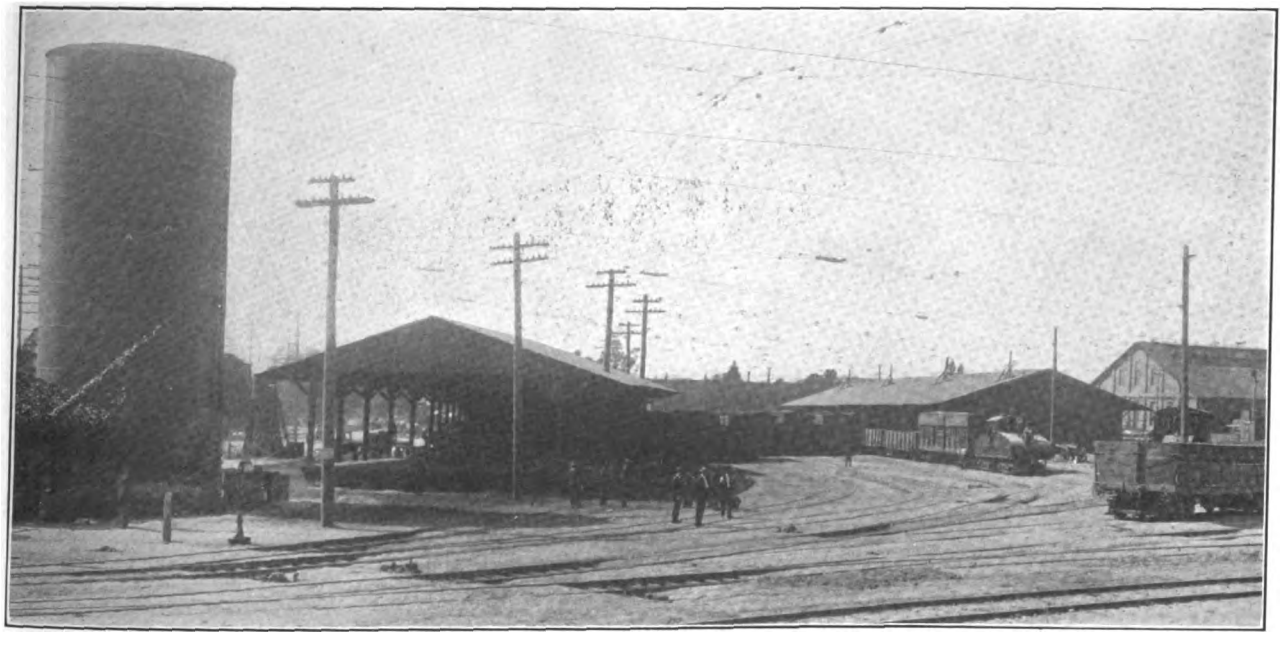
With certain commodities the location of the marking is important. This is particularly true in cases of eggs and crates of berries. Usually shipments of this character are handled in quantities and it becomes necessary to stack them in the freight house and car, so that marking on the end of the case is preferable to marking on the top.

The legibility of the marking of a shipment also is important, as a certain amount of handling by different men, both before and after a shipment reaches its destination, is absolutely necessary, and unless the marks are very distinct delivery is more than likely to be delayed. Where tags are used for marking they should be of a durable quality and securely attached, so that there will be little probability that they will be torn off in handling.

THROUGH CARS AND INTERLINE FREIGHT

When the volume of freight traffic reaches such proportions as to make the operation of through cars or through trains practicable for handling either local or interline freight, the operation of these through fast freight trains during the night, when the passenger service is off the line, has been found most satisfactory. Through freight for local delivery on any division is loaded in station order. When the quantity for one division is insufficient to require an entire car, freight for two or more divisions is loaded into it. Then it is moved to a junction point where the carload is split and transferred to the local express train on the division to which it is destined. These through fast freight trains may be made up of motor and trail cars, and this will enable the latter to be set out at the various division points to which they may be billed. This plan makes a morning delivery possible over quite a large system of lines, as the through train does not peddle the freight, except possibly over the division at the extreme end of the trip.

The development of interline business, when possible, in both carload and less-than-carload freight, provides a source of revenue which should be most profitable. It gives each railway company access to a territory for both freight originated and freight delivered which it could not otherwise reach. Interline freight business between two large terminals may be handled in a way similar to that already described, namely, a fast freight movement between distant points, which sets out cars at the various division points en route to be picked up the following morning by the local express trains operating over the division to which it is destined.



Freight Depot and Tracks at Los Angeles, Pacific Electric Railway—Receiving Shed at Left and Delivery Shed at Right

A recent decision of the Interstate Commerce Commission ordering through freight train service by the electric railway companies operating between Indianapolis, Ind., and Louisville, Ky., indicates that if interurban lines do not take advantage of the possibilities of an interline freight business on their own initiative, they will be forced to do so in case a demand comes from the shippers in the territory served. Quite a number of electric railway companies have seen the possibilities of this character of service and are doing everything in their power to

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stimulate traffic from their own to foreign lines. The distribution of the electric railway map by the Central Electric Traffic Association has been a great factor in stimulating interline business. Many shippers were not aware of the existence of the various connecting routes throughout Indiana, Ohio and Michigan, information which the map sets forth quite plainly.

IN-BOUND FREIGHT METHODS

Modern tendencies in the handling of in-bound freight through terminal warehouses lead to a segregation of the in-bound and the out-bound traffic, either into two separate freight houses or by assigning a certain portion of the warehouse floor for in-bound freight. Under either of these arrangements, both in-bound and out-bound deliveries and receipts may be made without interruption. Where receipts and deliveries of freight are spread over the day—that is to say, where several trains are operated over the lines at different periods during the day—an in-bound and out-bound warehouse is a necessity, if any quantity of freight is handled. Where single express and freight train movements are made over the line out of a large terminal—that is to say, with all out-bound freight leaving the terminal at night and all in-bound freight arriving at the terminal in the morning—it is possible to utilize a warehouse for in-bound freight during the morning and out-bound freight during the afternoon.

The method of receiving and checking in-bound freight at the larger freight houses is much the same as that practised by steam roads. After all freight has been unloaded from the car it is checked with a blind tally sheet, a method which appears to be most satisfactory. When a check by this tally sheet has been completed by the unloading clerk it is compared with the way bill. If an over or short shipment occurs, a re-check of the car is made before the unloading clerk makes an O. S. & D. report. If the tally sheet checks with the way bill, the latter is turned in to the clerical force, where the rates are checked and expense bills prepared. Usually a postal card notification to each shipper is made out with each expense bill.

SYSTEM OF HANDLING OVERS, SHORTS AND DAMAGED SHIPMENTS

In case shipments are "over," it is necessary that agents give a full description, showing name of shipper and consignee, if possible, and all other marks appearing on the packages, also the character and the weight of the goods and any other information which will be of assistance in securing a revenue billing. Over-shipments are delivered to the consignee only on surrender of the original bill of lading or other proof of ownership. At the time such delivery is made the agent takes a receipt and collects a sufficient amount to cover the excess charges for the over-shipment.

Team Side of Dayton Freight House, Ohio Electric Railway

On packages checked short from the car it is the usual custom for the agent to secure all the information possible from the crew, and he also must make a careful re-check to assure himself that the shortage is not the result of carelessness.

Some roads employ a separate report form for damaged shipments in addition to the over, short and refused reports. As a general rule, the claim department desires to begin investigation on damaged shipments as promptly as possible, and the separate form enables them to pick out damaged shipment reports much more readily.

In addition to the filing of the regular report forms on over, short and damaged shipments, the use of a register for recording this information in the general freight agent's office has been found very valuable. Generally reports coming from a local agent receive an office number, and the register is made sufficiently large so that all the information contained on the report may be written on a single line across two pages. If necessary to refer to old

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records of over, short or damaged shipments, it may be done expeditiously by looking up the information contained in the register.

SETTLING CLAIMS

Two important factors enter into the settlement of claims, and each has done much toward reducing the work. First, the agent should exercise great care in determining the character of the damage at the time the shipment is received and should make a full report upon it; second, the amount of the claim should be limited on the form of bill of lading employed.

In years past considerable time was required by steam roads to settle a freight claim, with the result that many shippers were dissatisfied. Electric roads, however, have profited by this experience and have made every effort either to settle claims promptly or else to explain their reasons for refusal. After every effort has been exhausted to bring about a fair settlement through correspondence, following a thorough investigation of a legitimate claim, if the demands of the shipper appear to be unfair, he should be personally investigated. Usually this course produces additional incriminating evidence or convinces the investigator that some error has been made in previous reports about the matter.

The experience of several large companies indicates that not many claims are carried up for suit but that they are compromised or abandoned, especially when the company's claim department brings good evidence to show that the railway was not liable for the damage or loss. Claims which do reach the court, however, are usually those for damage or loss of grain in transit and damage to live stock shipments. Damage to grain may be the result of loss through heating or through defective cars which permit the grain to spill in transit.

From time to time claims arise under the class known as "concealed losses," such as shortage in closed cases. In most instances the legal department or claim department has been able to establish non-liability, as it is very difficult for the shipper to verify the count at the time the goods were placed in the case. The fact, too, that merchandise of this character is handled by draymen at the receiving and delivery points brings in two other parties and makes it practically impossible to determine who is responsible for the loss.

General practice in holding shipments in storage is to establish forty-eight hours' free time, after which they may be deposited in a public storehouse or carried to a central storage point owned by the railway company. In case the shipment consists of perishables, it is sold before it becomes unmarketable, and an accurate record of the transaction is kept for future reference. In case perishable shipments handled in this way are called for by the consignee at a later date and there are no freight charges to be deducted, the storage charges are subtracted, and the amount of money remaining is turned over to the consignee.

Some roads make it a point to dispose of hold-over shipments in storage at the end of six months, while others are compelled to hold them for one year. Following the sale of storage shipments, all expenses are deducted, and the amount of money remaining some companies add to their receipts, while others are compelled by law to deposit it in a charitable fund which is maintained and distributed by the state.

Interior of Dayton Freight House, Ohio Electric Railway

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REQUIREMENTS FOR RECEIPT AND DELIVERY AT CROSSROADS

Quite a number of electric roads continue to make deliveries and receive freight at crossroads where agents are not maintained. The experience of some traffic managers in handling shipments of this character has been very unsatisfactory, and it has been abandoned. The general rule has been that a receipt given to the shipper at a crossroads or at a regular station requires that every shipment of this character must be prepaid and that the railway company is relieved of all liability after the shipment has been deposited on the platform at the destination. Although this method relieves the railway company of all liability, thefts resulting from this practice have made dissatisfied shippers and in many instances lost the company other freight business. When it is possible to operate the local express service on a regular schedule so that the consignee may know when to be at the stop to receive his consignment, deliveries at crossroads need not be discouraged.

DEMURRAGE AND SWITCHING CHARGES

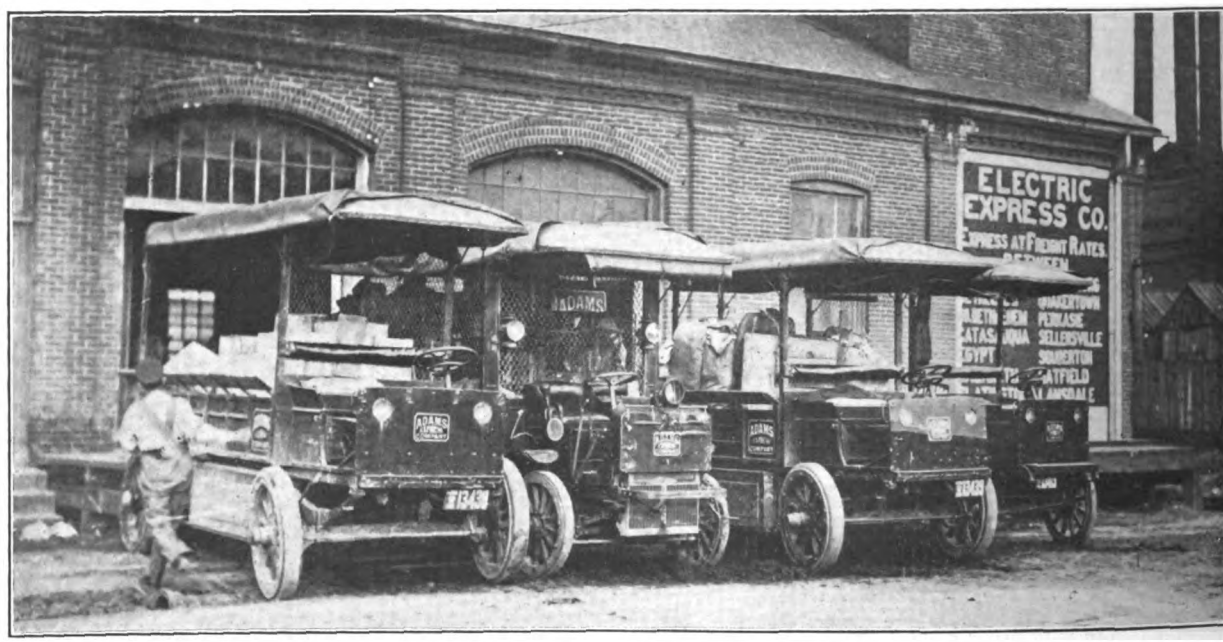
A report from a large number of roads scattered over the United States indicates that most of them are operating according to steam road practice by charging demurrage on cars at the end of the forty-eight-hour free period. This rule usually is adhered to both as regards loads and empties, and its adoption was forced on a number of electric railways because shippers attempted to use cars loaded with coal, lumber and gravel as a warehouse until such time as they could unload them. No convincing argument can be advanced against its general adoption, as it adds to the revenue by increasing car mileage for a given number of cars in service.

Experience has shown that freight received or delivered to and from connecting lines in which the electric road participates in the revenue only to the extent of a switching charge is unprofitable but is one of the phases of the industry which a common carrier must meet. Exceptions to unprofitable switch movements are those where the road making the delivery participates in the revenue at a certain rate per ton with a minimum and maximum charge per car delivered.

FREIGHT EARNINGS AND DESIRABLE COMMODITIES

Roads not engaged in a general interchange of freight and limited to less-than-carload business use the standard electric railway express cars exclusively for this purpose. The quantity of freight handled in this way produces approximately from 10 to 12 per cent of the gross income. On roads engaged in a general freight business, with proper equipment to handle all classes and with interchange relations with steam roads, the proportion of revenue returned from freight traffic amounts to between 30 per cent and 50 per cent of the gross income.

Electric roads which are engaged in conducting a general freight business have found it necessary to make a careful study of the various kinds of merchandise handled with a view to taking exception to the official classification by refusing to handle certain commodities, or by specifying how they must be prepared before they will be accepted, or by applying a minimum, or by increasing the rate. It is also possible for freight agents to eliminate certain commodities, classing them as undesirable business and not soliciting them.



Adams Express Delivery at Allentown, Lehigh Valley Transit Company

Under the heading of "desirable shipments" most electric lines place all classes of merchandise coming in closed cases, such as boots, shoes, dry goods, staple groceries, etc. Other desirable commodities include bulk or carload freight, but some companies are unable to handle shipments of this character owing to franchise restrictions. If an electric road will properly equip itself for handling bulk freight—that is to say, if it will install team tracks, grain elevators, etc.—it will find that such freight is not only an excellent revenue producer but is not subject to claims for damage or delay en route.

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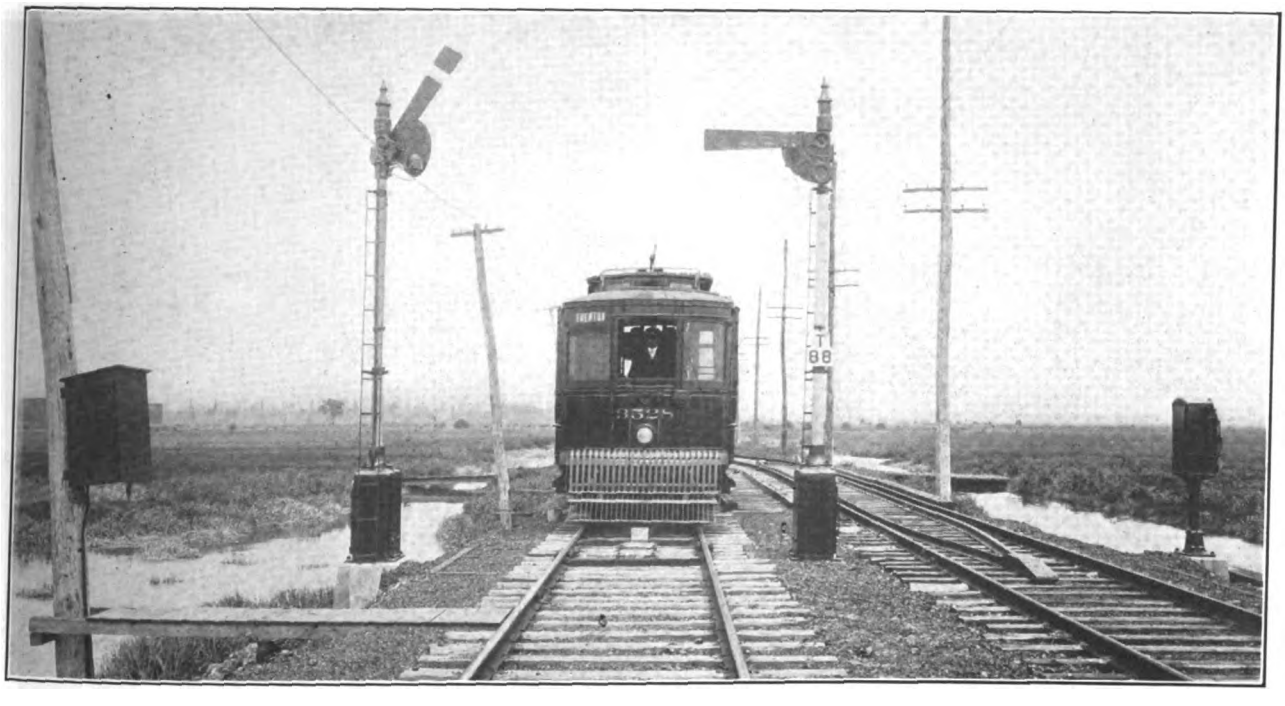
ELECTRIC RAILWAY SIGNALING

EVER since the first single-track electric railway began operation the need for block signals in some form has been recognized. Even as early as 1891 the decidedly primitive arrangement of lights on a circuit extending between sidings and controlled by a hand-operated switch alongside of the track was in use. About 1895 trolley contact signals began to appear, together with some contact devices for automatically operating the switches on the earlier light-circuit systems, although by the end of the decade most of the latter had dropped out of existence. Some intermittent control systems, including the trolley contact scheme, however, survived through the early stages of signal development, and in the year 1901 these were apparently conceded to be the only competitors of telephone train dispatching, the latter of course being the logical application of single-track steam railroad operating methods to the then light traffic of electric interurban railways.

However, neither telephonic dispatching nor intermittent control signals were considered at that time to have attained the perfection which had been developed in dispatching or block signaling on steam railroads, because the elaborate dispatching methods of the latter were made practicable by the presence of a telegraph operator at each meeting point—an utter impossibility for electric railways—and because the incomplete state of development of the early forms of intermittent control signals left much to be desired in their operation.

The track circuit which had come into extremely wide use for automatic block signaling and the control of manually operated signals and interlocking layouts on the steam railroads was at this time believed to be unsuitable for electric railway use owing to the necessity for utilizing the rails for a return circuit and thus preventing the separation of the track into a series of sections or blocks by means of insulated joints.

On the Boston elevated lines a system of track-circuit signals was placed in operation in the year 1901, but in this installation the problems were simplified by the existence of the steel supporting structure to which but one of the rails was grounded, so that the other rail was free to be divided into as many insulated sections as were required. In consequence, d.c. apparatus such as had become largely standardized upon steam railroads could be used, the operation of the signals being effected by low-voltage currents which were shunted away from the signal-operating relays whenever the presence of a pair of wheels provided a short-circuit path across from one rail to the other. This single-rail system was, however, hardly available for ordinary electric railways with earth or stone ballast where the rails, owing to the possibility of defective bonds, had to be cross-bonded at short intervals and where the distances covered were so great that both rails were needed for propulsion current return.



Home Signals for Adjoining Blocks on New High-Speed Line to Trenton, Public Service Railway

In fact, during this period considerable written comment was made regarding the lack of a thoroughly satisfactory signal system for electric railways, the Massachusetts Street Railway Association, through a number of queries sent out to various street railways, finding the prevalent idea to be that while signals were required for single-track operation, the systems then in operation

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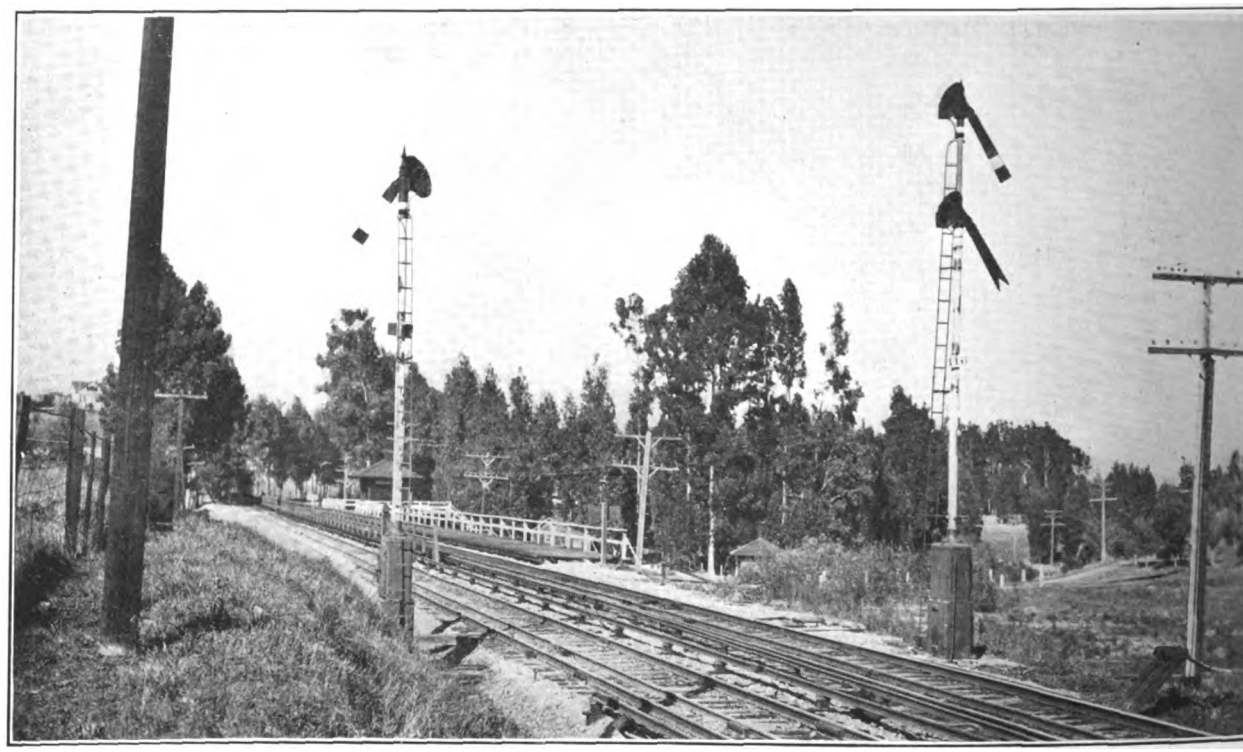
were not reliable. The principal defect in existing signals appeared to be a lack of ability to indicate the presence of more than one car in a block at one time, so that in following movements the rear car of a train run in sections was protected only up to the time when the first car left the block. It is obvious that in the majority of replies to this inquiry only trolley contact signals were considered, but it is interesting to note that the principal objection to them was not the danger of a failure in the operation of the trolley contact device on account of the car passing it while the trolley or the power was off but was rather the lack of the car-counting device which later was developed to register cars in and out of the block and thus to allow permissive following movements. No very serious consideration seemed to be given "impedance bonds" which were installed to replace the customary cross bonds and which were located at the ends of each insulated track section or block, taking the form of coils with a highly inductive effect to prevent the passage of practically all of the alternating signal current. The coils installed at the adjoining ends of blocks were, however, connected at their centers and the connection served as a return path for the direct propulsion current.

The development in methods and thoroughness of protection for double-track roads by a.c. track-circuit signal systems has naturally been rapid since the first installations, but during the same period an equally great improvement has been made in the operating features of the various intermittent control types, consisting in the



View on Northwestern Pacific Railroad, the First Line to Be Equipped with A. C. Signals, Showing Home and Distant Blades on One Mast Because of Short Block in Advance

to rear-end protection at this time, and but few double-track roads were believed to require signals.

Two years later, however, the track-circuit signal suddenly became available for use on electric railways through the commercial development of a.c. signal apparatus as installed on the North Shore Railroad in California, now a part of the Northwestern Pacific Railroad, and within a negligible period of time the track-circuit system changed its position from that of an utter impossibility to one which was strongly reinforced by the years of experience gained through actual operation on steam railroads.

The differences in principle of operation between the a.c. and the d.c. track circuits were of course negligible and the actual changes in apparatus were comparatively few, although they added materially to the cost of installation. The major change consisted in the use of previously mentioned car-counting devices, contactors with a directional sense, indicators to prove the operation of the contactor, and the closed circuit systems which guard against false clear indications. In addition, a number of dispatcher's control systems have been developed through which the dispatcher is enabled to direct the movement of trains by telephone orders and semaphores or other arrestive devices operated from his office.

During the last ten years therefore the conditions confronting electric railways in the matter of signal protection have been completely reversed. To-day a number of manufacturers have placed upon the market apparatus of demonstrated ability, and the problem of signal installation is no longer one of engineering but rather one of first cost. It is somewhat surprising therefore that interest in the matter has lain largely dormant for the greater part of this period. Indeed, it is only within

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the last three years that sufficient attention has been devoted to block signaling for electric railways to cause it to be taken up by a special committee of the American Electric Railway Association. The formation of this committee has, however, stimulated interest to a marked degree, and this has been considerably augmented by the recent installation of signals over a comparatively large mileage of track on the interurban railways of the Middle West. In some respects, therefore, the subject of signals presents more features of novelty than any other which concerns the electric railway industry at the present time, for but a small proportion of the total electric railway mileage in the country is protected to the extent desired by operating officials.

COMMERCIAL TYPES

Generally speaking, the commercial forms of electric railway signals may be separated into three distinct classes, namely, dispatcher's systems, intermittent contact types and those with continuous track-circuit control.

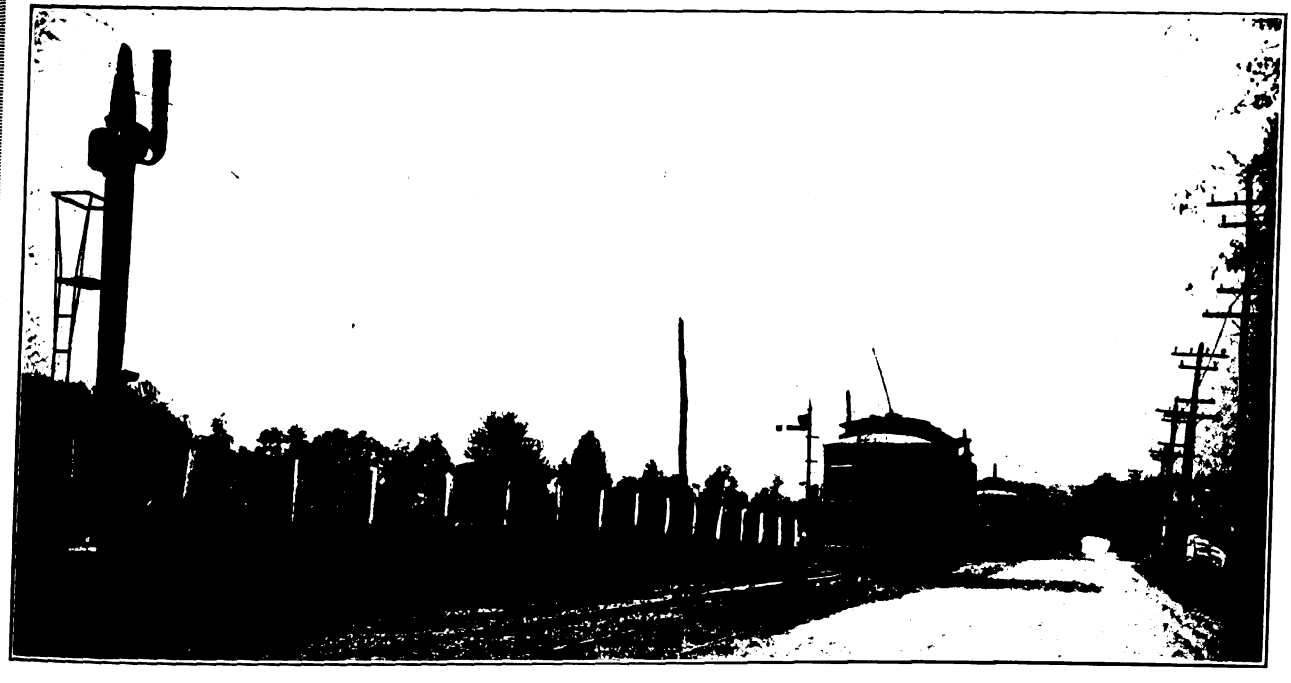
The dispatcher's systems of signaling which are in general use to-day are not directly included in the scope of this article, although a brief mention of them is warranted by the very considerable mileage which they serve. The important characteristics include an electric selective device which is operated by synchronous impulses sent over a single wire from the dispatcher's office and which sets a semaphore or other arrestive device at some point along the line where it is desired to stop a train for orders. The desired orders are given by the dispatcher to the train crew by a telephone mounted either on the signal mast or else within the car and connected at stops with a telephone receptacle on the mast by means of a flexible cord from the car. The arrestive device is usually cleared by the train crew after orders have been received.

About three years ago the Indianapolis & Cincinnati Traction Company made an installation of Simmen signals—a semi-automatic system which constitutes a radical departure from the generally accepted method of train protection. This system is by no means comparable with any of the types heretofore placed upon a commercial basis, but since it centralizes control of train movement in the hands of a single dispatcher it may be classed most nearly as a form of dispatcher's signals. It does, however, plan to eliminate the element of human fallibility by mechanical means, as it reduces the duties of the dispatcher to a series of operations of the simplest character and provides an automatically printed record to show the movements and position of all trains along the line.

In brief, this system consists in placing at each siding three insulated sections of third-rail about 75 ft. long and spaced at intervals of about 2000 ft. Each group of three sections is connected to a dispatcher's office at any desired point along the line, the wire from each group being connected to a separate control switch mounted on the dispatcher's switchboard. There is, therefore, a control switch which corresponds to each siding. Each car is equipped with a third-rail shoe, and whenever this is passing over any of the third-rail sections it is thus possible to complete a grounded circuit through any desired form of apparatus on the car.

In consequence the dispatcher can set the control switch for any siding so that the voltage from a battery is impressed upon the group of third-rail sections at the siding, and as soon as a car passes any one of the three sections the current, in flowing through the circuit between the third-rail shoe and the wheels on the car, closes a relay on the car and lights a green lamp in the cab.

A shunt circuit on the car keeps the green lamp burning until the relay is again de-energized by the breaking



Upper Left-Hand Quadrant Signals Located on Same Side of Track, Lehigh Valley Transit Company—Waiting Car Held by Stop Signal Until Opposing Car Enters Siding

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of the local circuit due to the lifting of the third-rail shoe in passing over the next section of third-rail. If the latter section is not energized by having the dispatcher's switch in the proper position, the relay armature on the car is allowed to fall and thus closes through a back contact a secondary local circuit which connects the battery to a red light and which naturally stays closed until the relay is once more energized by passing over an energized third-rail.

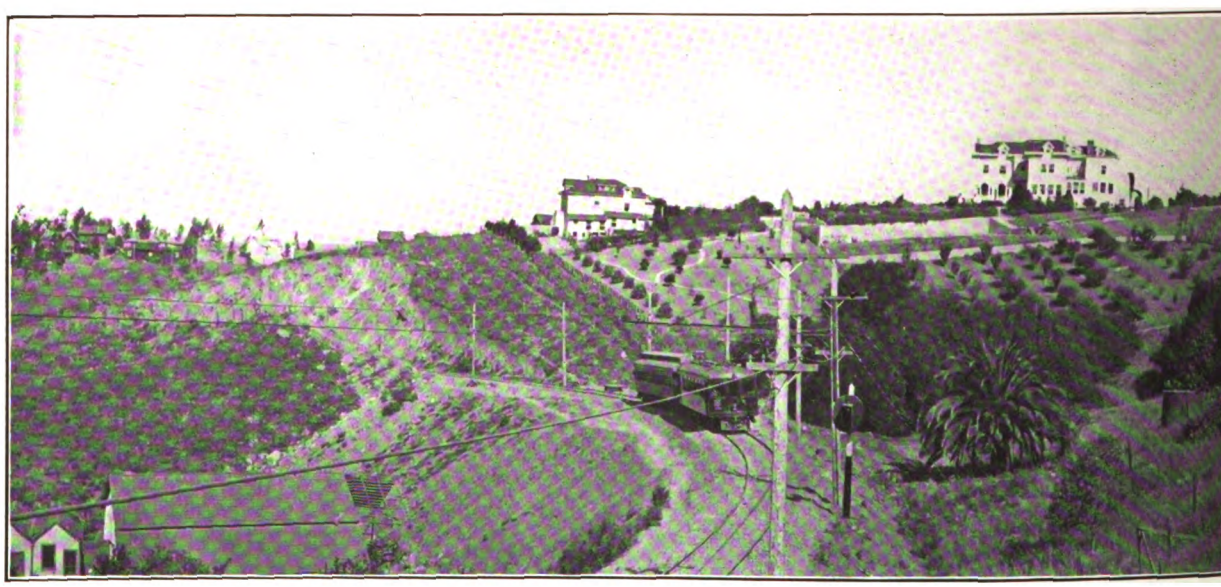
The dispatcher's control switches, one for each siding, are set in a row at the edge of a table, and the handles stand vertically but have a movement to the right or left of 45 deg. With a handle in the vertical position the corresponding circuit is open, but when the handle is moved either to the right or the left the circuit is closed and the third-rail sections are energized. In practice the dispatcher sits with his back to the track, and when he wishes to clear any siding for a car moving toward his left hand, he moves the proper handle to the left. The handles are, however, mechanically interlocked, and it is impossible to set the pair of adjoining handles so that the left-handed one points to the right and vice versa. If one handle is moved to the right, say, and thus gives a clear indication to the train at the corresponding siding, the next handle to the right must be kept vertical, holding any train which may be at the adjoining siding. In this way trains at adjoining sidings cannot both receive clear signals to approach each other and thus meet head-on between sidings. In addition, the handles in the latest form of this signal are electrically interlocked so that when once a train is in a block it becomes impossible to change the position of the control handle and thus open a way to let an opposing train into the other end of the block. Opposing movements of trains at a meeting point are controlled by the two outer third-rail sections of the group at the siding, and two trains which approach the same siding receive danger signals as soon as they pass these sections, leaving each train some 2000 ft. in which to make a stop.

The circuit which is completed when a car stands over one of the third-rail sections, in addition to its control of the lights in the cab, is utilized for telephonic communication direct from the cab to the dispatcher, and a motorman can receive his orders without leaving the car.

This system is more costly, although it is much less complex in the details of apparatus than the ordinary dispatcher's telephone systems. It is, however, less costly than track-circuit signals designed to give the same train spacing when absolute blocking is carried out for following movements, and of course when permissive following movements are allowed the spacing of trains in the same direction may be very much reduced. The cost of installation for a 50-mile line with sidings 5 miles apart approximates $800 per mile.

INTERMITTENT CONTROL SIGNALS

Special interest attaches to the group of signal systems which may be classified as the intermittent control types, among which only the trolley contact signals are now prominent; for, as previously mentioned, these were developed solely to meet the peculiar requirements of the early electric railways. While this class of signals retained complete supremacy in the field, so far as automatic devices were concerned, only until 1903, they are to-day in a most enviable position in their ability to furnish signal protection at an exceedingly moderate cost. This feature is, of course, one of serious moment to the average interurban or city railway which has to obtain the major part of its revenue by hauling passengers at rates of from 1 cent to 2 cents a mile, or at a figure under which a steam railroad would actually lose money.



Light Signals Near Berkeley, Cal., Oakland, Antioch & Eastern Railway

All of this general class of signals have developed certain standard characteristics, and they differ from each other only in details of design or in methods of arriving at the same result, which is to provide, by mechanical means, absolute head-on protection and either absolute or permissive blocking for following movements within a series of self-contained blocks. Each block is equipped

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with two main signals, one at each end, each having a contactor located near it, and both signals are electrically connected or interlocked so that the operation of one involves the operation of the other, often through a single circuit of low first cost. Each signal is arranged so that whenever its contactor is passed by a car moving into the block the signal movement will actuate some form of ratchet or other counting device in a certain direction.

Any movement of a car past the first contactor in the opposite direction, or else out of the other end of the block past the other contactor, actuates the ratchet in the same manner but in the reverse direction, so that whenever a car enters the block it is automatically "counted in" and when it leaves it is "counted out." Both signals are prevented from clearing up until the ratchet has finally reached normal position, or, in other words, until as many cars have moved out of the block in either direction as have entered it. Light signals in combination with disks or arms are generally used, power being obtained from the trolley. Indications are, however, usually locked mechanically so that a temporary interruption of the power supply will not derange their operation.

Differentiation between cars which enter the block and those which leave it obviously requires a contactor with a sense of direction. This is variously obtained, one method consisting in the use of a pendulum which is struck by the trolley wheel and is thus moved in the same direction as that of the car until it closes one of two circuits provided at the contactor. Another method involves two quick-acting interdependent relays which close different circuits according to the relay which is first energized.

The electrical connection between the two signals naturally permits the display of a different signal indication for following and for opposing movements, and it is customary for the signal which is passed when a car enters a block to be set at caution, allowing following cars to enter the block under control. The signal at the opposite end of the block is set at stop by the same movement and thus provides absolute head-on protection for the full block length. Protection against simultaneous entrance of the block by opposing cars is obtained by making one of each pair of signals slow-acting, by producing a special indication or lack of indication and the like.

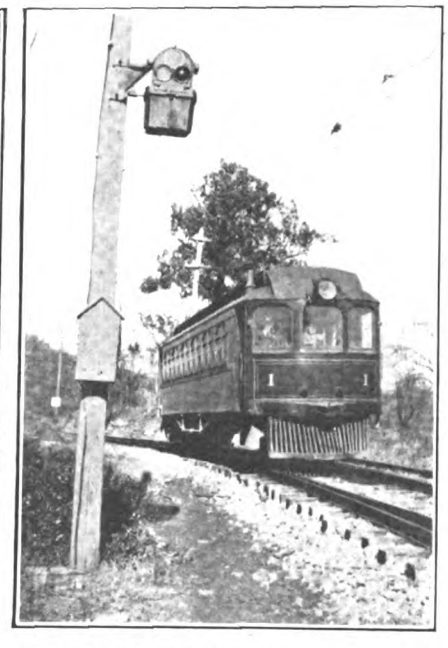
Permissive following movements are, however, by no means an essential feature of intermittent control signals. The signal passed by a car when it enters the block may, if desired, be made to display a stop indication and thus prevent any following car from entering the block until the first one has left it. Such a method of absolute blocking is in use on a number of roads, and where traffic conditions permit it is unquestionably a desirable plan of operation.

The adoption of absolute blocking for following movements with intermittent control nevertheless does not in general eliminate the necessity for the car-counting device, which might appear to be valuable only under the permissive system. Even under the most rigidly enforced operating rules there is always the possibility for violation of them either by carelessness or because of an emergency. When this occurs a car following another into the block is left without protection as soon as the first car leaves the block unless the car counter is installed to hold the signals at danger, and for this reason the counting device is considered desirable regardless of the method used for blocking following movement.

There is, however, an objection to the use of intermittent control for high-speed service which lies in the fact that a failure to operate may leave a signal at clear. This is covered in most cases by setting the signal in advance of the contactor so that the motorman approaching it can see by the change in aspect that the contactor has operated. To this plan, however, exists the

Trolley-Contact Signal for Interurban Service in South Bend, Ind.

Making Repairs to Trolley-Contact Signal in the Field



Trolley-Contact Signal on Line of Nashville Interurban Railway.

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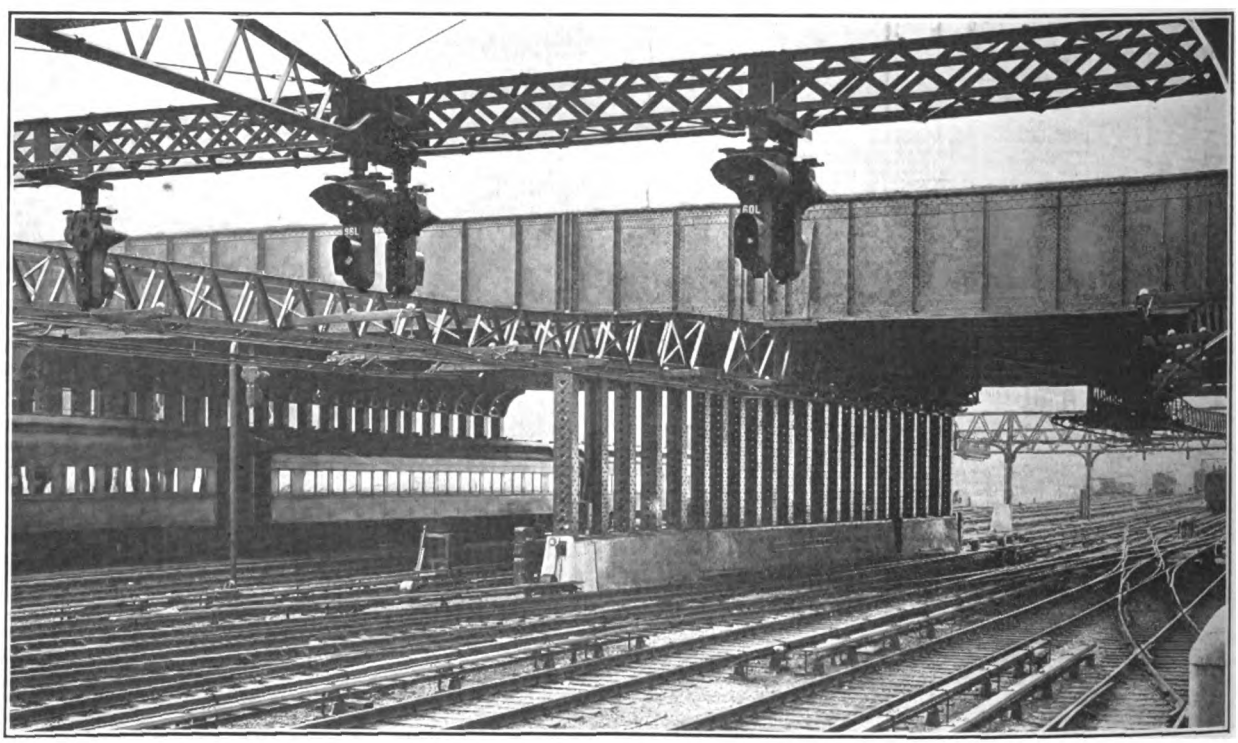
objection that motormen may be required to run by stop signals in case absolute blocking against following movements is practised because a stop indication is then given at the entering end of the block as soon as a car passes the contactor. A recent plan for overcoming this is to provide an indication for the operation of the contactor in the form of a special signal some distance in advance of the entrance of the block. This would, of course, properly cover the operation of the signals at both ends of the block, as the mutual operation of the two can be guaranteed by wiring them so that a short-circuit, ground or failure of power will produce stop indications. Failures of the car-counting device may also be provided against in a similar manner.

These "check indications" are perfectly satisfactory for movements at moderate speed and in locations where signals are not too frequent, but where signals have to be passed at high speed and at short intervals the additional duty imposed upon the motorman through the necessity for ascertaining that each signal has operated, thus distracting his attention from the track ahead, is generally considered to be a drawback. In brief, it may be said that the track-circuit signal system is the only one now in existence which is absolutely certain in operation and which in consequence does not need to have its operation checked. This is accomplished, however, only at a comparatively great expense, and if a less expensive form of signal is used, a greater degree of discipline for the motormen must be enforced to make up for it. With this exception the most improved forms of trolley contact systems leave nothing to be desired on the score of protection, nor do the latest forms of trolley contactor appear to limit the speed at which they may be safely passed.

On the other hand, for slow-speed service the latest developments in this type of block signals render it ideal not only because the first cost is exceedingly low but because no need exists for digging up the track, when the signals are installed, in order to rebond rails, insulate the sectionalizing joints and remove tie rods as is required with track circuits. The cost of a block 1 mile in length may be said roughly to approximate $550, of which $400 covers the cost and erection of the two signals and the two contactors. The remaining $150 covers the cost and erection of, say, four line wires, a figure which would, of course, vary directly with the length of the block in case any length other than 1 mile was used.

SPECIAL FORMS OF INTERMITTENT CONTROL SIGNALS

Four forms of intermittent control signals are in a practical stage of commercial development at the present time and all of them are operated by trolley contact devices.



Light Signals with Two Indications, Pennsylvania Railroad Terminal in New York City

Of these four types, the Nachod signal is furnished with a trolley contactor which has no moving parts, and which consists of a pair of metal strips on each side of the wire, so that the trolley wheel, in passing it, bridges across between the strips and trolley, closing the operating circuit. A pair of quick-acting interconnected relays is used to give the directional sense, the first one to operate holding the other open during the passage of the car. These relays, being slow releasing, are not affected should the trolley wheel bounce after it strikes the contactor. In a recent test on the lines of the Northern Electric Light & Traction Company signals were operated successfully by these contactors when cars were operated at speeds of over 75 m.p.h.

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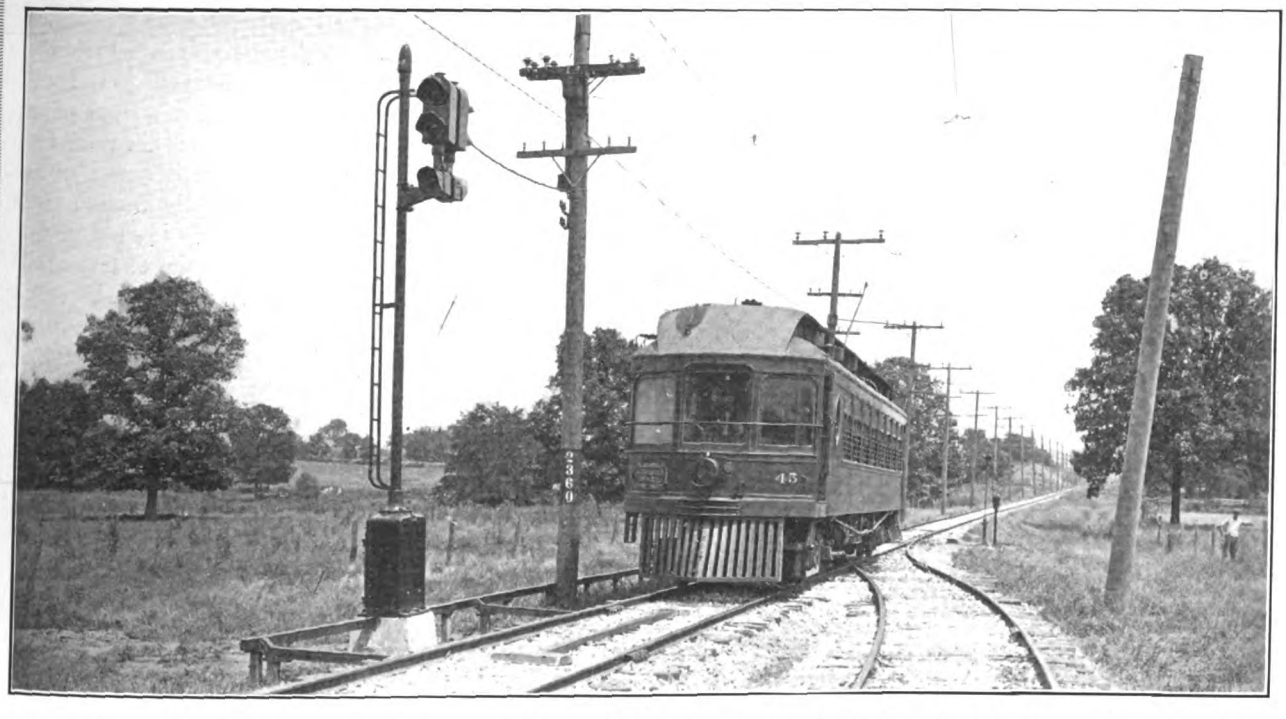
With this signal the indication is given both by a colored light and by an opaque disk of the same color viewed through a clear glass roundel. The effect of bright sunlight or a dark day is to dim the one and increase the brilliance of the other, so that there is always a distinct indication for any lighting. Opposing movements are prevented by a red light and a red disk, and following movements are allowed by a white light and a white disk, permissive movements past a white signal producing a "blink" in the light as an indication that the car has registered into the block. Simultaneous entrance of cars at opposite ends of the block leaves the signal at "neutral," or gives no indication. As cars are required to obtain white indications before entering a block, in case the light does not appear both cars must back out past the contactors and try to enter the block a second time, the first one in obtaining a white signal and setting a red against the other. One form of this signal uses but one line wire, the operating circuit being completed through ground. the signals are held in clear position by power and they fall to stop position by gravity in case of any derangement of the wiring, the signals at each end of the block being electrically interlocked so that a car cannot enter a block until the signal at the opposite end has actually moved to stop.

In another form of the trolley contact system—the Chapman signal—the indications are given by a pivoted arm painted red which assumes different positions in front of a white disk or background. The arm is illuminated at night by a bank of lamps carried in a hood which extends out over the front of the signal and which serves to reflect the light against the arm and to make it stand out prominently against its white background.

The signal indications consist of a horizontal position of the arm as a stop sign for opposing movements, a vertical position of the arm as a permissive following movement indication and a 45-deg. position as a normal or neutral indication. The latter position is assumed by



View on Terre Haute, Indianapolis & Eastern, Showing Light Signals for Adjoining Blocks Mounted on One Mast

This is designed for use with double-end sidings with spring switches where cars invariably pass to the right. In this case contactors without directional sense may be used if one is set over each track at the siding.

Another form with the directional feature has an additional line wire, required for the rare occurrence of a car running into the block against a red signal and having to back out again. The extra wire enables the car to count in on the signal relay for following movements at the opposite end of the block. Thus the car counts out as it backs out of the block without pulling down trolley under contactor, the signals being left in exactly the same condition as before its entrance. This type protects all possible shifting movements. In case absolute prevention of false clear indications is desired, a third form of this signal is furnished. In this, by means of four line wires, the signals at the two ends of a block when the block is clear. When a car enters the block the arm on the signal at the far end of the block first moves to the horizontal position and is locked, then the arm at the entering end moves to vertical. In other words, the permissive indication at the entering end cannot be obtained until the stop at the far end is set. This is of extreme importance since, in this way, a ground on the line wire gives a stop indication. The indication to show operation of the car-counting device is a momentary movement of the arm from vertical to 45 deg. followed by a return to vertical position.

The trolley contactor is of the pendulum type, a tongue pivotally supported in the path of the trolley wheel closing one of two circuits corresponding to the direction in which the car is moving. When one con-

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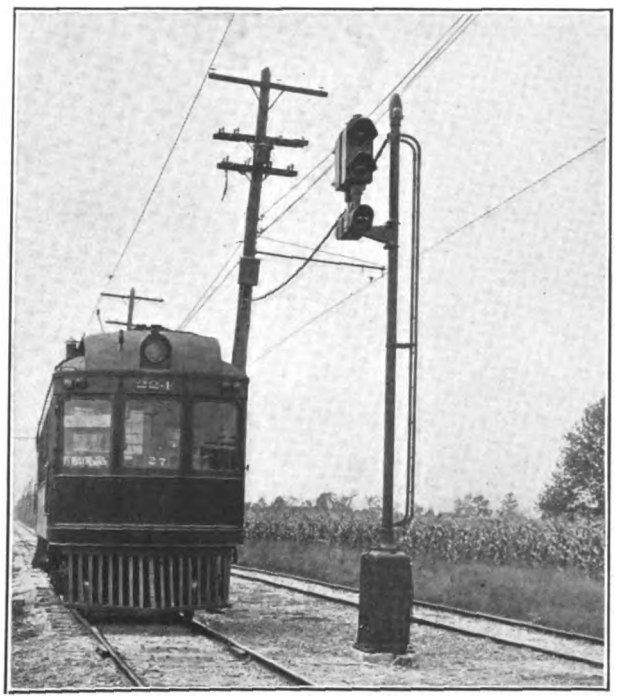
tactor acts, the contactor at the other end is automatically cut out, and simultaneous operation when two cars reach opposite ends of the block at the same instant is avoided by making one contactor slow-acting. All power is obtained from the trolley feeders. Only two line wires are used.

A contactor of the pendulum type is also used for the United States Electric Signal Company's signals. In the car-counting type the contactor operates to set the signals to display a single red light and below it a red disk behind plain glass for opposing movements and a white light in combination with a rotating disk for following movements. A non-counting type of signal is also manufactured.

On either side of the signal case an inclosed white semaphore disk with green center is provided, which in its normal position presents only its edge to view but



Light Signal with Permissive Indication, Union Traction Company of Indiana

when operated to display its indication is rotated on a horizontal axis to present its flat surface to view and is simultaneously illuminated by an incandescent lamp contained in the semaphore case.

The permissive indication for a car entering an unoccupied block is by the display of one of the white disks. The permissive indication for following movements is a shifting of the indication from one side to the other for each car entering the block. Interlocking control of the signals, one at each end of the block, is obtained by circuits operating through two line wires.

The Ward signal, which was placed in operation some two years ago, has a novel contactor which is operated by the raising of the trolley wire which occurs as the trolley wheel passes along it. The contactor proper is contained in a box carried on one of the span wires with the actuating rod extending out of the bottom and attached to the trolley wire with a standard ear. Standard three-position semaphore arms in combination with lights for night operation are used as indications, permissive following movements under caution signals being provided for, if desired, by means of an interlocking car-counting device. The contactor is reported to permit operation at the highest speeds as it involves the use of no obstruction on the trolley wire. The company also furnishes directional contactors of another type which are likewise adjusted for high speed. Three wires are used in the control circuits. Failures on account of the trolley pole having insufficient tension to lift the trolley wire and actuate the contactor or when the wire is heavily loaded with sleet are reported to be an impossibility. In any event, however, the assurance of operation is given by the usual procedure of setting the signal some distance in advance of the contactor so that the motorman can see the signal change indications.

CONTINUOUS TRACK-CIRCUIT SIGNALING

As previously mentioned, the continuous track circuit became generally available for electric railways through the introduction of a.c. signal apparatus in 1903. At that time the first cost of a.c. track-circuit systems was considerably greater than that of the d.c. systems which could be used upon steam railroads, and this proved to be a serious handicap to the track-circuit system except upon electric railways with exceptionally dense traffic. In consequence they were first used only to meet special local situations or upon lines whose density of traffic had warranted the installation of double track. The situation was, in fact, quite similar to that which existed in the steam railroad field until a short time ago, the consensus of opinion being that traffic which did not require double tracks would not successfully support the cost of a complete track-circuit installation.

Naturally, under these circumstances the developments in continuous track-circuit signaling were largely applicable to double-track operation just as they had been in the case of the steam roads, and the vastly greater problems of single-track protection received but scant consideration. Thus two of the first a.c. track-circuit systems were installed on the double-track lines of the North Shore Railroad in California and of the New York Subway. The installation on the former railway was a good example of the attitude of the period, for signals were installed only on that part of the line which was double-tracked, leaving the single-track branches to be operated by telegraphic orders from a dispatcher. Both of these early signal installations, it should be said, were operated on a single return rail system somewhat similar to that used on the Boston Elevated Railway except that alternating current was used for the track circuits. Neither system in consequence made use of impedance bonds, and it was, in fact, not until 1905 that this necessary device was introduced commercially, although here again the installation was on a double-track line of the Boston Elevated Railway.

The next three years saw a really remarkable increase in track-circuit signaling, as a large number of a.c. signals were installed, and even in the early installations the ability of the a.c. signal apparatus always to select the

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current for which it was designed was demonstrated. In the signal system installed on the New York, New Haven & Hartford Railroad's electrified division in 1907 twenty-five-cycle propulsion current was used, but the signal apparatus was designed for sixty-cycle current and the track relays successfully proved their ability to differentiate between the two frequencies impressed upon them.

Prominent among the early a.c. systems were the light signal installations of the Hudson & Manhattan Railroad and on the New York Central & Hudson River Railroad at its electrified terminal in New York City, which served in part as forerunners of the recently adopted plan of using light signals in the open sunlight.

LIGHT SIGNALS

This form of indication, consisting of a pair of red and green lamps mounted in a deep hood upon a signal mast beside the track, has been adopted by several interurban roads within the past two years. In operation the circuit for the green lamp is held closed by the relay connected across the two rails of the track just as a semaphore is held at clear. When the track relay is de-energized by the presence of a train on the same section of track as the relay, the green light circuit is broken and the red is lighted through a back contact connection on the relay armature.

The obvious advantages are mechanical simplicity and also, by the elimination of the semaphore operating mechanism, which requires a certain amount of inspection and repairs, a certain reduction in the cost of installation, although all equipment except the indication itself is exactly the same as with semaphores. This saving varies, under different circumstances, through wide limits, the estimates ranging from 5 per cent to 15 per cent. As opposed to this, however, there is an increased cost of operation due to power consumed in lighting the lamps, and a certain amount is involved in lamp renewals, so that the saving due to decreased first cost is by no means clear gain. In some of the latest installations, however, the expense due to lighting current and

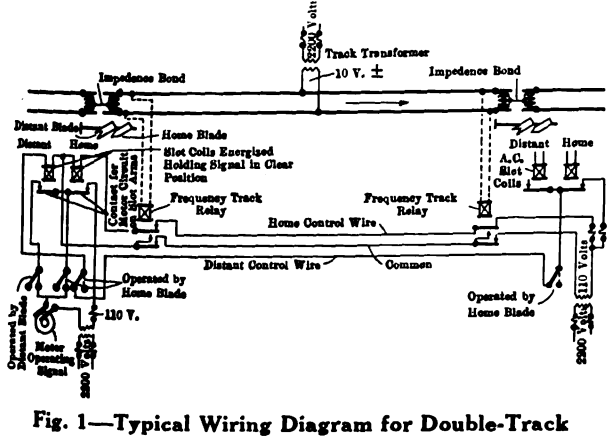
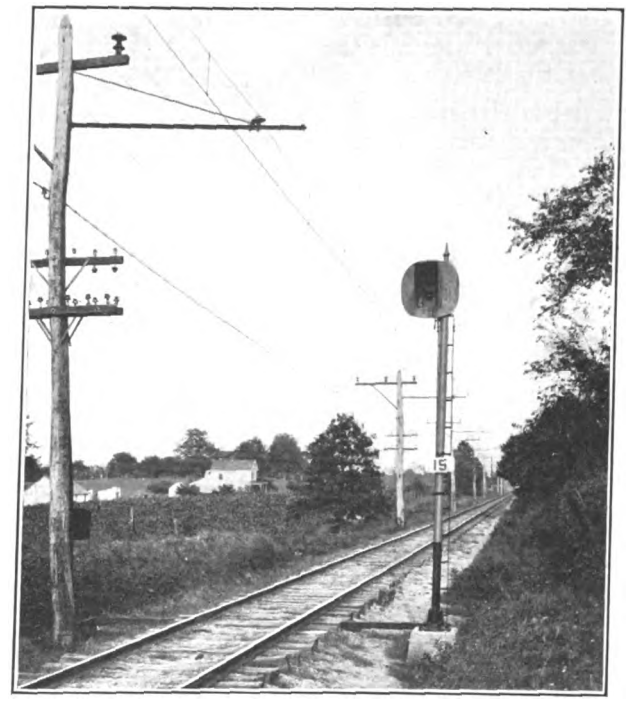


Fig. 1—Typical Wiring Diagram for Double-Track Two-Position Signals

deterioration of lamps is materially reduced by having the lamps lighted only when the signals are being approached by a train. To accomplish this the separate lighting circuits for lamps are closed only through back contacts on the track relays at each end of center-fed track sections. When a train is near the signal at the end of a block and consequently de-energizes the track relay, the armature in falling open closes the lighting circuit and supplies current to the lights. When no train is near the signals the track relays are, of course,



Advance-Intermediate Signal, Washington, Baltimore & Annapolis Railroad

closed, and the lighting circuit is opened at the back contact of the track relay.

DOUBLE-TRACK SIGNALING

Until recent years practically all of the electric railway signal systems with track circuits were, as mentioned before, of the simple form which was required only to protect against following movements. Two-position semaphore signals were generally used, these being located at the entrance end of each block. The most modern development of this method will be found in the signal installation of the New York, Westchester & Boston Railway, of which a description was given in the ELECTRIC RAILWAY JOURNAL for July 20, 1912.

The accompanying cut, showing a typical track circuit, is reproduced from this descriptive article to explain the method of operation in a conventional form, the main principles applying to all forms of track-circuit signaling. This installation, it should be noted, makes use of center-fed blocks, a practice which involves the slightly greater complication of using two relays to each block instead of one, the object being to obtain a saving in power consumption and a somewhat more positive action of the relays. The absence will be noted of overlapping blocks to provide for a positive spacing between trains at all times and to provide a possibility for the use of automatic stops. This omission, which is in some respects contrary to the most recent trend of opinion regarding the elimination of the human element, is due to reasons which are outlined in the descriptive article, but

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in other respects the circuits are representative of the latest developments in double-track signaling, the endeavor being to attain the greatest degree of simplicity consistent with an absolute certainty that false clear indications cannot be given.

It will be observed from the diagrammatic signals shown in the illustration that the semaphores are operated in the lower right-hand quadrant. This is also contrary to the present trend of opinion, the reason for the use of this quadrant being that the signals on this line were designed to agree in aspect with those of the New York, New Haven & Hartford Railroad on account of the joint use of tracks. This question of signal

Proceed and Stop Indications with Three-Position Signals, Oregon Electric Railway

aspects is, however, subject to certain differences of opinion at the present time.

SIGNAL INDICATIONS

The use of one of the left-hand quadrants is, of course, practically obligatory for electric railways because with any overhead contact system for propulsion current a perfect wall of poles has to be set up on at least one side of the track. With a semaphore arm operating in either the upper or lower right-hand quadrant, or, in other words, in some position to the right of the signal mast, the indication will be thrown toward the outside of the track and a motorman approaching a signal may have his view of it obscured by the intervening poles, or at least will have as a background for the indication the line of poles extending beyond the signal. With three-position signals confusion also may arise through the fact that the vertical or clear position for the semaphore arm will coincide with the vertical lines impressed upon the eye by the view of the poles ahead of the car.

For this reason the committee on block signals of the American Electric Railway Association has recommended for three-position signals the adoption of the upper left-hand quadrant indication, contrary to the practice of the steam railroads, upon which the upper right-hand quadrant has been generally advocated as a standard. For three-position signals the use of an upper quadrant is necessitated by the fact that a vertical downward position for the semaphore would be practically obscured by the signal mast.

The important differences in opinion, therefore, lie between two-position and three-position semaphores. With the latter all three indications which have become well standardized—namely, stop, caution and proceed—are given by one semaphore arm, so that to take advantage of the simplicity and economy of the three-position indication it is necessary to limit the length of block, or, in other words, to separate the home signals by a distance not greater than that which should properly be placed between a distant signal and its home signal. As the latter distance should be slightly more than the maximum distance within which the fastest train may be stopped by normal service applications of the air brakes, it may be on electric railways not more than 1200 ft., and any length of block even approximately as short as this is not often required or even desired on interurban lines. On the other hand, the adoption of the three positions as standard does not by any means prevent the use of separate distant signals indicating in but two of the three standard positions and thus following the standard aspects without giving up the principle of two-position signals where they are desired. The use of the vertical or clear position for the arm affords, of course, an opportunity for confusion owing to the lack of distinctiveness of the indication, but this is met by the advocates of the three positions with the argument that, so long as the signal furnishes a sufficiently arrestive indication for caution and stop, it has done the major part of its duty, as the distinctiveness of the clear signal can assist only in accelerating train movement.

The plan of having the separate and distinct daylight indication of a semaphore arm set at an angle of 45 deg. instead of giving the indication by means of two arms, the upper one horizontal and the lower one at an angle, is, in addition, a logical system on account of the standardization of three distinct night indications, consisting of a red light for stop, yellow for caution and green for clear. In addition, the modifications of stop signals which are now favored under special conditions, such as a semaphore below the main indication acting as a permissive or diverging route signal, are in this way devoid of much of the complication of aspect required when two-position distant and home signals are mounted on the same mast.

SINGLE-TRACK SIGNALING

The development of single-track signaling with track circuits may be said to have begun only within the past five years. One of the reasons for this has been, as mentioned before, the lack of demand on account of the relatively great expense of such systems for single-track railways whose traffic was necessarily only moderate in density. Such systems involve a first cost ranging from $1,000 to $2,000 per mile, depending upon the block

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length and the facilities employed for the acceleration of traffic. Until quite recently, therefore, the continuous track circuit for single-track lines was used mainly for special circumstances such as short blocks of single track and for the protection of curves where the view was obstructed by a deep cut or a grove of trees.

Such a signaling problem is, of course, exceedingly simple. A single signal at each end of the curve or section to be protected is installed alongside of the track so that each signal faces the traffic approaching the curve and will be seen at the right-hand side of the track by such traffic. If the section of protected track is insulated and equipped with reactance bonds at the ends, fed with alternating current at low voltage, and is furnished with a track relay at each signal to hold closed the operating circuits of the signals, it is obvious that a car on the curve or block as it would then become will set both signals at stop position regardless of the direction of motion.

THE USE OF PRELIMINARIES

This as it stands would be sufficient except for the fact that there is a possibility of two cars entering the block from opposite ends at the same time or at least sufficiently near to the same time to let both motormen past the signals without noticing that they were set at danger. This possibility may be eliminated by extending the control of one signal from 1000 ft. to 2000 ft. beyond the signal at the opposite end of the block. This "preliminary," or extension of the track circuit outside of the limits of the block as defined by the track between the two opposing signals, will then enable a car which passes on to it to set the signal at the opposite end of the block some time before the nearer signal is passed. If another car should enter the opposite end of the block at the same time that the first car entered the preliminary, the first car would receive a stop indication from the nearer signal when at an ample stopping distance from it. The preliminary section under the circumstances would be insulated from the block and would require a track relay connected to it to make or break the operating circuit of the signal at the opposite end of the block.

The above-described block for simple curve protection displays the characteristics upon which the earlier developments in single-track signaling were based. The so-called preliminaries have been, in fact, a feature of practically every single-track installation until less than two years ago, notwithstanding the fact that their use affords an opportunity for a train approaching the siding at the end of one block to stop an opposing train at the next signal, which is possibly one full block away even though the two trains are scheduled for a meet at the siding. Thus, if an east-bound train was somewhat late for a meet at a certain siding and did not get into the next block to the west of the siding before the west-bound train had entered the preliminary which is assumed to extend to the east of the meeting point, the east-bound train would obviously be held at the home signal controlled by the preliminary until the west-bound train had moved into the clear on the siding. This might involve a considerable lapse of time and cause additional delay to the train already late; yet it would not result from any necessity for protection, because the west-bound train within the preliminary would be protected by the east-bound home signal at the siding against any possibility of being hit by the east-bound train. In brief, the preliminary is a limitation imposed solely to provide against the rare occurrence of two opposing cars entering the block simultaneously.

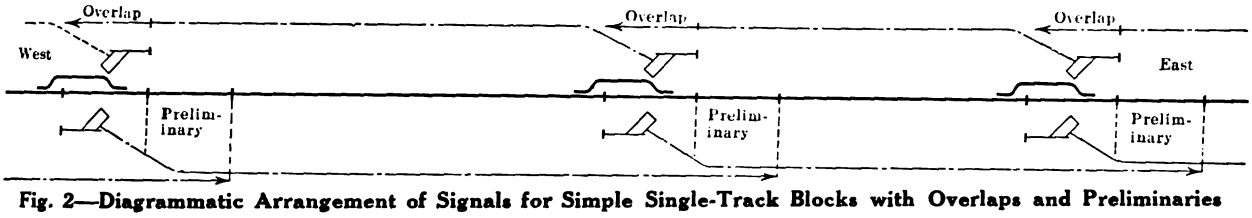

Fig. 2—Diagrammatic Arrangement of Signals for Simple Single-Track Blocks with Overlaps and Preliminaries

SINGLE-TRACK BLOCKING WITH PRELIMINARIES

A typical example of simple single-track blocking with preliminaries is shown in Fig. 3, which presents diagrammatically the scheme installed upon the lines of the Lehigh Valley Transit Company. In this installation, one of the latest plans of the General Railway Signal Company, the signals governing west-bound trains stand normally at stop, while the east-bound signals are normal-clear. The preliminary is used in every case as a clearing section for the normal-stop signal, and when a train enters this section of track the circuit of the motor for the signal which is being approached by a west-bound train is closed and causes the signal to indicate proceed. If there is a train already within the block, however, the

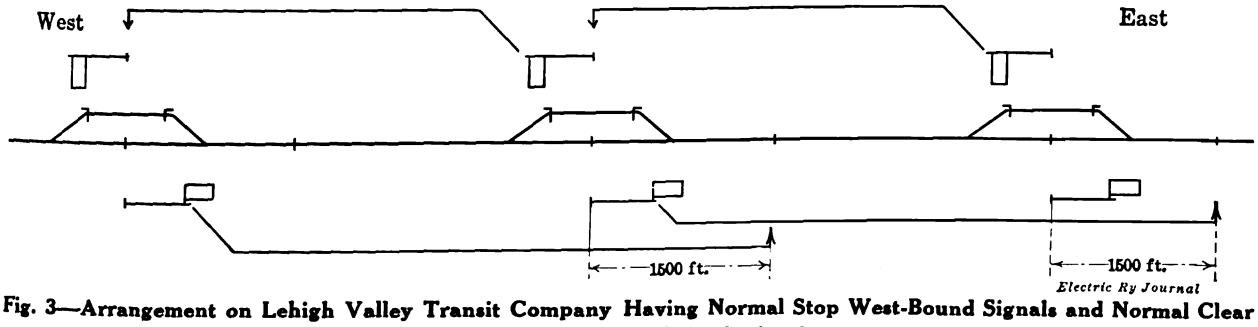

Fig. 3—Arrangement on Lehigh Valley Transit Company Having Normal Stop West-Bound Signals and Normal Clear East-Bound Signals with Preliminaries

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motor circuit is kept open and the signal remains at stop, preventing the west-bound train on the preliminary section from entering the block. This combination of normal-clear and normal-stop signals affords a means for electrically interlocking opposing signals so that one of the signals must indicate stop before the other can indicate clear.

Absolute blocking for following movements is employed and trains are required to head in and back out of all passing sidings, so that a train on a siding after the passage of an opposing train has its rear protected by the signal one black away at its rear and can start into the next block under full protection provided the signal which it faces is at clear when the car backs out of the switch. The track in each siding which extends beyond the clearing points is not included in the track circuits, so that a train in the clear on a siding cannot interfere with the movements of approaching trains.

This is the simplest and the least expensive of the most recent developments made by the manufacturer mentioned, although light signals would have been somewhat cheaper than the semaphores actually installed on this line. The protection which it affords is, of course, complete, but it rigidly compels the spacing of trains one block apart, or in this case from siding to siding, and where traffic requirements make this undesirable the scheme shown in Fig. 4 is recommended if conditions are suitable. Five Indiana interurban railways are installing signals in accordance with this scheme at the present time.

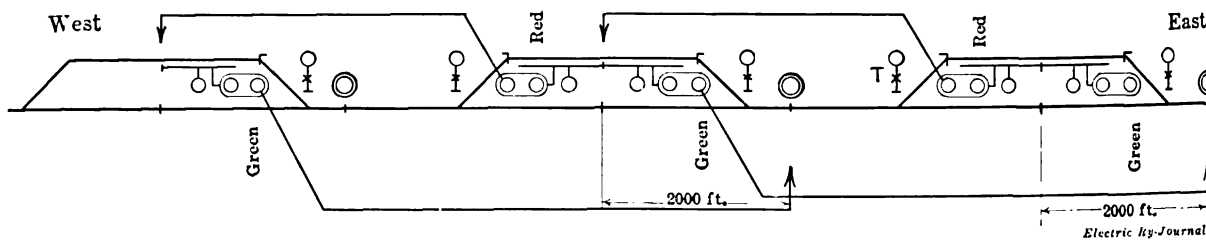

Fig. 4—Arrangement of Light Signals Having Permissive Indications for Following Movements, Switch Indicators and Block Indicators at the Commencements of the Preliminaries

This is based upon the same general plan as the foregoing one, except that light signals are used, but it provides for permissive following movements in order to eliminate the necessity for trains in the same direction to be spaced a full block-length apart. The two upper lights constitute the main signal and a lower light the permissive indication.

This method of operation is, in many classes of service, eminently satisfactory, although the manufacturer by no means claims that it is universally desirable under all conditions, and where permissive blocking is not desirable the use of multiple intermediate signals or a decreased block length is recommended instead.

Operation under permissive following movements, while not generally regarded with favor for extremely high-speed service, is acceptable to many operating men for ordinary electric railway traffic, and the adherents of such methods point to the New York elevated roads, which have operated for twenty-five years with practically no following movement signals and with no serious collisions. There is, of course, no question that train movement may thus be accelerated under many circumstances. In the Indiana installations, it should be said, distant signals which are repeaters of the home signal in advance are installed wherever a clear view of the home signal cannot be obtained at a sufficient distance to avoid reducing speed.

The permissive feature of the plan shown in Fig. 4 necessitates the use of switch indicators at the sidings, as the existence of a train in any block is no guarantee that the portion of the block at its rear is clear.

The switch indicators developed for this scheme possess an astonishing indicating ability. If trains approach the switch from either or both directions, a stop indication is given by the indicator, but if the blocks on either side of the indicator are clear, or if trains are in them but are receding from the switch in either direction, the switch indicator displays a clear indication and permits the train to move out into the main line. One of the greatest advantages of this device is the fact that it gives full information to trainmen with its one indication, and in consequence the motorman does not have to look at the signals and think out whether the combination of indications displayed makes it safe for the train to move out of the siding. Another advantage obtained through the use of this device exists where light signals are used in place of semaphores. In this case, as mentioned before, the cost of current for the lamps and the deterioration of the lamps themselves constitute a serious expense, so that the high-power lamps are extinguished when a train leaves a block. Such an arrangement would leave no main signals to govern a car on a siding as it would be necessary for the car to be on the main line before the signals would be illuminated, and here the switch indicator provides the way out of the difficulty by giving an indication independent of the condition of the lights on the high signals. To prevent simultaneous movements of trains from a siding and into the block at the other end time elements are used with the switch indicators, compelling the lapse of a fixed interval of time between throwing the switch and the receipt of the indication.

Another novel feature developed for this signaling scheme is the block indicator, represented in Fig. 4 by a pair of concentric circles. This is a single light mounted on one of the poles at the beginning of the preliminary, and it is connected through the signal near the siding at the end of the preliminary, thus being illuminated whenever the block is occupied. In consequence, a car ap-

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proaching the preliminary at a siding where a meet has been ordered waits at the block indicator until it is illuminated, being thus informed that the opposing train has entered the opposite end of the block and can no longer be interfered with by an opposing train which gets on to the preliminary track section. The excellence of the device aside from its simplicity lies in the fact that it eliminates the illogical procedure, previously followed, of using a distant signal at the commencement of the preliminary to serve the same purpose; for an approaching train, finding the distant signal at clear, would have to wait until it went to caution before proceeding to the siding.

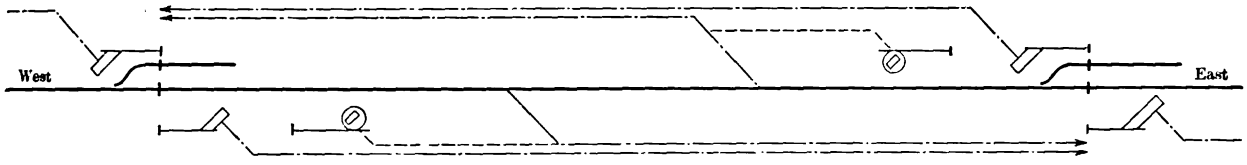

Fig. 5—Signal Arrangement Used on Washington, Baltimore & Annapolis Railroad to Effect the Elimination of Preliminaries

One of the features of this scheme is the use of but three line wires for opposing signals, and this assists materially in reducing the cost of installation. The cost is, however, considerably greater than that of the scheme outlined in Fig. 3, as the provisions for accelerating traffic are very much more elaborate and they naturally involve a proportionately higher cost. The scheme may be considered as the most recent of the General Railway Signal Company's developments for signaling interurban roads with moderately dense traffic.

TRACK-CIRCUIT SIGNALING WITHOUT PRELIMINARIES

In several suggested schemes for electric railway signaling the elimination of preliminaries has been accomplished by the use of intermediate signals, as these serve equally well to stop opposing trains in the rare case when they happen to enter opposite ends of the block at the same instant. This principle was, however, actually used for the first time in the now well-known installation made on the Washington, Baltimore & Annapolis Railroad in 1912 by the Union Switch & Signal Company. The arrangement of signals is shown in Fig. 5. In this each block is self-contained and a normal-clear home signal is located at each end and controlled by the track circuit of the entire block. In addition to these home signals two advance intermediate signals are located about 1000 ft. inside of the respective home signals. Each of these signals, however, is controlled only by the track in the opposite half of the block, the actual control extending from the opposite end to about 1000 ft. beyond the center of the block. In other words, each intermediate signal is about 1000 ft. in advance of the home signal but is at a considerable distance to the rear of the track by which it is controlled. An intermediate is therefore not affected by an approaching car until some time after it has been passed. The opposite intermediate is, however, set at stop as soon as the car enters the block. In operation, therefore, a car which enters the block sets both home signals and the farther intermediate at stop. After it reaches a point about 1000 ft. from the center of the block all four signals are set at stop, the whole block clearing up when the car leaves it.

For an arrangement where a spacing of a full block is required for following movements this scheme works out exceptionally well and it may be installed at a comparatively moderate cost. Another and much more recent scheme of the same manufacturer is shown by Fig. 6, the plan which has been adopted by five of the Indiana interurban roads for the installations purchased during the early part of the present summer.

In this scheme protection against simultaneous entrance of the block by opposing trains is also obtained by intermediates as in the foregoing plan. These intermediates are, however, located near the center of the block, being staggered so as to give a spacing of about 3000 ft., thus providing a stopping distance for opposing trains which might run by them. In consequence, the arrangement differs from that outlined in Fig. 5 by the fact that the distance between each home signal at the end of block and its intermediate is greatly increased.

Each block, siding to siding, is one center-fed track circuit having two track relays, one at each end. Each track relay is controlled by cars which are on that part of the track between the location of the relay and a point about 1000 ft. beyond the center of the block. Therefore, there is a space of about 2000 ft. in the center of the block in which a car would control both relays. The two home signals at the ends of the block are mutually operative through both of the track relays so that when a car enters either end of a block both signals assume the stop position, preventing the entrance of an opposing car. Thus as a car enters the block the track relay at the

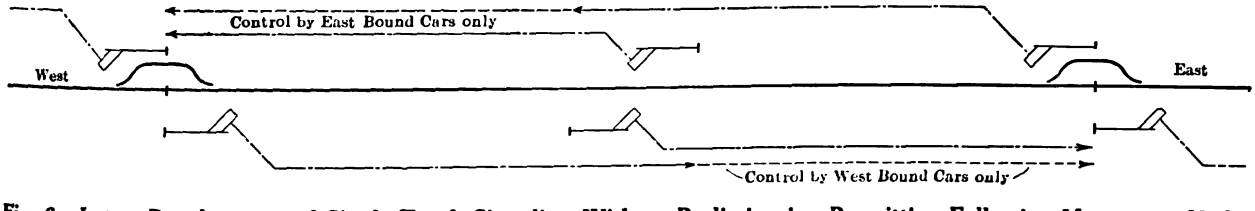

Fig. 6—Latest Development of Single-Track Signaling Without Preliminaries, Permitting Following Movements Under Spacing of One-half Block Length

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entrance end sets the opposing intermediate signal to the stop position, and a circuit controller on this signal opens the circuit for the opposing home signal at the other end of the block and sets it to stop. In consequence, the entering car is protected against opposing trains by two signals, one

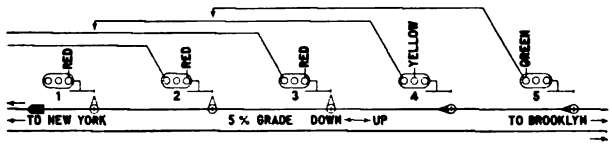

Fig. 7—Signal Arrangement on Williamsburg Bridge, New York Municipal Railways—Two Blocks Overlap and Speed Control on Down-Grade

at the end and one near the center of the block. The intermediate signal which is being approached by the car is, however, left in the clear position until the car reaches a point about 1000 ft. from the center of the block, when the track relay at the other end is de-energized and the signal goes to the stop position. At about the same time the home signal which was passed when the car entered the block is cleared up, this being accomplished through the use of a so-called stick relay, but since the home signal at the other end is controlled by the track relay at that end it is not cleared at this time, and it thus maintains protection against opposing movements into the block.

However, when the car has passed the center of the block the clearing of the home signal in the rear or at the entrance end permits the entrance of another car, thus providing absolute blocking for following movements under a spacing of half a block length, consequently accelerating the movement of traffic in direct proportion. In this case the first car is protected in the rear by the proper intermediate signal, as this is controlled by the track relay in the half of the block which is in advance of it, as well as by the opposing home signal in front, because the track relay at the advance end of the block is de-energized as long as a car is in that part of the block.

Cars may operate into and out of sidings as desired, and when in the clear, on the siding, they do not affect the signals so that sidings may be passed at high speed.

Considering the traffic that may be handled under this arrangement, the first cost is very moderate, although it is somewhat greater than that of the previously described scheme. Two position signals are being used in the first of the installations of this type, but light signals may, of course, be used instead if they are desired for reasons of further economy. One reason for the moderate cost is the use of but one track section to each block notwithstanding the presence of intermediate signals. Consequently, for high speeds and a traffic density that does not require more than two following cars between sidings this scheme offers obvious advantages, as the desideratum of expense is a most important one providing the demands of traffic are met in a satisfactory manner.

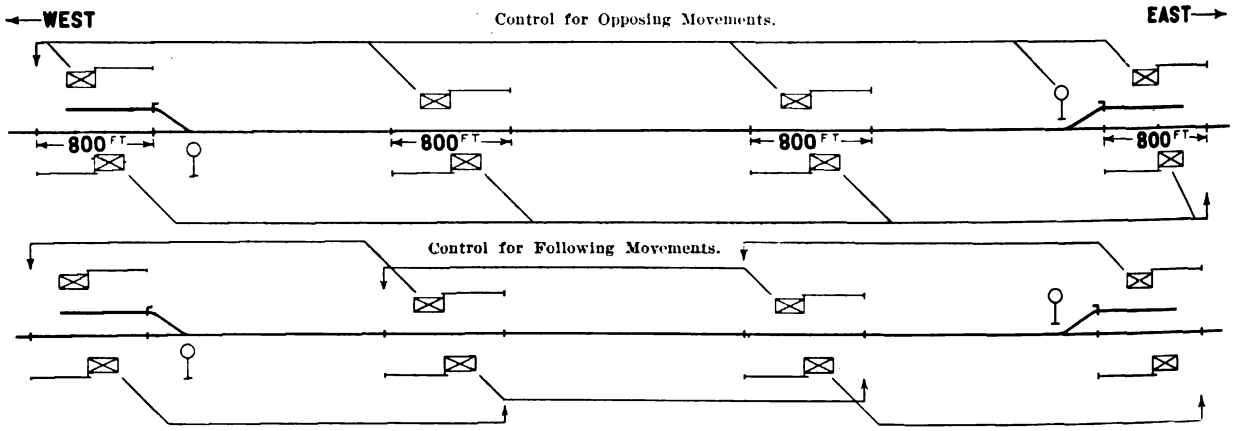

Fig. 8—Diagram Showing Limits of Signal Control for Opposing and for Following Movements, Rochester & Eastern Railroad

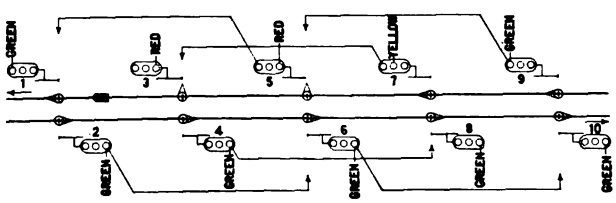

Fig. 9—One Block Overlap and Automatic Stops on Center Street Loop, New York Municipal Railways

BLOCKING WITH MULTIPLE INTERMEDIATE SIGNALS

For great density of traffic together with extremely high speeds the installation which is being made for the Rochester & Eastern Railway may be said to be the most complete single-track signal scheme yet planned for electric railways. The general arrangement is shown in Fig. 8. It will be noted that each block is self-contained and symmetrical, no preliminaries being used. The entering signal for each block is called the starting signal, and when this is passed by a car entering the block the action of this signal in moving to danger causes the starting signal at the other end of the block to go to danger also, taking with it all of the intermediate signals which cover the opposing movement.

The intermediate signals which govern the movement of the car after it has entered the block do not, however, go to danger until they have been passed by the car.

The signals are three-position and provide cautionary indications at 45 deg. for the signal in advance, the signal in the rear obtaining at the same time its clear position from the same operation. In consequence, a warning is always given one track section in advance of a danger signal except in the case where two trains effect

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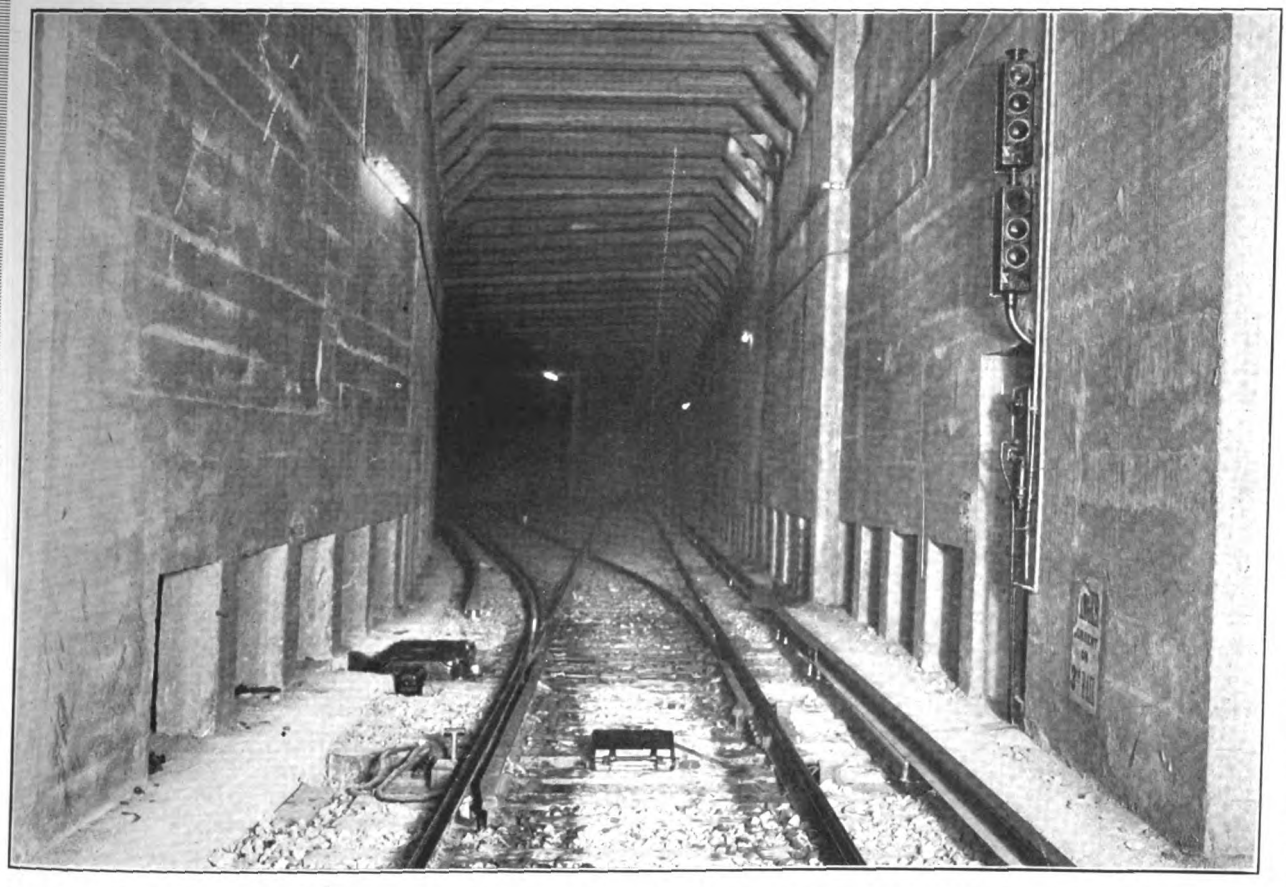
simultaneous entrance into a block with only two intermediate signals. In this case the intermediate signals are staggered 1500 ft., giving each car practically full stopping distance after passing its signal.

With more than one pair of intermediates the spacing for the stagger is, however, made 800 ft., and the control of each track section extends beyond the home signal to the opposing signal in advance, thus providing an overlap for following movements equal to the full stopping distance.

The scheme provides for following movements with a spacing of one-third or one-fourth of the block length, warning indications by distant signals and overlaps in accordance with the best practice in double-track signaling. Apparently nothing is left to be desired. The expense is, however, very heavy, the estimated first cost with blocks about 4000 ft. in length being in the vicinity of $2,600 per mile of track.



View Showing Three-Indication Signals for Main and Diverging Routes at the Right and Trip for Automatic Stop and Speed Control at the Left, Inter-Bridge Loop, New York Municipal Railways

AUTOMATIC STOPS AND SPEED CONTROL

The double-track installation on the New York Municipal Railways Corporation on the Centre Street loop subway and Williamsburg Bridge, New York City, which has just been placed in service, is the most recent installation of automatic stops on electric railways. It is a good example of intensive signaling. All of the principal refinements of modern signal practice are utilized—automatic block signals, automatic stop, automatic speed control, electric interlocking and illuminated track diagrams.

The speed-control system was installed on the bridge approach, in addition to the automatic signals and stops, to prevent a train on the heavy grade from exceeding a speed of 20 m.p.h. The signals on the bridge are normal-stop, but in the subway, which does not require speed control, the signals are normal-clear. Arrangements of typical sections are shown in Fig. 7 and Fig. 9.

All signals in the subway and on the bridge are light signals, those on the bridge being hooded. Each block signal has three 5-in. lenses, green for clear, yellow for caution and red for stop, placed one above the other.

The automatic stop has a tripping arm, located outside of and adjacent to one of the rails at each signal, and this engages a special valve mechanism on the motor car when a stop signal is over-run. When the signal indicates proceed, the tripping arm is in such a position that it does not engage the air valve on the motor car.

The operation of the speed-control system is accomplished by means of a time element or slow-acting device in the control circuit. This is operated by an approaching train and closes the control circuit for the next signal in advance of the train in a predetermined time, corresponding to the time required for a train to pass through the block at a speed of 20 m.p.h. If this speed is exceeded, the control circuit is still open when the train reaches the signal. The signal therefore still shows stop and the arm is in position to engage the air valve on the car and stop the train.

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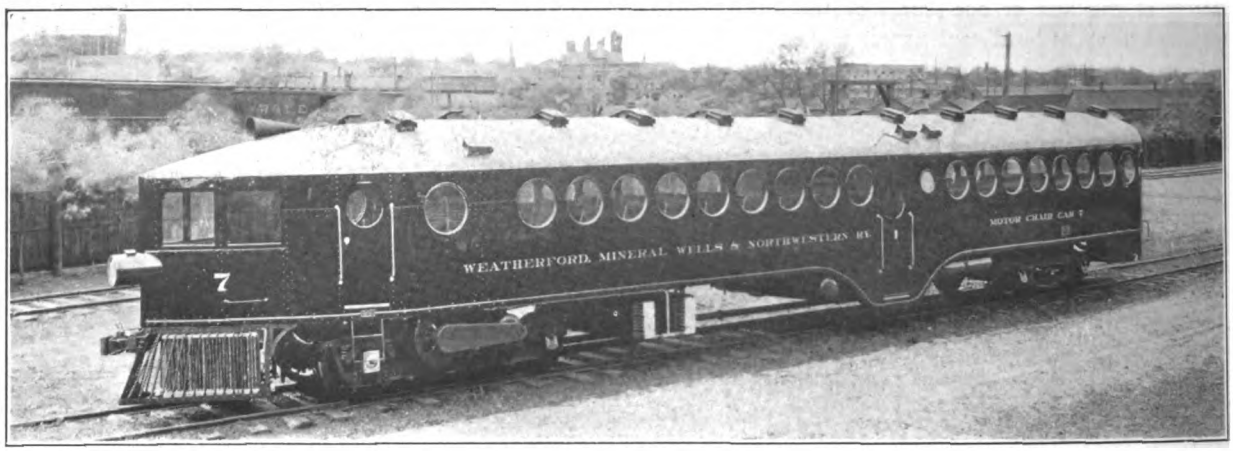
SELF-PROPELLED CARS

WHILE the self-propelled car has a lineage almost as old as that of the steam locomotive, it has long since ceased to be a serious rival either of the locomotive or of the much younger trolley car. It is true that the auto-vehicle of to-day embodies great technical advances on the steam,

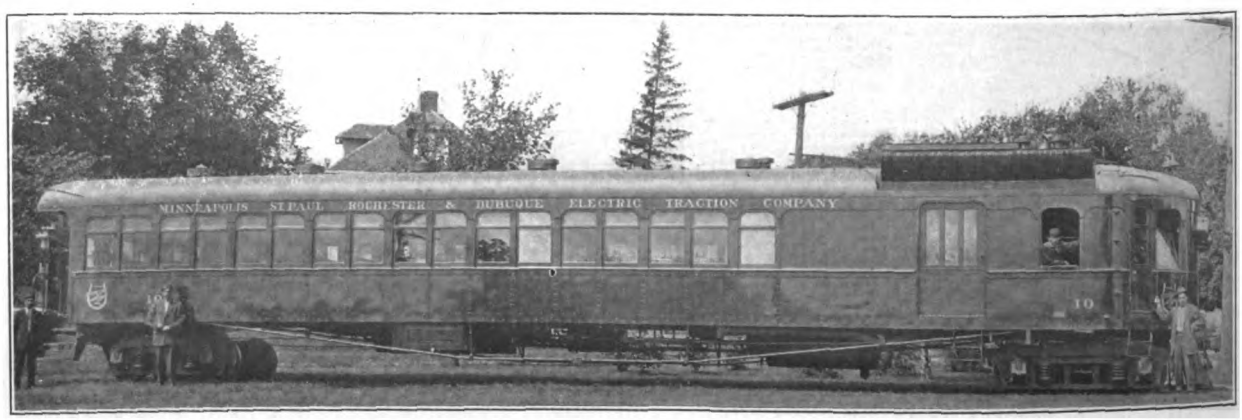
It would be easy to present a category of actual and possible conditions for which the self-propelled car is suitable, but the variety of applications will be still more impressive if the installations already made are allowed to tell their own story. From this variety it is possible to secure data for fairly definite conclusions on the merits



Direct-Driven Gasoline Motor Car of All-Steel Construction

air and ammonia cars of earlier times. But it is also true that there has been a parallel advance in the technic of the locomotive and of the electric railway which receives power direct from a central station. The attempt to conduct cross-country transportation on a large scale by the self-propelled car was abandoned in the forties when it was shown that trackless "steamers" were far costlier than trains on rails, and in a similar way the heavy service of city transportation was surrendered by the stor-

of each type for particular classes of service. As the following account tends to show, both the gasoline and the gas-electric type are readily capable of running 150 miles a day and more, whereas the limitations of battery weight, facilities for charging and limitations of schedules confine the accumulator car to city and short-line operation. In presenting this list of installations and tables of operating statistics it has been thought well to refer only to the representative builders of self-propelled cars rather



Gas-Electric Passenger and Baggage Car, 70 ft. Long, with Rear Platform Entrance

age battery to the trolley car about half a century later. Yet, if these fields of greater traffic were lost, many opportunities for usefulness remained and still others were created as the benefits of the various modes of transit became better known. It is this condition which has justified the continued development and successful exploitation of gasoline, gas-electric and storage battery cars.

than to include descriptions of more or less experimental designs.

GASOLINE CARS

The McKeen steel motor car was developed about ten years ago for service on the less important branches of the Union Pacific Railroad. Its conspicuous success has led to its adoption for similar service on other rail-

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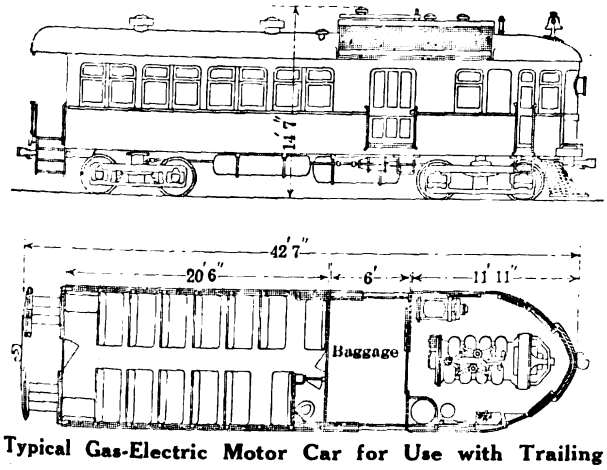
roads, so that to-day some 139 cars, comprising all that have been built by the McKeen Motor Car Company, are in use on fifty systems. Among the American users are the Erie Railroad, the Virginia & Truckee Railroad, the Denver, Laramie & Northwestern Railroad and the Norfolk & Western Railway, while five and two cars respectively have been sold to the Queensland and Victorian railways of Australia. The accompanying Table I is of exceptional interest as it shows what results can be obtained with straight gasoline cars after four to seven years' steady service. According to the manufacturing company, these figures include all the expenses of operation and maintenance. The manufacturer believes 3 per cent per annum to be a conservative maintenance charge on these equipments in view of the durable all-steel construction of the car bodies, the substantial trucks and the use of the best available gasoline machinery.

An inspection of Table I reveals immediately the character of operation for which these cars are used. The cars are from 55 ft. to 70 ft. long, carry 200 hp in engine equipment and run from 122 miles to 204 miles a day at schedule speed, between 19.8 and 26.5 m.p.h. The shortest distance between stops, regardless of crossroads, is 4 miles, and the longest distance between stops is 21 miles. The maximum grade is 1.9 per cent. The highest operating and maintenance cost, 19.33 cents per mile, is shown by the system with one stop per 5 miles; the lowest operating and maintenance cost, 12.28 cents per car mile, with a car of the same length making one stop about every 7 miles. With one exception, the general character of operation with these cars is to make one round trip a day. On dividing the schedule speed into the daily revenue mileage, it will be found that the cars run only eight or nine hours a day, so that ample time

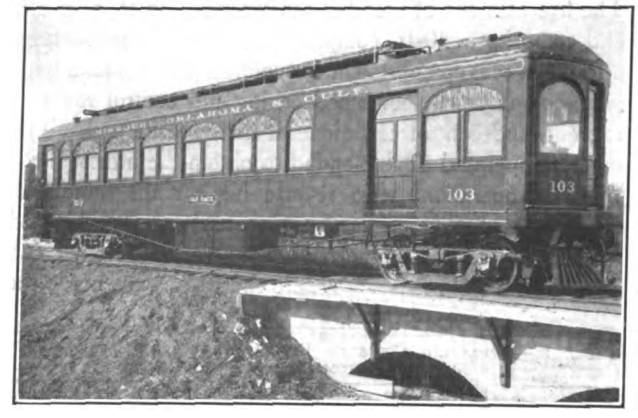


Typical Gas-Electric Motor Car for Use with Trailing Loads

is available for layovers and inspection even with performances of 200 miles.

DRAKE GAS-ELECTRIC CARS

The automotrice, or so-called "Dracar," of the Drake Railway Automotrice Company, was introduced in the United States in 1912 after its development and extensive installation abroad, notably on the Arad Csanad Railway, Hungary; Ostdeutsche Railway, Germany, and Great Central Railway, England. On the Arad line the service has grown from 67,017 train miles in 1903 to 1,000,000 train miles in 1912. In 1912 the same railway operated 952,143 train miles at an average cost of 7.62 cents per train mile, made up of the following components: gasoline, 3.66 cents; oil and waste, 0.33 cent; helpers and sundries, 0.75 cent; lighting, heating



Automotrice for High-Speed Service with Passenger and Baggage Compartments

and cleaning cars, 0.23 cent, and maintenance, 2.65 cents.

The forty-four-passenger 56-ft. car is furnished with a 90-hp gas-electric set and standard 500-volt railway motors, permitting a schedule speed of about 25 m.p.h. and a maximum of 40 m.p.h. The 60-ft. and 70-ft. cars, seating respectively sixty-eight and ninety-one passengers, are each equipped with a 150-hp gas-electric set, permitting a schedule speed of 30 m.p.h. and a maximum

TABLE I—OPERATING DATA ON MCKEEN GASOLINE CARS AS OF JULY 18, 1913

	Car "A"	Car "B"	Car "C"	Car "D"	Car "E"	Car "F"
When shipped	1906	1906	1906	1909	1908	1907
Type	55 ft. Steel, 200-hp	55 ft. Steel, 200-hp	55 ft. Steel, 200-hp	70 ft. Steel, 200-hp	55 ft. Steel, 200-hp	55 ft. Steel, 200-hp
Weight, lb.	60,000	60,000	60,000	68,000	60,000	60,000
Terminal points of route	AA-A	AB-B	AC-C	AD-D	AE-E	AF-F
Miles of route	61	39.7	102.3	39	95.7	80.5
Daily revenue mileage	122	148.8	204.6	176	191.4	161
Schedule speed, m.p.h.	19.8	26.5	25.1	22.3	23.4	21.7
Number intermediate stops	14 and cross-roads	7 and cross-roads	15 and cross-roads	5 and cross-roads	23 and cross-roads	16 and cross-roads
Maximum grade, per cent	0.8	1.6	0.5	0.3	1.9	0.9
Trailer	No	No	Yes	Yes	No	Yes
Operating and maintenance cost in cents per mile, seven-month period	13.47	14.81	12.28	14.83	15.41	19.33

of 50 m.p.h. The cars range in weight from but 30 tons to 37 tons, and this with their moderate speed allows a run of from 2½ to 3½ miles on 1 gal. of gasoline. A variation of this type of equipment is afforded by the Drake passenger tractor, which combines the functions of a locomotive and a passenger car, since it can be used either to handle freight at slow speeds or passenger service at speeds as high as 50 m.p.h.

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The first American installation of the "Dracar" was made in November, 1912, on the Missouri, Oklahoma & Gulf Railway on a 105-mile line between Joplin, Mo., and Denison, Tex. This line is paralleled on one side by the Missouri, Kansas & Texas Railway and on the other by the St. Louis & San Francisco Railway. The longest run is a single round trip of 210 miles a day. The five cars are of wooden construction, 56 ft. over all, and comprise a 30-ft. compartment for white passengers, a fourteen-seat compartment for colored passengers, a baggage compartment, combined engine and control room at one end and control cab alone at the opposite end. The cars are operated double-ended to obtain the utmost flexibility in operation. To reverse his car the motorman leaves the gasoline engine running under reduced speed and merely carries the controller handle to the other cab just as on a trolley car. Where short stops are made the engine is throttled down only. The engine is started by cranking, just like an automobile motor. In obedience to state commission regulations it is necessary to use three men per car, namely, a motorman, a conductor and a flagman. One inspector is also employed. Table II covers operating data on this installation from December, 1912, to April, 1913, as prepared by the auditor of the railway company. These figures show a gradual reduction in the cost per car mile to 16.4 cents.

TABLE II—OPERATING COSTS OF FIVE GAS-ELECTRIC CARS ON MISSOURI, OKLAHOMA & GULF RAILWAY

	Nov.	Dec.	Jan.	Feb.	March	April
Mileage:						
No. car miles...	2,350	7,130	9,390	12,858	22,352	18,336
Wages:						
Motormen.....	$91.20	$248.00	$392.72	$493.02	$814.64	$676.44
Conductors....	77.26	244.00	277.63	406.39	620.80	548.14
Flagmen.....	43.13	136.20	149.50	214.06	323.90	288.75
Supervision:						
Inspector.....	6.40	125.00	125.00	125.00	125.00	125.00
Fuel, etc.:						
Gasoline, gal...	684	2,050	3,080	5,515	7,406	5,483
Gasoline, cost..	$112.92	$328.10	$513.20	$917.27	$1186.52	$877.30
Lub. oil, pints..	582	612	1,088	1,057	3,748	3,139
Lub. oil, cost...	$17.45	$19.87	$71.67	$53.58	$139.86	$119.10
Supplies.....	14.67	45.66	67.57	65.25	74.91	35.67
Repairs:						
Running.....	$40.52	$130.02	$152.06	$35.401	$325.37	$167.30
Expense:						
Shop expense...	$130.88	$93.50	$116.79	$164.48	$153.74	$175.63
Total expense.	534.45	1420.35	1866.14	2793.76	3764.83	3023.33
Revenue:						
Total revenue..	$1136.43	$3576.74	$3872.12	$4955.46	$9249.39	$8850.62
Net revenue...	601.98	2156.39	2005.98	2161.70	5474.56	5827.29
Passengers:						
No. rev. pass....	2,230	7,377	6,085	9,937	18,718	15,972
Pass., 1 mile...	38,710	126,428	122,325	169,260	326,901	323,890
Gross rev. per pass.....	$0.510	$0.485	$0.479	$0.488	$0.494	$0.435
Net rev. per pass.....	0.256	0.302	0.239	0.168	0.244	0.328
Miles:						
Per gal. gas....	3.4	3.5	2.7	2.3	3	3.3
Per pt. oil.....	4.0	12.0	7.7	12.2	5.9	6.0
Cost per mile in cents:						
Wages.....	$0.093	$0.095	$0.098	$0.086	$0.079	$0.082
Inspection.....	0.003	0.018	0.015	0.009	0.005	0.007
Gasoline.....	0.049	0.046	0.065	0.071	0.053	0.048
Lubricating oil	0.007	0.003	0.006	0.004	0.006	0.006
Supplies.....	0.006	0.007	0.008	0.005	0.003	0.003
Repairs.....	0.017	0.018	0.018	0.027	0.016	0.011
Shop expense..	0.052	0.013	0.013	0.013	0.007	0.010
Total cost per car mile.....	$0.227	$0.200	$0.223	$0.217	$0.169	$0.164

GENERAL ELECTRIC GAS-ELECTRIC CARS

The gas-electric cars of the General Electric Company comprise three classes as follows: Center-entrance ("CE"), rear entrance ("RE") and center and rear entrance ("CRE"). Practically all cars have a 12-ft. engine compartment. In the combination cars the length of the baggage and mail compartments, "B" and "M," varies from 8 ft. to 15 ft. The smoking compartment is usually 6 ft. to 12 ft. long. At this time the company has in operation some sixty-two cars on twenty properties.

For convenience in tabulating the characteristics of the cars to date they are classified partly according to the initials already quoted and partly according to their dimensions. Thus RE-70-B-13-M-10 signifies a rear-entrance car 70 ft. long and including a 13-ft. baggage and 10-ft. mail compartment. All of these cars were built at the works of the Wason Manufacturing Company, Springfield, Mass., but were equipped by the General Electric Company.

Tables III, IV, V and VI as furnished by the manufacturer embody the most comprehensive data as yet prepared on this subject. Table III shows the conditions under which sixty cars are operated on twenty railroads in the United States. The Frisco Lines alone operates fourteen cars. The second in importance is the Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company with twelve cars. As a rule, the G.E. cars are operated on routes more than 50 miles in length and make one round trip a day with a maximum performance of 246 miles. The stops are from 1 mile to 7.5 miles apart and the schedule speed ranges from 14.5 m.p.h. to 29 m.p.h. On most lines the grades are easy, but in one instance a grade of 3 per cent is encountered. The ability of the gas-electric set to take care of overloads is illustrated by sixteen instances of trailer operation.

Table IV covers the operations for the calendar year 1912 of the Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company, popularly known as the "Dan Patch" line. The incorporated name of this company indicates its ultimate operation as an electric interurban railway, but so far the self-propelled cars have proved satisfactory. This line with local stops but 1 mile apart approximates regular interurban service very closely. The average cost of operation and maintenance was 18.08 cents per motor-car mile, and 13.38 cents per total car mile, trailers being used very extensively on this line.

Table V and VI respectively cover the operation of six and fourteen cars of the Frisco Lines, where the stops are much farther apart than on the "Dan Patch" line. The costs for the two groups are 16.61 cents and 17.31 cents per motor-car train mile respectively.

STORAGE BATTERY CARS

The present development of the storage battery car in the United States comprises some forty-five installations and 280 cars. Of these the Third Avenue Railway, New York, with 160 cars, operates more self-propelled units than all the other installations combined. The next larger installation is one of forty-five cars which has just been made for the New York Railways. No other company is operating more than six cars. Excepting the New York installations, which were due to the prohibitive cost of conduit construction for lines with weak traffic, it appears that the storage battery car has been applied

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only to very small roads and to some short low-travel branches of trunk-line steam railroads. However, these small applications fill needs of such diverse character that one may reasonably expect to see scores, if not hundreds, of similar installations in the near future. Broadly speaking, in the United States the accumulator car has found a place for service in small towns with cheap current, for real estate development and for short interurban lines; in Latin-American, and possibly other, countries it may be applied to old streets which are considered too narrow for safe use of an overhead wire, and finally it is used for short steam railroad lines radiating from cities as found in the extraordinary network of the Prussian State Railroads.

Two distinct types of storage batteries are used in this country, the lead and the nickel-iron. Both have shown

TABLE III—GENERAL ELECTRIC GAS-ELECTRIC PASSENGER CARS IN SERVICE

Railway	No.	Type	Seats	Wght. Tons	Shipped	Where Used	Miles Route	Max. Grade	Daily Reven. Mileage	Sched. Speed, M.P.H.	No. of Interm. Stops
Southern	1	CRE-55	52	41	2-11	Greenville-Anderson, S. C.	37	1	170	18½	34
Southern[1]	1	CRE-55	52	41	4-11	Memphis-Collierville, Tenn.	25	1	100	21½	18
Buffalo, Rochester & Pittsburgh[2]	1	CE-66-B-6	90	46	4-11	Buffalo-Springville, N. Y.	32	..	128	22½	..
Minneapolis, St. Paul, Rochester & Dubuque Traction	1	RE-50-B-5	44	32	12-10	Minneapolis-Northfield	37.34		See Table IV		
Minneapolis, St. Paul, Rochester & Dubuque Traction	2	CE-58-B-8	47	41	5-11	Minneapolis-Northfield	..	..	..	..	..
Minneapolis, St. Paul, Rochester & Dubuque Traction	1	RE-57	88	39	6-11	Minneapolis-Northfield	..	..	..	..	..
Minneapolis, St. Paul, Rochester & Dubuque Traction	1	RE-57-B-6	75	40	7-11	Minneapolis-Northfield	..	..	..	..	..
Minneapolis, St. Paul, Rochester & Dubuque Traction	1	RE-67-B-11	88	46	3-12	Minneapolis-Northfield	..	..	..	..	..
Minneapolis, St. Paul, Rochester & Dubuque Traction	2	RE-70-B-11	91	49	5-12	Minneapolis-Northfield	..	..	..	..	..
Minn., St. P., Roch. & Dub. Tr.	1	"Marion"	...	49	5-13	Minneapolis-Northfield	..	..	..	..	.
Minn., St. P., Roch. & Dub. Tr.	2	RE-70-B-11	91	49	8-13	Minneapolis-Northfield	..	..	..	..	..
Frisco Lines	1	CRE-70-B-8	86	50	9-11	Muskogee-Westville, Okla.	72	1½	144	20½	15
Frisco Lines[3]	1	CRE-70-B-8	86	50	10-11	Lawton, Okla.-Quanah, Tex.	94	1	188	22	15
Frisco Lines	1	CE-70-B-11	91	52	3-12	Dallas-Sherman, Tex.	76	1½	152	24¾	18
Frisco Lines[4]	1	CE-70-B-11	91	52	3-12	Bolivar-Chadwick, Mo.	73	2.3	146	20	19
Frisco Lines[3]	1	CE-70-B-11	91	52	4-12	Kansas City-Clinton Mo.	87	2½	174	22	28
Frisco Lines[3]	1	CE-70-B-11	91	52	4-12	Enid-Clinton, Okla.	94	1½	188	23½	12
Frisco Lines[3]	1	CRE-70-B-8	86	50	8-11	Cape Girardeau-Poplar Bluff, Mo.	64	..	128	20	25
Frisco Lines	1	CRE-70-B-8	86	50	6-11	Brownsville-Sam Fordyce, Tex.	78	0	156	22	17
Frisco Lines[3]	1	CRE-70-B-8	86	50	9-11	Orange-Newton, Tex.	62	0	124	18	16
Frisco Lines[5]	1	CE-70-B-11	91	52	7-12	Fort O'Connor-Victoria-Austwell, Tex.	70	0	204	21	10
Frisco Lines[6]	1	CE-70-B-11	91	52	8-12	Houston-Beaumont, Tex.	89	0	178	22	17
Frisco Lines[7]	1	CE-70-B-11	91	52	7-12	New Orleans-Shell Beach, La.	29	0	116	14½	15
Frisco Lines	1	CE-70-B-11	91	52	9-12		Excur	sion se	rvice		
Frisco Lines	1	CRE-70-B-8	86	50	7-11		spare	equip	ment		
New Iberia & Northern	2	CE-70-B-11	91	52	6-12 8-12	Port Barre-Shady Side, La.	89	0	178	18	12
Quanah, Acme & Pacific	1	CE-70-B-11	91	52	8-12	Quanah-Paducah, Tex.	43	1	86	17	6
Bangor & Aroostook	1	CE-66-B-6	97	47	8-11	Fort Kent-Squa Pan, Me.	109	..	218	27	26
Bangor & Aroostook	1	CE-68-B-10½	91	48	3-12	Greenville-Brownville Junction, Me.	58	..	116	26	22
Delaware & Hudson	1	CE-68-B-10½	91	46	12-11	Delanson-Mechanicsville, N. Y.	32	1	128	27	7
Canadian Northern	1	RE-57-B-6	76	40.5	4-12	Picton-Trenton-Napanee	60	..	120	..	..
Missouri Pacific	1	CRE-70-B-11	85	51	5-12	Butler, Mo.-Madison, Kan.	108	1.2	216	22	21
Missouri & North Arkansas	1	CRE-70-B-11	85	51	9-12	Eureka Springs, Ark.-Joplin, Mo.	79	2.6	234	24	14
Missouri & North Arkansas[8]	1	CRE-70-B-11	85	51	9-12	Heber Springs-Helena, Ark.	116	1	241	21	16
Chicago, Rock Island & Pacific	1	CE-70-B-13½	79	51.5	10-12	Enid-Anadarko, Okla.	123	1	246	20	19
Chicago, Rock Island & Pacific[9]	1	CE-70-B-13½	79	51.5	10-12	Eunice-Alexandria, La.	56	..	112	22	12
Pittsburgh & Lake Erie[10]	1	RE-42-B-6	42	39	11-12	Pittsburgh-College, Pa.	31	0	154	25	18
Texas Midland	2	CRE-70-B-2½	101	52.5	10-12	Dallas-Paris, Tex.	116	1	232	26	24
Great Northern	1	CRE-70-B-11	86	52	2-13	Burlington-Anacortes, Wash.	17	..	102	20	5
Great Northern[11]	1	CRE-70-B-11	86	52	2-13	Minneapolis-Mound, Minn.	22	1.75	88	26	10
Chicago, Milwaukee & Puget Sound	1	CE-69-B-15	77	51	11-12	Everett-Monroe, Wash.	14	..	70	21	6
Chicago, Milwaukee & Puget Sound	1	CE-69-B-15	77	51	12-12	Seattle-Enumclaw, Wash.	62	3	124	24	16
Chicago, Milwaukee & St. Paul	1	RE-70-B-15	80	51	12-12	Seattle-Enumclaw, Wash.	62	3	124	24	16
Chicago, Milwaukee & St. Paul	1	RE-70-B-15	80	51	12-12	Waukum Junction, Dubuque, Ia.	62	..	124	..	..
Chicago, Milwaukee & St. Paul	1	RE-70-B-15	80	51	12-12	Wabasha-Faribault, Minn.	94	..	188	..	..
Chicago, Milwaukee & St. Paul	1	RE-70-B-15	80	51	12-12	Racine-Corliss, Wis.	7.4	..	103.6	..	..
Chicago, Milwaukee & St. Paul[12]	1	RE-70-B-13-M-10	60	52.5	3-13	Hastings-Cologne, Minn.	56	..	112	17	18
Pere Marquette[13]	1	RE-70-B-11	91	49	4-13	Bay View, Clary, Mich.	98	..	146	..	..
Chicago, Peoria & St. Louis[14]	1	RE-70-B-11	91	49	5-13	Springfield, Ill.-St. L., Mo.	112½	..	228	.	31
Chicago, Peoria & St. Louis[15]	1	RE-70-B-11	91	49	5-13	Palmyra-Peoria, Ill.	122	..	224	..	33
Chicago, Peoria & St. Louis[14]	1	RE-70-B-11	91	49	5-13	Peoria-Springfield, Ill.	88	..	176	..	24
Chicago, Peoria & St. Louis[15]	1	RE-70-B-11	91	49	6-13	Springfield, Ill.-St. L., Mo.	112½	..	226	..	31
Atchison, Topeka & Santa Fe	1	CE-68-B-10	89	50½	6-13	Holliday to Atchison, Kan.	60	..	..	..	8
Atchison, Topeka & Santa Fe[16]	1	CE-68-B-10	89	50½	7-13	Emporia to Gridley, Kan.	112	..	224	22.4	10
Midland Valley	1	CRE-70-B-11	86	52	7-13	Wichita-ArkansasCity, Kan.	51	..	102	18.5	13

[1]Hauls a 22-ton trailer. [2]Hauls milk car morning and evening trip. [3]Hauls a 23-ton trailer. [4]Route has 4 miles of 2 per cent continuous grade; hauls 25-ton trailer 66 miles daily. [5]Ten stops in 52 miles. [6]Hauls 20-ton trailer. [7]Hauls two trailers weighing 45 tons 13 miles each day. [8]Hauls 16-ton trailer. [9]Hauls 25-ton trailer two days a week. [10]Hauls 23-ton trailer. [11]Hauls 47-ton trailer. [12]Hauls combination baggage and mail car. [13]Hauls 35-ton trailer. [14]Hauls 27½ ton trailer. [15]Hauls 29-ton trailer. [16]Hauls 33-ton trailer.

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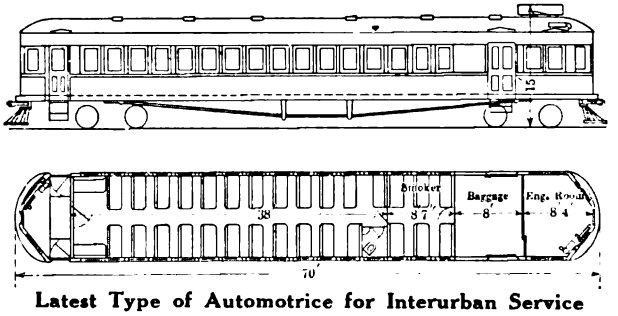
suitability for traction purposes, although they differ much in their characteristics. It is unnecessary to describe their differences, but it is desirable to point out the conflicting advice given by the manufacturers to railway operators. One battery maker suggests an accumulator which will be large enough to do a day's work without



Latest Type of Automotrice for Interurban Service

intermediate normal or high-rate charging; another suggests a small battery which can be replenished by boosting charges during layovers and by normal charges at night. The buyer of accumulator cars, therefore, should make certain that the batteries which are offered to him will meet exactly the same schedule. It would be unwise to purchase a battery of excessive weight and capacity, but it is equally important to select a battery which will fit the service instead of requiring the service to fit the battery. It follows that a fundamental factor in the choice of the type and capacity of the storage battery is the amount of proper layover time during the day.

Before describing the individual installations of the several manufacturers, it is well to point out the influence which the construction of storage battery cars has had, and is likely to have, on the standard trolley car. The necessity for extreme economy in energy consumption has made the builders of storage battery cars lead in the use of anti-friction bearings for journal boxes and motors, the independent wheel, the metallic-filament lamp, the current-checking meter, and in light-weight trucks and car-body construction. In some cases, as in the attempt to build welded frames, less success has been attained, but, on the whole, the various experiments have been of great value. The small motors used for the services hereinafter described offer the best proof of their success from the standpoint of energy consumption as well as first cost.

Table IV—Operating Data of Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company—"Dan Patch Line"—Jan. 1, 1912, to Jan. 1, 1913.

Total motor car miles	216,498
Total trailer car miles	75,948
Total car miles	292,446
Per cent of time trailers hauled	35.5
Number of motor cars in service	8
Length of line	37.34
Maximum grade, per cent	1.5
Average grade for 4 miles, per cent	1.34
Schedule time for express trains	1 hr. 17 min.
Average distance in miles between express stops	3.734
Schedule speed of express trains, m.p.h.	29.1
Schedule time for local trains	1 hr. 35 min.
Average distance between local stops, miles	1.067
Schedule speed of local trains, m.p.h.	23.6
Fuel per motor car mile, gal.	0.758
Fuel per car mile	0.527

	Total Cost for Year	Average Cost per Motor Car Mile	Average Cost per Car Mile
Wages of crew	$12,056.95	$0.0557	$0.0412
Fuel (naphtha)	17,622.26	0.0814	0.0603
Lubrication (gas engine)	1,141.56	0.0052	0.0039
Journal oil	77.77	0.0004	0.0003
Supplies and car heating	1,389.03	0.0064	0.0047
Maintenance electrical equipment	1,949.81	0.0090	0.0067
Maintenance cars and trucks	1,349.56	0.0065	0.0047
Shop expenses and heating	3,507.77	0.0162	0.0120
Total	$39,139.71	$0.1808	$0.1338

Table V—Operating Data Frisco Lines, July 1, 1912, to Feb. 28, 1913, for First Six Cars in Table III

Revenue motor car miles	181,438
Revenue trailer car miles	127,605
Per cent of time trailers hauled	70.3
Average working weight of motor cars, tons	51.9
Average load of motor cars, tons (estimated)	3.5
Average working weight of trailer cars, tons	23.3
Average load of trailer cars (estimated), tons	2.5
Average gross weight motor car trains, tons	73.3
Total gross ton miles (revenue only)	13,296,820
Fuel used per motor car train mile, gal. (revenue only)	.751
Gross ton miles per gallon fuel (revenue only)	97.6

	Total Cost for Eight Months	Average Cost per Motor-Car Train Mile
Wages of crews	$14,417.09	$0.0794
Fuel (naphtha)	8,666.42	.0477
Lubrication (gas engine)	1,356.49	.0075
Cleaning, supplies, miscellaneous expenses	1,596.89	.0088
Running repairs, labor	2,908.46	.0160
Running repairs, material	1,242.28	.0067
Total	$30,187.63	$0.1661

Table VI—Operating Data on Fourteen Cars of Frisco Lines July 1, 1912, to Dec. 31, 1912

Revenue motor car miles	251,627
Revenue trailer car miles	114,164
Total passenger car miles	365,791
Per cent of time trailers hauled	40.3
Fuel (naphtha) used per motor car mile, gal.	0.721
Fuel (naphtha) used per car mile, gal	0.496

	Total Cost for Six Months	Average Cost per Motor Car Train Mile
Wages of crew	$19,840.96	$0.0788
Fuel (naphtha)	11,857.68	0.0471
Lubrication (gas engine)	1,553.28	0.0062
Cleaning, supplies and miscellaneous expenses	2,545.91	0.0101
Running and shop repairs	7,769.73	0.0309
Total	$43,567.56	$0.1731

TYPICAL INSTALLATIONS OF THE GOULD STORAGE BATTERY COMPANY

The Gould Storage Battery Company has furnished thirty-two 420-amp-hr., fifty-eight-cell equipments to the Third Avenue Railway and has made a number of smaller installations both in this country and abroad.

On Feb. 15, 1913, the Cienfuegos, Palmira & Cruces Electric Railway & Power Company placed in service four cars of the Third Avenue single-truck type. The line is 10 miles long, operating between Cienfuegos and Caonao, Cuba, alongside a highway with a maximum grade of 4 per cent. These cars are 27 ft. 1 in. long

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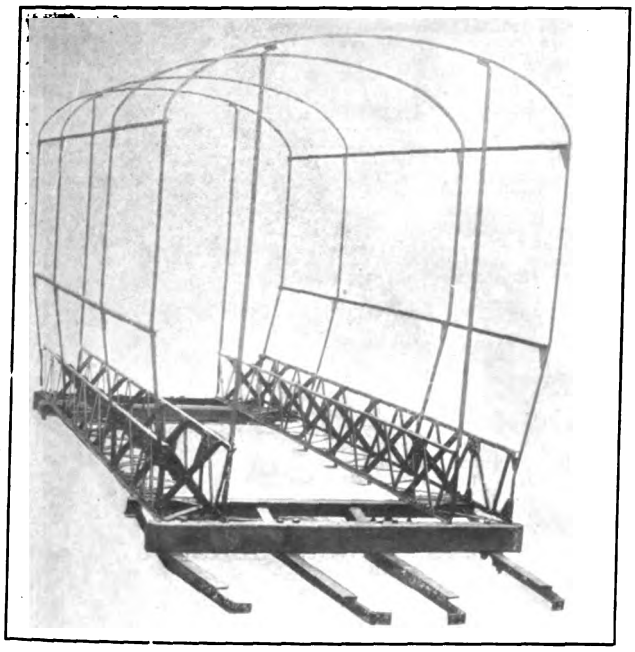
over all, with a seating capacity of twenty-eight, although they have carried as many as eighty passengers. The company has since ordered twelve eight-bench, forty-passenger open cars also for storage battery operation.

The Ocean City Passenger Railway Company and the Cape May, Delaware Bay & Sewell's Point Railway, with a total mileage of 7.7 miles, jointly operate two cars, also of Third Avenue design. Two more have been ordered. Since July, 1912, the Cape May cars have been running 80 to 120 miles a day in miscellaneous city service, including even the shunting of freight cars. Current is charged at the rate of 2 cents per kw-hr. The situation at Cape May is unique, for after the consolidation of the lighting and railway interests the use of storage battery cars made it possible to shut down the railway plant except for the few months when the ocean beach business is at its height. During the summer months the storage battery cars are an auxiliary to the ten or

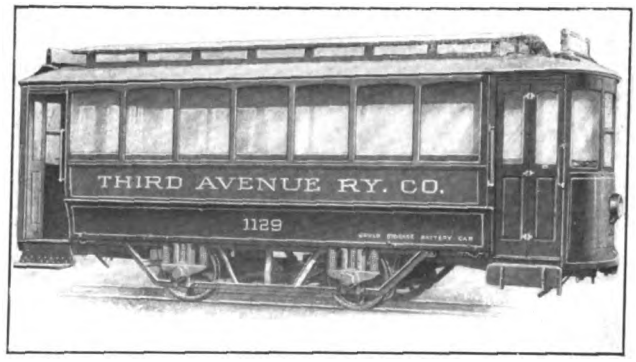


Light Steel Frame for Billings Car with Battery Compartments Used for Side Girders

eleven trolley cars, but in the winter only storage battery cars are employed. These cars are charged for six to seven hours every night from the lighting plant and run about sixteen hours a day. An application of different character is that of the Newbern-Ghent Street Railway, Newbern, N. C., which operates a 5-mile line between the towns named. Three cars are used at present and a fourth is under way. Storage battery cars were adopted here to facilitate real estate development.

This manufacturer has received an order for one car from a South American company, and if it proves satisfactory eight more cars will be ordered. It also expects to close a contract with a West Indian company for six cars. In both instances the cars will be operated in streets which are too narrow for safe overhead construction.

All of the Gould cars have been furnished with anti-friction bearings, and the maker believes that for isolated companies with a lack of skilled mechanics the ordinary axle drive is more satisfactory on account of its simplicity than the independent wheel drive of other storage battery cars. The batteries are always designed to do a full day's work on one charge, although boosting is declared to be entirely feasible. All of these cars carry two



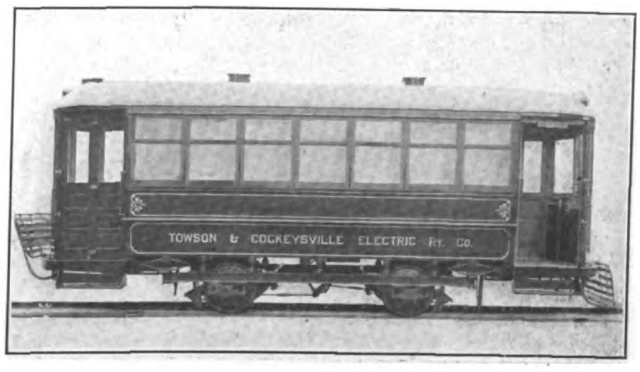
Standard Storage Battery Car, Third Avenue Railway

GE-1022 vehicle-type motors which have a continuous rating of 30 amp at 110 volts and an hourly rating of 75 amp at 110 volts.

TYPICAL INSTALLATIONS OF THE ELECTRIC STORAGE BATTERY COMPANY

The Electric Storage Battery Company has supplied all but thirty-two equipments for the Third Avenue Railway and has filled an order from the New York Railways for forty-five equipments since placed on stepless cars. These battery equipments will be of 420-amp-hr. capacity as on the Third Avenue cars. The Third Avenue Railway, through T. F. Mullaney, chief engineer, under date of June 14, 1913, supplied the data presented in Table VII.

The figures in Table VII do not include any expense for the maintenance of battery, as this feature is cared for by contract with the battery companies, which are paid a definite rate that is less than 3 cents per car mile.



Storage Battery Car with Special Light-Weight Truck

Since Oct. 9, 1912, the Lewisburg, Milton & Watsontown Pasenger Railway Company, Milton, Pa., has used a combination passenger and baggage car which was ordered as an addition to a car from another manufacturer which had been in use since the summer of 1911. This installation presents an interesting example

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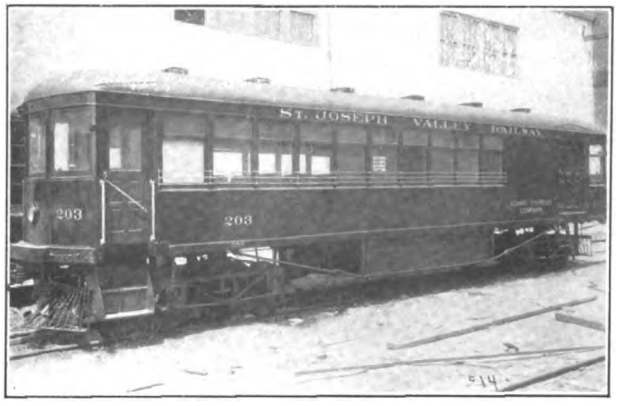
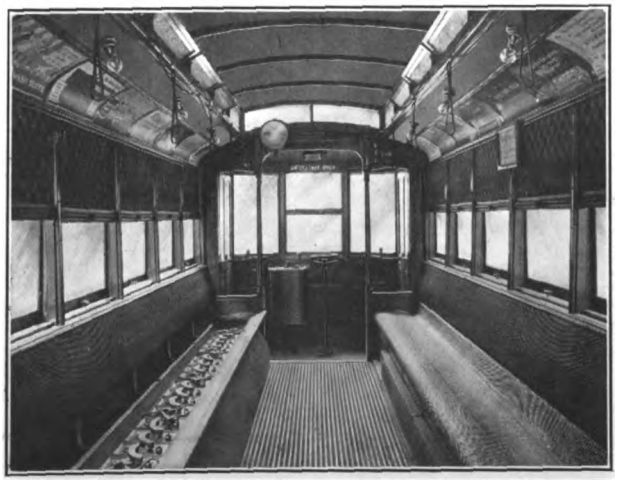
of the increase in traffic which can be obtained on a railroad branch by substituting electricity for steam. Originally this company acquired trackage rights from the Pennsylvania Railroad from Montandon to Lewisburg, a distance of approximately 1½ miles, in order



Storage Battery Car for High-Speed Service

to connect Lewisburg by overhead trolley with Milton and Watsontown. Later the right was acquired to operate on 9 miles of track between Lewisburg and Mifflinburg. A storage battery car was chosen for this extension as the traffic did not justify an overhead line. The cars are operated between steam trains on a schedule published in the Pennsylvania Railroad timetable and their movements are subject to orders from the signal men of the steam road. The later car is 39 ft. 8 in. over all, with a thirty-two-passenger compartment 22 ft. 6 in. long and an 11-ft. 6-in. baggage compartment provided with folding seats for eight smokers. Its total weight is as follows: car body, less electrical equipment, 10,700 lb.; electrical equipment, including battery of nearly 8000



Storage Batteries Under Longitudinal Seats, Third Avenue Railway

lb., 8800 lb.; motors, two GE-1027, 2200 lb.; trucks, 9000 lb.; storage air brakes, 1500 lb.; total, 32,200 lb. The car has a tapering front end to reduce wind resistance, but no anti-friction devices are used except ball-bearing journals. The maximum speed is 30 m.p.h. and the schedule speed is 16 m.p.h. with one to one and one-half stops per mile. The battery equipment consists of eighty-eight cells having a rated capacity of 400 amp-hr. at the six-hour rate of discharge.

Between Oct. 9, 1912, and Sept. 1, 1913, this car ran more than 36,000 miles, making an average of 122 miles a day every day in the week. During this time only 19 miles of schedule operation was lost, and this was on account of the burn-out of a charging plug which incidentally damaged some car wiring. The car is in operation from 5.30 to 8 a.m., running 25 miles, when it is charged until 9.20 a.m. It is in operation again from 9:20 a.m. to 1:30 p.m., running 28.2 miles, when it is charged until 2:30 p.m. It is in operation from 2:30 to 4 p.m., running 18.6 miles, when it is charged

TABLE VII—OPERATING DATA ON STORAGE BATTERY CARS OF THE THIRD AVENUE RAILWAY, NEW YORK

Length of run, minimum	5 miles
Length of run, maximum	10 miles
Length of run, average	8 miles
Maximum grades	5 per cent
Average number of miles per car a day	58
Number of trips per day, minimum	7
Number of trips per day, maximum	18
Number of trips per day, average	10
Maximum speed	15 m.p.h
Schedule speed, minimum	6 m.p.h.
Schedule speed, maximum	7.6 m.p.h
Average number of stops per mile	8
Average duration of stops	6 sec.
Number and type of cars operated (of one type)	121*
Weight of car complete	14,500 lb
Length of car	26 ft. 1½ in.
Seating capacity	26
Number of motors per car, type and rating—two motors, rated 30 amp at 110 volts.	
Kind of battery and number per car, 58-cell, 29-plate lead battery.	
Kw-hr. per car mile used at motors	0.5 to 0.6
Kw-hr. per car mile purchased, a.c. energy at 6600 volts	1 to 1.2
Kw-hr. per car mile battery input	0.910
Amp-hr. per car mile of charge	5.53 to 6.85
Amp-hr. per car mile of discharge	4.52 to 5.45
Amp-hr efficiency of battery	82 per cent
Voltage efficiency of battery	79.1 per cent
Watt-hour efficiency of battery	64.8 per cent
Time required to charge batteries	7½ to 9 hours
Number of miles obtained per charge, normal	85 miles
Number of miles obtained per charge, maximum	119 miles
Operating Cost per Car Mile:	
Platform expenses	8.75 cents
Total repairs to cars, trucks, electrical equipment and all shop and carhouse expense	2.55 cents
Power	1.2 cents

*Now 160 cars.

until 4:50 p.m. It is in operation from 4:50 to 7:30 p.m., running 25 miles, when it is charged to run from 8:05 to 11:10 p.m., running 25 miles, after which it has the necessary charge to fill up the battery for the first stages of the next day's run. It will be noted that the battery is not large enough for a day's run because the schedule permits longer layover periods, but it is larger than is necessary for a single trip to allow flexibility in rearranging the schedule from time to time. In fact, it is the practice of the company to operate approximately the last 50 miles of the day without any intermediate charging. Charged as at present, the car can make 150 miles a day and even more if desired. An empty battery is charged 30 per cent of its capacity in twenty minutes, 50 per cent in forty minutes, 66 per cent in one hour, to 75 per cent in one hour and twenty minutes and 100 per cent in about three and one-half hours. The characteristics of the battery permit it to receive high-rate charges, when such charging is useful, at approximately 90 per cent amp-hr. efficiency.

The batteries are maintained entirely by the car crews,

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who required very little instruction. The cost of operation is from 17 to 18 cents per car mile. This total includes a high charge for energy on account of temporary charging conditions. On the whole, this electrification has proved very satisfactory. The Pennsylvania Railroad gets a trackage rental in place of operating an unprofitable train, while the electric railway company also makes money.

EDISON-BEACH INSTALLATIONS

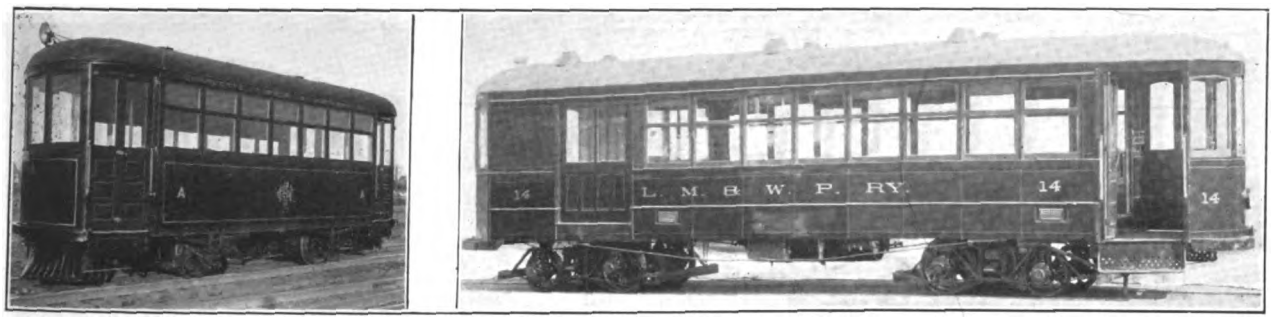
The Federal Storage Battery Car Company has sold some ninety cars in the United States and abroad to about forty-five roads. Characteristics of Edison-Beach installations are operation on very severe grades, use of multiple-unit trains and construction of largest American cars yet produced (52 ft. over-all length).

The traction batteries of this company are rated as follows:

	Type of Cell				
	A-4-H	A-6-H	A-8-H	A-10-H	A-12-H
Rated capacity, amp-hr. output..	150	225	300	375	450
Normal actual output, seven-hour charge, amp-hr.....	168	252	336	420	504
Maximum output on overcharge, amp-hr	190	285	380	475	570
Rated capacity watt-hours per cell	180	270	360	450	540

The Tanana Valley Railway Company, Fairbanks, Alaska, has been operating since the middle of 1912 a single-track combination passenger and baggage car over a 22½-mile narrow-gage line between Fairbanks and Gilmore, this stretch including a 2 per cent grade about 1000 ft. long and 1½ per cent grade about 1 mile long. The daily service of the car comprises two round trips, or 90 miles, with layover boosts of one to one and one-half hours in addition to night charging. The charge for current is the highest known, namely, 20 cents per kw-hr., but without doubt the fares are in proportion. The electrical equipment comprises 135 A-6 cells for traction, five like cells for lighting and four 6.7-hp special type motors. The speed on level track is 25 m.p.h.

The Cambria & Indiana Railway, Colver, Pa., operates a combination baggage and passenger car, 35 ft. 1 in. over all, on a 12-mile three-leg switchback line between Rexis and Colver. This line has a steady rise of 435 ft. in 10 miles and then of 400 ft. in the next 2 miles. On 2 miles a constant grade of 5 per cent prevails. The car makes three round trips a day. On an inspection trip when there was 2 in. of snow on the ground only 212 amp-hr. was required for a 24-mile run, the time of the round trip being two hours and five minutes. Upon this the battery was boosted for forty-five minutes, and the following round trip, which was made in one hour and forty-four minutes, required 178 amp-hr. The battery was then boosted for one and one-half hours, the third trip requiring one hour and forty-eight minutes with an energy consumption of 162 amp-hr. The battery finally had the usual seven-hour night charge before going into service the next day. During the run five intermediate stops were made each way. The average loaded weight of the car was 18 tons. The energy consumption worked out at 7.66 amp-hr. per car mile or 64 watt-hr. per ton mile. The equipment of the car consisted of 130 A-10 cells for traction, five like cells for lighting and four 10-hp motors.



Typical Storage Battery Cars for City and Light Interurban Service

As to grades, the Burlingame (Cal) Electric Railway has used one single-truck car, 27 ft. 6 in. over all, since the spring of 1913 on a suburban run about 7000 ft. long. This short run, however, has a grade of 5.2 per cent for 250 ft., followed by somewhat shorter lengths of 2.4 per cent and 3.4 per cent and then by 250 ft. of 12.76 per cent grade. The calculated speed of this car is 23 m.p.h. on the level and 5 m.p.h. on the maximum grade mentioned. This extraordinary service is handled by four 10-hp motors and 119 A-10-H traction cells. Five cells of the same type are used for lighting. The battery equipment is boosted for three hours and forty-eight minutes during the day in addition to the usual seven-hour night charge. The railway buys energy from the local lighting company at 2½ cents per kw-hr. for the first 5400 kw-hr. taken in a month and 1½ cents for the second 5400 kw-hr.

Two cars with 18-ft. bodies are used by the Manhattan Beach Estates, a high-grade realty development at Manhattan Beach, New York. These cars are operated through the estates on a track less than 1 mile long to furnish connection with the station of the Long Island Railroad Company. The electrical equipment of each car includes ninety-five A-6-H cells for traction, five like cells for lighting and two 10-hp motors.

STORAGE BATTERY TRAIN FOR HAVANA

The ELECTRIC RAILWAY JOURNAL for Sept. 28, 1912, contained an article on the three-car multiple-unit battery train built for the United Railways of Havana. The service was begun on Jan. 8, 1913. Owing to the tropical climate, bad track conditions and too high a gear ratio trouble was experienced at once from the excessive heating of the batteries, but these difficulties were readily corrected by an increase in the number of cells and a

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reduction of the gear ratio. The following account is an abstract of a report on this installation as made to R. M. Orr, general manager, by John A. Thompson, electrical engineer of the company:

The cars are of the double-truck type, seating forty passengers each. The trucks, which are among the best features of the car, are of diamond-frame pattern with fixed axles and revolving wheels. The wheels rotate on roller bearings and the end thrust is taken up by ball-bearing thrust plates. The friction is very low, and grinding of wheels and rails on curves is eliminated. The smooth-running qualities of these trucks are very noticeable. The air-brake equipment has been changed from the storage air system to standard straight and automatic system with a motor-compressor mounted on the cars and operated from the battery.

The batteries are Edison A/6 type and have a rated capacity of 225 amp-hr. Originally there were 220 cells per car, 200 for power and twenty for lighting and control circuits; but these have been increased to 239—228 for power and eleven for lighting and control. The four motors are each rated at 10 hp, 200 volts, 37.5 amp, 800 r.p.m., and are guaranteed to stand an overload of 100 per cent for short periods. The motors are geared to the hub of the driving wheels through single reduction wheel and pinion gearing. The gear ratio was originally 26:68, but it has been changed to 15:79. The system of multiple-unit control works very satisfactorily.

Each car is fitted with a two-point receptacle for receiving the current and a connection for an ordinary air coupling for charging the air tank. The car is switched up alongside the charging station and the connections are made in less than a minute. The rate of charging is varied by cutting out the series resistance. The amount of current that can be put in during a certain time is limited by the heating of the cells. The allowable rates given by the makers are: Five minutes at 225 amp, twenty minutes at 180 amp, thirty minutes at 135 amp, sixty minutes at 90 amp and normal rate, 45 amp for seven hours. The original mileage on one charge was 65 miles, but this has been increased to 75 miles.

The only attention required by the battery is the addition of distilled water. This can be attended to by the operator in charge of the charging station at any time while the car is lying over for charging. Two boys earning $1.50 per day and a car cleaner at $1 a day are the only attendants in addition to the train crews who are required to run the cars.

On Jan. 8, 1913, regular service was begun on the old United Railway main line between Cienaga and Galiano. The schedule advertised was a train each way every fifteen minutes, passing at Pueblo Nueno station. The round trip was 6.6 miles, with fourteen stops per round trip. The schedule time was thirty minutes, so that there were always two cars on the line while the other was lying over at Cienaga charging station. The method attempted was to send each car out for one round trip taking thirty minutes, then to charge it for fifteen minutes, then to send it out again for another round trip and so on.

Difficulties began at once. The schedule could not be maintained; the batteries heated to 140 deg. Fahr., causing discomfort to passengers; the motors heated and the batteries lost their charge because it was impossible to put enough charge into them during the layover. An attempt was made to relieve matters by altering the schedule to every half-hour from 10:09 a.m. till 4:09 p.m. This also proved unsatisfactory, and the cars were withdrawn from service on Jan. 15 with two motors burned out.

The causes of this failure were several. The track was very bad within city limits and it was completely covered with dust in some parts. As the gear ratio was too high for such frequent stops, it caused an abnormal current discharge, heating up both batteries and motors and pulling down the voltage. Owing to the frequent stops the equipment had no chance of cooling down again. From the same cause also the energy used per car mile was excessive so that the car had to be charged at a high rate during the layover to make up for it. This also kept up the temperature of the batteries. Then, finally,

TABLE VIII—OPERATION OF STORAGE BATTERY CARS BETWEEN CIENAGA AND GALIANO, CUBA, AFTER GEAR RATIO HAD BEEN CHANGED AND NUMBER OF CELLS INCREASED

Date	Car Miles	Fares	Fares per Car Mile	Kw-hr. from Trolley	Kw-hr. Lost in Resistance	Kw-hr. to Battery	Charging Efficiency	KW-HR. PER CAR MILE			COST OF CUR'NT		WAGES		TOTAL EXPENSE	
								From Trolley	To Battery	To Motors	Dollars per Day	Cents per Car Mile	Dollars per Day	Cents per Car Mile	Dollars per Day	Cents per Car Mile
March 5.	330	...	...	855	273	582	68.1	2.60	1.77	0.745	34.20	10.4	29.00	8.8	63.20	19.2
March 6.	455	...	...	997	293	704	70.6	2.20	1.54	0.722	39.88	8.8	29.00	6.4	68.88	15.2
March 7.	...	...	...	93	32	61	65.6	...	...	...	3.72	...	...	...	Lying over	
March 8.	436	866	1.99	1120	330	790	70.6	2.57	1.81	0.774	44.80	10.3	29.00	6.7	73.80	17.0
March 9.	462	1532	3.31	1200	355	845	70.4	2.60	1.83	0.771	48.00	10.4	29.00	6.3	77.00	16.7
March 10.	462	701	1.52	1128	338	790	70.0	2.45	1.71	0.743	45.12	9.8	29.00	6.3	74.12	16.1
March 11	449	728	1.63	1082	342	740	68.4	2.41	1.65	0.823	43.28	9.6	29.00	6.5	72.28	16.1
March 12	462	746	1.62	1028	312	716	69.7	2.23	1.55	0.788	41.12	8.9	29.00	6.3	70.12	15.2

Remarks: March 5 to 6—No passengers. From March 8 to 12—Regular service.
Kw-hr. per car mile from trolley and to battery are correct. Kw-hr. per car mile to motors are only approximate.

Round trip, miles	6.6	Average kw-hr. per car mile to battery	1.72
Number of stops per trip	14	Average kw-hr. per car mile to motors	0.76
Schedule time, minutes	27	Average cost per car mile for current at 4 cents	9.84
Schedule speed, m.p.h.	14.7	Average cost per car mile wages, cents	6.64
Average kw-hr. per car mile from trolley line	2.46	Average cost per car mile total, cents	16.48

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owing to the inconvenient tracks at Cienaga, time was lost in switching, so that the charging did not amount to more than seven to ten minutes.

The ampere-hours used per round trip averaged about 35. With an ampere-hour efficiency of 85 per cent this amounts to 41.2 amp-hr. on charge. To keep up the fifteen-minute schedule all day would require that at least 30 amp-hr. be put into the battery after each run. The average time being say ten minutes or one-sixth hour, the required current would be at least 180 amp. According to the makers' figures, 180 amp can be put into the battery for twenty minutes; but this is on the assumption that it is cool to begin with. In this case the cells were hot from an excessive discharge and were kept hot by excessive charging rates.

It was decided to reduce the gear ratio and enlarge the power battery as already noted. The effect of these changes was to reduce the current discharge in starting and accelerating, to raise the average voltage on discharge, to reduce the kilowatt-hours per car mile and to raise the charging voltage nearer to that of the line so as to have less waste in the charging resistance.

On March 5 the alterations were completed on all three cars, and they were tried out on the Cienaga-Galiano run without passengers. They were found to be able to keep up a fifteen-minute schedule all day, so they were put in regular service again on March 8. The operating records up till March 12 are given in Table VIII. The batteries still heat up to about 116 deg. Fahr. after a heavy run, but this is hardly noticeable to the passengers.

The kilowatt-hours per car mile for March 12 are as follows: 2.23 from the line, 1.55 to the battery and 0.788 to the motors, or 0.0394 per ton mile. The charging efficiency is 69.7 per cent and the battery efficiency 50.8 per cent. Each car now makes five consecutive runs without recharging and is then put on charge for an hour and a quarter. This method is a decided improvement and saves time in switching.

In conclusion Mr. Orr says that the cars now come up to guarantee with regard to energy consumption. The consumption of 39.4 watt-hr. per ton mile is extremely low and is due to the special type of truck with fixed axle and roller bearings. The efficiency of the battery is only 44.4 per cent, and this is an inherent defect in the Edison battery. Better efficiencies than this may be had under special circumstances, but it is doubtful if it has ever been much above 50 per cent in car service. Taking the figures for March 12 as before, 0.79 kw-hr. per car mile is used in the motors and 0.76 kw-hr. per car mile is lost in the battery. Even at 4 cents per kw-hr., this represents a charge of 3.04 cents per car mile. If a lead battery was used, the cost of upkeep would be more than 3 cents per car mile; therefore no matter what the efficiency of the lead battery might be it is bound to be more expensive to operate than the Edison battery, even with current at the high price of 4 cents.

OTHER INSTALLATIONS WITH EDISON BATTERIES

The first steam line to which the storage battery car was applied was the 2.3-mile Bushwick branch of the Long Island Railroad. On April 1, 1911, it was furnished with one 28-ft. car equipped with two 15-hp motors. Up to April 1, 1913, this car ran more than 60,000 miles. The railroad company reports that the car saves $21 a day as compared with a steam locomotive and coach. This is equivalent to a saving of more than $14,000 for the first twenty-three months of operation, while the car itself cost $6,000. Table IX is a

Multiple-Unit Cars with Continental Type Suspension, Used Singly for Passenger Service and Together as a Freight Locomotive

TABLE IX—OPERATION OF BUSHWICK JUNCTION BRANCH, LONG ISLAND RAILROAD

Length of run, miles	2.3
Number of grades	2
Maximum grade, per cent	0.7
Average number of miles per car per day	45
Number of trips a day	9
Maximum speed, m.p.h.	20
Schedule speed, m.p.h.	15
Average number of stops per mile	1.2
Average duration of stops, minutes	4
Weight of car complete, lb	16,000
Length of car, ft	28
Seating capacity	26
No. of motors per car, type and rating—two series, 15 hp each	
Kind of battery and number of cells per car	125 A-4
Kw-hr. per car mile purchased power	2.86
Time required to charge batteries	2 hr. 30 min.
Number of miles obtained per charge	45

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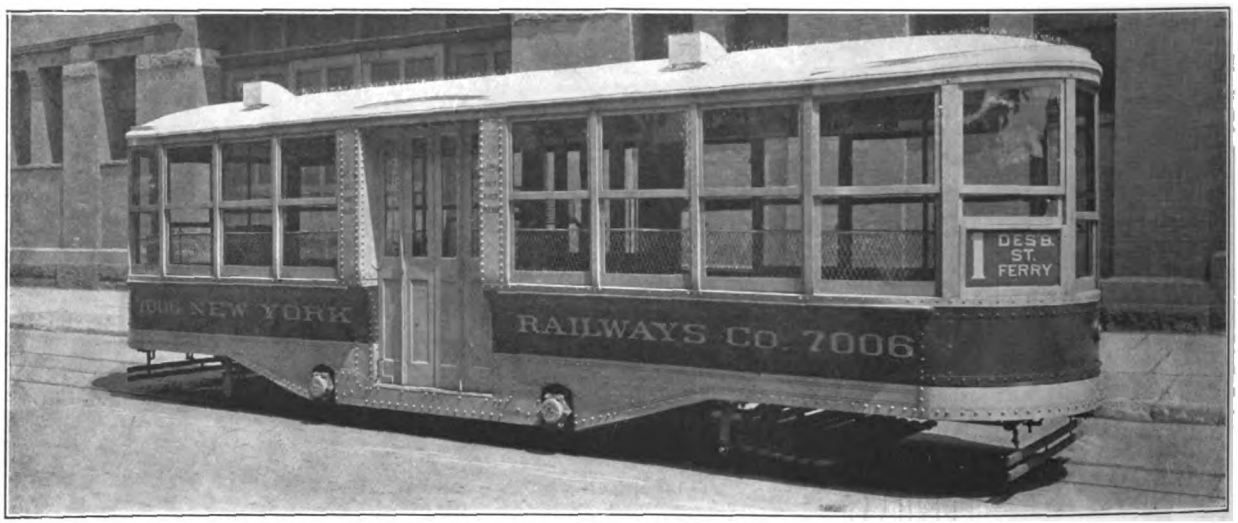
report on the operation of the Bushwick branch as made under date of June 11, 1913, by George Gibbs, chief engineer electric traction Long Island Railroad Company.

The batteries are charged through a line about 3 miles long, receiving 675-volt current from the third-rail. The size of the wire is so proportioned that the necessary resistance is obtained for full charges. Under this condition the kilowatt-hours per mile are very high, as the company prefers to waste some energy in line losses rather than to use a motor-generator set of proper voltage and provide an attendant for operating.

The Long Island Railroad Company also has operated since May 26, 1913, a 32-ft. car on a 7½-mile branch between Valley Stream and Mineola. It seats thirty-two persons and weighs about 22,900 lb. light. The schedule calls for six intermediate stops and is made in twenty-two minutes. The car is capable of a maximum speed of 33 m.p.h. It makes seven round trips a day and one round trip from Valley Stream to Rockaway

able to haul a freight trailer weighing from 7 tons to 10 tons. Since this installation the company ordered two double-truck cars, the first in September, 1912, and the second during the current year. These are of the combination baggage and passenger type, one car carrying 225 A-6 cells for traction, five similar cells for lighting and the other a similar combination of 225 A-6 H cells. Both cars have four 12½-hp motors. The 9½ miles between Dobbinsville and Delaware City, including a 6 per cent grade over a drawbridge and a 7 per cent grade at an overhead railroad crossing, is made in thirty minutes, although the run can be made in fifteen minutes. The stops are favorably located on the tops of grades so that cars frequently coast half way to the next station. A typical operation is to have the car run for thirty-five minutes and to lie over at Dobbinsville for fifty minutes. When two cars are used the full hour schedule is maintained, the distance being made in thirty minutes each way, with one hour for layover and charging available at Dobbinsville for each trip.



Storage Battery Stepless Car, New York Railways

for the night layover, making a total of 115 miles a day. The battery is boosted during the seven layovers of the day, which vary from fourteen minutes to two hours and twenty-seven minutes. The electrical equipment consists of 213 A-4 cells for traction, five similar cells for lighting and four 10-hp motors.

The Billings (Mont.) Traction Company operates five cars, each carrying 105 A-6 cells for traction, five like cells for lighting and two 10-hp motors. The traction company buys energy from the lighting company at 2 cents per kw-hr. and refrains from charging during the lighting company's peak loads.

The Wilmington (Del.), New Castle & Delaware City Traction Company was originally a 10-mile overhead line. The cars were sold and operation discontinued for three years, after which the overhead system was taken down and sold and a 32-ft. car of Continental type installed Nov. 1, 1911. This car was equipped with 205 A-4 cells for traction, five A-4 cells for lighting and four 12½-hp motors. Although the road had 7 per cent grades and poor track, this car was

Early in the summer of 1913 the Twin Falls (Idaho) Railway placed in service a two-car multiple-unit train consisting of 38-ft. combination passenger and baggage cars, the bodies mounted on trucks of 19-ft. wheelbase. The cars are operated either singly or in pairs for passenger service and in pairs for hauling freight cars at night. Each one is equipped with 190 A-6-H cells for traction, twelve like cells for control and lighting and four 10-hp motors, multiple-unit equipment, air brakes, etc. The cars are now operated on a line which is only 3 miles long, but the full service will cover a 12-mile line between Twin Falls and Shoshone Falls. The territory served is a rich farming country requiring railway service but not populated enough to call for standard electric railway operation.

The Chesapeake & Ohio Railway purchased a year ago a 38-ft. car for operation on a 12-mile branch between Covington & Silver Grove, Ky. This car weighs 34,000 lb. and is geared for a maximum speed of 39 m.p.h. The car is not now in operation in view of the fact that the railroad wanted it to take the place of two

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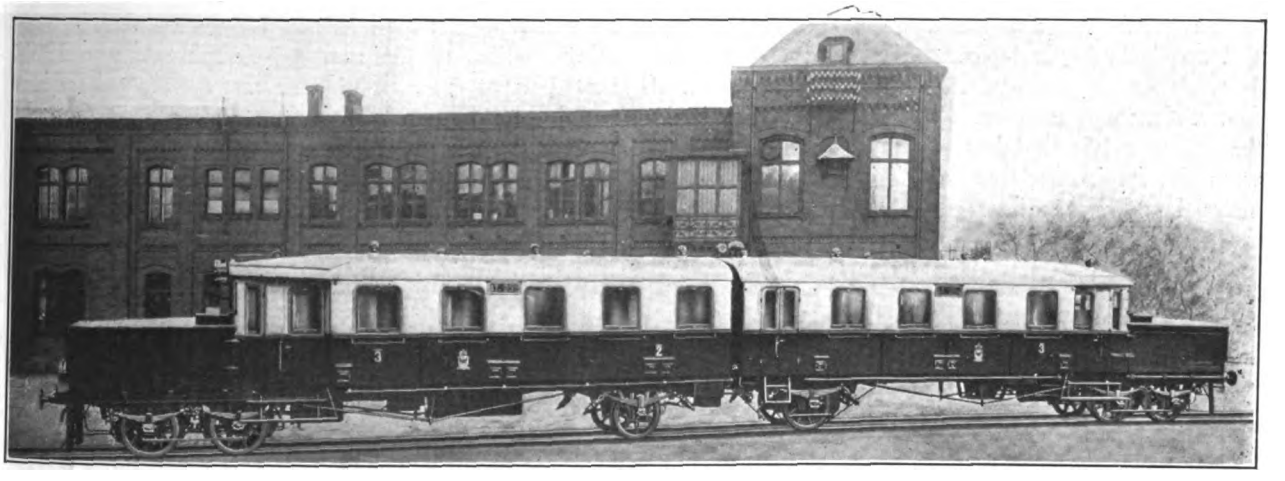
steam trains. The schedule was too severe to permit this end to be accomplished regularly because blockades by freight trains did not permit the minimum of thirty minutes' layover time at the end of each round trip as required for boosting. The operating records show that the car ran as many as 264 miles in one day, but, of course, this performance could not be kept up continuously.

The Lorain (Ohio), Ashland & Southern Railway operates a combination passenger, baggage and smoking car, 50 ft. over all, equipped with 220 A-8-H cells for traction, seven similar cells for lighting and four 20-hp motors. A test of this car was made on the tracks of the Jamestown (N. Y.), Chautauqua & Lake Erie Railway, as a result of which the Jamestown company has ordered a car of simliar design.

The St. Joseph Valley Railway, Elkhart, Ind., placed in service early in the summer of 1913 a 50-ft. combination car weighing without load 61,750 lb. and equipped with 224 A-10-H cells for traction, six similar cells for lighting and four 30-hp motors. In a test on the Erie tracks with a total load of 31.77 tons this car made an average speed of 37.8 m.p.h. on level track and consumed 106 kw-hr. per car mile, or 33.4 watt-hr. per ton mile, for a run of 31.1 miles, which included eleven intermediate stops and a 7-mile continuous grade of 1½ per cent. The car is geared for a maximum speed of 40 m.p.h.



Twin Storage Battery Car, Prussian State Railways

STORAGE BATTERY AND OTHER SELF-PROPELLED CARS IN GERMANY

A remarkable feature of German storage battery practice is the fact that its development has been confined practically to steam railroads, of which the installation on the Prussian-Hessian State Railroads is by far the largest. The leading thought in creating this self-propelled car traffic was not to obtain a saving in operating costs but to improve the means of travel on lines which hitherto had had very poor service. The results have proved very satisfactory to the public and the railway administration.

In most cases the routes are weak traffic lines, radiating from cities where cheap current is available. In 1906, when the service was begun, experiments were made also with steam cars and gas-electric cars, but it was found that the former were not satisfactory and that the latter had not yet reached the desired degree of reliability. As of June 1, 1913, there were in service throughout Germany 148 accumulator cars, ten gas-electric cars and five steam cars, costing a total of $2,795,000. There were also under construction forty-three accumulator cars, six gas-electric and two Diesel-electric motor cars, so that at the end of 1913 a total of 200 motor cars will be in use. The 152 cars in service during the first part of 1913 operated on 180 sections with a total length of 3070 miles. The lengths of run on one charge are as follows: 125 cars, 62 miles; twenty-seven cars, 81 miles; nineteen cars, 112 miles, and five cars, 56 miles. The total approximate mileage of self-propelled cars has grown as follows: 1907, 124,000 miles; 1908, 357,000 miles; 1909, 1,520,000 miles; 1910, 1,860,000 miles; 1911, 2,726,000 miles; 1912, 3,720,000 miles, with an estimate of 4,960,000 car miles when the new cars are included. The mileage of routes will also rise to 3600 miles. Energy for the accumulator cars is supplied from fifty-three charging stations.

The cars are operated in accordance with the standard steam railroad regulations. These regulations do not forbid the operation of motor cars by one man, but two men are employed for the sake of safety, although it is appreciated that automatic devices, such as the dead-man's handle, are available for one-man service. The wages of the motor-car operators are less than those of locomotive engineers, owing to the short period of instruction required to handle the car and make minor repairs. The conductors receive the training of motormen and are their logical sucessors. The conductors or trackmen must have one year's training, four months of which is used in acting as motormen under an instructor. The steam and gas-electric cars, on account of their greater complexity, are operated by locomotive engineers.

Trailers are rarely used, nor is any attempt made to operate trains of accumulator cars, although multiple-unit apparatus is available for that purpose. All of the

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accumulator cars have been furnished by one company, the Accumulatoren Fabrik Aktiengesellschaft, which undertakes for 3.4 cents per car mile (with a small extra guarantee if the minimum distances of 62,000, 80,600 or 111,600 miles for the three different types of cars shown in Table X are not made before the replacement of the positive plates) the entire maintenance of the batteries, including replacement of plates and electrolyte. For this service one man may attend to a maximum of four stations and ten cars. In case of extensive repairs the railways furnish labor without charge. The railways also furnish free transportation for men and battery material and make all arrangements for charging plant buildings and supply of current. The battery company, however, is responsible for the reliability of service.

TABLE X—STANDARD ACCUMULATOR CARS OF THE PRUSSIAN-HESSIAN STATE RAILWAYS

Run on one charge	62 miles	80.6 miles	112 miles
Design	Two short-coupled 3-axle coaches		
Carrying capacity	100 persons in third and fourth classes		
Approximate weight (empty) (metric tons)	58.5	60	66
Maximum speed	About 37.2 m.p.h.		
Approximate price without battery and without electrical fittings	$7,500	$7,750	.....
Motor equipment	Two 85-hp capacity one-hour rating		
Approximate weight of electrical fittings	8 tons		
Approximate price of electrical fittings	$5,750		
Number of cells	168		
Type of cells	V-GC-185	VI-GC-185	VI-GC-235
Capacity on two hours' discharge, amp-hr	368	443	562
Approximate mean discharge voltage	300		
Charging voltage	340-460		
Approximate weight of battery, tons	18.5	20	25.5
Approximate price of battery	$5,500	$6,000	$7,500
Approximate price of complete coach	$18,640	$19,600	$21,360

OPERATING COSTS OF PRUSSIAN CARS

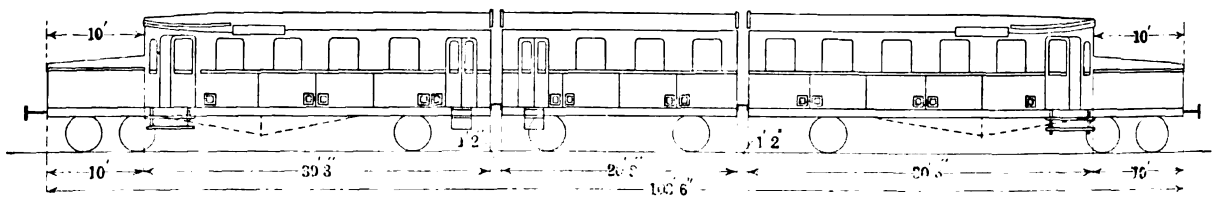
Tables X and XI are based on a performance of 2,366,000 car miles from April 1, 1911, to March 31, 1912, of which 2,287,000 car miles were operated by means of storage battery cars with series-wound motors, the remainder being made by one storage battery car with shunt-wound motors, four steam cars and four gas-electric cars.

Although the early experiments with shunt-wound equipments for regenerative control were not satisfactory, five simplified equipments were built during 1912. Four of these cars have but one motor on account of the difficulty of operating shunt-wound motors in parallel. The speed regulation of the one-motor cars is obtained by parallel-series connection of the battery halves in addition to the usual resistances. Experiments indicate that these equipments are not so economical as the series motors if the longer grades are less than 1.7 per cent. The operating expense of the four gas-electric sets was 19.28 cents per car mile. The latter cars are wanted for high speeds like 44 m.p.h., but they have not yet been developed to the desired degree of reliability. Tests of three storage battery cars equipped with roller and ball bearings appear to show that they are more advantageous for service approximating street car conditions, and that in any event their economy would not justify the conversion of cars with ordinary bearings.

The State Railways are now working in two directions—increasing the running range and improving the conveniences of the cars. As previously noted, nineteen cars have been equipped for a range of 112 miles and it is proposed to build a six-axle twin car for a range of 186 miles. The State Railways have also built several triplet cars, namely, twin passenger cars with an intermediate baggage body. These are mounted on eight axles and are about 125 ft. long. The straight passenger design seats 187 passengers. The characteristics of the 168-volt battery sets are given in Table XIII.

TABLE XII—DIVISION OF EXPENSES OF PRUSSIAN CARS

	General, Cents per Car Mile	Average per Cent of Earnings	Highest, Cents per Car Mile	Lowest, Cents per Car Mile
Fixed charges on investment (4 per cent) and depreciation of cars and charging plants	5.52	26.60	12.00	3.44
Current	5.24	25.15	10.08	2.00
Heating	0.44	2.10	0.80	0.16
Employees	4.20	20.25	6.80	2.76
Lubrication, cleaning, station attendance, etc	0.74	3.55	1.76	0.8
Maintenance of batteries, including amortization	3.84	18.4	5.26	3.56
Maintenance of car equipment exclusive of batteries	0.82	3.95	2.20	.08
Total	20.80	100.00		



Articulated Storage Battery Car of Triplet Type for Prussian State Railways

TABLE XI—GENERAL DATA ON PRUSSIAN CARS

	Average	Highest	Lowest
Annual performance, miles	25,532	39,637	16,058
Number of passengers per trip	27.4	55	15.3
Operating time, per cent	....	77.8	....
Reserve time, per cent	....	9.0	....
Shop time, per cent	....	13.2	....
Earnings per car mile, cents	24.6	57.6	15.1
Expenses per car mile, cents	20.8	33.1	15.2

TABLE XIII—CHARACTERISTICS OF GERMAN BATTERY

Range in car miles	62	80.6	111.6
Capacity on two-hour discharge basis, amp-hr	368	443	562
Maximum charging current, amp	200	240	300
Normal charging current, amp	160	192	240
Charging time with maximum charging current and complete discharge, hours	2	2	2
Charging time with normal charging current and complete discharge, hours	2½	2½	2½

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THE ATLANTIC CITY CONVENTION

According to every indication the Atlantic City convention will be the largest in the history of the association. And it is well that it should be so. In each branch of electric railway work are important questions for settlement for which the co-operation of all interested in the industry is necessary. There is no obvious road toward improvement except conscientious hard work on the part of every member company of the association and co-operative service by all who can be enlisted to help in the desired end. Unless each does his share the industry must suffer. The executive committee has acted wisely in devoting the greater part of its opening session to the subject of valuations. In fact, the papers and addresses scheduled for this first meeting give the keynote to the entire convention of the American Association. They will be followed on Wednesday by the report of the committee on public policy and on Thursday by that on federal relations, the two most important subjects which the association has to discuss this year, and these reports should, and undoubtedly will, point the directions in which progress should be made.

VITAL PROBLEMS TO BE CONSIDERED

During the past year various events have occurred which have a direct bearing upon the question of the valuation of railway properties. One of the most important, of course, is the appointment by the Interstate Commerce Commission under authority from Congress of a committee to undertake the valuation of interstate roads. Other recent events which have a bearing upon this same general subject or the attempt to solve the question of the relation between the carriers and the public have been the Minneapolis rate decision by the Supreme Court, the proposed new franchises at Kansas City and Detroit and the establishment of a full-fledged municipal street railway in San Francisco. This is the proper time for the association clearly to define its policy upon these points. Is municipal ownership for all of our public utilities the proper solution? Will it be profitable for the city and advisable from a political standpoint? If not, what should be the relations between the city and the public utility companies? If some form of regulation, of what kind does the industry approve as best for the companies and best for the public? Finally, what should be the franchise relations between the city and the companies? If the electric railway companies are negligent in reaching a rational solution to these questions, others will not be backward in pushing forward their views. The association is the logical body through which this united action should be performed. It was organized primarily for such co-operative effort, and its members are not only vitally interested from a financial standpoint in seeing that their properties receive justice in the settlement of these questions, but, being thoroughly conversant with the transportation situation, they can give authoritative advice on matters regarding which the public is ignorant.

PUBLICITY AND A CAMPAIGN OF EDUCATION

But a correct solution of the question is not alone sufficient. Coupled with it should be the ability on the part of the association to make its views known and to impress them upon the general public. Publicity is a matter which has been woefully neglected by the railway men in the past. Most of them now, we believe, realize the necessity for it, although all do not understand the best methods by which it may be secured. Nevertheless, it is quite essential to make people understand one's position on a public question if the arguments are to receive any attention. Here also is the place where every agency able to assist should be utilized. At the present time we believe that both the authorities and the public realize that there is much to be said on the railroad side of the case. They are willing to listen. They want to know what the railroads have to say in defence of their general position and what the companies offer as a practical solution for the difficulties of which they complain. Neglect of this opportunity will be interpreted as a confession of weakness or an absence of any definite program. There should be no doubt in the mind of anyone as to the policy for which the association stands. We hope that the reports of the committees which have been assigned to consider these important problems at the Atlantic City convention and the addresses which will be submitted there will furnish the ammunition for an active campaign of enlightenment and publicity and that the association and all concerned in the welfare of the industry will utilize this material to the very best advantage.

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THE GEARY STREET MUNICIPAL RAILWAY

Elsewhere in this issue we publish a brief history of the Geary Street Municipal Railway of San Francisco, from June, 1896, when the privately owned Geary Street, Park & Ocean line had its application for a fifty-year franchise extension denied, down to August, 1913, when the popular vote of the city authorized more city-built, owned and operated street railways. Our facts have been taken neither from the mouths of extraordinarily zealous municipal advocates nor from the caustic criticisms that have been uttered by the adversaries of the system. We have derived our information solely from statements in the form of public documents submitted by city officials to the municipal bodies. At the end of our compilation of facts we have placed Mayor Rolph's statement that the proposition is a veritable "gold mine." With this conclusion, however, we think that many will not agree, for the city reports obtainable are so incomplete and so strangely inadequate as hardly to warrant such an unreserved prophecy.

The first omissions noticeable to us in these statements occur in connection with the cost of construction of the municipal line, which does not include the $350,000 appropriated by the City Council for plans and specifications prior to the 1906 disaster. Apparently no one knows whether this sum was entirely spent for plans and specifications or swallowed up in the earthquake. The only tangible facts are that the plans already made were destroyed, that a vote of an additional sum after the disaster was declared illegal, that a bond issue had to be resorted to in order to raise the funds with which to proceed, and finally that in calculating the cost of constructing the road the city officials have relegated into obscurity this $350,000 that had formerly been actually appropriated and presumably spent. This is of peculiar significance when we consider that $32,418 is the only amount included in the cost of construction for plans and specifications. Why this expenditure, only 1.9 per cent of the whole construction cost, should be so low in comparison to the usual 7 to 10 per cent on electric railways, and also so much less than the amount the Council deemed necessary for plans and specifications a few years before, is indeed a mystery. Even if we add the items of $500 for the city attorney's trip to Washington, $2,000 for litigation and $1,171 for Mr. Arnold's reports on cars, the percentage for expenses of engineering and superintendence during construction is only 2.1 per cent of the total cost. Looking at the question broadly, it is certainly impossible for a city or for a company to obtain the services of construction engineers or drawings or superintendence without charge, and if these expenses are not included in the official statement of construction cost they must be paid for in some other way.

Another item which seems to have been omitted in the official statement of cost of construction of the railway is the interest during construction. The rulings of the Interstate Commerce Commission expressly provide that interest paid or accrued on the capital investment prior to the actual moment of beginning operations shall be capitalized, but it appears that this item for the Geary Street road has not been computed as yet. Inasmuch as the city officials announce that they chose the Interstate Commerce Commission system of accounts and rulings because of the wide use of this system and because it gave the public a means for checking up the allocation and distribution of the various expenditures, it is strange that special care should not have been taken to compute this preliminary interest item before the first report was rendered.

It would be possible to criticise other faults in the statement of cost of construction, such as the omission of the $91,905, the cost of the four special elections, which in a sense is comparable with the organization expenses of a private company and so should have been capitalized or amortized if a fair comparison with a private corporation is to be made. But instead of delving further into the construction account for errors of omission or commission we shall pass to the operating statement, which shows an equal lack of specific provision for certain charges. In this connection it is interesting to compare the operating expenses of the Geary road with the figures given in the special census report on electric railways for 1907 showing the percentage distribution of the operating expense accounts for thirteen selected electric railways in the largest cities of the country. With these roads the municipal railway is fairly to be classed so far as its operating conditions are concerned. On an aggregate basis of 100 per cent for all operating expenses, the average expenditure of the standard lines for maintenance of way was 10.1 per cent, while the Geary line expended only 2.59 per cent, made up of $1,867 for cleaning and sanding tracks and of only $37 for all of the other items in the way and structures account. The standard electric line maintenance was 1.8 per cent, the Geary item being 0.03 per cent, and the carhouse maintenance charges were 0.8 per cent and 0.005 per cent respectively. In the maintenance of equipment the standard lines expended 13.5 per cent, including 6.1 per cent for cars and 4.4 per cent for the electric equipment of cars, as against maintenance of equipment on the municipal line of 4.3 per cent, including 3.07 per cent for cars and 0.21 per cent for the electric equipment of cars.

In view of these figures, it might be safe to assume that those for conducting transportation will be interesting. This is where the question of politics enters, because the largest item in this primary account is that of wages of conductors and motormen. The parallel is instructive. In conducting transportation the standard lines expended 59.3 per cent, 44.7 per cent of which was for car operation, while the Geary line used 87.1 per cent for conducting transportation and 62 per cent for car operation. In regard to the last general operating expense group, that of general and miscellaneous expenses, the chief item here on which payment can be postponed is that of injuries and damages. In this account the standard roads expended 9.4 per cent and the Geary road 0.13 per cent. The totals upon which these standard percentages are based are fairly representative of the operating conditions in large cities, and the variations therefrom of the Geary percentages are quite illuminating.

It is to be expected that the cost of maintaining the track and roadway in San Francisco would be low at first owing to the recent entirely new construction, and the same conditions would apply to a large extent to maintenance of equipment. But the point for San Francisco to bear in

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mind, in calculating the profits of its municipal system, is that its maintenance expenses have barely begun. On the other hand, the charges for conducting transportation are already a third higher than the standard. This is undoubtedly caused by the requirement that every municipal employee must receive $3 per day, which makes an expenditure for motormen and conductors alone of 62 per cent of the operating expenses and 26 per cent of the operating revenue. There is no reason either for believing that the municipal road will be any more immune from the average injuries and damages charge than a privately operated system. Hence the amount of $99 charged to this account during the first six months of operation can mean only that no attempt has been made to provide a fund for this accrued liability. Instead, as in the cases of track and equipment maintenance, these charges are cheerfully postponed, with the result that the report is to that extent misleading.

The operating report, which is a copy of that in the files of the Board of Public Works, concludes with this remarkable statement: "Surplus over audited expenses and interest charges, $32,557.59, from which all depreciation, sinking fund, mythical taxes, insurance, etc., *may* be deducted." The italics are ours. In view of the fact that the city charter of San Francisco expressly provides that allowances for taxes must be made in the financial statements of all public utilities, whether they are assessable or not, it seems to us that the taxes in this particular case might well appear in more than a "mythical" form. It would be interesting to put these taxes in the form of a concrete estimate, as well as a few of those other charges that the city "may" deduct, if it so desires.

The city officials might, for instance, follow the plan employed in connection with the Chicago rehabilitation and charge off 16 per cent of the gross receipts, not an unduly large percentage, half for maintenance and half for depreciation. On its gross receipts of $134,923 this would mean $21,587, instead of nothing for depreciation charges and only about $4,443 for maintenance. If to this 16 per cent for depreciation and maintenance it should add 5.5 per cent of its gross receipts for damages and 4.6 per cent of its gross receipts for taxes, percentages corresponding to those of the average city road according to the 1907 census report, it would have a total of 26.1 per cent of the gross operating revenue, or $35,214, to be deducted from the present apparent surplus of $32,557. Considering the $4,443 that the municipal line has actually spent for maintenance, which must be excluded from the total of $35,214, we admit that a small surplus is left, but were the city simply to carry fire insurance on its $341,931 of cars and its carhouse costing $234,688, even at the average rate of 37 cents per $100, the threatened deficit would be a reality. When to this fact we add the statement that for the retirement of $101,000 of the $1,969,000 bond issue each year from 1915 to 1934 a sinking fund provision of approximately $8,300 a month is required, the "gold mine" of Mayor Rolph becomes rather the illusory pot of gold at the end of the rainbow.

These are some of the points which occur to us in looking at the report of the municipal railway in San Francisco. Our deductions may not be exact, but they do take into consideration several omitted points th question of profit. In choosing the I Commission classification of accounts tl ities adopted a system that enables then the constructional, operating and capital be present, and it is unfortunate that ca absolutely complete statements of financ operations have not been rendered. As bookkeeper's report stops at the point w of profit begins to hang in the balance, a is hidden under estimates. Our chief reg port fails to afford electric railways, mun and even the layman any definite author tion on the subject of the success of the m in San Francisco.

THE SPLIT-PHASE LOCOMOT

Induction motors have been used as phas phase shifters for a long time, and one is i why they are only now being adapted to trac by the forthcoming application on the Norfol Railway. The first element of the answer to is that a.c. power has had to overcome the san in the traction field as in lighting and indu work. It should be noted further that until phase converter has not been seriously consi commercial machine on account of its inherent In its elementary form it is not a good convert the secondary emfs and currents are not well Invention has therefore been required to overcor fects, and this is recent, having awaited the cc pressure needed to render it productive. That cc pressure has been provided through the realizatic excellent traction qualities of the polyphase motor tain kinds of work, and it has led to a means of u motor without the additional overhead conductor hitherto have been necessary.

The propulsion element of the split-phase locomot hardly be considered an experiment, for the po motor is appreciated as one of the best-seasoned pi electrical equipment extant. Its control and regen features are also well understood and must appeal st to the conservative instincts of the engineer, who a dislikes waste. The phase converter, which is the novel element, is merely an induction motor used ir other way. It will operate without phase-balancing de and the motor will produce some torque even if the ph are not balanced, although it appears from tests alre made that the phases can be balanced in one way or other. The General Electric Company has announced o plan as disclosed elsewhere in this issue, but it remains be seen whether the same method will be applied comme cially. The Westinghouse company has not announced th procedure to be used on the Norfolk & Western locomotives, but undoubtedly that company feels satisfied that it has a good one. In short, there is no electrical reason why the split-phase locomotive should not be an important factor in railroad electrification, provided that its first cost and operating charges are low enough, so as to allow it to compete with the types that are already in successful service.

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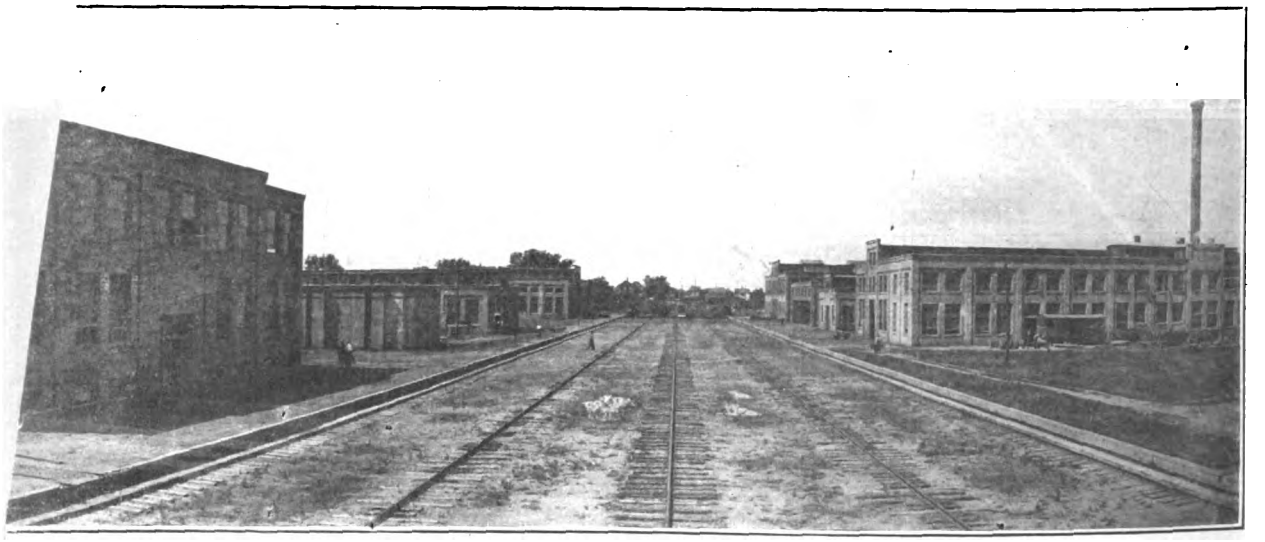
:nt Repair Shop Improvements at Minneapolis

ıpid Transit Company Has Recently Constructed Several New Shop Buildings, Thus Completing the Layout Which Was Planned Nearly Seven Years Ago—A Description of the New Structures Is Given, Together with Notes Upon Present Shop Practices

' known, the Twin City Rapid Transit ıll of its regular and special cars. This un fifteen years ago and has been con- :cause the company believes there is a ng and partly because it enables the cars y the workmen who originally constructed hought to result in efficiency and economy. ɛ located on Snelling Avenue between Uni- and St. Anthony Avenue and cover an area ɔres. These shops have been described in :tail in previous issues of the ELECTRIC RAIL-,* but since the last of these articles was ive improvements have been made, the most vhich are the construction of a new structural oil house and the rearrangement which has to withstand long the severe wear and tear of shops in which heavy work is handled.

The new building is divided into two equal sections, one for forge, the other for structural work. In these the present tools have been placed in their permanent positions, which were planned to insure most economical handling of work. This leaves, at present, large floor spaces unoccupied. This is all provided, however, in accordance with a definite scheme, and as each new machine is added it can be placed effectively without serious disturbance to the previous equipment. Between the two sections is a small two-story building which contains the tool rooms, offices and wash and lunch rooms. While, at first sight, a building within a building strikes one as novel, the arrangement is logical. The interior building is accessible from all parts of the



Twin City Shop Improvements—Panoramic View of Snelling Avenue Shops

d therefrom. This work is now about finished, and ctically completes the original plan laid out nearly years ago. The general view which is published on ɔage was taken just before the construction of the tural shop was begun. The new shop occupies the nt space in the foreground at the right of the picture. diagram of shop layout shows the relation of the dings forming the group.

'he new forge and structural shop is 200 ft. x 120 ft. in ıensions with light structural steel frame and brick walls. ıe height is 29½ ft. from the ground to the top of the arly flat roof. This roof was made light in weight to save ɛpense and avoid the effects of vibration. It consists of ine planking 1¾ in. thick covered with five-ply paper and ar and gravel. The floor is a 1½-in, layer of asphalt .nastic laid on a concrete foundation. The composition is 65 per cent gravel, rock and bank sand and 35 per cent mastic and flux. In order to avoid sponginess it was put down hot and thoroughly troweled. This type of floor is practically paving concrete. If it proves satisfactory, it will be used in other parts of the shops to replace cement concrete, wood and cast-iron floors, none of which is able shop. The walls keep out noise and dirt and the large windows furnish ample light and a view of all parts of the building. The building is not carried up to the shop roof because two floors give all the space needed.

The arrangement of the tools is such as to facilitate the efficient handling of all structural steel needed for bridges, viaducts, buildings, all power station and substation steel construction, truck frames, car frames, tanks, boilers, in short, practically every kind of steel work. In the old shop which was replaced by this new one 1400 tons of steel work were handled in a year. The capacity of the new shop is much greater than this. To serve the tools economically a double system of cranes has been installed, a 20-ton traveling crane for the structural shop and individual 2-ton jib cranes of original design for all heavy tools. A second traveling crane will be installed later in the forge shop. The jib cranes take care of a large part of the lifting, leaving the large crane free for the heavy work and long-distance moving. The large crane is electrically equipped.

THE OIL HOUSE

The new oil house, while less pretentious than the forge and structural shop, is nevertheless an important addition to the plant. The building is 160 x 50 ft., with a basement under one end. Architecturally it conforms in style to the

*See particularly Vols. XXVIII, page 100; XXX, page 318; XXXII, pages 744, 890; XXXV, page 937; XXXIX, page 543.

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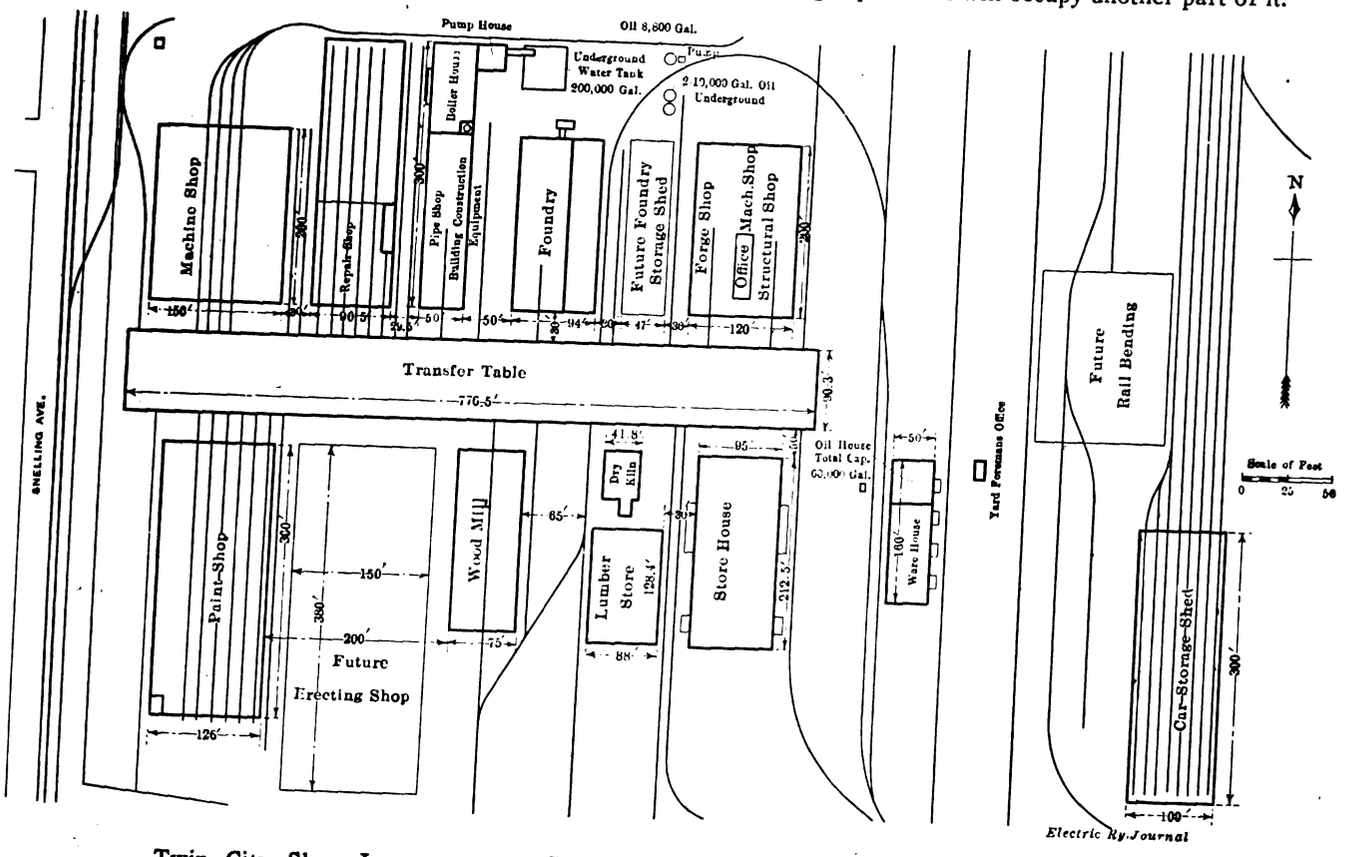
group of buildings of which it forms a part. Only a third of the building is at present required for oils and waste, the rest being used for storage of track and line supplies. The oil tanks are compactly placed in the basement and will

The completion of the new buildings greatly relieves congestion in the former smith shop and storehouse. The pipe shop will continue to occupy part of the old smith shop, and the building department will occupy another part of it.

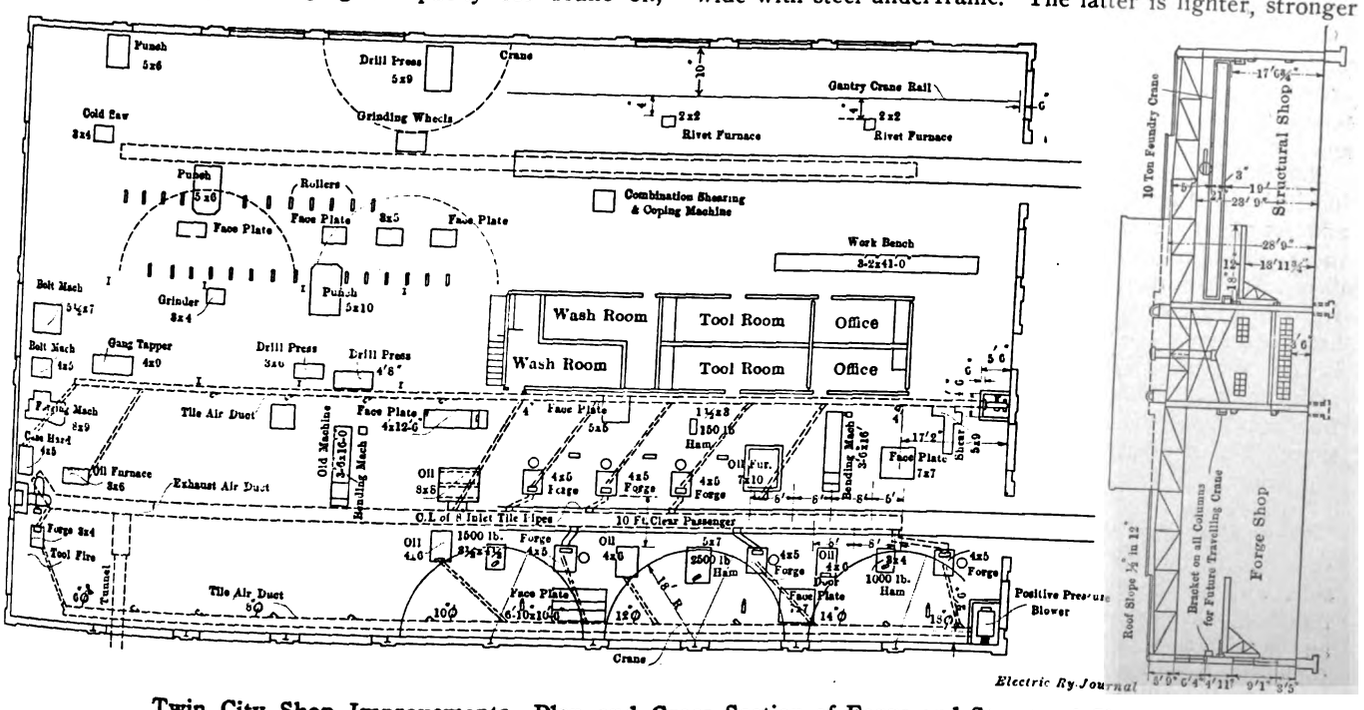


Twin City Shop Improvements—General Layout Showing Location of New Shops

eventually comprise six of 10,000-gal. capacity each for car oil, turpentine and gasoline; four of 2000-gal. capacity for kerosene, engine oil and compressor oil; six of 500-gal. capacity for benzine, signal oil, engine oil, car oil and automobile oil, and eight of 250-gal. capacity for brake oil,

CAR DESIGN

There are but two types of car which are standard with the company. One is known as the older type and is 8 ft. 6 in. wide, with wood underframe. The other is 9 ft. 1 in. wide with steel underframe. The latter is lighter, stronger



Twin City Shop Improvements—Plan and Cross-Section of Forge and Structural Shop

germicide, alcohol, lard oil and castor oil. Directly over the tanks are power and hand pumps with cast-iron catch basins. Bins for several car loads of waste are also located in this pump room.

and has more area of glass in window sash. Since manufacturing was begun there has been a constant effort to reduce car weight. The last car turned out, 46 ft. 8 in. x 9 ft. 1 in., weighed, complete with storm windows, sand in

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boxes, water in heating system and coal in bin, 42,100 lb. actual scale weight. The type built eighteen months earlier weighed 46,200 lb., and that of a few years earlier 48,000 lb. The suburban type built eight years ago weighed 59,000 lb. These weights apply to cars seating forty-eight passengers, the standard seating capacity for all cars on the Twin City lines.

The lightening process has been carried on in all parts of the car and equipment. Wheels were reduced to 425 lb. for the 34-in. size, and these are scrapped as light as 310 lb. with a diameter of 31 in. Twenty-five pounds has been added recently as a concession to the manufacturers. Axles have been brought down to a minimum safe size with allowance for wear. A 2-in. hole from end to end eliminates 62 lb. of useless weight. Brake rigging and trucks have been lightened by the use of better steel and forgings, thus permitting smaller parts to be used. The greatest saving here was obtained by doing more machine work on castings. These have to be made larger than necessary for strength on account of foundry limitations, and 25 per cent or more can be machined off in many cases without danger. It was found also that steel bolsters could not be cast straight and uniform. These were therefore planed off with a saving of 150 lb. All parts of the bolster were at the same time made perfectly true. In the body all woodwork was made 1/16 in. thinner, and the steel underframes were lightened to the limit of safety. Even the grab-handles on the seat backs were trimmed down.

CAR CLEANING AND RENOVATING

In regular maintenance, cars are now washed outside, and floors are swept daily with a careful wiping throughout. At nine-day intervals the floors are scrubbed. Every seventy days there is a thorough cleaning and hidden corners receive special attention. A thorough overhauling of the car body occurs every eighteen months for cars in heavy service and every four to five years for those in light service. During this process, which costs about $260 per car, new mastic flooring is placed on the platforms, the inside floors are patched or relaid, the seats are removed and refinished or replaced with new ones, new curtains, cushion covers, steps and gates are supplied if they are at all worn, and bell and battery boxes, push buttons and other fixtures are replaced. By being trimmed true and then having strips glued on all of the worn surfaces the sashes are made practically new. For window curtains, woolen terry has been found most satisfactory in the long run in spite of its high price.

Renovating the car exteriors includes a complete refinishing inside and out. Paint is burned off irregular surfaces and thoroughly smoothed off elsewhere. A new finish is then applied, the work requiring the car to be about fourteen days in the paint shop. When it leaves the shop with its fresh bright coat of light chrome yellow and aluminum bronze striping the car in appearance as well as in fact is as good as new. On an average thirty cars are kept in the main paint shop undergoing a thorough refinishing, while four more have the finishing touches added in an adjoining shop. This number keeps the force well occupied. All of the painting is done by piece work.

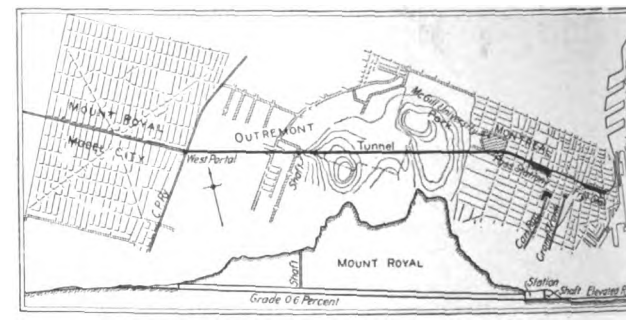
PAINT SHOP

The paint shop, while not new, is a model of its kind. It is 300 ft. by 126 ft. wide and contains six tracks. One side, with a wide gallery, accommodates the carrying, sash finishing, glazing and other detail departments. Between and outside the tracks on the main floor are painting scaffolds of a type invented by G. L. Wilson, engineer maintenance of way, some years ago, and these have been found very convenient in practical operation. Nine-foot lengths of 4-in. wrought-iron pipes are set 10 ft. apart and 2½ ft. deep in cylindrical concrete foundations, 20 in. in diameter and 2 ft. 10 in. long. On the pipes are mounted cast-iron sleeves from which project brackets with extension sections. The sleeves are clamped to the standards by means of set screws. The brackets and planks spanning them are counterweighted by weights inside the pipes connected with the brackets by chains passing over pulleys mounted in housings on the top of the standards. This arrangement permits a quick adjustment of the scaffolding and leaves the floor practically clear. It is substantial enough to eliminate danger to the workmen from breakdown.

The paint shop is lighted partly by incandescent lamps in wall sockets placed directly on the concrete columns a few feet from the floor. The conduits are molded in the column so that no wiring is visible, and each lamp is protected by two strap-iron arches crossed at right angles.

ELECTRIFICATION OF MONTREAL TUNNEL AND TERMINAL

The adoption of 2400 volts direct current for the Canadian Northern Railway's tunnel and terminal at Montreal has been definitely decided upon, and an order has just been placed for seven electric locomotives, eight multiple-unit motor car equipments and complete substation apparatus. The terminal electrification will consist of 10 miles of double track between the passenger and freight terminals in Montreal and the Cartierville yards beyond the town of Mount Royal, where the incoming and outgoing trains will change from steam to electric locomotives and vice versa. The multiple-unit trains will give the



Map Showing Terminal and Tunnel of Canadian Northern Railway to Be Electrified

suburban town of Mount Royal and the country beyond a quick and frequent service to the city. Montreal will be the eastern terminal of the Canadian Northern Railway, the new transcontinental line.

The locomotives will weigh 80 tons each, all weight being on the drivers. They will be equipped with two four-wheel trucks articulated together, with four motors geared to the drivers through twin gears. The motors will be of the commutating-pole type wound for 1200 volts and insulated for 2400 volts, operating two in permanent series. The control will be multiple-unit series-parallel, the current for the contactors being furnished by a motor-generator set. The motors for the multiple-unit four-motor car equipments are rated at 125 hp, 1200 volts each. The control is in general similar to that of the locomotives.

The substation will be located at the west portal of the tunnel, where power will be purchased at three-phase, sixty cycles, 11,000 volts. Each motor-generator set will be rated at 1500 kw at 2400 volts with a five-minute overload capacity of 200 per cent. This set will consist of two commutating-pole generators each wound for 1200 volts and insulated for 2400 volts in permanent series, and on the same shaft with and driven by a 2100-kw, 11,000-volt synchronous motor. The station will be designed for an ultimate capacity of 4500 kw at normal rating, or three of these sets. At present only two will be installed.

All of the apparatus will be manufactured by the General Electric Company. The design and installation of the apparatus will be in charge of W. C. Lancaster, electrical and mechanical engineer of MacKenzie, Mann & Company, Ltd.

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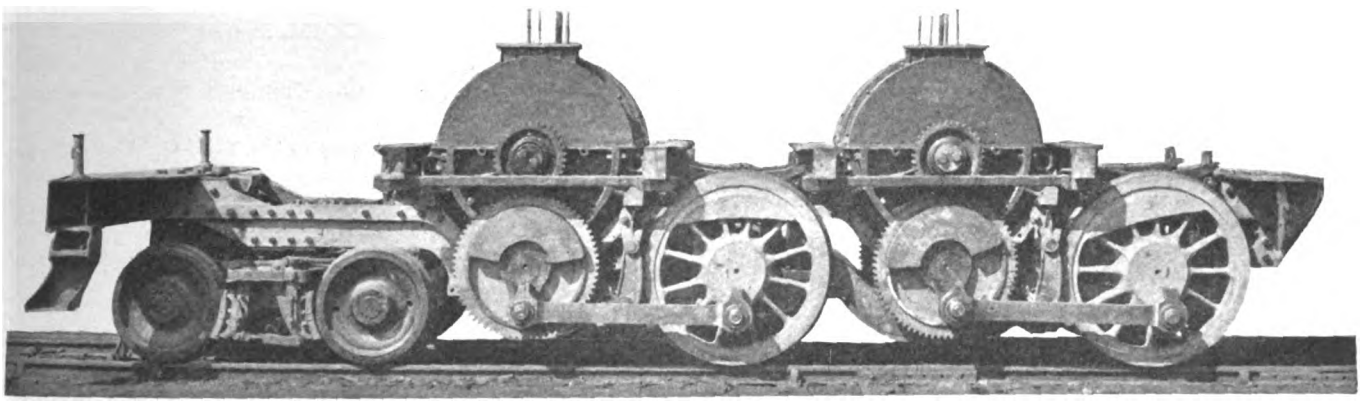
New Single-Phase Motor and Phase Converter for Locomotive Service

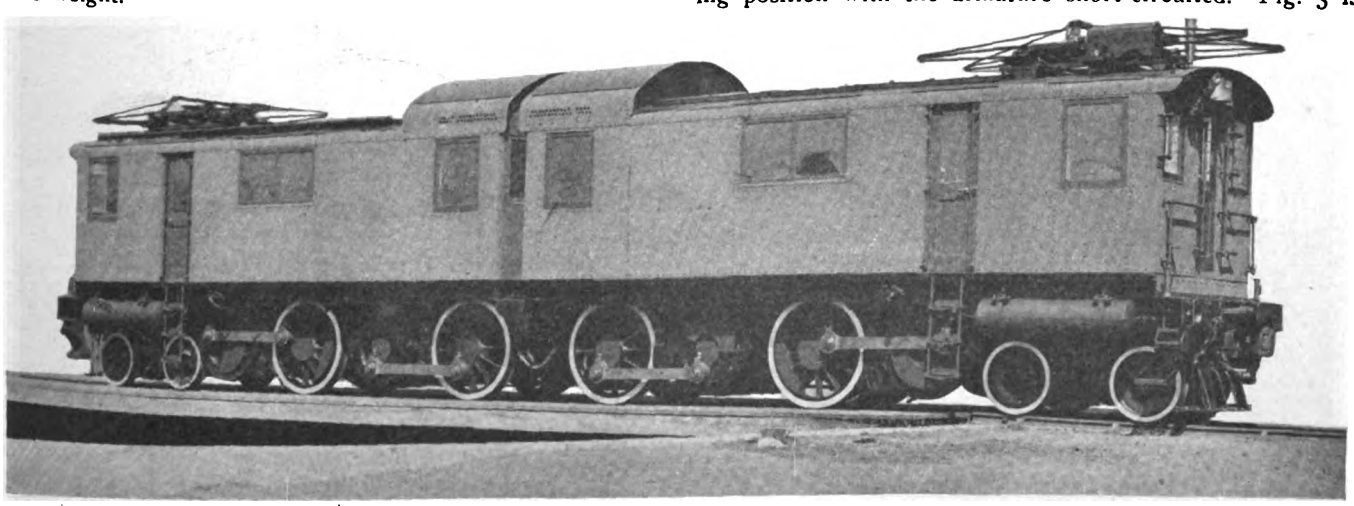
The Article Describes an Experimental Type of Articulated Locomotive with Single-Phase Commutator Motors and Also a Device for Converting High-Voltage Single-Phase Current to Polyphase Current

It is a matter of common knowledge that for some time past the General Electric Company has been conducting experiments at Schenectady to determine the commercial feasibility of a novel form of articulated locomotive equipped with four 400-hp series-repulsion twelve-pole motors. These motors are similar in design to those which have been in operation in motor-car service for the past two years on the New Canaan branch of the New York, New Haven & Hartford Railroad.



Experimental Single-Phase Locomotive with Cab Removed

In this experimental locomotive the motors are mounted on the truck frame over jack shafts to which they are geared at both ends. Cranks on the jack shafts are connected to the driving wheels by means of connecting rods, each motor having its own pair of drivers. Each section of the locomotive has a four-wheel pony truck which carries half the weight of one motor as well as a share of the cab weight.



Experimental Single-Phase Locomotive of General Electric Company

The principle of this type of motor was described by E. F. W. Alexanderson in a paper presented before the American Institute of Electrical Engineers in January, 1908. The special features are a drum-type distributed stator winding consisting of two parts, the exciting winding and the inducing winding, and the arrangement of these in series with provision for short-circuiting the armature at starting. The arrangement of the windings is shown diagrammatically in Fig. 1, which shows a two-pole motor. The brushes are located in the middle of the zone of the inducing winding, and the armature, therefore, is the secondary of a transformer of which the inducing winding is the primary. The two stator windings and the armature winding are permanently connected in series.

This arrangement permits the motor to be started as a repulsion motor under the transformer action of the inducing winding and with the brushes short-circuited. The inducing winding has twice the number of turns of the armature so that the current which the controller must handle will be correspondingly less than the armature current. In order to make clear the operation of starting and running, the accompanying diagrams showing the connections used in the locomotive circuits will be of interest. Fig. 2 shows diagrammatically the connections in the starting position with the armature short-circuited. Fig. 3 is a connection diagram and should be studied with reference to the contactor chart given in Fig. 4. The exciting fields of the two motors forming a locomotive unit are shown connected permanently in parallel and the armatures permanently in series, but this does not alter the general principle. With the transfer switch in the position shown, the contactors are manipulated by the master controller to give first low voltage with starting resistance, next to cut out

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the resistance, then to increase the voltage in two steps to full value, all with the armature short-circuited. The transfer switch is next shifted to the running position, removing the short-circuit from the armature. The contactors then gradually raise the voltage on the armature and exciting circuit, the inducing winding being connected across part of the transformer winding and supplying a part of the power to the armature by induction.

There are no resistance leads between commutator bars and armature winding. The short-circuit currents in the coils are kept down by the expedient of using a short-pitch winding, the coil pitch being approximately the same as the width of the inducing winding.

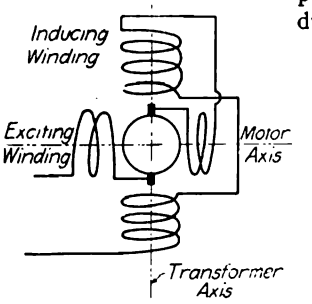


Fig. 1—Series-Repulsion Motor

Step	Contactors							F	R	F	R
	1	2	3	4	5	6	7	8	9	10	11
1st		●				●	●	●	○	●	○
2Nd		●	●			●	●	●	○	●	○
3Rd				●	●	●	●	●	○	●	○
4Th	●		●			●	●	●	○	●	○

F-Forward R-Reverse

Fig. 4—Contactor Diagram

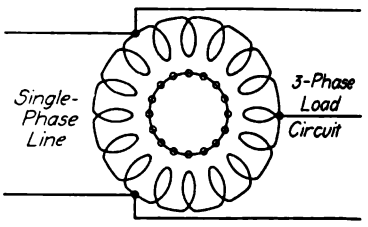


Fig. 5—Simple Phase Converter

Thus when short-circuited the sides of the coils are in flux of the same kind and the coils do not link with the field flux. This method of preventing the production of transformer currents in the short-circuited coils is said to be entirely satisfactory. The short-pitch winding also plays another important part in the commutation, for, by selecting the proper pitch, the flux distribution can be controlled so that the short-circuited coil will be located in a good reversing field.

NEW APPLICATIONS OF THE PHASE CONVERTER

In the Electric Railway Journal for Aug. 23, 1913, a reference was made to the Westinghouse contract with the Norfolk & Western Railroad. The adoption of induction motors with phase-splitting devices for this line has drawn fresh attention to the subject of phase converters, which up to this time has possessed only academic interest. The contract mentioned indicates that the Westinghouse Company has been studying the subject quietly for a long time and the same is true of the General Electric Company.

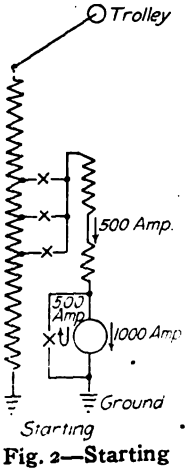


Fig. 2—Starting Diagram

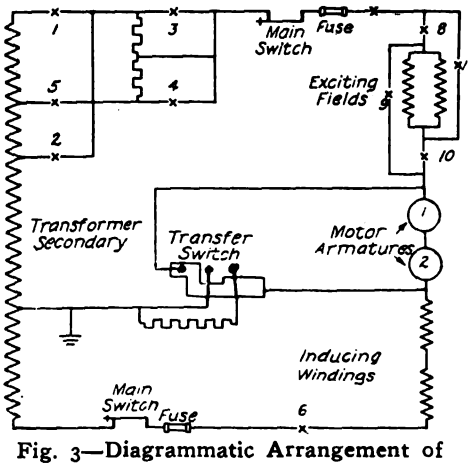


Fig. 3—Diagrammatic Arrangement of Connections

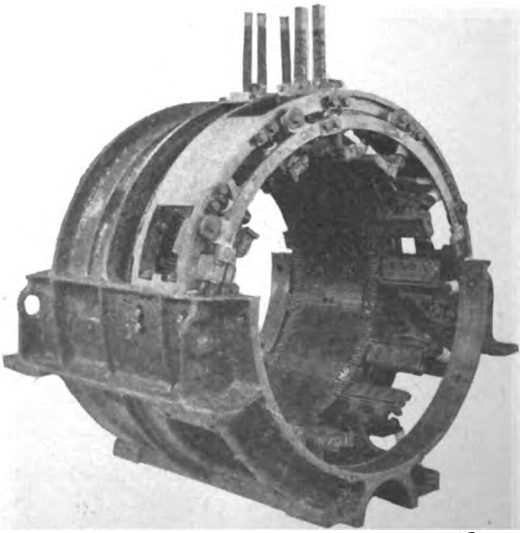
Both of these manufacturers realized that the problems of alternating-current traction had not yet been completely solved and that some kind of auxiliary apparatus might be necessary. Abroad the permutator, with synchronously rotating brushes, has been seriously proposed for traction purposes but it has not attracted much attention in this country. Presumably the phase converter is receiving attention abroad also. By virtue of the Northern contract the phase converter assumes a new rank in the electrical machinery field and for the next few years must make rapid progress.

The split-phase locomotive equipment comprises a number of polyphase induction motors which are inherently of the constant-speed type, a phase-converter and any system of control of the motors which would be used in a polyphase system. The only features added are the phase converter and its controller, a very simple piece of apparatus.

In a paper delivered at the 1911 convention of the American Institute of Electrical Engineers, Mr. Alexanderson described some experiments with a small phase converter, suggesting that it might yet be of considerable commercial importance. Even with the 25-kw equipment employed in the tests the efficiency of conversion was nearly 90 per cent, although the power factor was low. The experiments, however, were so satisfactory that preparations were made immediately for carrying them out on a larger scale and in heavy electric traction work, as hereinafter described.

PRINCIPLES OF THE PHASE CONVERTER

Any polyphase motor can be operated as a single-phase motor by connecting one phase to the line and giving the rotor a start. The latter will then run at a speed somewhat less than its polyphase speed, and at no load its speed will be practically synchronous. From all of the primary windings, including those not connected to the line, polyphase current can be taken off. (See Fig. 5.) In this case the alternating flux produced by the line current is cut by the conductors of the rotating secondary, which may be either squirrel-cage or phase-wound. The resulting secondary current in turn produces a magnetizing force out of phase both in time and space with the flux which produced it and having such a direction that, when combined with the first flux, a rotating field is produced. This rotating field cuts the primary windings not connected to the line and generates emf in them. Thus in a simple manner is produced a converter for changing single into polyphase current.



Magnet Frame of Single-Phase Commutator Motor with Armature Removed

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When no current is drawn in the three-phase circuit the phase voltages are equal and balanced in phase position. When the three-phase circuit is loaded the simple converter described is not commercially satisfactory as the phase voltages are badly unbalanced.

As developed by the General Electric Company the phase converter is substantially as shown in Fig. 7, which, for simplicity, represents a two-phase machine. This arrangement differs in these essentials from that shown in Fig. 5. The line phase of the converter is connected in series with one phase of the motor and the second phase of the converter in series with the other phase of the motor. This arrangement reduces the phase displacement between emfs. By means of an auto-transformer or, as shown in Fig. 6, extra turns on the secondary of the main transformer, a part of the line emf is introduced into the second phase to correct for phase displacement and reduction of the induced emf. An exciting winding is placed on the rotor of the converter in addition to the squirrel cage and is furnished with synchronous exciting current from a small exciter. This permits the elimination of the exciting current from the main windings and greatly improves the power factor. Referring to Fig. 6, it will be noted that the trolley voltage is reduced by means of a transformer. This will, in general, be necessary, as it will not be economical to insulate motors for the line potentials which will usually be employed, that is to say, 10,000 volts or more. The secondary of the transformer is provided with numerous taps to vary the applied voltage, and thus the motor speed, and for supplying the compensating voltage in the second phase. The motors are connected permanently in parallel with a reversing switch in the leads connecting them with the converter. The operation of the converter will be clearer after a study of Fig. 8, which is a vector diagram of the whole circuit shown diagrammatically in Fig. 7 on the next page.

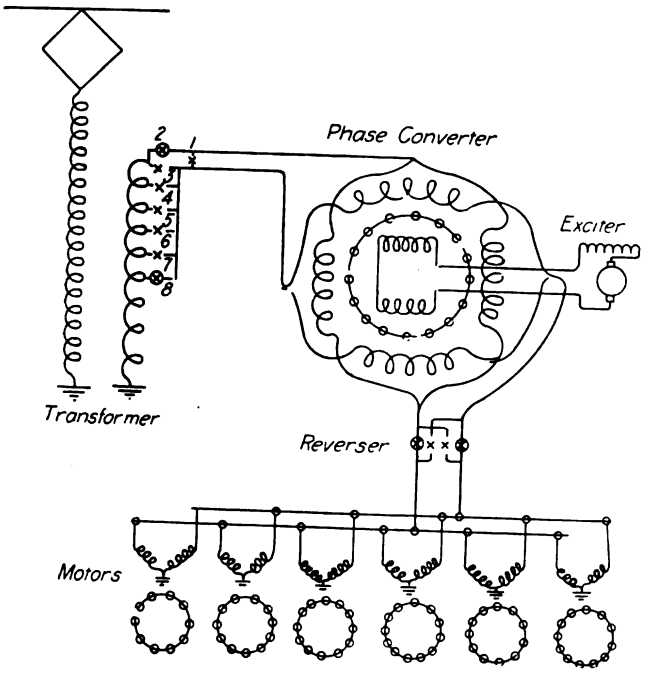


Fig. 6—G. E. Phase Converter Connections

EMF RELATIONS

In Fig. 8 the horizontal line OO' represents the line volts V_l, between A and B in Fig. 7. This voltage is consumed in the converter counter emf E_{ca} (Fig. 8), the motor emf E_{ma}, and in the impedance drops in converter and motor.

By induction an emf E_{cb} is generated in the second phase of the converter, in time quadrature with E_{ca} because the windings are in space quadrature. A part of the line voltage, V_{tb} (not shown), is introduced into phase b and the vector sum of it and E_{cb}, indicated by V_{mb}, is delivered to phase b of the motor. By the addition of V_{tb}, which is of course in phase with V_l, V_{mb} is brought in practical quadrature and equality with V_{ma} as desired. Finally a part of V_{mb} is used in overcoming the motor impedance leaving as the motor counter emf E_{mb}.

CURRENT RELATIONS

By the connection of the phase-a windings of the converter and motor in series, the former becomes a series transformer the secondary of which produces a current practically equal to and in time quadrature with the primary current. This kind of a series transformer differs from the stationary type only in this quadrature relation of the currents. The quadrature relation, as already suggested, is due to the production of the secondary current by the motion of the secondary conductors through the primary flux. The flux is approximately in time quadrature with the primary current, and the secondary current approximately in time phase with the flux is produced by motion through it.

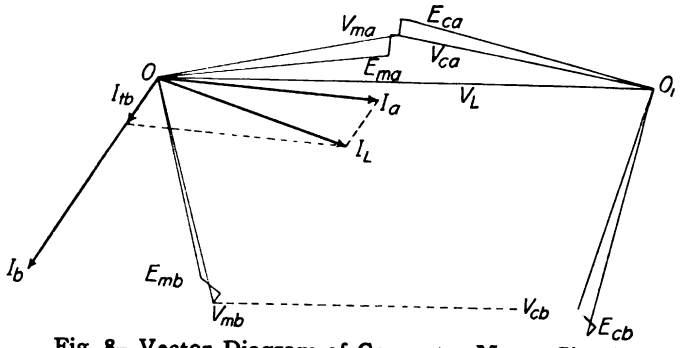
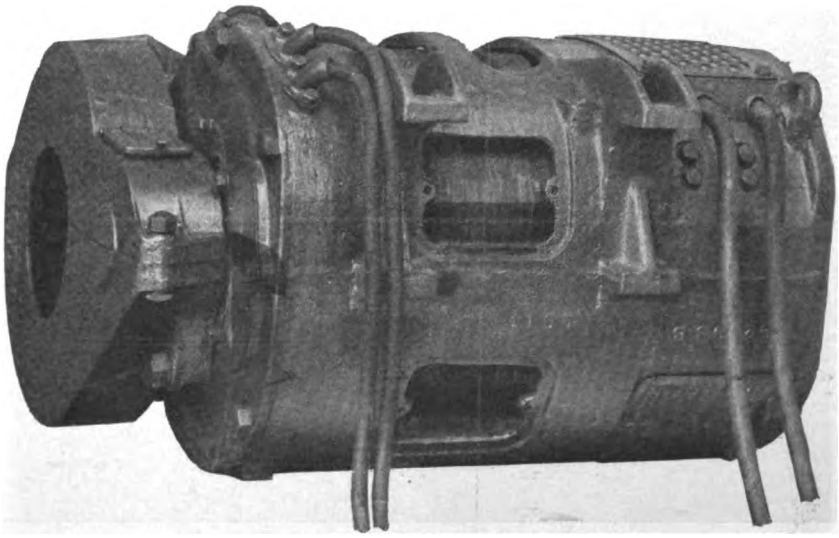


Fig. 8—Vector Diagram of Converter Motor Circuit

Referring then to Fig. 8, we note that a current I_a is drawn through phase a, its value and phase position depending upon the load and the impedance of the circuit. There is also drawn through the auto-transformer a current, I_{tb}, due to the connection of part of its turns in phase b. Its relation to I_b, the current in phase b, is determined by the proportion of turns included in phase b. The line current is the vector sum of I_a and I_{tb}.

The current in phase b, being the secondary current in a series transformer, is proportional to the primary current and with the same number of turns in each winding the



Exterior View of G. E. A-613 Railway Motor

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two should be equal. Moreover, as explained, they should be in time quadrature in this case and would be so but for the presence of impedance and magnetizing current. The effect of impedance can be eliminated by the auto-transformer voltage. The synchronous excitation eliminates the latter, the theory being as follows: In an ordinary stationary transformer we know that the primary and secondary currents cannot be exactly equal and opposite or there would be no magnetization of the core. The phase displacement is, therefore, just enough less than 180 deg. to produce a resultant sufficient to set up the required flux. In a two-phase converter the same argument applies to the quadrature relation. With equal currents in quadrature there would be no magnetizing current. The phase displacement then automatically adjusts itself to some value less than 90 deg. to produce the required magnetizing component. In the case of the stationary transformer, if an extra winding carrying quadrature magnetizing current were introduced the phase displacement could have the ideal value of 180 deg., or if the extra current were increased above the necessary value the phase displacement would be more than 180 deg. Obviously the flux could not be increased or the counter emf would be greater than the applied emf. The primary and secondary currents must, then, automatically produce a demagnetizing component to keep the flux at its proper value. Just so, in the General Electric phase converter an extra winding on the secondary produces any desired phase displacement between I_a and I_b which would be in time quadrature with exact neutralization of magnetizing component. As, in the case shown in Fig. 8, I_a and I_b are more than 90 deg. apart it is evident that the converter is "over-excited." A study of Figs. 8 and 11 shows that the result of all of the three corrective devices is to produce a good phase balance and a high power factor.

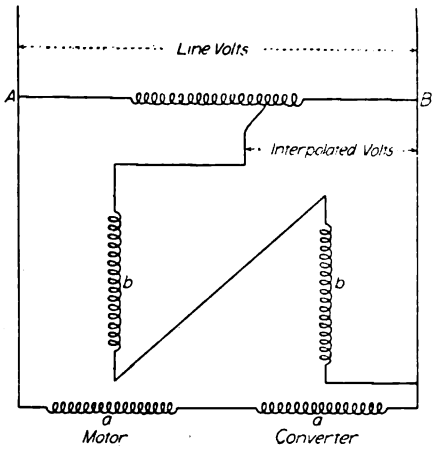

Fig. 7—Simplified Converter Motor Circuit

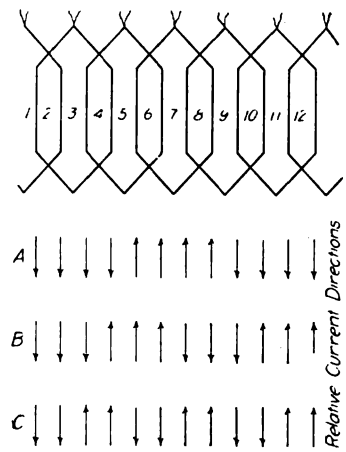

Fig. 10—Diagram of Pole-Changing-Connections

SPLIT-PHASE LOCOMOTIVE

As stated before, the General Electric Company some two years ago constructed an experimental locomotive to try out the phase converter on a larger scale. An experimental locomotive was rigged up as shown in Fig. 9. In the center of the equipment is seen a 200-hp motor arranged as a phase converter. This had a squirrel-cage rotor and was tested with and without an exciting winding. The exciter, belted to the converter, is seen in the foreground and the transformers behind the converter.

One axle of this locomotive was equipped with a motor of about 250-hp capacity having a temporary steel cylindrical rotor containing no winding. While this was a makeshift the skin effect in the steel at starting, when the secondary current has line frequency, undoubtedly was of great assistance in producing good starting torque.

With this crude locomotive a number of satisfactory tests were made under very severe conditions. It was accelerated while the trolley contact was frequently interrupted, without any evil effect. As the phase converter runs light it loses little speed when the supply current is interrupted even for a half minute or so. Its rotor momentum is considerable and there is no resistance except friction and windage, the excitation failing with the power supply. A still more severe test was the application of full trolley voltage with the locomotive at standstill, the converter running at greatly reduced speed, and with the controller at full-speed position. Under these extraordinary circumstances the converter picked up rapidly and the motor developed sufficient torque to slip the wheels. As a climax the trolley was lowered for a minute with the locomotive at full speed forward, the controller was set for reverse and the trolley returned to position. The motor promptly developed full torque in a reverse direction, slipping the wheels as before.

These tests were so satisfactory that the company pro-

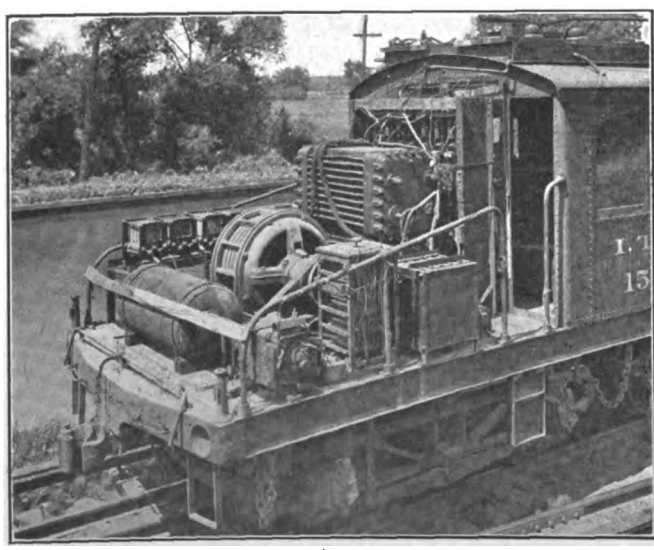

Fig. 9—View of Apparatus on Experimental Split-Phase Locomotive

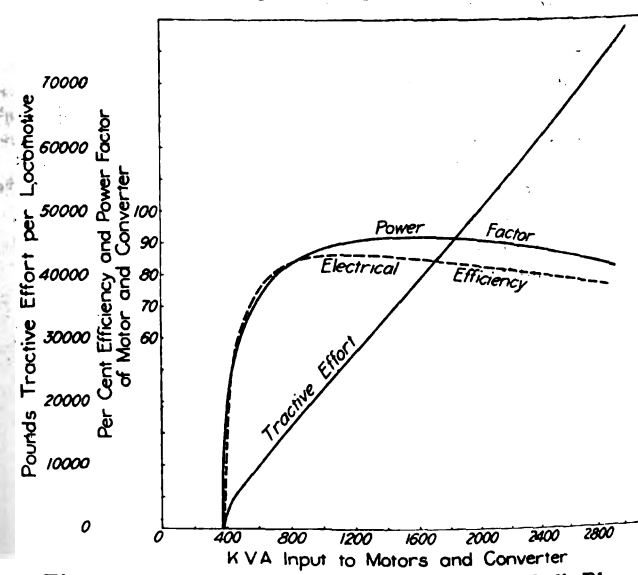

Fig. 11—Typical Characteristic Curves of Split-Phase Locomotive

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ceeded to develop a 1600-hp converter and designed a locomotive now under construction having six motors of 300 hp each and intended to produce a 45,000-lb. tractive effort at 15 m.p.h. and one of 30,000 lb. at 22 m.p.h. Fig 10 shows in a general way the arrangement of the equipment.

The company is developing some interesting methods for simplifying the speed control. Among these is the use of the pole-changing scheme patented Dec. 25, 1906. The principle of this plan is shown in Fig. 10, which represents a part of a simple winding. The coils of one phase are connected in three groups which can be connected so that the currents flow as shown at *A*, *B* and *C*. When they flow down in conductors 1, 2, 3 and 4 and up in 5, 6, 7 and 8 they produce the minimum number of poles. The intermediate number is secured by reversal of current in 4, 7 and 8, etc., and the maximum number by the reversal of 4, 6, 7, etc., from the *A* connection. On account of the simplicity of other parts of the equipment, the complexity of the controller connections for pole changing will undoubtedly be warranted.

On the basis of experimental data now in hand the company's engineers have been able to compute the characteristics of the new equipment as given in Fig. 11. The efficiency and power factor are both high and remain so over a wide range of output.

TRACK CONSTRUCTION ON NARROW RIGHT-OF-WAY

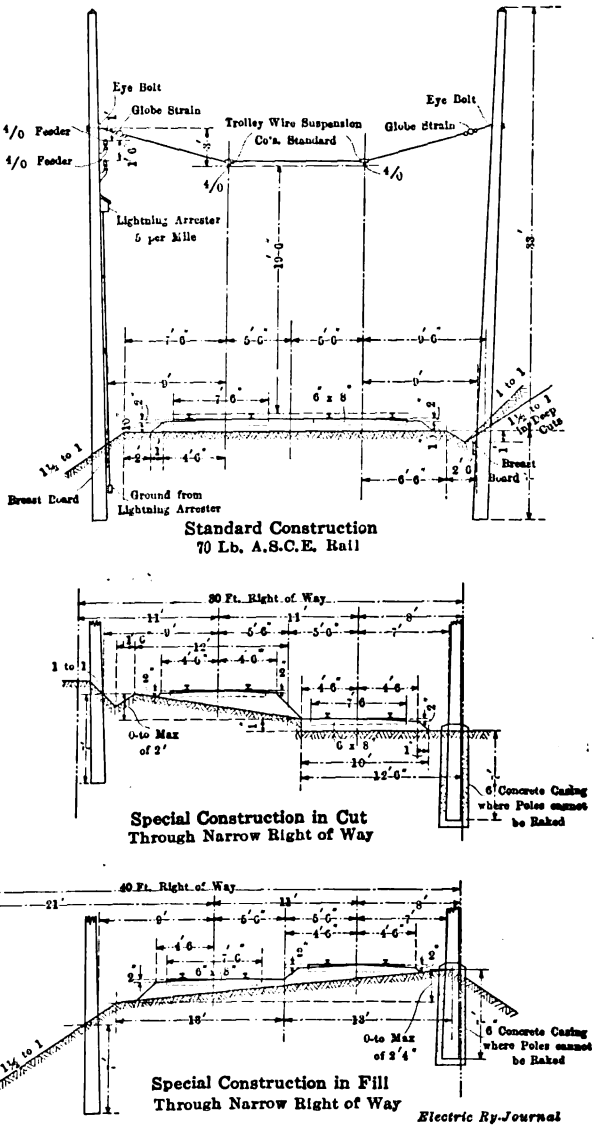
Some interesting interurban double-track construction is now being done by the J. G. White Engineering Company, New York, on the Morris Railroad, an interurban electric railway about 3 miles in length between Morristown and Madison, N. J. The new line parallels the main line of the Delaware, Lackawanna & Western Railroad practically throughout its entire length, the right-of-way of the new line being immediately adjacent to that of the Lackawanna Railroad.

The grading is generally light, but excavation and fill at each end of the line are comparatively heavy, and in order to expedite the work a steam shovel has been put into operation in the largest of the cuts. The light grading is being done mostly by wagon haul, as the haul is too long to utilize either slush or wheel scrapers to any great extent. Although the line is not through city or village property, the right-of-way has been unusually expensive, lying as it does through some of the finest country places and estates in New Jersey.

A single-track railroad was at first intended, but later it was decided to construct a double track. It seemed at first that this could be done only by the construction of retaining walls at a great additional cost or by the purchase of additional right-of-way at about the same expenditure of money and with perhaps a year's delay in time. A careful study of the situation, however, resulted in the adoption of a special cross-section for the double-track roadbed in cuts and fills where the width was limited. The interesting feature in these cross-sections is that one of the tracks is at a higher elevation than the other.

The first illustration shows a standard roadbed cross-section with tracks at the same elevations, and the two lower drawings show the construction through cuts and fills where the same distance, 11 ft., is maintained between track centers. In the cross-section of shallow cut illustrated a slope of 1 to 1 has been retained, but the higher elevation of the track on the side toward the cut has permitted a very much shallower cut at this point than would otherwise have to be the case. The slopes are 1 to 1 in shallow cuts and 1½ to 1 in deep cuts and fills. At one of the fills where the right-of-way is only 40 ft. in width the roadbed also has an incline in cross-section, but is not stepped, thus reducing the height of the fill on the lower side and keeping the slope within fence line. In all cases, of course, the track on tangent has level cross-section, being leveled up by the ballast.

As the entire roadbed grading is in gravely material that drains readily and is not subject to upheaval by frost,



Track Construction on Narrow Right-of-Way, Morris Railroad

it is thought that the fact that the ballast will be of varying thickness on the cross-section of the roadbed will not materially increase the difficulty of maintaining good track.

The eleventh annual convention of the Colorado Electric Light, Power & Railway Association was held at the Hotel Colorado in Glenwood Springs, Col., Sept. 25 to 27, inclusive. The convention opened with a few remarks from President W. N. Clark, of Canon City. Following him, W. H. Bullock, of Denver, read a paper entitled "Industrial Motor Appliances." An interesting demonstration of the "lung-motor" given by E. S. Tyler, of Chicago, terminated the first session. At the Friday morning session B. C. J. Wheatlake, of Denver, read the first paper, which was entitled "Lightning Arresters." Charles Neely, of Cripple Creek, read a short paper on "Joint Pole Usage." R. E. Campbell, of Cleveland, Ohio, delivered the first paper of the afternoon session. His topic was on "The Relation of the Incandescent Lamp to Lighting Service." Other papers were read as follows: "The Central Station in the Small Town," by H. L. Titus, of Sterling; "The Use of Single-Phase Motors from the Central Station Standpoint," by W. A. Layman, of St. Louis, Mo.

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Measuring Currents in Underground Structures

The Writer Describes with Examples a Practical Method for Measuring the Resistance of Parts of Underground Pipes, Rails, Bridges, Busbars, Etc., for the Purpose of Measuring the Currents in Them with a Millivoltmeter

BY CARL HERING

The purpose of this article is to describe the details of a method for measuring the resistance of parts of underground pipes while a variable current is flowing through them, thereby enabling the currents in them to be then measured reliably with a millivoltmeter. It is applicable to out-of-door measurements on country roads, with portable apparatus, and is free from any doubtful assumptions. It is also applicable to rails, busbars, shunts or joints in them, with or without direct or alternating currents flowing through them; also to laboratory testing in cases in which a circuit cannot be opened and in which the current flowing is unknown or variable.

In a paper on "Measuring Stray Currents in Underground Pipes," read before the American Institute of Electrical Engineers in June, 1912, the present writer described a basic method of measuring the currents flowing in underground pipes or similar partly accessible circuits which do not admit of being opened; also a number of modifications of it. In the present article one of these modifications, which seems to be best suited for such work, is described more in detail, including the necessary formulas, recommendations, practical hints and experience with it, etc.

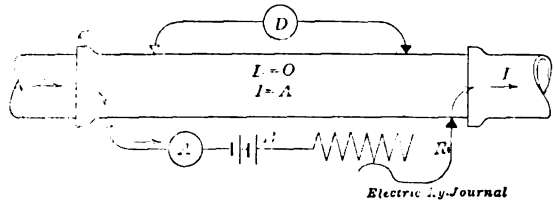

Fig. 1—Simple Method for Constant Currents

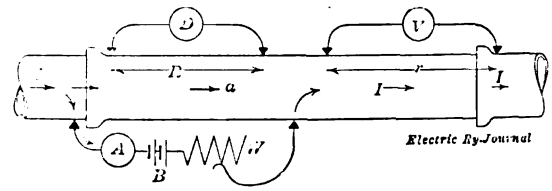

Fig. 2—Modified Method for Varying Currents

FUNDAMENTAL FORM

The fundamental principle of this set of methods is shown in Fig. 1, taken from the former paper.

P is an exposed part of an underground pipe, or a busbar or other portion of any closed circuit of unknown resistances through which an unknown current is passing, the circuit of which cannot be opened to insert an ammeter. Let *A* be an ammeter, *B* a source of current like a portable storage battery, and *R* an adjustable resistance, their circuit being connected as a shunt to the part of the pipe to be tested, the polarity of the battery being such as to act as a negative booster to suck the current out of the pipe into this shunt. Let *D* be a suitable millivoltmeter. Then by adjusting the resistance *R* until *D* reads zero all the pipe current will have been sucked out into the shunt circuit, hence through the ammeter where it can then be measured. By then opening the shunt circuit and reading *D*, the millivolt drop for that current can be measured and from these two the resistance between the taps *D* can readily be determined. This, however, assumes that the current remains constant for these two readings, which are necessarily successive, and with the rapidly varying currents in pipes and busbars this assumption is not always safe; hence the following modification of the method is preferable as it involves no such assumptions, although, on the other hand, it is not quite so simple.

MODIFIED FORM

It is shown in Fig. 2, which is identical with Fig. 1 except that an additional instrument *V* is connected beyond the part embraced by the shunt, its function being to give deflections which are at all times proportional to the pipe current. A somewhat longer length of exposed pipe is therefore desirable. This additional length may include to advantage a joint so as to increase its resistance, hence to shorten the length, provided, however, that the resistance of the joint can be trusted to remain constant during the test. The resistance to be measured is the part *R*, embraced by *D*; the other resistance *r*, embraced by *V*, also becomes known without requiring any additional readings.

The measurement of both resistance and current then consists in taking two pairs of readings, the first without the shunt current and the second with it. Preferably groups of readings are taken to get a better average value, the number of readings of each group depending upon the accuracy desired and to a great extent upon the rapidity of variations of the current in the pipe. Two observers are required as each pair of readings must be taken simultaneously.

APPARATUS

The apparatus required consists of the following: a sensitive, reliable, well-calibrated millivoltmeter, *D*, preferably with a middle zero; a second instrument, *V*, of about the same range, also preferably with a middle zero, which need not necessarily read correctly in millivolts but should give deflections which are proportionate to the millivolts (hence a portable galvanometer with a proportionate scale would do, but it is then simplest first to get its constance once for all by connecting it in parallel with *D* and taking a few pairs of readings to determine $K = D/V'$ and then substituting KV' for V in all the formulas, in all of which V must be in millivolts; of course, the most convenient instrument is an exact duplicate of the millivoltmeter *D*); also an ammeter, *A*; a portable battery, *B*, capable of giving relatively large constant currents for periods of ten to fifteen minutes, a storage battery being the best; an adjustable resistance, *W*, capable of carrying that battery current, and six clamps for attaching the leads to the pipes. The ranges of the millivoltmeters, ammeter, battery currents and resistance depend greatly upon the size of the pipe, the smallness of the pipe current, the length which can be uncovered and the desired accuracy of the measurements, and must therefore be predetermined by the one who is to make the specific tests. Some actual figures will be given below.

READINGS

The first pair of readings to be made are the deflections of *D* and *V* taken simultaneously while the shunt circuit with the battery is open; that is to say, the simultaneous deflections of both millivoltmeters due to the pipe current alone. These same readings may afterward be used also for calculating the currents flowing in the pipe at those moments, hence it is desirable to include the maximum and minimum deflections if possible, also reversals, approximately normal values, or any others that are of interest;

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and, of course, it is preferable to take the readings when the needles are momentarily at rest.

Should the pipe current be too small, the instruments not sufficiently sensitive or the pipe lengths too short to give deflections as large as would be desired to give good readings, the battery circuit may be temporarily connected to the two extreme ends of the exposed pipe so as to embrace both voltmeters, but with its polarity reversed so that the battery current is added to that already in the pipe. The larger this additional current the better, for the instruments need then be less sensitive, or the two parts R and r may then be shorter, or both. It also diminishes the fluctuations relatively, as a larger portion of the total current will then be constant. It is not necessary in this part of the test to know what this extra current is, nor that it be contsant. It may, in fact, be continually varied with a carbon plate rheostat so as to neutralize, as much as possible, the fluctuations of the pipe current. If, however, a battery current is thus added, then the deflections of D and V cannot, of course, be used afterward for calculating the pipe currents, as was stated above; but if this battery current is also measured in the ammeter at the times the millivoltmeters are being read, it could be subtracted from the total which is determined later on, the rest being then the pipe current. But this may not always be safe because it might happen that some of this battery current flows through the rest of the pipe, which is not under test, hence not through R and r. This would almost certainly be the case if the pipe were otherwise free from current or nearly so, or if the ground around the buried pipe were very wet. It is therefore advisable, when a battery current is thus added, to take new readings later on for determining the pipe currents alone.

If convenient to do so, it is preferable to choose the resistances R and r to be as nearly alike as practiable and to have the instruments D and V identical.

After taking a number of pairs of simultaneous readings of D and V, divide each D by its mate V, giving the ratio n, which ought to be the same for each pair of readings, and is preferably as near unity as practicable; that is:

$$D/V = n \text{ (a constant)}.$$

Under ordinary conditions an average of the values of n from ten to twenty pairs of readings will suffice.

Having now obtained a good value for this ratio n, connect the battery circuit as shown in Fig. 2, being careful not to disturb the connections of D and V; hence this test should follow the other immediately. Let the polarity of the battery now be such that its current diminishes the current through R, as in the diagram. If A is the battery current in amperes, I the original pipe current and a the current through R, then

$$I = A + a,$$

the algebraic signs of the values of these currents being considered plus when they have the directions indicated in the drawing. If any of them have the opposite direction, the negative sign must be given to their numerical values; this is of very great importance.

This battery current may best be adjusted to some whole number of amperes for convenience in the subsequent calculations in which it occurs as a divisor. With a suitable storage battery and a liberal rheostat this current may be adjusted before the next set of readings are taken and should then remain constant during the ten to fifteen minutes required for those readings. It then saves one observer and greatly reduces the subsequent calculations. If this battery current is not constant, an observer should try to keep it so with the rheostat, or if not possible, then to read it simultaneously with the millivoltmeter readings. When thus connected, pairs of simultaneous readings should again be taken of D and V, noting the value of the battery current A, being careful to note the signs of all three, as some may be negative. A set of ten to twenty pairs of readings will probably be ample for a good average.

The best value of this battery current is again the largest that the ranges of the instruments and battery will permit. If larger than the pipe current, it will naturally reverse the current through R, hence make the deflections of D negative, which sign, of course, must be carefully noted. A large battery current makes the difference between the readings D and V greater, and this is very desirable in this test, which, unlike the former, is a test for differences and not for ratios. Hence it is best to increase this current until the needle of D reads high up in the negative part of the scale, while V reads its lowest on the positive side.

CALCULATIONS

Having now determined the ratio n from the first test and the simultaneous values of D, V and A from the second, the resistances R and r in milliohms are calculated from the following formulas in which D and V of this second test are in millivolts and A is in amperes:

$$R = \frac{nV - D}{A}$$

and

$$r = \frac{nV - D}{nA} = \frac{R}{n}$$

The meaning of the quantity nV in these formulas is that this would be the deflection if an instrument identical with D had been placed at V and embraced exactly the same resistance R as is embraced by D. In other words, it reduces the deflections of V to the same conditions as those of D; hence they can be substratced and their difference $nV - D$ then represents exactly the deflection due to the added constant current A. The variable unknown pipe current is therefore entirely eliminated from the calculations, which is the theory on which this method is based.

If the current A is kept constant during a set of readings, as is easily done and is very advisable to do, then this difference $nV - D$, should also be a constant for that set of readings. Hence these differences can be averaged before dividing by A, thereby simplifying the calculations.

In these formulas great care must, of course, be taken with the signs of the deflections and that of the current A. When the deflections of D are to the negative side of zero they must be inserted in the formula as negative quantities; hence in that case the numerator becomes $nV - (-D) = nV + D$, that is, their numerical sums. Or if both V and D are negative, then numerically it is $D - nV$. Or if the current A is in the opposite direction from that in the diagram, hence is added to that through R, then it must have the negative sign in the formula. If the calculated value of the resistance turns out to be negative, then some mistake has been made with the signs of A, D or V.

A good rule to avoid confusion as to the signs and directions of currents is to connect D and V so that their deflections are to the positive side (or chiefly so, if they occasionally reverse) when there is no battery current. If the deflections of D are then lessened or reversed, when the battery current is applied around D, then the current A is positive and the directions of the currents are those in Fig. 2.

Having thus determined once for all the resistance R in the milliohms, the currents in the pipe in amperes are thereafter readily determined, as usual, by dividing the drops D in millivolts by R in milliohms when the shunt circuit is open, as it was in the first test for determining n, those values being therefore available for the current measurements as was described above. Hence

$$I = \frac{D}{R}$$

As this calculation must be made many times, it is, of course, simpler to use the conductivity K in kilo-ohms (the reciprocal of R) instead of R; hence

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$$I = KD.$$

The meaning of K is that it is the "amperes per millivolt" flowing through that particular resistance. Although it really expresses a conductivity, it is better known by the latter self-explanatory term.

REMARKS

When the resistance of a piece of pipe has thus been carefully and reliably determined, it is often of use in the future to bring out a pair of permanent leads from these ends of that piece to or near to the surface of the ground before filling in the hole, as the currents can then at any future time be measured with a millivoltmeter without again unearthing and recalibrating the pipe. Of course, care must then be taken to mark one free end with a knot, or else one cannot determine the direction of the current. And when such permament leads are attached it is best to have them include the sum of $R+r$ together with the small piece between them, the resistance of which would be calculated (if it does not include a joint) from the specific resistances per foot obtained from R and r. This will give larger deflections or detect smaller currents, or require less sensitive millivoltmeters. It is advisable also in such cases to varnish or otherwise insulate the calibrated part of the pipe, as it is assumed that no current enters or leaves this section to or from the ground. By marking the points on the pipe its deterioration could be determined at some later date by a subsequent resistance measurement of the same piece.

By including a joint in one of the two resistances R or r the resistance of that joint could be readily determined from the measurements. It is advisable, however, in that case to have R and r on the same length of pipe, therefore having the joint at the extreme end of one of them so as not to include part of another length, as it is found that the resistances per foot of different lengths of presumably the same size and kind of pipe may vary quite considerably and hence a result obtained by the difference between R and r might then be very erroneous. The writer has found in this way that screwed joints of buried gas pipe may have an appreciably higher resistance than an equal length of pipe, notwithstanding the large amount of metal in the sleeve.

In uncovering pipes for this test care must be taken to have no leakage of current to or from the ground between the two extreme connections during the test, otherwise the formulas do not apply correctly.

If the readings of V are in millivolts, then, having determined the corresponding resistance r, those readings may be used to calculate the current in the line of pipe, whether the shunt current is applied around D or not and whether A is positive or negative, provided the resistance of the rest of the circuit of the pipe current is great compared with the resistance of the piece under test. If it is not, and especially if the pipe current is small and the battery current relatively large, errors may enter, and in such cases it is preferable to use only the readings of D without a battery current for determining the pipe current, as these are free from this assumption.

BEST CONDITIONS

The best conditions for making the tests are as follows: Make the two uncovered pipe lengths as long as practicable, especially when permanent leads are to be attached to the measured parts and brought to the surface for measurements of the currents with ordinary millivoltmeters at future times after the holes have been filled in. For the resistance measurement alone, as distinguished from the measurement of currents, the disadvantages of shortness of these parts or of large diameters of pipes can be counteracted by using large battery currents.

Make R and r as nearly alike as practicable so that their ratio n will be near to unity. The error in the first test is then the least. When the pipe current in the first test is not sufficient to give nearly full scale readings, then add enough battery current to both in series to make the deflections as large as practicable.

In the second test connect the battery circuit so as to reverse the normal deflection of D and make the current great enough to give a nearly full scale deflection of D in that reversed direction, when V is nearly zero. The difference between V and D will then be the greatest, hence the error will be least. It will save trouble and calculations to have the two instruments D and V exactly alike and to adjust the battery current to an exact number of amperes as it enters the calculation as a divisor.

DEDUCTION OF THE FORMULAS

Although the formulas are virtually self-evident, their deduction is given here for completeness.

The letters used in them are those in Fig. 2 and not those in Fig. 1. In the first test for obtaining the ratio n the two readings D and V must both be in millivolts, R and r are in milliohms and the currents are in amperes; hence in the first test, in which A equals zero, $D = IR$, and $V = Ir$; hence $D/V = R/r = n$; or

$$D = nV \text{ and } R = nr;$$

hence by making R and r as nearly equal as practicable n becomes nearly unity, which is its best value.

The relation of the three currents in amperes is always

$$I = A + a,$$

the direction shown in the diagram being considered positive. If any of them are reversed their numerical value must have the negative sign.

In the second test $D = aR$ and $V = Ir = (A+a)r$, but D and V now no longer have the ratio n which they had in the first test.

Combining these two equations to eliminate a and replacing r by R/n gives

$$R = \frac{nV - D}{A}$$

and as $r = R/n$

$$r = \frac{nV - D}{nA}$$

If it is practicable to make $R = r$ by adjusting the taps of D or V along the pipe until the readings are alike in the first test, then $n = 1$ and

$$R = r = \frac{V - D}{A}$$

These formulas are, of course, correct whether A be greater or less than zero, or whether A, D or V be positive or negative, provided care is taken to give all the numerical quantities their correct sign. This is very important, for otherwise the results will lead to absurdities.

ACTUAL RESULTS

The following numerical data from an actual test will serve to give a general idea of the ranges, deflections, relative values, lengths of pipes, etc.

The measurements were made on underground gas pipes of 1½ in. to 3½ in. outside diameters. The two identical millivoltmeters had a full scale deflection of 2.5 millivolts to either side of a middle zero. Each division represented 0.05 millivolt and it could be read to 0.01 millivolt. The storage battery, weighing about 25 lb., could give a current of about 50 amp. It consisted of three cells (a 6-volt sparking battery), of which, however, only one was necessary. The battery currents used on these small pipes were 2, 3 and 4 amp. More would have been better, but a break in the rheostat interfered. They were adjusted to read exactly these values and were absolutely constant. In some of the cases there was too little current flowing through the pipes to give large enough deflections for obtaining good values for the ratio n in the first part of the test, and in those cases the battery circuit was connected to the extreme ends and in such a direction as to add its current to that in the pipe. A few amperes were sufficient; more would have been better. At other times the pipe current alone was great enough to throw the needles off

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the scale, therefore requiring the observers to be ready to break the circuits quickly. The pipe currents changed rapidly and sometimes over wide ranges. The readings had to be made "on call" whenever the needles were sufficiently steady. About ten good readings were enough to give good averages, which did not differ more than a few per cent from the extreme.

The lengths of the pipes exposed for the test were about 15 ft., thus giving about 7-ft. lengths for each of the two parts to be measured, including 6 in. between and 3 in. at each end for properly distributing the battery current over the whole cross-section. The deflections averaged less than half of the full scale, hence the battery currents might better have been made greater, which in the present case was prevented by a break in the rheostat. Although the two lengths under test were always made equal to each other, so as to have the ratios n as nearly as possible equal to unity, yet it was found that the resistances were never equal, differing generally from 3 per cent to 10 per cent and in one case the resistance of one length was more than double that of

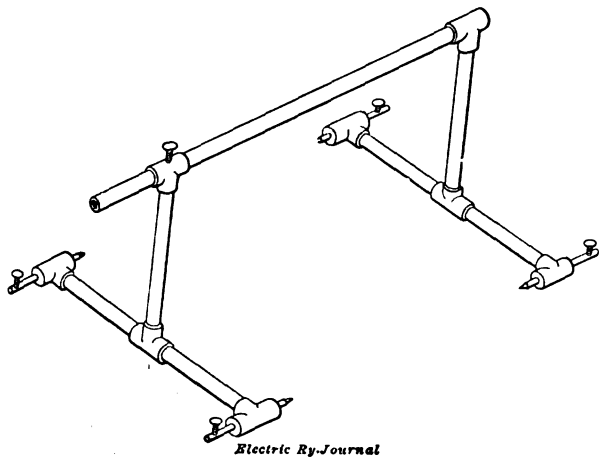

Fig. 3—Convenient Form of Clamp for the Contacts

the other. This shows how incorrect it is to assume equal resistances for equal lengths of presumably the same pipe, as is usually done. In this very abnormal case there was a joint in the 6 in. between the two parts, hence two different pieces of pipe of the same outside diameter were being measured, while in the other cases the two parts were mostly of the same piece, though sometimes including a joint. The resistances per foot of pipe of the same outside diameter but in different holes also differed greatly.

The actual resistances per foot of the pipes also differed quite greatly from those published in tables with the intention of being assumed in measuring the current flowing by measuring the millivolt drop over a given length, as is usually done. These tables give the resistance of a wrought-iron gas pipe 3½ in. outside diameter as 0.0240 milliohm per foot, while the actual measured resistance of different pieces varied from 0.0140 to 0.0361 milliohm. This shows very strikingly what great errors can be made by the usual method of assuming the resistances instead of measuring them in place.

With the instruments used, assuming that one can read down to one-fifth of a division, and with lengths of 7 ft. each, it would be possible to measure anything above about 0.012 amp in a gas pipe of 1⅝-in., 0.017 amp in one of 2-in. and 0.04 amp in one of 3-in. outside diameter. And assuming the currents to be steady enough to be measured, and that the reading could be made to one-fifth of a division, a current could be measured to 1 per cent accuracy if there was more than 1.2, 1.7 and 4 amp respectively in the pipes just mentioned, assuming the resistance measurements to have been exact. This is far greater accuracy than is needed in such pipe measurements, hence the method is more than sufficiently accurate.

ESTIMATE FOR A 16-IN. WATER PIPE

The following estimate, showing the conditions required for applying this method to a 16-in. cast-iron water pipe, may be of interest:

With pipes having 12 ft. between joints it would be permissible to uncover about 18 ft. of pipe without danger of loosening a joint. One of the two joints should then be at one extreme end, with room enough beyond it to make one of the battery connections. This would leave 8½ ft. clear for R and without a joint; r would be 7½ ft. long and would include a joint which would probably bring its resistance up to R. This leaves 6 in. at each end and 1 ft. between the two parts for the battery connections, the current being led into the pipe at at least two points diametrically opposite to each other by suitable clamps, so as to distribute it more evenly over the whole cross-section.

Assuming the resistivity of such a pipe to be about 0.01 milliohm per foot, the 8½ ft. would have 0.085 milliohm, hence the current would be about 12 amp per millivolt. With these millivoltmeters a current as small as 0.12 amp could therefore still be detected, and anything above that could be measured. A current of 12 amp (if steady enough) could be read to an accuracy of 1 per cent.

If there was no current in the pipe, a battery current of a little less than 30 amp through both lengths would give a full scale deflection of these millivoltmeters in the first test, and a like battery current in the second test through only one part would give the maximum readings which these instruments would allow when the pipe current is zero. Such a current is easily handled as far as the leads and connections are concerned and can readily be obtained from a portable one-cell storage battery, the voltage of which is ample. The accuracy of a reading of 2.5 millivolts would be better than ½ per cent if the currents were constant.

It will be seen, therefore, that the method is more than sufficiently accurate even for such large thick pipes, using these portable millivoltmeters with a comparatively small battery and leads. The clamp connections for such a current would not involve difficulties. A convenient form of clamp was shown in the Institute paper previously mentioned and is reproduced as Fig. 3.

ENTERTAINMENTS AT ATLANTIC CITY

The entertainment program for the Atlantic City convention of the American Electric Railway Association, which is to be held during the coming week, has been announced by Henry G. Pearce, chairman of the entertainment committee, American Electric Railway Manufacturers' Association. The orchestra of William Fenrich will give concerts in the lobby of the Convention Pier on Monday, Tuesday, Wednesday and Thursday at 11 a. m. and 3 p. m. and on Friday at 11 a. m. only. The principal other musical and social events of the week will be the annual reception and dance in the ballroom on the Convention Pier at 9 p. m. Monday; informal dancing in the ballroom on the Convention Pier at 9 p. m. on Tuesday; informal entertainment at Steeplechase Pier, opposite Haddon Hall, at 9 p. m. Wednesday, and a promenade concert and ball in the ballroom on the Convention Pier at 9 p. m. Thursday. Other entertainments will comprise a ladies' auction bridge tournament on the afternoons of Tuesday and Wednesday and a qualifying round on Monday for the golf tournament on Thursday. Further particulars of the various entertainments will be published in the daily editions of the ELECTRIC RAILWAY JOURNAL to be issued in Atlantic City during the convention.

It has been decided by the Montreal (Que.) Tramways to obtain rulings before the highest courts if necessary in order to test the extent of the company's powers over passengers who refuse to comply with the anti-smoking regulations.

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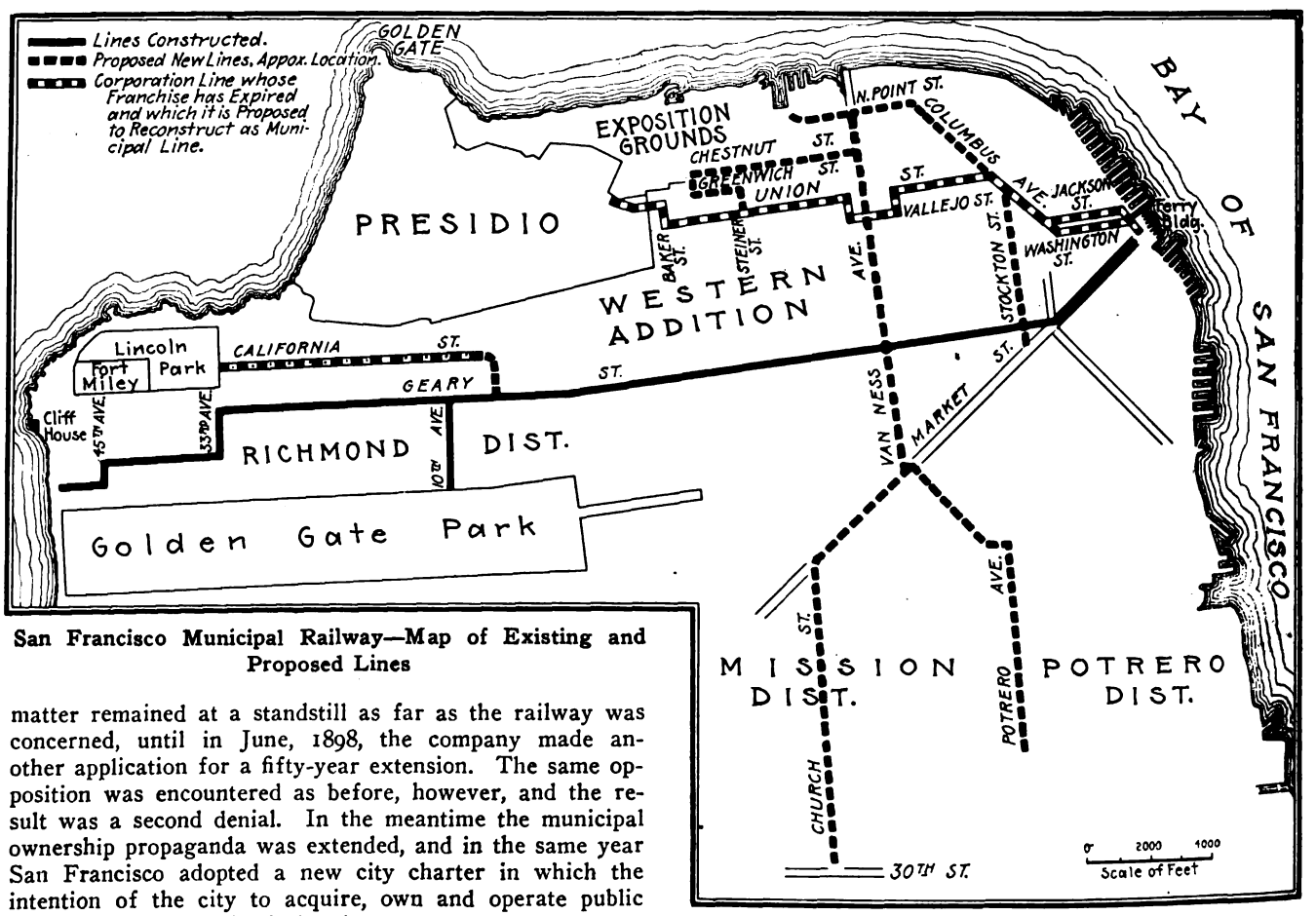
San Francisco Municipal Railway

The First Plans Were Destroyed in the Fire of 1906—About 7.6 Miles of Double Track Are Now in Operation—Official Statement of the Cost of Construction and the Operating Statement Are Published

Although municipal ownership of public utilities in San Francisco has become an accomplished fact only within the last few months, yet for more than a decade the idea had its strong advocates in that city. The proposition first came up as early as 1896, in connection with the effort of the Geary Street, Park & Ocean Railway to secure a fifty-year extension to its franchise on Geary Street, which was to expire in 1903. The Board of Supervisors called for bids for a renewal of the franchise, but on Aug. 3, 1896, several district improvement clubs opposed to further private ownership of the line secured an injunction from the Superior Court, and prevented the Board of Supervisors from opening the bids received. For some time the matter remained at a standstill as far as the railway was concerned, until in June, 1898, the company made another application for a fifty-year extension. The same opposition was encountered as before, however, and the result was a second denial. In the meantime the municipal ownership propaganda was extended, and in the same year San Francisco adopted a new city charter in which the intention of the city to acquire, own and operate public utilities was expressly declared.



San Francisco Municipal Railway—Map of Existing and Proposed Lines

One of the first moves on the part of the advocates of municipal ownership, subsequent to the second refusal of the city to extend the franchise of the Geary Street, Park & Ocean Railway, was to propose a bond issue to secure funds for the reconstruction of this line by the city. At this time the company operated cable cars on Geary Street from Market Street to Fifth Avenue, and thence along Fifth Avenue to Golden Gate Park. It was proposed to convert this line into an electric road and extend it to the ocean beach. The proposition was submitted to the voters of the city on Dec. 2, 1902, but the number of voters favoring the bond issue fell short of the necessary two-thirds. Shortly after this, in February, 1903, the railway company made its third application for a new fifty-year franchise and was again defeated. This result prepared the way for a second bond election on Oct. 8, 1903, but at this time the proposition again failed to carry.

On Nov. 6, 1903, the franchise of the Geary Street, Park & Ocean Railway expired. On the advice of the city attorney no written agreement was entered into between the city and the railway, but the latter merely paid 5 per cent of its gross earnings into the city treasury in return for permission to run its cars. This arrangement lasted until May, 1905, when the Board of Supervisors declared its intenion of rebuilding the road without recourse to a bond issue. For this purpose $350,000 with which to begin the proposed work was appropriated the following month from the city budget. Plans and specifications were made by the city engineer, construction contracts were being prepared, and all was in readiness for actual construction work when the earthquake and fire of 1906 devastated the business section of San Francisco. All records, plans and estimates were completely destroyed and negotiations were temporarily abandoned.

For the next eighteen months the residents were too busy clearing their property, rebuilding their homes and providing for the destitute refugees to be able to take up the question of reconstructing the railway. Eventually, however, the proposition was again advanced, but a second appropriation of $325,000 for rebuilding a portion of the road was declared illegal by the Superior Court. A proposal to issue bonds to the extent of $2,000,000 for the new line was submitted to the voters on June, 24, 1909, and fell short of the necessary two-thirds vote by 421.

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Another election was called for Dec. 30, 1909, however, and two municipal railway bond issues were submitted to the people. One provided for $1,900,000 to construct an electric line on Geary Street from Market Street to the ocean; the other was to furnish $120,000 with which to construct the line down Market Street from Geary Street to the ferries, or a total of $2,020,000. Both propositions carried by a vote of about three for the bonds to one against.

To bring about a popular vote in favor of municipal ownership, therefore, four municipal railway special elections were held. According to an interview with Auditor Thomas F. Boyle, published in *Town Talk* of Feb. 22, 1913, figures made up by Registrar Zemansky show the following costs for the special elections: Dec. 2, 1902, about $23,000; Oct. 8, 1903, about $25,000; June 24, 1909, $13,461, and Dec. 30, 1909, $30,444, or a total of about $91,905.

The election on Dec. 29, 1909, having proved favorable to municipal ownership, the Board of Supervisors in the following February formally passed an ordinance authorizing the sale of the bond issues. Horace G. Platt, president of the Geary Street, Park & Ocean Railway, immediately brought suit in the Superior Court to restrain the city officials from selling the bonds, on the grounds that the city had exceeded its legitimate rights in authorizing the issues. The court decided against the railway and held that the bonds were valid in every respect. This decision was affirmed by the Supreme Court on June 25, 1910, and in July the first bids for the purchase of the bonds were received.

Of the total of $2,020,000 bonds authorized for sale, the following issues have been made: July 1, 1910, to June 30, 1911, $1,100,000; July 1, 1911 to June 30, 1912, $800,000, and July 1, 1912, to June 30, 1913, $69,000, making a total amount authorized and outstanding of $1,969,000. There remains at present an amount of $51,000 authorized but unissued. These bonds are $1,000 par value, bear 4½ per cent interest, and mature yearly from 1915 to 1934, at the rate of $101,000 per annum. The $1,969,000 of bonds sold up to July 1, 1913, for the construction of the railway have realized a premium of $2,341, making the total amount available for construction work $1,971,341.

After the bond sales began in July, 1910, plans and specifications for roadbed construction and overhead equipment were prepared by the city engineer, and actual construction work commenced in the summer of 1911. Up to the present time 7.6 miles of double track have been completed and are in operation. Forty-three new cars have been purchased, and a reinforced concrete carhouse has been built and fully equipped. At an election held on Aug. 26, 1913, an additional bond issue of $3,500,000 was voted for the construction of new lines on Van Ness Avenue, Stockton Street, Eleventh Street and Potrero Avenue and Church Street, for the reconstruction of the Fifth Street and California Street line and the taking over of the Union Street line, whose franchise expires in December, 1913. This new bond issue was described in the ELECTRIC RAILWAY JOURNAL of Aug. 30, 1913, page 348.

TRACK CONSTRUCTION

When the city took over the Geary Street road no allowance was made for old rails, etc., but the railway was allowed to remove any such property that it desired. All the construction work done by the city was under the supervision of the city engineer. Track work was begun by day labor, but this was not found economical, and the greater portion was performed under contract by P. H Mahoney, general contractor. The time allowance was 180 calendar days, with provisions for a bonus of $250 per day for finishing in less than the allotted time, the total bonus being limited to $15,000. The actual elapsed time from start to finish was 139 days, giving a bonus of $10,250, but inasmuch as the contractor claimed that he was held up by unavoidable delays, he was allowed the maximum sum.

The greater portion of the road work was done on one track at a time, the remainder of the street being kept open to vehicle traffic. In the down-town district the contractor was allowed to close the entire street in order to facilitate rapid work. The cable tracks formerly in use on Geary Street were removed by first taking up the pavement outside the rails, cutting the bolt heads and pulling the track rails, then breaking the slot rails and cable conduit with a 2-ton drop-hammer piledriver mounted on skids. A derrick followed the piledriver and lifted out the broken steel and blocks of concrete. The concrete was broken to crusher size with hammer and gads, crushed in a movable crusher operated by a 36-hp gasoline engine and then used for ballast.

After the cable conduit trench was cleared out, additional excavation was required at the sides of the track. A portion of the excavated material was required to fill the trench up to the subgrade. The balance was shoveled directly into wagons and hauled to a dump. On the subgrade was placed a layer of crushed rock, or old concrete crushed as previously described, about 6 in. thick. Sand was washed into the voids of the rock by flushing with water. The surface was then rolled with a 5-ton steam road roller to a level 17½ in. below the grade of the finished track, allowing 2 in. for tamping to grade. The grade work having been thus completed, ties were laid, rails were put in place on the tie plates, the joints bolted up temporarily, and the rails spiked to gage.

The next step was the raising of the laid track to the finished grade, and the tamping of ballasts in under the ties. The joint plates were removed, the rails bonded, the joint plates replaced and fastened permanently, and the tie rods put in place. The lining and surfacing gang then adjusted the track to perfect line and grade. The space between the ties was next filled with ballast or concrete, the rail joint nuts retightened, and the pavement replaced. The construction is now complete with the exception of a section of the lower Market Street line, which it is estimated can be completed for $25,000 and equipped for $15,000.

EQUIPMENT AND POWER

The equipment of the municipal line consists of forty-three cars, 47 ft. 1 in. long and 8 ft. 6 in. wide. These cars can comfortably accommodate 110 passengers each, and during the first few days of operation as many as 145 persons per car were carried. They are of the prepayment California type, having a closed section in the center and open sections at both ends. Their design conforms closely to the Chicago standard.

Power for operating the line is supplied by the Pacific Gas & Electric Company at 1 cent per kw-hr., delivered on the trolley wire as d.c. at 600 volts. It is converted by the Pacific Gas & Electric Company in two of that company's substations, each of which is provided with one 1000-kw and one 500-kw machine. A motor generator set was purchased in order to use the 600-volt d.c. off the trolley wire for carhouse lighting at 110 volts and for the running of shop equipment at 220 volts.

TRAFFIC

Since the opening of the municipal line the traffic has steadily increased, and cars now run during the rush hours on a two-minute headway.

When the municipal line was first put in operation no transfer arrangements between the United Railroads of San Francisco and itself had been arranged. Within the last few months, however, an agreement has been entered into between the private and municipal lines whereby the two electric railways will pay equally for the reconstruction of the outer tracks on Market Street, from Sansome Street to the Ferry Depot, and whereby transfers will be exchanged between the two companies' lines at certain intersections.

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COST OF CONSTRUCTION

The following is an official statement of the cost of the road, as compiled from the report to the Board of Public Works of Leonard Levy, head bookkeeper of the board, and in charge of the accounts of the Municipal Railway. This report has not as yet been printed, but will be included in the next annual report of the board. The figures are given to the nearest even dollars.

RECEIPTS FROM BOND SALES

Total bonds sold	$1,969,000
Premiums on bonds	2,341
Total amount available from bonds sold	$1,971,341

EXPENDITURES, INCLUDING LIABILITES INCURRED

Purchase and delivery of rails	$122,331
Purchase and delivery of redwood cross ties	26,149
Rail joints, tie rods and plates, bonds, spikes and fastenings	37,785
Curves, switches and track specials	56,669
Track construction and paving	509,673
Tubular steel trolley poles and overhead wires	60,467
Conduit and power conductors	94,968
Construction of carhouse	234,689
Motor generator set	3,117
Purchase of cars	341,931
Extra parts and equipment	2,596
Lubricating oil house	1,000
Plans, specifications, etc	32,418
Salaries of engineer and superintendent	2,449
Purchase of land, litigation and miscellaneous	118,227
Amount due (estimated) for completion of lower Market Street line and equipment	40,000
Total	$1,684,469
Less miscellaneous credits	4,214
Total cost	$1,680,255
Balance of bond issue unexpended	291,086
Bonds unsold	51,000
Total in bond issue unexpended	$342,086

It will be noticed that the report of Mr. Levy does not contain any reference to the $350,000 spent for plans prepared prior to the fire of 1906, nor to the cost of the four special elections, amounting approximately to $91,905. The item of $118,227 for purchase of land, etc., includes $112,263 for expenditures by the Board of Supervisors for lands, $2,293 for miscellaneous expenditures by the board, $500 for the expense of the city attorney's trip to Washington, $2,000 for litigation, and $1,171 for B. J. Arnold's report on cars.

The sum of the $1,171 for the Arnold report, $2,449 for salaries of engineer and superintendent, and $32,418 for plans, specifications, etc., is $35,984. In other words, according to the report, the charges for all engineering and superintendence were only 2.1 per cent of the total amount expended.

OPERATING REPORT

The receipts of the Geary Street Municipal Railway from Dec. 28, 1912, to June 30, 1913, inclusive, were $134,924; the expenditures (demands audited) were $73,252, leaving excess receipts of the period of $61,672. The analysis of the amount of $73,252 for demands audited, showing the operation of the road during the accounting period, follows:

Way and Structures:		
Maintenance of Way:		
10. Miscellaneous roadway and track expenses	$8.64	
11. Cleaning and sanding tracks	1,867.35	
23. Overhead trolleys	23.65	
25. Carhouses	3.95	
		$1,903.59
Equipment:		
29. Superintendence of equipment	$750.00	
Maintenance of Equipment:		
32. Passenger cars	2,241.70	
36. Electrical equipment of cars	160.43	
38. Shop machinery and tools	5.74	
39. Shop expenses	5.13	
		3,163.00
Conducting Transportation:		
42. Superintendence of transportation	$3,971.55	
56. Power purchased	18,850.57	
60. Conductors and motormen, etc	5,271.25	
60-A. Conductors	14,817.80	
60-B. Motormen	14,742.25	
62. Miscellaneous car service employees	390.00	
63. Miscellaneous car service expenses	280.91	
63-A. Tickets and transfers	213.85	
63-B. Lubricants and waste	67.07	
63-C. Special agents and fare registers	65.00	
63-D. Incandescent lamps	109.15	
63-E. Miscellaneous	.80	
66. Carhouse employees	5,197.56	
67. Carhouse expenses	175.29	
		63,853.05
General and Miscellaneous:		
73. Salaries and expenses general officers	$2,499.91	
74. Salaries and expenses general office	231.35	
75. General office supplies and expenses	117.99	
79. Miscellaneous general expenses	13.45	
82. Injuries and damages	99.40	
83. Insurance (indemnity bonds)	277.50	
84. Stationery and printing	473.08	
85. Store expenses	150.00	
		$3,862.68
Undistributed stores account (stock on hand)		469.01
		$73,252.32

The statement of receipts and expenditures for the fiscal period is as follows:

Excess of receipts over expenditures	$61,672.62
Credit (from demands audited) account stores in stock	469.01
Gross excess	$62,141.63
Total interest estimated to be charged off operation to June 30	29,584.04
Surplus over audited expenses and interest charges, from which all depreciation, sinking fund, mythical taxes, insurance, services not charged, etc., may be deducted	$32,557.59

The item of $29,584 for interest in the foregoing statement was estimated by the bookkeeper of the Board of Works for the period from Dec. 28, 1912, to June 30, 1913, inclusive—185 days. This interest was not calculated on the base of the total cost of $1,680,255 for a period of six months; it is figured for such portions of the road and equipment as were in use at a given time and only for the periods during which they were in use. In actually working out the estimated interest, the estimated total net expenditures in account, as of the first and fifteenth of each month, were used, thereby creating an equitable (mean average) charge against net income in accordance with decisions No. 29 and No. 53 of the Interstate Commerce Commission.

Section 41 of the Interstate Commerce Commission rulings provides that: "Interest on bonds and other securities including equipment bonds or car trust notes, paid or accrued during construction and before the line is opened for operation, is chargeable to the interest account under general expenditures for road and equipment." No actual computation has as yet been made by the city for the interest during construction in accordance with this ruling of the commission.

The operating statement, as shown, contains under the heading of "general and miscellaneous" an item of $278 for "insurance" (indemnity bonds). This has reference to the sum paid by the city for indemnity for theft by platform men. According to the report no provision has been made for fire insurance to cover the carhouse, worth $234,689, the cars, worth $341,931, and other plant and property assets. No taxes or depreciation or sinking fund provisions have been taken into the accounting for the six months' period.

WAGES

Under an ordinance that has been effective in San Francisco for the last two years, the minimum wage for anyone engaged on municipal work is fixed at $3 for an eight-hour day. This applies to platform men employed by the municipal railway, as well as to laborers employed by contractors engaged on city work.

OPINION OF MAYOR

No attempt will be made here to analyze this report, but Mayor James Rolph, Jr., has authorized a statement to this effect: "I am extremely well satisfied with the financial showing made by the road, and instead of a gold brick, as its opponents called the project, I consider it a veritable gold mine."

That 53.8 per cent, or 103,566 of the fatalities charged to United States railways in twenty-three years, 1890 to 1912 inclusive, were caused by trespassing is the statement sent out by the Bureau of Railway News and Statistics. "So long as legislators," the bureau continues, "commissions and critics rivet their attention on steel cars, the tale of railroad fatalities will grow along the line of the greatest percentage of causes."

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Annual Convention of Municipal Tramways Association

At This Meeting Papers Were Presented on Platform Fare Collection, Paving Charges and Omnibus Competition

The twelfth annual conference of the Municipal Tramways Association of Great Britain was held at Sheffield on Sept. 24, 25 and 26. The proceedings were in charge of A. R. Fearnley, president of the association and general manager of the Sheffield Tramways. The delegates were welcomed by the Lord Mayor of the city at the council chamber of the town hall, which had been placed at their disposal for the conference.

IMPROVEMENTS IN TRAMWAY OPERATION

The first order of regular business was an address by President Fearnley on "Improvements in Tramway Operation." Nineteen applications had been made by municipalities since the last conference for provisional orders to permit them to extend their trolley lines or to add motor bus or trackless trolley routes. The general tendency throughout the country was toward the improvement of running time. Sheffield and many other cities had spent large sums for the rehabilitation of equipment and the installation of commutating-pole motors. The mechanical types of rail joints were rapidly becoming obsolete and welded joints of electrical, thermit or cast type were being adopted in their stead. The isolation of tramway power houses from the other municipal stations in the same district was now being abandoned. He hoped that before the end of the year arrangements would be completed in Sheffield whereby all the power plants would be interconnected, particularly to help out on the railway peak loads. The Sheffield tramways committee had ordered ten buses, which had been in service since February, 1913, on four routes. The fifth route was to be opened during October. The vehicles had proved reliable in service and had run more than 100,000 miles to date. If reasonable use could be made of the vehicles during the winter months, there was no doubt that next summer a much larger number of buses would be required.

ADVANTAGES AND DISADVANTAGES OF PLATFORM FARE COLLECTION

Alderman S. Flint, chairman Leicester Corporation tramways committee, then read a paper on "Advantages and Disadvantages of Platform Fare Collection." The Leicester tramways center in the heart of the city, which makes it possible to charge universal penny fares on all the lines. Early in 1913 the pay-as-you-enter system was inaugurated on a section bearing the heaviest traffic. The conductor collected the fares as the passengers boarded the car and, except in the case of transfer and workmen's tickets, all tickets were put into a box on leaving. The color and letters on the tickets enabled the conductor to detect at a glance whether a passenger was over-riding his zone. Six varieties of tickets were used for the different through and cross lines on the system and twelve on the prepayment section. Among the results of prepayment operation were the entire elimination of platform accidents, and better schedules. One of the early complaints against the system was that passengers on the upper deck had to leave their seats before reaching their destination, but this had been remedied by permitting them to leave by either stairway. To meet other complaints, accommodation had been made for baggage, and the staircases had been widened.

Complete financial comparisons could not yet be made but undoubtedly there had been an increase in the receipts on the trial section, probably in excess of the average over the whole system.

In the discussion on Mr. Flint's paper, J. A. Smith, Aberdeen, said that the experience with the prepayment system on one route in that city was entirely satisfactory. The number of passengers who required change was only 5 per cent. The system had effected a saving in time of one minute per trip, namely, 34.2 minutes as against 35.1 minutes. The receipts had increased by more than $115 per week. In reply to a question by A. L. C. Fell, London County Council Tramways, Alderman Flint expressed his belief that the prepayment system would enable nineteen cars to do the work of twenty. F. R. Smith, also of Leicester, added that, besides the royalty of $100 per car, the cost of rebuilding the platforms had amounted to $150 to $160 per car.

J. M. McElroy, Manchester, said that in the United States prepayment had practically eliminated all boarding and alighting accidents, the most prolific cause for damages in the past. He approved of the system where a universal fare obtained but doubted its applicability to large towns with many overlapping fares.

THE UNFAIR BURDEN OF TRACK PAVING

At the Wednesday afternoon session, William C. Fenton, Sheffield, read a paper on "The Maintenance of Paving on Tramway Track as Affected by Section 28 of the Tramways Act, 1870." This act provides that promoters shall at their own expense maintain in such manner as the road authorities shall direct that portion of the road between the tramways, and in every case so much of the road as extends 18 in. beyond the rails on each side of the tramway. Mr. Fenton pointed out the unfairness of this act to-day, inasmuch as it relates to animal traction and, of course, should not apply to electrically operated railways. The paper was apropos of the question of the free use of the streets by motor buses.

C. F. Spencer, Halifax, said that the tramways had to pay practically the whole cost of the upkeep of the streets, while other users paid nothing. He thought it would be equitable, however, if the tramways paid for maintenance between the tracks and 9 in. on each side.

W. J. Squires, London County Council, expressed the belief that, given equal treatment, the tramways would hold their own against buses for all time.

W. Smith-Sayville, borough engineer, Darwin, said that since the advent of heavy motor traffic the maintenance of roads had cost his borough $4,400 per mile as against $1,700 previously.

URBAN PASSENGER TRANSPORT

On Thursday morning J. B. Hamilton, general manager Leeds Corporation Tramways, presented a paper on "Urban Passenger Transport." He said that the motor bus had seven times the number of fatal accidents per vehicle per annum, and twice as many injuries per million passengers as compared with tramways. Its obstructive street condition in fine weather was as two buses to one car, and in inclement weather as four buses to one, while the cost to the municipality of providing transit by motor bus was double the amount per seat provided by electric tramways. He also presented statements showing the results of tramway operation in twenty-seven towns of more than 150,000 population, with an annual revenue of $33,848,000, as compared with the assumed results for transport effected by means of motor buses. On the basis of 80 per cent efficiency for the bus in comparison with cars, the operation of 146,810,902 car miles and the transport of 1,580,514,058 passengers in these towns would require 4995 buses in place

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of 3996 cars. The annual operating cost per bus seat would be $225, as compared with $115 per car seat, and the total loss from the substitution of buses for cars would be approximately $4,570,000 a year.

The great development of buses in London had been due to such exceptional conditions as very smooth streets with few grades and the present impossibility of rail transit along the main highways. No authoritative figures had been issued by the London bus companies on the cost of operation, although the accounts of the General Omnibus Company showed a figure of 19.52 cents per mile. It was probable, however, that the company did not want to inform the public of the exact cost of operation. In the case of municipalities, the figures of which are usually available, he quoted the cost of operation as follows: Keighley, 32 cents; Halifax, 25.4 cents, and Eastbourne, 28.78 cents per mile. The Halifax vehicles were of the most modern type. After much examination of figures he had come to the conclusion that 20 cents per mile would be a reasonable figure for all costs of operation, interest upon investment and sinking fund allowance as specified by Parliament for tramways. These figures, however, took no account of the larger margin of spare buses which would be required as against tramcars. In conclusion, Mr. Hamilton made some reference to trackless trolleys. He said that their total cost of operation under ordinary conditions was at least 20 per cent to 25 per cent less per car mile than that of motor buses, and that they were equal in flexibility to the motor buses for the ordinary roadway width, namely, 30 ft. to 35 ft. Trackless trolley systems were now in use in eight different districts in England and several others were under construction.

ELECTION OF OFFICERS

At the annual business meeting, which was held on Friday morning, the following officers were elected for the ensuing year: President, Alderman H. Linsley, chairman Salford tramways committee; vice-president, P. Fisher, general manager Dundee Corporation Tramways; auditor, W. J. McCombe, general manager Hull Corporation Tramways. Members of council, A. L. C. Fell, chief officer London County Council Tramways; J. B. Hamilton, general manager Leeds City Tramways; G. W. Holford, general manager Salford Corporation Tramways; J. H. Rodgers, chairman Newcastle-on-Tyne tramways committee. C. J. Spencer, general manager Bradford Corporation Tramways, was re-elected honorary secretary.

CALIFORNIA REPORT ON INDUCTIVE INTERFERENCE

The committee of engineers representing the electric wire interests in the State of California, authorized by the California State Railroad Commission in December, 1912, to investigate the subject of inductive interference between power and communication lines and to make recommendations for commission rulings intended to prevent undue interference, has reported progress up to Sept. 1, 1913. The organization of this committee was mentioned in the ELECTRIC RAILWAY JOURNAL for March 15, 1913.

Since the first of the year a field force of from five to eight experimenters and computers has been engaged in collecting and computing data under instructions from the committee. The field force is equipped with a large amount of apparatus, including an oscillograph having three vibrators, noise standards, an impedance bridge, complete equipment for harmonic analyses and instruments of various kinds, the total aggregating in value approximately $9,000. Equipment is provided for harmonic analyses by either or both of two methods The first involves the use of the oscillograph and the second of what is termed the resonant shunt.

The parallels on which this work has now been completed are four in number, all of which involve one telephone line. This is the main coast line trunk lead of the Pacific Telephone & Telegraph Company between San Francisco and Los Angeles. These parallels cover a distance of approximately 120 miles. The telephone lead consists in the main of ten copper physical circuits, part of which are loaded and some of which are made up into phantoms. The high-tension portions of these exposures are as follows:

First—A 57,000-volt, three-phase line of the Sierra & San Francisco Power Company, approximately 20 miles long, between San José and Gilroy. Second—A portion of the same line, approximately 8 miles long, running into Salinas. Third—A 22,000-volt, three-phase line of the Coast Counties Gas & Electric Company, approximately 16 miles long, between Morganhill and Sargents, and overlapping the above-mentioned line of the Sierra & San Francisco Power Company from Morganhill to Gilroy for a distance of approximately 10 miles. Fourth—A 33,000-volt, three-phase line of the Coast Valleys Gas & Electric Company, approximately 40 miles long, between Salinas and King City. All of these lines are operated at sixty cycles.

In all cases the telephone pole line is on one side of the public highway and the power line or lines on the other side, with average separation of approximately 60 ft. The power lines of the two separate companies, overlapping as mentioned above, are erected one above the other.

The system of the Sierra & San Francisco Power Company is operated with a solidly grounded neutral, while that of the Coast Counties Gas & Electric Company is operated without a grounded neutral. This makes it possible to obtain a certain number of comparative data between grounded and ungrounded systems, although the comparison will be limited by the fact that the two systems have different electrical and mechanical characteristics. Thorough investigations have been made of residual and balanced currents and voltages in the power system, of the shielding effects of other wires on the telephone lead, of the existing transposition systems in both the power and telephone lines and of the relative locations of the power and telephone transpositions; also of the effects of modifications of these transposition schemes. The effects of the power lines on Western Union telegraph wires and the signal circuits of the Southern Pacific Company have been included in the investigation.

The joint committee has a membership of fifteen engineers, part of whom represent the power interests, part the communication interests in the State of California and part the State Railroad Commission. The necessary funds for the work have been voluntarily contributed by the power and communication interests in the State. A large amount of the apparatus used has been loaned by the Pacific Telephone & Telegraph Company, some has been purchased by the committee, and a relatively small amount, consisting of current and potential transformers, oil switches, etc., has been loaned by the power companies. The study has developed into an investigation of much greater scope and complications than was originally anticipated. Although eight active months have already been spent on this work, the investigation has not as yet been made on a sufficiently large number of exposures of different characteristics to allow any general conclusions.

While the complications of the problem now appear to those carrying on the work so great as to make extremely difficult the drafting of general remedial measures which shall not be onerous on the interests involved and shall not be subject to so many exceptions and alternatives as to make them ineffective, the committee expects that this work can be made to serve as a basis of rulings which will be helpful not only to the communication interests but also to the power interests in standardization of construction and operating methods and the reduction of interruptions to service. Members of the committee also feel that, more important than the above, the work will enable the Railroad Commission to make rulings which will in future reduce harmful agitation, legislation and litigation.

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STATISTICS OF ELECTRIC RAILWAY COMPANIES

The accompanying table, giving the miles of track, cars and capitalization of electric railway companies, is similar to the corresponding table which has been published annually by the ELECTRIC RAILWAY JOURNAL for a number of years. The statistics are based primarily on the reports contained in the *McGraw Electric Railway Manual* for 1913. As the full statistics of all companies, however, are not published in the *McGraw Electric Railway Manual*, it was necessary to make estimates for the remaining companies, which are the smaller properties of the country. The statistics relating to the smaller properties, of course, represent a small part of the total for all companies.

STATE	NUMBER OF RY. COMPANIES.	MILES OF TRACK.	CARS.	CAPITAL STOCK		FUNDED DEBT		TOTAL STOCKS AND BONDS	
				AUTHORIZED.	OUTSTANDING.	AUTHORIZED.	OUTSTANDING.	AUTHORIZED.	OUTSTANDING.
NEW ENGLAND STATES:									
Connecticut	12	1,340.01	2,964	$83,117,400	$61,748,300	$80,256,000	$59,946,000	$16,373,400	$121,694,300
Maine	16	523.71	771	16,728,400	16,471,700	29,298,975	15,711,325	46,027,375	32,183,025
Massachusetts	58	3,554.27	10,673	112,300,850	111,278,500	111,072,500	82,733,000	223,373,350	194,011,500
New Hampshire	19	278.02	370	6,611,900	4,359,400	4,461,200	3,895,000	11,073,100	8,254,400
Rhode Island	6	447.14	1,284	37,596,200	22,129,300	17,789,900	16,513,900	55,386,100	39,243,200
Vermont	9	104.25	127	2,920,000	2,549,600	2,700,000	2,668,000	5,620,000	5,217,600
Total	120	6,247.40	16,189	$259,274,750	$219,136,800	$245,578,575	$181,467,225	$504,853,325	$400,604,025
EASTERN STATES:									
Delaware	4	86.66	157	$11,087,400	$9,047,400	$6,909,400	$5,078,500	$17,996,800	$14,125,900
Dist. of Columbia	6	322.21	1,546	90,383,500	31,085,500	46,215,400	36,491,200	136,598,900	67,576,700
Maryland	13	724.44	2,028	49,850,000	22,679,000	90,477,000	71,807,500	140,327,000	94,486,500
New Jersey	33	1,480.64	2,966	107,700,276	86,002,640	123,462,585	101,093,685	231,162,861	187,096,325
New York	135	4,879.86	16,418	588,827,100	417,666,500	1,067,337,626	591,632,476	1,656,164,726	1,009,298,976
Pennsylvania	172	4,619.15	9,492	364,229,338	300,014,700	373,047,100	234,249,060	737,276,438	534,263,760
Virginia	17	463.71	904	33,951,500	25,913,250	50,038,100	31,998,800	83,989,600	57,912,050
West Virginia	16	373.03	537	22,260,000	16,966,400	59,867,100	17,954,100	82,127,100	34,920,500
Total	396	12,951.70	34,048	$1,268,289,114	$909,375,390	$1,817,354,311	$1,090,305,321	$3,085,643,425	$1,999,680,711
CENTRAL STATES:									
Illinois	72	3,378.59	8,189	$249,956,000	$157,486,300	$384,388,000	$272,742,700	$634,344,000	$430,229,000
Indiana	46	2,377.75	2,267	114,194,500	90,009,760	157,600,200	92,436,630	271,794,700	182,446,390
Iowa	34	763.14	1,515	51,430,000	40,418,535	88,157,000	39,622,800	139,587,000	80,041,335
Kentucky	10	459.36	966	28,837,500	23,269,400	51,377,000	23,357,400	80,214,500	46,626,800
Michigan	26	1,532.47	2,763	53,533,000	47,129,900	129,408,000	74,537,000	182,941,000	121,666,900
Minnesota	9	545.07	1,127	55,625,000	50,150,850	40,205,600	29,555,000	95,830,600	79,705,850
Missouri	19	1,162.49	2,843	134,448,800	84,336,480	163,358,100	116,974,200	297,806,900	201,310,680
Ohio	82	4,137.32	6,358	255,728,000	197,177,500	263,422,000	132,975,740	519,150,000	330,153,240
Wisconsin	23	732.91	1,047	67,533,000	24,503,200	197,251,500	43,518,900	264,784,500	68,022,100
Total	321	15,089.10	27,075	$1,011,285,800	$714,481,925	$1,457,167,400	$825,720,370	$2,468,453,200	$1,540,202,295
SOUTHERN STATES:									
Alabama	13	334.60	625	$58,327,000	$35,957,000	$84,825,000	$29,890,000	$143,152,000	$65,847,000
Arkansas	10	123.19	299	25,840,000	12,792,700	29,681,000	12,124,500	55,621,000	24,917,200
Florida	8	147.71	255	6,220,000	5,605,600	11,000,000	4,513,000	17,200,000	10,118,600
Georgia	15	405.25	712	61,774,600	58,274,100	108,750,000	33,682,000	170,524,600	91,956,100
Louisiana	8	265.86	722	53,497,800	31,995,000	97,269,000	34,970,100	150,766,800	66,965,100
Mississippi	10	108.30	172	11,500,000	6,932,670	16,400,000	6,743,500	27,900,000	13,676,170
North Carolina	14	196.07	238	29,500,000	23,802,800	25,525,000	11,656,750	55,025,000	35,459,550
South Carolina	8	193.72	243	20,700,000	15,436,350	19,605,000	11,349,000	40,305,000	26,785,350
Tennessee	10	369.80	876	20,650,000	19,943,000	70,650,000	28,335,000	91,300,000	48,278,000
Total	96	2,144.50	4,142	$288,009,400	$210,739,220	$463,705,000	$173,263,850	$751,714,400	$384,003,070
WESTERN STATES									
Arizona	4	56.10	40	$3,665,000	$3,273,000	$1,200,000	$1,200,000	$4,865,000	$4,473,000
California	45	2,496.70	5,365	798,178,500	641,443,200	648,800,800	169,789,500	1,446,979,300	811,232,700
Colorado	15	439.45	757	54,000,000	23,429,300	73,968,000	31,953,400	127,968,000	55,382,700
Idaho	1	85.00	55	30,000,000	30,000,000	5,750,000	1,457,000	35,750,000	31,457,000
Kansas	16	289.95	356	9,600,000	6,974,000	11,513,000	6,635,000	21,113,000	13,609,000
Montana	7	155.86	155	3,844,600	3,275,515	2,524,000	1,944,000	6,368,600	5,219,515
Nebraska	4	240.72	556	22,032,000	12,594,450	15,891,600	11,677,900	37,923,600	24,272,350
Nevada	2	10.75	12	2,000,000	1,042,000	1,000,000	135,000	3,000,000	1,177,000
New Mexico	2	10.50	11	550,000	410,000	160,000	160,000	710,000	570,000
North Dakota	3	23.50	60	450,000	444,775	314,555	214,555	764,555	659,330
Oklahoma	15	246.27	290	22,120,000	8,504,350	25,650,000	7,194,000	47,770,000	15,698,350
Oregon	8	499.32	1,309	63,510,000	42,640,000	161,837,000	48,408,000	225,347,000	91,048,000
South Dakota	3	20.00	30	1,000,000	586,690	500,000	200,000	1,500,000	786,690
Texas	32	717.09	1,133	46,585,000	38,321,175	51,897,000	30,694,000	98,482,000	69,015,175
Utah	5	260.25	349	12,400,000	7,583,400	22,185,000	7,145,900	34,585,000	14,729,300
Washington	18	1,038.31	1,993	105,566,300	70,944,900	122,200,000	50,993,500	227,766,300	121,938,400
Wyoming	2	21.50	21	75,000	75,000	20,000	20,000	95,000	95,000
Total	182	6,611.27	12,492	$1,175,576,400	$891,541,755	$1,145,410,955	$369,821,755	$2,320,987,355	$1,261,363,510
All States	1,115	43,043.97	93,946	$4,002,435,464	$2,945,275,090	$5,129,216,241	$2,640,578,521	$9,131,651,705	$5,585,853,611

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The statistics were compiled generally in accordance with the plan that has been followed in previous years in the compilation of the table. This plan was described in the issue of the ELECTRIC RAILWAY JOURNAL for Dec. 12, 1912, page 1156. The average date of the returns from which the table on page 691 was compiled was Jan. 1, 1913.

DINNER TO RETIRING SECRETARY DONECKER

A complimentary dinner was extended on the evening of Oct. 9 at the Hotel Astor to H. C. Donecker, who resigned recently as secretary and treasurer of the American Electric Railway Association to accept the position of assistant general manager of the Public Service Railway of Newark. The hosts on the occasion were more than one hundred warm friends, mostly from electric railway circles in New York, whom he made during his service as secretary and treasurer of the association. The dinner was a spontaneous expression of Mr. Donecker's popularity in the field which he has ably served during his administration of the affairs of the association and showed the strong hold which he has on the members of the industry.

W. H. Sawyer, of Ford, Bacon & Davis, New York, acted as toastmaster, and among those who spoke after the repast were Past-president Thomas N. McCarter and President Gen. George H. Harries, of the association; Frank Hedley, W. O. Wood, W. L. Conwell and Charles C. Peirce. Messrs. McCarter and Harries, speaking for the association, bore testimony to the high value of the work which Mr. Donecker had performed for the organization. Mr. McCarter said that his own connection with the association had coincided for a longer time than that of any other person with Mr. Donecker's connection with the association, and for this reason he was able to speak with especial knowledge of the service which Mr. Donecker had performed for the field. After the remarks of the gentlemen mentioned Mr. Donecker made an appropriate reply in which he expressed his appreciation of the compliments which had been extended to him by his hosts, as well as of the courtesies which he had enjoyed while he occupied the office of secretary and treasurer.

While Mr. Donecker's service as secretary and treasurer of the association dates from his election in February, 1910, he has been connected with the association since January, 1908, when he was appointed office manager. His previous experience had been along electric railway lines so that he was able to bring to the task a wide knowledge of electric railway conditions as well as of association work. The office of secretary of an association is often a perfunctory one, but Mr. Donecker made it important. He entered into the undertaking with unflagging zeal, a tremendous capacity for the work and a mind trained for the systematic consideration of topics relating to all branches of the electric railway field. Those who have had occasion to seek the assistance of the association in the solution of their problems have always found him not only ready to assist, but in nearly every case with all of the information needed already in hand, and where this was not immediately available but could be obtained it was secured promptly. This fact, coupled with Mr. Donecker's universal courtesy, gave significance to the testimonial dinner to him last Thursday night.

The ninth annual convention of the Empire State Gas & Electric Association was held in the Engineering Societies Building, New York, on Oct. 2. A new feature which contributed greatly to the success of this meeting was the participation of Martin S. Decker, chairman of the New York Public Service Commission, Second District, who spoke on "Public Service by Private Corporations," and Milo R. Maltbie, member of the First District Commission, who spoke on "The Advantages of Public Utilities." James T. Hutchings, of Rochester, was elected president.

ADDITIONS TO THE A.E.R.A. CONVENTION PROGRAM

Since the publication of the convention program in the ELECTRIC RAILWAY JOURNAL for Sept. 6 several changes have been made, and these are listed in the subjoined paragraphs.

To the American Association program there have been added: An address on "The Cleveland Situation—Its Economies as Developed in the Arbitration Decision of June 19, 1913," by C. N. Duffy, vice-president The Milwaukee Electric Railway & Light Company; an address on "Franchise Values," by William M. Wherry, of Wherry & Mygatt, New York, who will take the place of Frank Bergen. Both addresses will be delivered on Tuesday. William D. Kerr will deliver an address on "A Model Public Utility Law" at the Thursday session. The title of A. D. B. Van Zandt's paper, to be read on Wednesday, has been changed to "Progress in Publicity."

At the joint session of the Accountants' and Transportation & Traffic Associations on Wednesday T. A. Emery, of Ford, Bacon & Davis, will deliver an address on "Statistical Unit Used in Analysis of Electric Railway Accounts."

At the joint session of the Accountants' and Engineering Associations on Wednesday J. Vipond Davies, chief engineer Hudson & Manhattan Railroad, will deliver an address on "Engineering Accounting," and William McClellan, electrical engineer Public Service Commission, First District, New York, will deliver one on "Life of Railway Physical Property."

At the meeting of the Transportation & Traffic Association on Thursday Dr. W. P. Rucker, assistant surgeon-general United States Bureau of Public Health, Washington, will deliver an address on "Regulations on Sanitation as Relating to Public Carriers."

A RAILWAY EXHIBIT AT PITTSBURGH

The Pittsburgh Railways Company has been conducting a novel exhibit at the Pittsburgh Exposition for the purpose of demonstrating to the people of that city the efforts which have been made by the company along lines of improved service, increased comfort for passengers and safety and reliability of operation. The exhibit included old and new types of cars, controllers, motors, rails, track construction and paving, many of these having exceptional historical interest.

One of the most unusual of the features of the exhibit is the use of a moving picture outfit to show a series of scenes along the surface car lines of the city, the machine being set up overhead at one side of the booth as shown in one of the accompanying illustrations. One of the scenes shown is entitled "A Two-Minute Delay." It shows a woman entering a car and holding up all those behind her at the fare box. She first opens a grip, from which she takes a handbag, and from this handbag she takes a small purse, and from the purse she extracts a large bill which takes the conductor considerable time to change. She then drops in her fare and adds to the delay by restoring all her various receptacles to their original positions before moving on.

In another picture are shown a number of men, each of whom is sitting in the middle of a seat in the car and reading a newspaper. A woman stops at each of these cross seats in an effort to find a place for herself. When she reaches the front cross seat a gentleman two seats back, who is not reading a paper, jumps up and tenders her his place. He then steps forward and knocks the newspaper out of the hands of the man who occupies the entire front cross seat and, sitting down on the edge of this seat, gives the man a violent shove to send him over toward the side of the car and thereby make room for himself on the seat. A second scene of this picture shows a woman entering the car and a number of men sitting about 6 in. apart on the longitudinal seat. After looking at the men and hesitating

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a number of times she arrives at the forward portion of the car and sits down hastily on top of two of these men, causing them to move over. She then sits down in the space so provided.

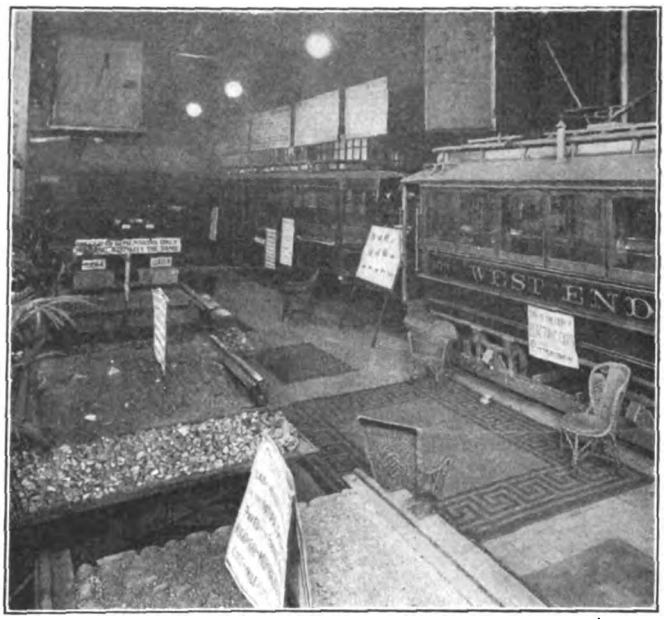
On a picture under the heading of "Accidents Due to Carelessness," a man is shown running from behind one car and being struck by a car going in the opposite direction on the other track. Another scene is of a woman getting off a summer car before it stops, stepping off backward and getting a dangerous fall. Another is of a man running after a moving car and falling, an emergency wagon coming to take him away to the hospital.

Other pictures of educational value show how one-way traffic increases the capacity of the street, how two-way traffic decreases it, and how a busy street may be blocked during the evening rush period by standing automobiles lined up at the side of the street awaiting their owners. In a scene showing "empties" going to the city for the evening rush it is explained that these cars stand in the car-house twenty hours each day and haul a load only one way. In other scenes are shown the Pittsburgh low-floor car and the Pittsburgh double-deck car at stands, receiving and discharging passengers. Still another shows the use of an electric crane for handling special work, ties, etc., at a very important corner where two main arteries of traffic cross each other. At this point the old tracks and special work had to be removed, the grade lowered about 2 ft. and new rails and special work put in between the hours of midnight Saturday and 5 a. m. Monday, on account of the leveling of a hill in the business district of Pittsburgh.

Among the interesting signs accompanying the exhibit is one placed over three types of track stating that the cost per mile of double track has increased 1000 per cent in twenty-five years, the horse-car track costing $7,862, the first electric track $27,616 and the present track $89,760. Another sign placed over the exhibit of different types of motors reads: "Fifteen types of motors used in Pittsburgh. Fourteen obsolete types could not be found. Can you think of any other business requiring a change in the type of its equipment twenty-nine times in twenty-five years?"

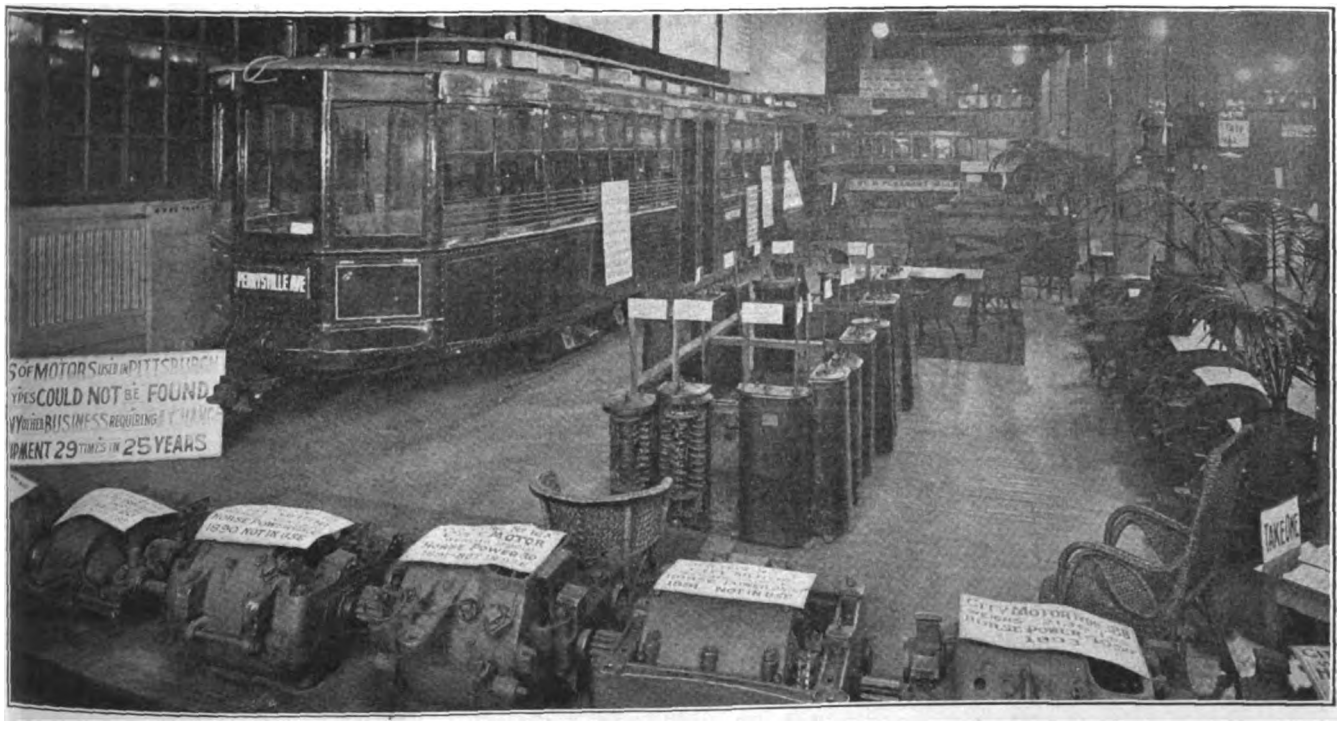
Over an old-time horse car was a sign reading: "How we rode twenty-five years ago and forgot to kick. Method of heating, straw to knees; method of lighting, tallow candles and oil lamps; seating capacity, sixteen passengers. The fare up hill was 10 cents and the fare down hill was 5 cents." Signs over one of the new steel trail cars read as follows:

"A street-car ride is the one thing in Pittsburgh cheaper to-day than ever before. True, it still costs 5 cents, but how long was the average ride ten years ago and how long is the average ride now? A 5-cent fare in hilly Pittsburgh amounts to only one-half as much per passenger mile as a 5-cent fare in most level cities."



Pittsburgh Exhibit—View Showing Old-Style Car, Samples of Track Construction and Moving Picture Cabinet

The well-known low-floor car of the Pittsburgh Railways was included in the exhibit, and on it were signs reading: "Fifty new motor cars are ordered like this except that they will have cross seats and front door exits. These will be the lightest single-deck motor cars ever built per seated passenger. Take a look at the Pittsburgh Railways Company's baby controller inside and note the seating space saved."



Pittsburgh Exhibit—View Showing Steel Trail Car and Various Types of Motors and Controllers

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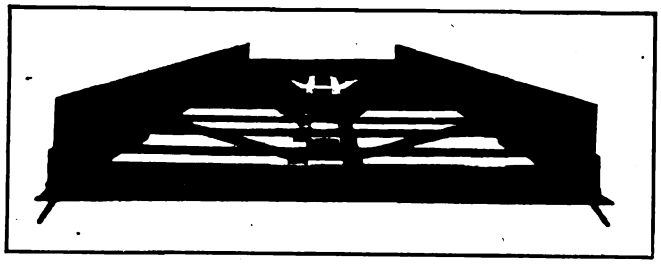
CONVERTIBLE CAR WITH STEEL UNDERFRAME

J. M. Jones' Sons Company, Watervliet, N. Y., announces a new convertible car which it asserts has all the advantages and none of the disadvantages of the bench-type open car and when uesd for winter service



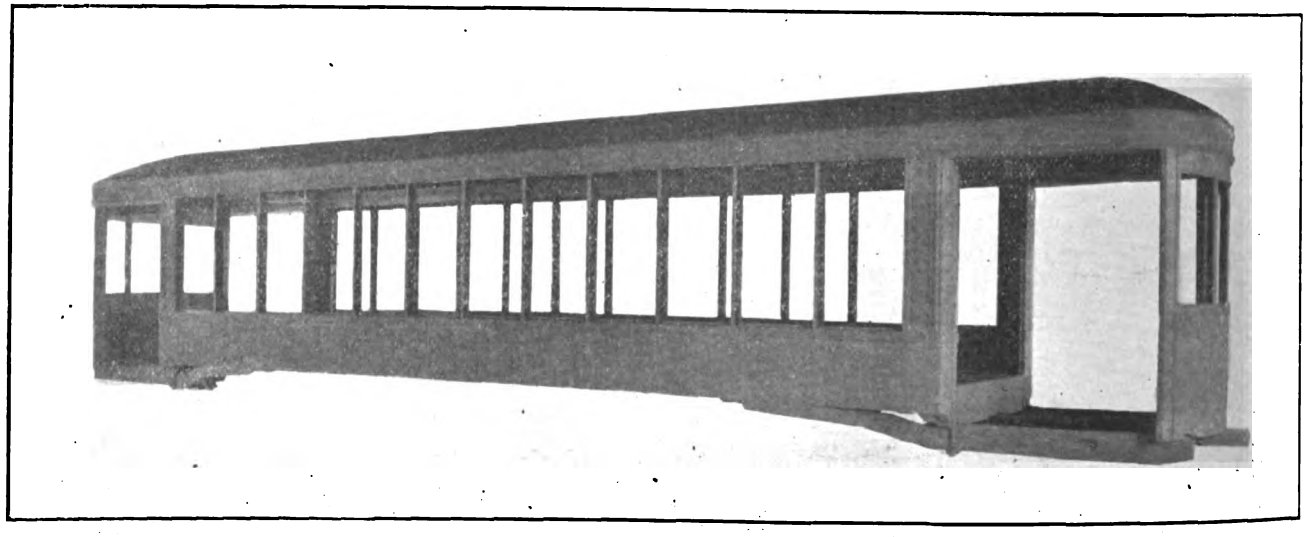
Underframe of Semi-Convertible Car

has all the advantages of the closed car. The main feature of this new car is the window sash. By the use of special newly designed fixtures these sashes can be restored to place as securely as those of a permanently closed car. Furthermore, as the sides are attached and removed from the outer side of the car body any handy man at the carhouse can remove or restore all used on one car in fifteen to thirty minutes. The sashes are interchangeable, will not rattle and are held securely to prevent the entrance of air. The design of the pillars is such that when the sash is removed the runs for the curtains will prevent the rain from beating in during summer showers. The sashes for forty cars of this type would not require any more storage space than that required for one car body of the same dimensions.

The construction of the car body allows for a very low water table, namely, about on a line with the top of the seat cushion. When used as a summer car the open space from the top of the water table to the bottom of the side top is about 4 in. more than is allowed for the old type of open car. As the space below the water table is permanently closed to the floor, the car is made more desirable both in summer and winter. The car is designed for twelve sashes on each side of the body, each sash being in one piece for two panes of glass. Curtains are provided to run below the top of the water table to prevent the rain from beating in during the summer, and the same curtains are used for winter service. Screens are provided to prevent accidents to the passengers and to protect the glass from breakage. The floor plan calls for twenty transverse and four longitudinal corner seats, seating forty-eight persons in all. No end partitions are required when the car is constructed with vestibuled platforms. The roof, platforms and the interior finish may be of any type ordered.

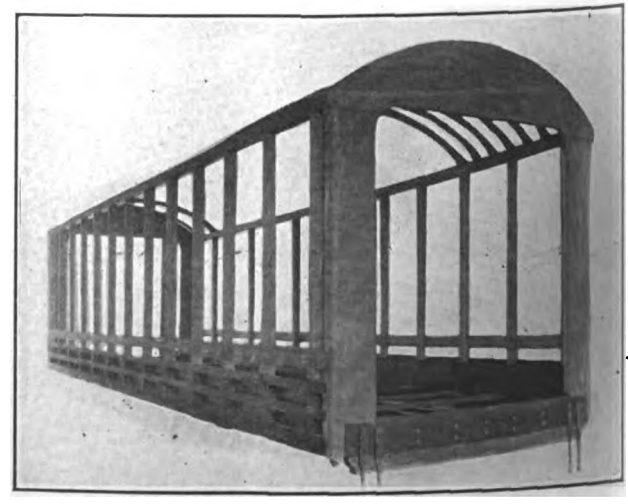
The underframe is of the all-steel type. The side sills are composed of steel plates with an angle riveted to the bottom edge to support the wood sill which carries the side and corner posts. The two I-beam center sills run through open bolsters and are securely riveted to the end sill channels. The crossings are I-beams and angles. The three I-beam crossings in the center of the car bottom are bent so as to go under the center-sill I-beams and are riveted to the center beams and side plates. The angle crossings for motor traps, if any, are fastened in place like the beams. The floor of the car is double. The vestibule and sides and ends of the car body are sheathed with steel.

The general dimensions are as follows: Length over the body, 32 ft.; length over the buffers, 46 ft. 4 in.; width at bottom, 8 ft. 2 in.; extreme width, 8 ft. 5 in.; center to center side posts, 2 ft. 6 in., and height from the underside of the sill to the top of the trolley boards, 9 ft. 1 in.



View of Side Framing Showing Platform Framing

A car body of these dimensions with 2-in. wall space on each side will give 7 ft. 10 in. clear space inside width. This allows for a 35-in. seat each side and a 24-in. aisle at knee height and a 28-in. aisle at hip height. With a body 8 ft. 6 in. wide outside and 2-in. wall space, the cross seats could be 36 in. long on each side with a 26-in. aisle at knee height and a 30-in. aisle at hip height.



General View of Side Framing of Semi-Convertible Car

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The platform distances are as follows: From ground to step, 15 in.; from step to platform, 14 in., and from platform to body, 10 in.

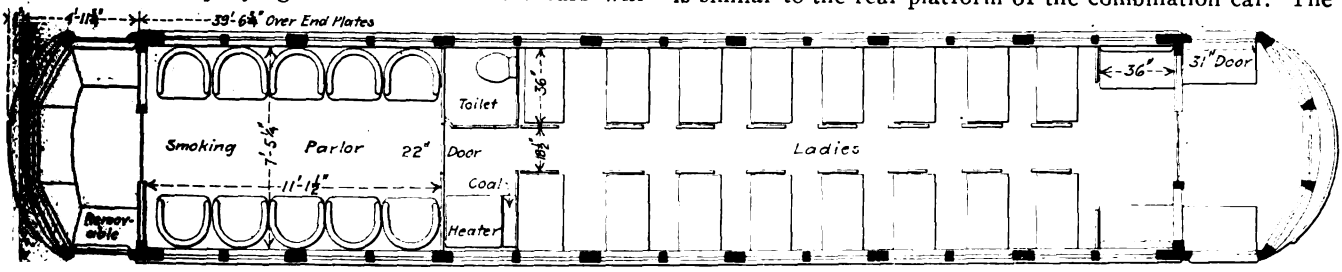
The attention given by the builder to eliminate all unnecessary weight without sacrificing strength is indicated by the fact that this car body weighs, without seating, only 14,500 lb. The accompanying illustrations show the steel underframe, the skeleton of the body framing, showing construction without end partitions and with no roof or platforms, and finally the body with arch roof and platforms ready for color.

AN UNUSUAL TWO-CAR TRAIN

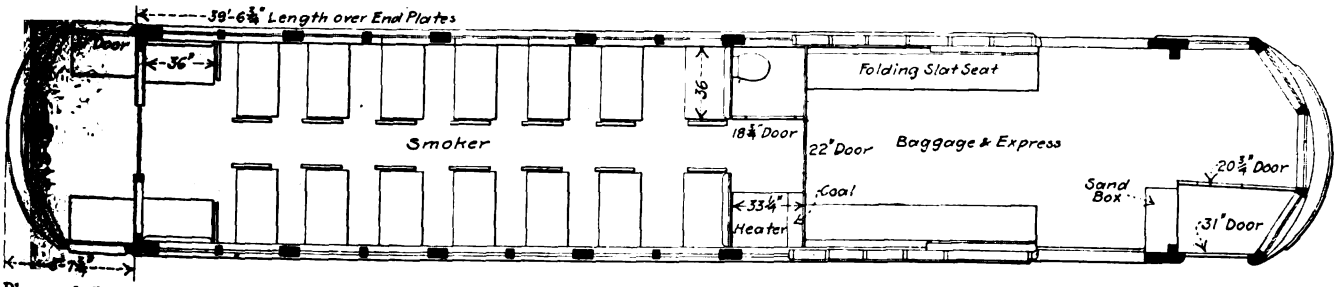
The Northwestern Pennsylvania Railway has recently received from the Niles Car & Manufacturing Company the parlor car and combination smoker and baggage coach shown in the accompanying illustrations. These cars will be operated as a train for limited service between Erie and Meadville, Pa. The arrangement is unusual in that the two cars will operate with passenger entrance in the center of the train only. The combination car will be placed at the front end of the train. Each car is 50 ft. 10¼ in. long over the buffers, 49 ft. 6¼ in. long over the vestibules, 39 ft. 6¼ in. long over the end plates, 9 ft. 4 in. high from sill to top of roof, 8 ft. 6 in. wide over all and 8 ft. 2 in. wide over the sills. The distance between the center line of the bolsters is 27 ft. 9 in. and the wheelbase is 6 ft. 6 in. Both cars are mounted on Baldwin A-type trucks and are equipped with Westinghouse No. 306 motors, HL control and A.M.M. air brakes.

While a center-entrance train is not altogether new, there is some novelty in the car plans, which were designed by C. M. Hatch, general manager of the railway. The baggage and express section of the combination car is furnished with a sliding door of 4-ft. opening on each side and with folding slat seats. The motorman's cab, which is placed at the right-hand side, is provided with a 20¾-in. inside swing door and a 31-in. swing door to cover the front entrance to the car. A space between the smokers' compartment and the baggage compartment is reserved for the heater, the toilet room and lockers for the crew, card tables, etc. The passengers' platform at the rear is provided with a 31-in. swing door on each side.

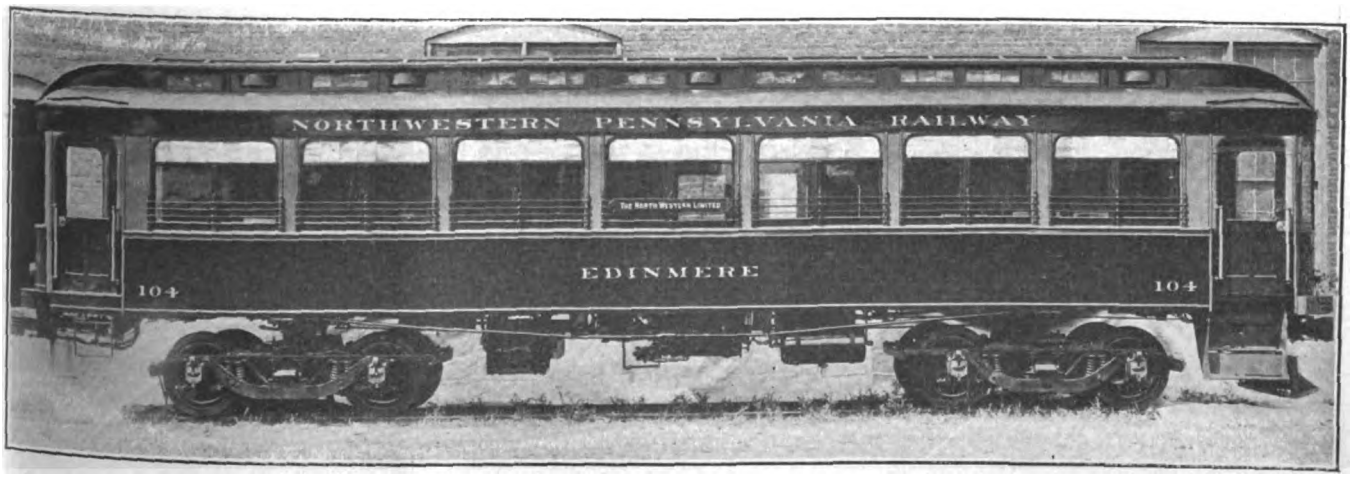
The second car of the train has a front platform which is similar to the rear platform of the combination car. The rest of the car, however, is divided by partitions with center doors into a section with cross seats designated as the ladies' compartment, a section with individual chairs called the parlor compartment and finally a smokers' section de luxe at the rear. The seats in this smaller smoking compartment are removable in case it is desired to use the platform for operation. All seats are upholstered in crimson plush. An extra fare will be charged passengers for the use of the parlor compartment and the smoking section which adjoins it.



Plan and Seating Arrangement of Parlor Car for Northwestern Pennsylvania Railway



Plan and Seating Arrangement of Combination Smoker and Baggage Coach for Northwestern Pennsylvania Railway



General View of Parlor Car for Northwestern Pennsylvania Railway

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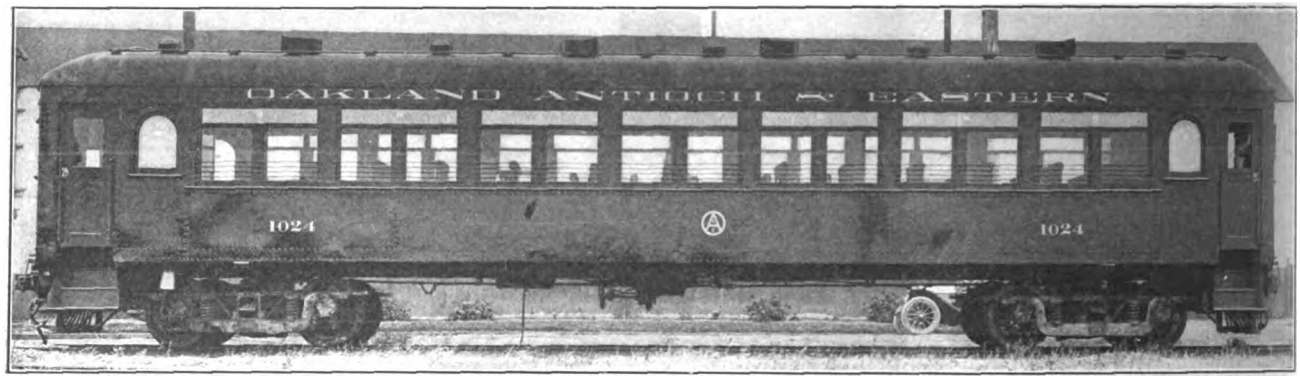
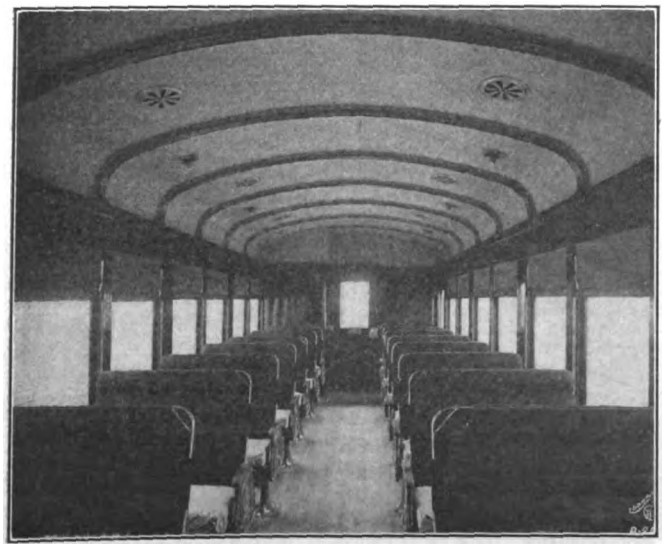
STEEL CARS FOR CALIFORNIA TRAIN OPERATION

The Oakland, Antioch & Eastern Railway, of San Francisco, has recently placed in service eight suburban steel cars manufactured by the Hall-Scott Motor Car Company, San Francisco. At present the cars are used in an all-steel electric train running between Oakland and Sacramento, drawn by a Baldwin-Westinghouse electric locomotive of 2000-hp capacity. The principal dimensions of each car follow: length over the bumpers, 58 ft. 1 in.; width over the sides, in the clear, 10 ft. 3 in.; width inside, in the clear, 9 ft. 4¾ in.; height from track to top of roof, 13 ft.; length of main passenger compartment, 27 ft.; length of smoking compartment, 21 ft.; width of aisle, 2 ft. 8¾ in., and length of vestibules, 4 ft. 6 in. Each car seats sixty passengers. The weight of the body is 30,000 lb.



General View of Steel Car for Oakland, Antioch & Eastern Railway

All cars are of steel throughout, except that the interior trim is of mahogany. The outside and end sills of the bottom framing are of 7-in. channels; the sub-frame sills, running under the entire length of car, are of 7-in. I-beams. The cross-framing consists of 5-in. channels, resting on and securely fastened by means of steel angles to the two I-beams. The bottom framing is braced with ⅜-in. x 3-in. steel strips, which are secured to the outside sills. The body framing consists of 3-in. channels, resting on top of the outside sills and fastened by double steel angles. The car siding is of No. 10 gage sheet steel riveted to the outside sills, side posts and top plates. The roof is of No. 12 gage sheet steel, rolled to shape, and the joints are covered with steel battens.

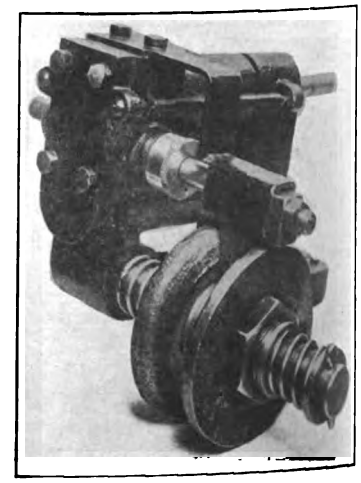


Interior View of Steel Car for Oakland, Antioch & Eastern Railway

The car is equipped with radial drawbars and with shock-absorbing spring cage supports, secured directly to the underframing of the car. The floor is double, with deadening felt between. The first course is of select kiln-dried fir, laid diagonally, and the second course is of select pine, laid lengthwise. The main passenger and smoking room compartments are finished in West Coast mahogany. The windows in the main passenger compartment have the upper part stationary and the lower parts to raise. Fourteen Globe ventilators are installed on the roof with openings into the passenger compartments and into the lavatory provided at each end of the car. The hardware throughout is of polished brass. The seats, accommodating two passengers each, are upholstered in plush, and of the walkover type. The vestibules, fully inclosed, have outside doors and step traps. A motorman's compartment is located on the right-hand side at each end of the car. The windows in these compartments are made to drop into pockets.

A NEW FLANGE OILER

An attachment for oiling the flanges of car wheels has recently been placed upon the market by the National Appliances Company, of Spokane, Wash. This differs from the devices which have been generally used for this purpose in that oiling contactors are applied to or removed from the flanges at will of the motorman, thus permitting the applications of oil to be made only where they are needed.



New Flange Oiler

The oiling wheel is attached to a small plunger casting, which in turn is supported on a bracket bolted on the frame of the truck so that the oiling wheel is directly in front of the flange of the car wheel, the movement of the plunger permitting the oiler to be moved up against the flange or away from it. Air is piped to the machine through a three-way valve in front of the motorman. There is a 12-gal. tank for the oil in the front end of the car connected to the pipe running down to the machine, with a check-valve between the tank and the pipe, and the pipe is consequently kept full of oil. When the car comes to a curve the motorman turns the air into the pipe above the oil, which acts on the plunger and forces the oiling wheel up to the flange. As

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the plunger casting moves it opens a small port that lets the oil out on both sides of a feeder which is located between the two parts of the oiling wheel, and thus both sides of the flange are oiled. There is a needle feed located between the port and the feeder to adjust the flow of oil as desired. After the car has gone around the curve the motorman releases the air that is on the column of oil and a pair of coil springs bring the plunger casting back from the flange, closing off the oil port in the barrel of the machine.

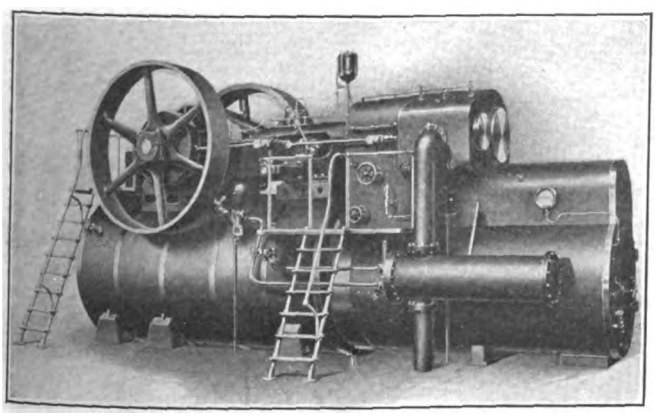
The small oiling wheel can be adjusted to fit flanges of any design, as it is in two sections and threaded on a brass bushing with jam nuts on both sides to hold it together. The feeder can also be adjusted to fit in between the halves of the oiling wheel, and provision is made for both to move laterally in accordance with the side play of the car wheel. The oiling wheel is cut away on the under side so that it does not come in contact with the point of the flange but delivers the oil near the wheel tread, and as the flange transfers the oil to the rail at the point of side contact no oil gets on the tread of the rail.

A NEW SELF-CONTAINED PRIME MOVER

A self-contained prime mover, including engine and boiler complete, has recently been placed upon the market to supply the long-existing need for a really economical steam-driven unit in small sizes. This is the so-called "Buckeye-mobile" built by the Buckeye Engine Company, Salem, Ohio. It is manufactured in sizes between 75 brake-hp and 600 brake-hp and for all capacities a unit coal consumption ranging between 1 lb. and 2 lb. per hp-hr. is attained, depending upon the quality of coal and whether the unit is run condensing or non-condensing.

The field of usefulness for the new machine on electric railways is obviously in outlying districts of towns where direct current is generated and the trolley is fed directly from the generators.

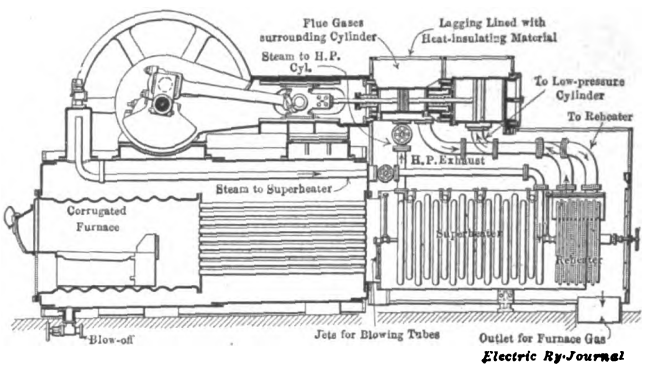
The intermittent load upon the average interurban substation, involving a low daily load factor for transmission lines, transformers and rotaries, also appears to be well suited to a compact and highly economical prime mover in place of the substation equipment, because the low coal consumption of the engine permits one man to do the firing as well as to attend to the other work of operation. That the new machine is commercially competitive with existing prime movers is shown by the price, which is approximately $55 per hp, including all equipment except the generator, for the ordinary sizes and ranges below $50 for the larger machines.



Self-Contained Unit—General View Showing Auxiliary Equipment

The new unit consists of a compound engine mounted on an internally fired boiler, the engine cylinders being inclosed in the smoke box, which also contains a superheater, a reheater and all high-pressure piping and valves as well as the intermediate piping. A special casing compels the hot gases as they leave the boiler tubes to traverse the superheater and reheater before emerging into the smoke box proper on their way to the stack.

The engine drives a feed pump which supplies the boiler through a tubular heater in the exhaust line. The engine exhausts into a suitable condenser equipped with an air pump also directly driven from the main engine, although when a supply of water for condensing purposes is not available the unit is operated non-condensing.



Self-Contained Unit—Longitudinal Section Showing Arrangement of Machinery

The boiler is of the internal corrugated furnace fire-tube type. The furnace tubes and tube sheets constitute the entire active heating surface; therefore deterioration and need of repairs are confined to these parts which are attached to the boiler shell by studs and nuts, so that they are readily removable for inspection and cleaning. Sediment collects in the bottom of the boiler (the coolest part) and can be readily blown off. A steam pressure of 225 lb. per square inch is carried.

The initial superheater consists of a single coil of seamless steel tubing. The steam passes through it in a direction counter to that of the hot gases, and the flexibility of the coil prevents any expansion strains in the high-pressure valves or fittings. The steam on its way from the high-pressure cylinder to the low-pressure cylinder passes through a secondary superheater or reheater built up of a large number of small tubes expanded into heaters. The superheater and reheater are suspended from rollers on an overhead track which allows perfect freedom for expansion of piping and also affords easy means of removal from the smoke box should occasion ever require it. A steam jet soot blower effectually removes the soot and dust from boiler tubes, superheater and reheater. This jet may be used as frequently as desired since its operation interferes in no way with the action of the fire. Superheated steam is used for blowing the tubes.

The engine is of the tandem-compound center-crank type and is of extremely simple and rugged construction. The bedplate is rigidly bolted at its main bearing end to a saddle which spans about one-third of the boiler's circumference. The guide barrel end rests on a smaller saddle and is free to slide thereon, thus relieving the bedplate from the effects of boiler expansion.

The extraordinarily low steam consumption of about 9.5 lb. per indicated hp condensing and 13 lb. non-condensing which is attained by these engines is inherently due to the practical elimination of radiation and cylinder condensation. As the engine is mounted over the boiler, all live-steam piping may be surrounded by the flue gases, and for the same reason the cylinders are jacketed by the same hot medium. The use of a high superheat both for the high-pressure steam and for the steam leaving the receiver, or reheater, is another element of economy, and the effectiveness of these means for transferring heat from the flue gas to the steam is shown by stack temperatures which have been found to range between 450 deg. and 500 deg.

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News of Electric Railways

Plans for Philadelphia Rapid Transit System Explained to the Councils

A. Merritt Taylor, director of the Department of Transit of the city of Philadelphia, appeared before the joint committee on finance and street railways of the Councils of that city on Oct. 1 and explained his recent report on the transit situation. He presented figures in regard to the cost and the net return to be expected from the operation of the various elevated and subway lines advocated in his report. In this connection he said that the Frankford elevated line would return approximately 8 per cent upon the investment. In his report the director recommended that this line and the Darby line be built and operated by the Philadelphia Rapid Transit Company under an agreement that their ultimate ownership would be vested in the city. The Broad Street line is to be built by the city and equipped and operated by the Philadelphia Rapid Transit Company. In discussing the transit situation Mr. Taylor said in part:

"The recommended transit facilities will not be possible until 1920 at least, and, according to our present population, it is apparent that the congestion at that time will be great, but the rapid transit lines recommended for immediate construction in conjunction with surface subway lines will relieve congestion and reduce the running time between widely separated points, as, for instance:

"From Frankford to Market Street, from forty-four minutes to twenty-two minutes.

"Frankford to Darby, from eight-nine minutes to fifty minutes.

"Germantown to City Hall, from forty-six minutes to thirty minutes.

"Ninth and Luzerne Streets to City Hall, from thirty-five minutes to twenty minutes.

"To construct the elevated extension from the Market Street subway at Front and Arch Streets to Frankford, as recommended, would require no additional outlay of capital for the construction of a subway through the delivery district, as the trains will be routed via the present Market Street line. This line carries a large volume of east-bound traffic in the morning and the cars return west-bound light. The same condition, only reversed, obtains in the evening.

"By running the trains of the Market Street elevated line through to Frankford they would be made to do double work, saving unnecessary investment. This means that a large portion of the investment necessary for the Frankford elevated line has already been made.

"The Philadelphia Rapid Transit Company should build and operate the Darby and Frankford elevated lines, as logically they are additions to the Market Street elevated system. The city's interests in the two lines should be conserved, however, under an agreement whereby ultimate ownership would revert to the city, and, further, whereby profits in excess of a reasonable return upon the company's investment should go to the city annually to relieve the costs of the construction of the Broad Street subway.

"The construction of the Broad Street subway is imperative, as it is the logical route for the main north and south line. This line would tap North Philadelphia station, Germantown, via transfer lines, as well as make accessible vast areas of waste land.

"I have recommended that the subway terminate at Broad and Pike Streets, and that two elevated lines branch therefrom to the northwest and the northeast. These two elevated structures would thereby serve twice the area that could be served if the subway were continued up Broad Street beyond Pike.

"The cost of the Broad Street subway with loops and branches as recommended will be $34,682,000, plus equipment, worth $7,393,000, a total of $42,075,000. It will earn approximately 3.2 per cent upon the total cost in the third year of operation.

"The Frankford elevated line will cost about $6,510,000, plus equipment, worth $2,402,000, a total of $8,912,000. It will earn approximately 8 per cent on the cost in the fourth year of operation.

"The cost of the Darby line with equipment will be $6,591,000 and it will earn 4 per cent in the fourth year of operation. The average return on all will be 4.1 per cent. The average return on the subway will be 3.2 per cent and on the elevated lines 6.4 per cent.

"The Broad Street subway is as badly needed as the two elevated lines. Although the rate of return is lower because of higher cost of subway construction, in the end it will be as profitable as the Darby or Frankford elevated lines. It is essential for the uniform development of the city that the work on the lines recommended be done at the same time.

"I have recommended that the city build the Broad Street subway because the work cannot be done without municipal aid. I have recommended that the elevated lines be built, equipped and operated by the Philadelphia Rapid Transit Company under guarded restrictions and with a return of earnings above a reasonable amount upon the investment. The city's liability is, therefore, reduced to the cost of the subway delivery loops and branches and the sinking fund charges and interest on the bonds. These amounts would be as follows:

Interest at 4 per cent	$1,384,880
Sinking fund at 4 per cent	865,550
Total	$2,250,430

"If the constitutional amendment enabling the city to issue thirty-year bonds, instead of fifty-year bonds, is adopted, the sinking fund requirement will be reduced to 1 per cent, thus reducing the total to $1,731,100.

"Against the city's liability under the present law of $2,250,000 the municipality has the following offsets:

"The revenue, net, produced by the Frankford and Darby lines in excess of the operators' return; net revenue of the Broad Street subway in excess of return for operators' equipment; the subsidy granted the city by the State in aid of transit development in the amount of 1 mill of the present personal property tax—upward of $660,000 per annum, which will increase annually.

"On April 1, 1914, the transit department will be prepared to take bids and award contracts for the construction of sewers and other sub-surface structures which are in the line of the subway delivery loop. No contracts should be let until after the way is clear to continue the work and until judicial decisions have established the city's borrowing capacity either at the present rate or an increased rate.

"The passage of a resolution by Councils fixing the routes in a general way, subject to such changes as may be determined upon by Councils, from time to time, and adopting the general recommendations, subject to future councilmanic control, will establish the general policy of the city and enable the transit department to proceed officially with the work of design and in the necessary negotiations with the Philadelphia Rapid Transit Company."

Chicago Surface Railways Outline Proposed Plan of Merger

At a meeting of the local transportation committee of the Chicago City Council held on Oct. 4, 1913, the surface railways, represented by L. A. Busby, president of the Chicago City Railway and the Calumet & South Chicago Railway, and W. W. Gurley, general counsel of the Chicago Railways, presented a proposed plan for unified operation of the surface lines. This tentative plan of merger was prepared at the request of the local transportation committee and is the result of numerous conferences between the surface railway management. In explanation of this tentative plan Mr. Busby stated that in the negotiations prior to the presentation of this report the representatives of the surface railways agreed to retain the principles embodied in the 1907 settlement ordinances. These were well understood and have as a whole been satisfactory to both the city and the surface railways. In view of this it was thought inadvisable to submit any radical departure from the substance and principles embodied in the old ordinance.

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Following this preliminary statement, the committee proceeded to read the proposed plan clause by clause, approving some without much discussion and referring others to committees composed of the Board of Supervising Engineers, the railway companies' engineers, the city electrician, the commissioner of public works and the health commissioner. In addition to the local transportation committee, the city was represented by Bion J. Arnold, chairman of the Board of Supervising Engineers, Chicago Traction; George Weston, chief engineer of the board; L. H. Davidson, secretary of the board, and Ray Palmer, city electrician.

The plan submitted for unified operation by the representatives of the surface railways is as follows:

1. All the surface line companies in the city shall enter into an operating agreement which shall become effective as soon as approved by the City Council. This agreement, among other things, shall provide for the following:

(a) Unified operation of all surface street railways in the city, with the same effect as regards service to the public as though all the lines were owned and operated by one company.

(b) Through routing of all cars so far as the local service balances. This will eliminate all switch-backs and most of the present looping of cars in the down-town district and will increase the down-town surface terminal facilities approximately 30 per cent.

(c) Purchase by the companies of a sufficient number of additional cars to utilize during the rush hours the additional track facilities in the down-town district made available by such through routing. This will increase the rush-hour down-town transportation facilities fully 30 per cent.

(d) More rapid transit, by means of through service cars, from one division of the city to another, owing to the relief of congestion in the down-town district.

(e) A 5-cent fare throughout the entire city on surface lines. This will give a 5-cent fare in lieu of the present 10-cent fare in the Calumet district south of Seventy-ninth Street.

2. The operating agreement shall be subject to all the terms, requirements and conditions of the 1907 ordinance and subsequent ordinances, except in so far as these ordinances are modified or supplemented by the plan for unified operation.

3. The basis of accounting which has been in effect for the past six years under the 1907 ordinance, with reference to the renewal, maintenance and other funds, payment of fines and any other questions of accounting, shall be continued as heretofore. Any further questions of accounting not covered by the express terms of the ordinance shall be determined by the Board of Supervising Engineers.

4. Provision for the investment in first mortgage bonds of the several companies of such an amount of their several and respective renewal funds as shall be approved by the Board of Supervising Engineers, bonds to be taken at the market price but not to exceed par.

5. Authority to the companies to lease, on terms to be approved by the Board of Supervising Engineers, any real estate now owned but not necessary to the operation of the operties. This will enable the companies and the city o derive an income from certain property of this kind hich cannot now be sold to advantage.

6. Existing tracks having an estimated life of five years or more may, with the approval of the Board of Supervising Engineers, be rehabilitated, instead of being scrapped, required by the present ordinances, when new pavement e treet.

sweeping right-of-way occupied by tracks ncluding the removal of snow, shall be nd the companies shall pay the city work, the method of determining he merger ordinance.

ll be made in the merger ordi- ctrolysis, in lieu of the pres-

he Calumet company has urchase price, but it has rnings next year will be unt. The Calumet ordi- is shortage shall be paid out of future division with the city. Under unified operation the Calumet company will waive its 10-cent fare and will cease to be operated as a separate company, and it will, therefore, be necessary to make some equitable provision to take care of this shortage.

10. Where it becomes necessary to remove new or rehabilitated tracks from the streets in order to construct or replace sewers or water mains, the cost of such work shall be charged to capital account, and where practicable in the construction of new sewers or water mains they should be so placed in the streets as not to cause the removal of street railway tracks.

11. Provision should be made for a reasonable variation in the temperature of cars under extreme weather conditions.

12. Provision should be made requiring corporations and persons making openings in or tunneling under the tracks of the companies to deposit with the city or with the company, before proceeding with the work, an amount sufficient to cover the cost of repairing the track and paving.

13. Such other provisions, if any, as may be advisable or beneficial to the service, based on the results of six years' operation under the 1907 ordinances.

As the various clauses of the proposed plan were read Mr. Busby was requested to explain them in detail. In amplifying Clause (a), Section 1, Mr. Busby stated that under unified operation as contemplated by these plans all down-town terminals now under separate ownership would be utilized by both companies. Under the existing system of operation the terminals were not being operated up to their highest efficiency and a comprehensive scheme of through routing would obviate the difficulties now obtaining in switch-back movements and looping in the downtown district. The manner of handling the gross income from the unified railways was amplified by a statement that all the earnings of all the companies would go into a common fund. After operating expenses were deducted the net would be divided on the 55 and 45 per cent basis now effective in the old settlement ordinances. Many economies would be effected in the operating organization as the new plan proposes that the whole system shall be operated by a single management. Under the present system of operation it has been difficult to divide the earnings from through-route cars. On some of the through routes it was desirable to divide the earnings on a territorial basis, but on others the same result would be obtained if the gross earnings of each through route were turned into the company furnishing the crew and equipment.

Under Section 3 it was suggested that the city comptroller be included as an arbiter in questions of accounting, in addition to the Board of Supervising Engineers. This was acceptable to the representatives of the railways. In explanation of Section 5, Mr. Gurley, of the Chicago Railways, stated that his company owned considerable real estate not now being used for railroad purposes which under the present ordinance could not be improved owing to the limits necessary in a lease to outside parties. The railway company could not sell this property at a profitable figure because of its unimproved condition. The committee saw no objection to the provisions of this section. The property would be improved and be on a profitable basis in case the city took it over at the expiration of the franchise period. At the suggestion of the local transportation committee the city comptroller will be made a party to all leases of real estate made under this authority, and it was proposed that the time should not be limited by the life of the franchise.

Section 7, which refers to cleaning and sweeping the right-of-way occupied by the tracks of the surface railways, was explained by Mr. Busby. He stated that at the present time, although the 1907 ordinance required that the city railways clean their own right-of-way, the arrangement was not satisfactory either to the board of public works or the railways. The board of public works has consequently been authorized to do the work. Under this arrangement there has been considerable difficulty in making settlements. According to the proposed arrangement it is contemplated that the city will do the work on some pre-arranged basis or unit cost and bill the railway company.

It appeared according to Section 8 of the proposed merger plans that the railways were asking for re-consideration of the electrolysis ordinance passed by the Chicago

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City Council about a year ago. It was held that this subject was too technical for the committee to handle, and it was referred to the Board of Supervising Engineers, the railway companies' engineers, the city electrician and the commissioner of public works for recommendations.

Section 9, relating to the Calumet & South Chicago Railway Company's ordinance and a provision in it as regards the method of adjusting the net earnings, also was referred to the Board of Supervising Engineers and the city comptroller. Mr. Busby stated that at the close of the present year the shortage in net earnings will be approximately $250,000. Under the old ordinance it was provided that this shortage be paid out of the future earnings of the company before any division was made with the city. He stated further that he felt sure that the Calumet company would show a profit this year and in future years, but that some provision should be made in the proposed ordinance to set aside the shortage accumulated up to this time. Bion J. Arnold suggested that it would be better to pay this sum from the city's traction fund rather than allow it to be charged against capital account. Both the committee and the railway companies' representatives agreed that this might be the best way to adjust the difference, particularly since the proposed plan included the waiving of a 10-cent fare in the Calumet district south of Seventy-ninth Street.

In amplifying Section 11 Mr. Busby stated that at the present time the settlement ordinance required that all cars be heated to at least 50 deg. Fahr. at all times. He stated further that the construction of the car, as well as the method of operation with the double-end design, made this temperature a physical impossibility when the outside temperature was less than 10 deg. Fahr. above zero. While the railways had paid the city only $2,000 in fines owing to failure to comply with the heating clause in the old ordinance, the amount was small because the city authorities had been reasonable. The sub-committee referred the provisions of this clause to the commissioner of public health.

The Boston Arbitration Hearings

The board of arbitration sitting in the Boston Elevated Railway wage and working conditions investigation resumed its hearings on Sept. 29. John D. Connelly, a member of the company's emergency force, testified as to working conditions in the field. He stated that the company has recently supplied emergency crews with a vertical lamp bank of five units for protection against approaching cars, the lamps being connected between the rail and the trolley at a height of 2½ ft. to 4 ft. above the ground. Another recent protective measure is the sending out of a ground man with a red lantern for a distance of 150 ft. from the tower wagon in the direction of traffic to warn oncoming cars. The witness presented an examination paper which he had passed several years ago as a head emergency lineman and the questions were discussed at length. Practically all dealt with the handling of feeder switches on the surface and subway lines under various conditions. Regarding wages, the witness said that teamsters and ground men are each paid 24½ cents per hour, and that on night work a man receives nine hours' pay for eight hours' service. Emergency linemen are paid $2.10 per night, on a straight rate of 26¼ cents per hour.

J. Henry Neal, general auditor, recalled, stated that employees are paid on the piece-work basis in the armature shop, machine shop and at the Bartlett Street car shops of the company. There are about 1200 jobs on a piece-work basis, including 200 to 300 on control systems. Mr. Neal estimated that the company's managerial expenses have increased from $182.000 in 1898 to $280,000 per annum in 1913. The salary list includes merely persons paid by the month. The witness said that in his opinion the managerial expense should increase proportionately to the increase in revenue. The company's permanent investment has grown from $25,000,000 to $105,000,000 in the last fifteen years, and the passenger revenue has increased from $8,067,587 to $16,289,910 for the same period. The classifications of the Interstate Commerce Commission are closely followed in tabulating operating and administrative expenses.

In answer to inquiries it was brought out that head wiremen now receive $3.47 for nine hours' work per day, whereas in June, 1912, the pay was $3.15 and the working hours were ten per day. Five years ago the pay was $2.87. A boy starting in as a helper at $1 per day should become a wireman in about six years.

Testimony was introduced at the session on Sept. 29 in explanation of the apprentice course offered by the company in co-operation with the Boston Young Men's Christian Association's Electrical Engineering Institute. The hours of labor and rates of pay for these apprentices follow:

	Wages
First year:	
Six months' pit work in car house, fifty-four hours per week.....	$6.00
Six months' work in armature shop, fifty-one hours per week.....	6.00
Second year:	
Twelve months' work in machine shop, fifty-one hours per week....	7.50
Third year:	
Six months' work in drafting room, forty-five hours per week.....	9.00
Fourth year:	
Six months' work on transmission lines.....	10.50
Six months' work on transmission lines and overhead work, fifty and one-half hours per week.....	10.50
Six months' work in electrical engineering department, forty-five hours per week.....	10.50

In order to be eligible to the course, the application of the apprentice must be approved by parent or guardian, with proper witnesses; the applicant must have passed the entrance examination to the institute and must agree to work 4650 hours in the course as laid out. The program may be changed at the company's option. Apprentices are granted a week's vacation at Christmas and two weeks' vacation in the summer without pay. The company reserves the right to suspend work wholly or in part at any time, to dismiss the student at any time without notice and to establish thereby his dismissal from the institute itself. The student is required to purchase any tools needed in his work, and he has a chance to share in the premium or bonus wherever one is offered for piece work. Ultimately the student must resign or accept a regular position in the company's ranks.

Schedules of wages paid in the department of wires and conduits were presented at the hearing. Representative items follow: Foreman of underground and overhead feeders, 52½ cents per hour; foreman of trolley line maintenance, night work, and foreman of this work with pole maintenance added, day service, 52½ cents per hour; foreman of light wiring, 50 cents per hour; sub-foremen, interior and exterior wiring, 38 to 41 cents; inspectors, 40 to 41 cents; head linemen, 36 to 38 cents; head teamsters, 23.7 cents; cable splicers, 40 to 48½ cents; head linemen, emergency crews, $24 per week; spare linemen, emergency crews, $22 per week; linemen, emergency cars, $22 per week; groundmen and teamsters' helpers, 24 to 24½ cents per hour; groundmen, emergency crews, $16 per week; foreman department stables, 26.3 cents per hour. Stockroom attendants work one Sunday a month and receive twelve hours' pay for eleven hours' work, the regular compensation being $14 per week.

H. M. Steward, chief engineer of maintenance of way, stated that in the road department the hours are nine per weekday with the exception of Saturdays, when eight hours' work is required. Regular night work is performed on an eight-hour basis and is compensated on the basis of "time plus one-eighth." Emergency crews are on duty twelve hours per shift and seven days per week, with two days' leave of absence per month with pay. Foremen receive twelve days' vacations, inspectors twelve days, head teamsters twelve days and sub-foremen six days. Steward described the duties of trackmen and pavers, former receiving $2.25 per day and the latter $2.[illegible] engaged in paving. A trackman's work is [illegible] of a laborer, but, in addition, the employee must know how to drive spikes, put on [illegible] install rail bonds. A sub-track[illegible] same, except that he is rarely required [illegible] labor-saving machines used in [illegible] mendations as to the employees [illegible] are made by division track [illegible] and by him referred to [illegible] count of the pressure [illegible] as economically as possible [illegible] been unable to give [illegible] question of individual [illegible] study of conditions [illegible] systems. At present [illegible] significance, it being me[illegible]

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step upward in passing into the upper class. The witness said that he had general charge of track and roadway maintenance upon all the surface, elevated and subway lines of the company, including the maintenance of signals on the rapid transit lines, and that consequently he was obliged to depend largely upon his subordinate officials in considering the advancement of employees in the ranks. The hearing was then adjourned until Oct. 1.

Storm Floods New York Subway

An extremely severe storm in the East on Oct. 1 disrupted traffic on the transit lines in Greater New York and interfered with steam railroad traffic. From the time the storm began at 7:13 a. m. until it ended at 6:35 p. m., a fall of 4.68 in. was recorded officially. Between 1:30 and 2:30 o'clock in the afternoon the rainfall was 2.23 in. This was greater than any other rainfall recorded by the Weather Bureau. During this hour the sewers were taxed beyond their capacity and the excess water poured into cellars and into the subway. At one period during the storm 1 in. of water fell in fifteen minutes, while at another time 2 in. fell in forty-five minutes. Water began to run into the subway just below Fiftieth Street early in the afternoon and at 3:45 o'clock it was necessary to stop sending trains through the flooded section. Southbound trains were turned back at Seventy-second Street and northbound trains were sent back downtown at the Grand Central Station. A few minutes after trains stopped running to Fiftieth Street the water became so deep at the Seventy-second Street station that it was necessary to discontinue the trains at that point and trains were switched north at Ninety-sixth Street. The Interborough Rapid Transit Company began at once to pump the water out and passengers were instructed in regard to the conditions before they bought tickets. The stopping of trains running between Forty-second Street and Ninety-sixth Street resulted in an overflow to the elevated railway lines and increased greatly the congestion of traffic at both the Brooklyn Bridge and the Williamsburg Bridge. In fact, the congestion at the Brooklyn Bridge became so great at the height of the regular peak load that many persons walked the bridge and boarded cars in Brooklyn. The Long Island Railroad and the Brooklyn Rapid Transit Company also suffered severely on some of their lines from the damage by the storm.

Frank Hedley, vice-president and general manager of the Interborough Rapid Transit Company, issued a statement in which he asserted that the sewers of the city were not large enough to carry off the water.

Compromise Proposed in Akron

At a meeting of a special committee of the Chamber of Commerce, the City Council and the officers of the Northern Ohio Traction & Light Company at Akron on Oct. 2 an agreement was reached that will probably result in a settlement of the differences between the city and the company in regard to the construction of extensions. The terms of the agreement were worked out by the special committee of citizens, consisting of F. A. Seiberling, president of the Goodyear Tire & Rubber Company; C. B. Raymond, secretary of the Goodrich Rubber Company; S. F. Ziloix, of the Commercial Printing Company; J. Edward Good, president of the Chamber of Commerce, and V. S. Stevens, secretary of the same body, together with Councilman Shaw. Conferences were held with the officers of the company from time to time, and when the terms were finally completed the committee felt that they would be satisfactory to both the city and the company. The agreement contains the following provisions:

1. The Northern Ohio Traction & Light Company will surrender all its rights under its present franchise when a new twenty-five-year franchise with satisfactory terms is accepted by the city and ratified, if necessary, by a referendum vote.

2. The company will agree to build 6 miles of extensions. 3 miles in 1914 and 3 miles in 1915, all in 1914 if possible. In addition the company is to build 1 mile of extensions for each increase of 5000 in the population of the city, the location of such extensions to be settled by arbitration in case the city and company fail to agree. This will take care of the question of further extensions in the future.

3. The city is to have the right of supervision over the service and may prescribe reasonable rules and regulations for operation of the cars.

4. The company is to agree to sell twenty-seven tickets for $1, but the rates of 5 cents for a cash fare and six tickets for 25 cents are to be continued.

5. The city is to have the right at the expiration of five-year periods, commencing with the expiration of fifteen years from the time the new franchise takes effect, to purchase and take over the property of the company, with the exception of power stations, substations and commercial lighting and power distribution systems, under methods provided by the state laws, but no franchise or good will shall be included in the purchase price. The provision is made that the company shall at all times have the right to use and operate over so much of the tracks and equipment in the city as may be necessary for the operation of its interurban service upon terms to be agreed upon and provided in the ordinance.

6. Proper forfeiture and penalty clauses are to be provided in case of the non-performance of the provisions of the contract.

7. Provision is to be made through which the company shall pay a fair proportionate share of the city's part in the separation of railroad grade crossings wherever the street railway tracks cross steam roads

8. The new franchise is to continue for a period of twenty-five years, provided the city does not purchase the property within either fifteen or twenty years.

9. Matters in litigation, the water rights in the Cuyahoga River and the Mill Street viaduct case, now pending in the Ohio Supreme Court, are to be settled through the payment to the company by the city of $300,000, which will operate as a cancellation of the judgment and full discharge of all liability incurred in building the dam at Kent on the part of the company.

An alternate proposition was made to build the extensions mentioned above, without any extension of the franchise except giving the right to lay the additional track. This was accompanied by the same condition as to the settlement of the litigation as the first proposition.

City Solicitor Jonathan Taylor and A. B. du Pont were instructed to prepare an ordinance based upon the conditions in the first proposition and have it ready, if possible, for consideration by Council on Oct. 6.

Committees of Directors to Report on Operations of the New Haven Railroad

At a special meeting of the directors of the New York, New Haven & Hartford Railroad on Oct. 3 a resolution was adopted to create committees of the directors to examine and report in detail upon the suggestions and recommendations of the Interstate Commerce Commission, to report and recommend to the board what action in their judgment is best in the interest of the company, of the employees and of the bondholders and shareholders, the report to be made not later than Dec. 1. Seven committees were appointed to consider minutely the specific recommendations of the Interstate Commerce Commission, which investigated the New England situation. The committees were appointed to take up, investigate and discuss the following:

1. Connecticut trolley situation.
2. Rhode Island trolley situation.
3. Steamship situation.
4. Relations of the New Haven railroad and the Boston & Albany Railroad.
5. Relations of the New Haven railroad and the Boston & Maine Railroad.
6. The Western Massachusetts trolley situation.

A committee composed of Howard Elliott, Thomas DeWitt Cuyler and A. T. Hadley was appointed to wait upon the Interstate Commerce Commission and the Attorney-General and lay before them the resolutions adopted by the directors and to outline to the government officers the plan the directors are now working under in order to respond to the recommendations made by various public authorities. The personnel of the committees in the order given above follows:

1. Samuel Rea, John L. Billard, Charles F. Brooker, James

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S. Hemingway, William Rockefeller, A. T. Hadley and Howard Elliott.

2. D. Newton Barney, Robert W. Taft, Edward Milligan, Edward Milner, T. DeWitt Cuyler, Howard Elliott and Vice-president Buckland.

3. A. Heaton Robertson, Henry K. McHarg, J. T. Pratt, George F. Baker, Francis T. Maxwell, Howard Elliott and Vice-president Gardner.

4. W. Murray Crane, Theodore N. Vail, Alexander Cochrane, William Skinner, James S. Elton and J. W. Hustis.

5. Charles F. Brooker, W. Murray Crane, Lawrence Minot, Frederick F. Brewster and J. H. Hustis.

6. Charles F. Brooker, William Skinner, Theodore N. Vail, Alexander Cochrane, Arthur T. Hadley and Howard Elliott.

Each of the committees will select its own chairman. The committees on the Connecticut Company and the Rhode Island Company will confer with the public service or public utilities commissions of the states and a representative of the committee on trolley affairs of the New England conference. The western Massachusetts trolley committee will confer with the Massachusetts Public Service Commission and with George M. Woodruff of the New England conference committee on trolley affairs.

In announcing the resolution and the appointment of committees, Howard Elliott, president of the New York, New Haven & Hartford Railroad, explained that the directors have not been unmindful of the commission's suggestions and recommendations and have fully realized the importance of those suggestions, but making large changes in the structure of any organization is necessarily a slow and delicate process, which should be done so far as possible without demoralizing the forces. Until organization changes were fairly started, the directors did not feel that they could give that careful attention to the recommendations of Mr. Prouty, of the Interstate Commerce Commission, that their importance deserves.

Arbitration Hearings Resumed in Detroit

The arbitration of the differences between the Detroit (Mich.) United Railway and its men was resumed in the Circuit Court rooms at Detroit on Sept. 29, after an adjournment of several weeks. The day was spent largely in comparing the training, duties and responsibilities of railway engineers with those of motormen. William Reidy, instructor of motormen for the company, said that the men are generally passed after training them from seven to ten days. He was a locomotive engineer before entering the employ of the Detroit United Railway and testified as to the time required in commencing at the bottom and building up to the position of engineer of a fast passenger train. F. W. Brooks, general manager of the company, who also has had experience in steam railroad work, testified.

E. H. Ives, schedule expert, testified that 70 per cent of the men were included in the thirteen-hour limit for a workday. Harry Bullen, general superintendent, said that since the first of the year 119 men who had formerly held positions as motormen and conductors had applied for reinstatement in the same capacity. This statement was made in rebuttal of testimony to the effect that many men leave the company's employ because their earnings are insufficient or their work too hard.

The following day was devoted largely to schedules. Mr. Bullen contended that neither the arbitrators nor the men could make the schedules. In the last analysis the question whether cars shall be run frequently or infrequently depends upon the patronage. Mr. Bullen contended that the ordinance which provides for a twelve-hour day for the men, with a half hour extra for a trip, could not be complied with strictly because of the demands of the people for adequate service.

Mr. Brooks presented lists of the men employed the last sixteen days in January and July, together with maximum and minimum wages paid them. The payroll figures showed that the highest paid men drew $55.95 for those periods of time and that the lowest paid received $36.32.

William Stimson, a member of the wage committee of the local branch of the union, testified on Oct. 1 that the men are not receiving sufficient wages for their work to live comfortably. He gave the high cost of living and the high rents in Detroit as the reasons. Stanley Anderson, president of the local union, testified along the same lines.

The merit system was discussed at some length. Mr. Bullen said that some system of punishing infraction of the rules had to be used. Mr. Brooks stated that he would rest his case with the understanding that he might introduce other testimony after the men had submitted their testimony.

On Oct. 2 W. D. Mahon presented a list of cities in which street railway men are paid more than in Detroit.

Plans to Complete Detroit, Lansing & Grand Rapids Railway

At Grand Rapids, Mich., on Sept. 29, Andrew Fyfe, formerly State Senator and until recently United States surveyor of customs, stated that he, with Eastern associates, had purchased all the interests of Dr. Oliver H. Lau, Detroit, in the Detroit, Lansing & Grand Rapids Railway and the interests of certain other stockholders.

For about two years the work of making preliminary surveys on the proposed line between Detroit and Grand Rapids, by way of Lansing, has been under way. The line will be 174.24 miles long and will pass through Ada, Saranac, Portland, Lansing, Fowlerville, Howell, Brighton, South Lyon, Northville and Plymouth. The company holds fourteen city and village franchises, comprising all the municipalities through which it will pass. These franchises have all been approved by vote of the electors. The company also holds franchises from fifty-two townships, all approved by vote of the people.

Mr. Fyfe stated that it is probable the road will be double-tracked between Detroit and Plymouth. The road will be standard gage and laid with 90-lb. rails. Henry M. Wallace, 705 Union Trust Building, Detroit, is vice-president of the company.

Contracts Opened for Construction of Seventh Avenue Section of New York Subway

Bids for the construction of a section of the proposed Seventh Avenue subway in Manhattan were opened by the Public Service Commission for the First District on Oct. 1. The section is known as Section No. 2 of Routes Nos. 4 and 38, a part of the new system which will be operated by the Interborough Rapid Transit Company in connection with the existing subway. The Seventh Avenue extension will leave the existing subway at Times Square and run down Seventh Avenue to and under the East River to a connection with the subway in Brooklyn. It will be a four-track underground railroad from Times Square to Park Place, where two of the tracks will continue to the Battery and two diverge to Brooklyn. Section No. 2 covers a part of the line under Greenwich Street, West Broadway and Varick Street, between Vesey Street and Beach Street. The commission's engineers have not yet reported the official totals of the bids submitted, but according to unofficial figures furnished by the contractors the lowest bidder was the Thomas J. Buckley Engineering Company, New York, at $3,036,000, and the next lowest bidder the O'Rourke Engineering Construction Company, New York, at $3,138,000. As soon as the engineers' report is received the commission will award the contract.

The Board of Estimate has refused to concur in the action of the Public Service Commission in granting to the Interborough Rapid Transit Company the contract for the construction of the temporary work in the Steinway Tunnel at a profit of 10 per cent on the actual cost and has adopted a report recommending that the work be let out on public bids. Chairman McCall says that the commission will advertise for bids as soon as possible.

The commission has authorized the New York Municipal Railway Corporation to contract with George W. McNulty for the immediate reconstruction of the Sea Beach railroad from its connection with the Fourth Avenue subway at about Sixty-fifth Street, Brooklyn, to a point immediately south of Eighty-sixth Street, near Coney Island. This road will be one of the Coney Island connections with the new Fourth Avenue subway and over it the Brooklyn company will be enabled to provide a fast express service between points in Manhattan and Coney Island. It will

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be a four-track line, built in a cut for the greater part of the distance. This line is owned by the company, but under the dual system contracts it is to be rebuilt and made a part of the Broadway-Fourth Avenue subway. According to estimates submitted by Mr. McNulty, the reconstruction work is to cost about $1,877,525, and if completed within seventeen months the contractor is to receive a bonus of 15 cents a cubic yard for excavation and 50 cents a cubic yard for concrete. A corresponding penalty is provided in case the work is not completed within the time specified.

Branch Canadian Line to Be Electrified.—J. L. Englehart, chairman of the board of directors of the Temiskaming & Northern Ontario Railway, states that in the spring the Kerr Lake branch of the railway may be electrified and operated as a portion of the Nipissing Central Railway.

Minneapolis to Build Short Municipal Line.—The city of Minneapolis, Minn., has decided to build a municipal street railway of short length to its filtration plant, in order to haul building supplies for the construction of new units at the plant, supplies for road construction and other equipment and to carry passengers. The road will cost about $26,000. Power for operating the line will be furnished by the Twin City Rapid Transit Company.

Newark Terminal Ordinances Passed.—Mayor Haussling of Newark, N. J., has signed the seven ordinances passed recently by the Board of Public Works in favor of the Public Service Railway. Thirty-one ordinances will be presented to the Board of Public Utility Commissioners for consideration. The ordinances all bear on the plans made by the Public Service Railway in connection with its proposed terminal improvement for Newark.

Bids for Municipal Railway Advertising.—The Board of Public Works of San Francisco on Sept. 23 received bids for the advertising privilege on the cars of the Geary Street Municipal Railway. The R. W. Scott Advertising Company, Trenton, N. J., submitted the highest bid, offering $115 per year for use of each of the thirty-eight cars in regular use. In all, six bids were received. The nearest competitor of the Scott company offered $101.25, while the price offered by the lowest bidder was $64.80 a car a year.

London & Port Stanley Electrification—At a public conference on Sept. 30 the Grand Trunk Railway System, represented by Mr. Long, head of the freight department for Ontario, stated that the company would refuse to operate its coal and freight business over the London & Port Stanley Railway if it is electrified. The company, he said, would also refuse to accept a commission to operate the road. The question as to whether the city will electrify the road is to come before the ratepayers on Oct. 20, when a by-law will be presented providing for the expenditure of $700,000.

Recommendation to Abolish Commerce Court.—A subcommittee of the Senate appropriations committee decided recently to recommend the abolishment of the United States Commerce Court in practically the same terms as were contained in the deficiency appropriation bill pased by the House recently. The future of the court will depend on the action of the full appropriations committee of the Senate. The provision passed by the House would abolish the court on Dec. 31 next and would reduce the number of circuit judges so that the Commerce Court judges would be legislated out of office at once.

New Offer from City for Purchase of Seattle, Renton & Southern Railway.—Agreeing to pay $1,400,000 for the property of the Seattle, Renton & Southern Railway, provided that the rate of interest on the deferred payments is reduced from 6 per cent to 5 per cent, the city utilities and finance committees of the City Council of Seattle, Wash., recently submitted a new proposition to the receivers of the company. Scott Calhoun, one of the receivers of the company, has agreed to place the new offer before the bondholders of the company and will report to the utilities and finance committees shortly.

Petition for Compulsory Extension in Seattle.—An appeal which it is intended to carry to the State Public Service Commission for an order directing the Puget Sound Traction, Light & Power Company, Seattle, Wash., to extend its lines from Seattle Boulevard to Holgate Street on Fourth Avenue South, has been referred by the corporation counsel to the City Council for approval. Property owners on Fourth Avenue South and the owners of mercantile and manufacturing establishments appealed to the company to construct this extension, and, failing, they have placed the matter before the City Council.

Proposed Service Between Buffalo and Attica.—Residents of Batavia have called the attention of officials of the Central Railway of New York to the feasibility of operating an out-of-town connection to Buffalo over the Buffalo, Attica & Arcade Railroad, which is a leased line of the New York Central. It is not improbable that the Central Railway will devise plans for the operation of such a line with an Edison-Beach storage battery car. E. G. B. Fox, New York, engineer of the Central Railway, is expected to visit Batavia to report on the plan. The car will enter Buffalo over the tracks of the Buffalo & Williamsville Electric Railway at North Main Street.

Steam Road Electrification Ordinance Held Up by Chicago City Council.—The ordinance submitted to the Chicago City Council last spring, which contained provisions for the electrification of the railroad terminals and the abatement of the smoke nuisance, was again referred to committee for further investigation and recommendations. This action was taken owing to a protest raised by five organizations representing more than 55,000 members, all of whom are railroad employees in and around Chicago. They charge that the ordinance is unfair to them as compliance with its provisions would endanger the lives of railroad employees and cause many of them to lose employment because of the change from steam to electricity.

Decision in Cincinnati Extension Case.—The Ohio Supreme Court has affirmed the decision of the Hamilton County Court in which David L. Carpenter and others were granted a perpetual injunction against the Cincinnati Traction Company to prevent an extension of the Avondale Street railway line out Paddock Road to Bond Hill. When consents of property owners on Paddock Road could not be secured the City Council resorted to the expedient of changing the name of the thoroughfare from Clinton Springs Avenue to the Norfolk & Western Railway to Reading Road. Consents of a majority of property owners on the newly named streets were then obtained. The courts decided that the act of Council was not made in good faith, but to further a plan to deprive the property owners of their rights.

Franchise Negotiations Later in Toledo.—Henry L. Doherty, of Henry L. Doherty & Company, New York, N. Y., who control the Toledo Railways & Light Company, is quoted in part as follows by the Toledo *Blade* in regard to the plans for developing the property and the prospects in regard to negotiations with the city for a new franchise: "We are in no hurry about the franchise. We want time to show the residents of Toledo what we can do. In a sense the new ownership of the Toledo street railway properties is on probation. I believe that a public utility should be so developed and operated as to give the community which it serves the greatest possible benefits, and when the highest possible efficiency has been reached in this respect, we may naturally expect courtesies in return on the part of the city. The new management is doing some improving, but definite plans for larger betterments of the Toledo properties have not been worked out."

Plans for Civic Lines from Toronto to Port-Perry.—Blueprints of the proposed civic radial line to run from Toronto to Port Perry have been distributed among the various municipal councils representing the townships which will be served by the system. J. O. McCarthy, chairman of the permanent committee of the various municipalities, arranged a conference with Adam Beck to discuss the proposed plans. Mr. Beck stated that the Hydro-Electric Power Commission of Ontario is now prepared to deal with the question. The principal problem is that of securing an entrance into Toronto. Under present conditions the proposed line could not operate beyond Danforth Avenue, where a connection could be made with the Toronto civic line. This would necessitate the payment of a fare to the Toronto Railway to travel to the business section. The chairman pointed out that if the negotiations for the purchase of the property of the Toronto Railway are concluded by the city it would be possible to eliminate the second fare.

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Financial and Corporate

Stock and Money Markets

October 8, 1913.

A short reaction occurred in the New York stock market to-day, bringing prices of prominent issues down a point or more. New low points were reached by noon, but they seemed to be the result of raiding rather than of liquidation. The only buying in the late afternoon represented the covering of shorts. The sale of bonds also showed a decline in volume. Rates in the money market to-day were: Call, 3½ @ 4 per cent, ruling rate 4 per cent; sixty days, 3¾ @ 5 per cent; ninety days and four months, 4½ per cent; five and six months, 5 per cent.

The Philadelphia market showed a continued weakness to-day and was dull and featureless to the end of the fourth hour. Trading ended quiet without material price changes.

Lower levels were established in the Chicago stock market to-day. Bonds also were frequently off.

After a firm start, weakness developed on the Boston Stock Exchange to-day, and during the remainder of the session irregularity was shown.

Fair activity was developed on the Pittsburgh stock market to-day, while no material changes at all were recorded in the Cincinnati market.

Quotations of traction and manufacturing securities as compared with last week follow:

	Sept. 30	Oct. 8
American Brake Shoe & Foundry (common)	90	90¼
American Brake Shoe & Foundry (preferred)	131½	131
American Cities Company (common)	36	36
American Cities Company (preferred)	66	65
American Light & Traction Company (common)	353	353
American Light & Traction Company (preferred)	105	105
American Railways Company	39⅜	39
Aurora, Elgin & Chicago Railroad (common)	41	41
Aurora, Elgin & Chicago Railroad (preferred)	83	82½
Boston Elevated Railway	86½	86
Boston Suburban Electric Companies (common)	7	*7
Boston Suburban Electric Companies (preferred)	56½	*56¼
Boston & Worcester Electric Companies (common)	*10	*10
Boston & Worcester Electric Companies (preferred)	43	*43
Brooklyn Rapid Transit Company	89	87
Capital Traction Company, Washington	115	115
Chicago City Railway	150	160
Chicago Elevated Railways (common)	20	25
Chicago Elevated Railways (preferred)	75	75
Chicago Railways, ptcptg., ctf. 1	93	95½
Chicago Railways, ptcptg., ctf. 2	30	28½
Chicago Railways, ptcptg., ctf. 3	8	7¾
Chicago Railways, ptcptg., ctf. 4	3	2½
Cincinnati Street Railway	107¼	108
Cleveland Railway	102½	103¼
Cleveland, Southwestern & Columbus Ry. (common)	*5½	*5½
Cleveland, Southwestern & Columbus Ry. (preferred)	*28¼	*28¼
Columbus Railway & Light Company	18	18
Columbus Railway (common)	69½	a69½
Columbus Railway (preferred)	88	88
Denver & Northwestern Railway	*104	*104
Detroit United Railway	69	69
General Electric Company	146¼	143
Georgia Railway & Electric Company (common)	117	*117
Georgia Railway & Electric Company (preferred)	87	*87
Interborough Metropolitan Company (common)	15¾	15¼
Interborough Metropolitan Company (preferred)	61¾	61⅜
International Traction Company (common)	*30	*30
International Traction Company (preferred)	*95	*95
Kansas City Railway & Light Company (common)	22	*22
Kansas City Railway & Light Company (preferred)	30	*30
Lake Shore Electric Railway (common)	*5	*5
Lake Shore Electric Railway (1st preferred)	*89	*89
Lake Shore Electric Railway (2d preferred)	*24	*24
Manhattan Railway	133	128
Massachusetts Electric Companies (common)	13¾	13
Massachusetts Electric Companies (preferred)	67	68
Milwaukee Electric Railway & Light Co. (preferred)	95	*95
Norfolk Railway & Light Company	*27½	*27½
North American Company	72	71
Northern Ohio Light & Traction Company (common)	63	63
Northern Ohio Light & Traction Company (preferred)	97	98
Philadelphia Company, Pittsburgh (common)	42⅞	41
Philadelphia Company, Pittsburgh (preferred)	40	40
Philadelphia Rapid Transit Company	22⅝	22⅝
Portland Railway, Light & Power Company	55	*55
Public Service Corporation	112	111
Third Avenue Railway, New York	42	40¼
Toledo Traction, Light & Power Company (common)	30	a30
Toledo Traction, Light & Power Company (preferred)	80	80
Twin City Rapid Transit Co., Minneapolis (common)	105	104½
Union Traction Company of Indiana (common)	*5	*5
Union Traction Company of Indiana (1st preferred)	80	*80
Union Traction Company of Indiana (2d preferred)	*20	*20
United Rys. & Electric Company (Baltimore)	26⅝	25⅜
United Rys. Inv. Company (common)	20	18
United Rys. Inv. Company (preferred)	40	35
Virginia Railway & Power Company (common)	53	a56
Virginia Railway & Power Company (preferred)	94	95
Washington Ry. & Electric Company (common)	89½	93
Washington Ry. & Electric Company (preferred)	89½	90¼
West End Street Railway, Boston (common)	71	*71
West End Street Railway, Boston (preferred)	89	*89
Westinghouse Elec. & Mfg. Company	69⅞	67
Westinghouse Elec. & Mfg. Company (1st preferred)	110	107

*Last sale. a Asked.

ANNUAL REPORTS

Eastern Pennsylvania Railways

The consolidated statement of earnings and expenses of the Eastern Pennsylvania Railways, Pottsville, Pa., for the year ended June 30, 1913, follows:

Gross earnings	$769,680
Operating expenses and taxes	436,004
Net earnings from operation	$333,676
Deduct: Underlying companies' charges	45,148
Balance	$288,528
Deduct: Interest on bonds, loans and rentals of Eastern Pennsylvania Railways	170,155
Surplus	$118,373

John H. Pardee, president of the company, says in part:

"Compared with the year ended June 30, 1912, the gross earnings for the fiscal year show an increase of $70,374, or 10.06 per cent; the operating expenses were reduced $2,589, or 0.59 per cent; the net earnings from operation increased $72,963, or 27.96 per cent, while the net profit for the year increased $71,906. The earnings of the railway department showed an increase of $45,202. The electric department earnings increased $27,210. The earnings of the gas department increased $743 and the park earnings decreased $2,782. During the year there was expended for maintenance in the railway department over $64,000, or more than 10 per cent of the gross earnings of that department.

"During the year your company acquired the entire outstanding capital stock of the Edison Electric Illuminating Company, Ashland, Pa., which has since been merged with the property of the Eastern Pennsylvania Light, Heat & Power Company. It is expected that the acquisition of this property will add materially to the earnings of the lighting department of the company.

"There was certified by the trustee under the mortgage of your company $263,500 face amount of the first mortgage 5 per cent gold bonds to reimburse the company for amounts expended from its earnings for improvements, betterments and extensions to its properties. Of this amount $6,000 was given in part payment of the stock of the Edison Electric Illuminating Company, Ashland, Pa., above mentioned; the remainder is held in the company's treasury, making a total of $409,000 now held in the treasury.

"A new turnout in Tamaqua, known as the Armory Turnout, was completed. Mining conditions necessitated the relocating of 1400 ft. of track on the Nesquehoning Mountain. There were 11,014 ties used in maintenance and 3071 in new construction. Thirteen thousand five hundred and sixty feet of new No. 4/0 grooved trolley wire was strung, replacing old wornout No. 2/0 wire. We laid 2800 ft. of new 70-lb. high 'T' rail on Dock Street, Schuylkill Haven, and the street was paved with stone, concrete and brick for a width of 18 ft. The double track on the Tumbling Run Division, a distance of 1 1/6 miles, was widened to permit the use of larger equipment."

New York, New Haven & Hartford Railroad

The annual report of the New York, New Haven & Hartford Railroad system for the year ended June 30, 1913, made public on Oct. 6, shows a deficit in the general income account of $4,127,632. The operating revenues of the system amounted to $95,190,466 and the operating expenses to $65,694,517. The net revenue derived from outside operations was $641,061, making the net revenue for the system $30,137,009. Taxes paid during the year were $5,062,683, leaving an operating income of $25,074,326. The income derived from other sources, such as dividends, interest, rentals, etc., was $4,979,409.42 and deductions from income on account of interest, rentals, etc., were $22,394,337, leaving a net income for the year of $7,659,397. There was paid out in dividends on the stock of the New York New Haven & Hartford Railroad and on the stock of subsidiary companies held by the public a total of $11,787,030, making a deficit on the year's operations of $4,127,632.64.

In referring to these figures President Howard Elliott says that while the earnings for the first few months of the fiscal year were highly encouraging, being the greatest

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in the history of the company for a similar period, the net results for the year compared with 1912 show a large decrease, due to heavier operating expenses, which reflect principally the expenditures made by the company to put the property and equipment in better condition to handle business safely and promptly and to pay increased wages.

Speaking of the company's general policy, Mr. Elliott says in part:

"The past year marks the completion of a period in which your directors and management deemed it essential, for the protection of its lines and the enlargement of its business and to serve effectively the public and develop the New England States by a comprehensive transportation system operated co-operatively with your railroad, to adopt the policy of acquiring an interest in various transportation lines adjacent to and serving the territory in which your railroad is located. These acquisitions, in the opinion of your board, were legally made, and after due consideration that they were for the best interests of the company and the public, which is the only source from which its revenues are derived, but your company has no desire to retain these investments except in conformity with law and sound public policy. During the same period the company was also confronted by very large reconstruction outlays for the electrification of the important section of the system terminating in the Grand Central Station, New York City, for new equipment and facilities, larger and heavier bridges and other structures, as shown in the annual statements to the stockholders. In the opinion of your management all of these steps were necessary and advisable for the internal development of the territory in which your lines are located and to handle increased local and through traffic with safety, economy and expedition and enable your company properly to discharge its duty to the shippers and the public. It could not with any certainty be expected that this company, or any other, could make expenditures of this extraordinary character produce immediate results in the shape of increased profits, but undoubtedly they will have the effect of attracting more traffic to your lines, strengthening the company's position and utility as a large transportation system and eventually will produce satisfactory and permanent returns."

Referring to the electrification policy, the report says:

"Your company was the pioneer in adopting the overhead single-phase system of electrification on a long-distance steam railroad for freight as well as passenger traffic. It has constructed the first important freight yard in the world for electrical operations, this being essential for the freight as well as the passenger traffic, because of the legislation requiring your company and others to electrify their tracks and stations in the city of New York. While the operation of freight trains by electricity has many problems still to be solved, in order to demonstrate beyond a doubt the adaptability of electricity for freight yard and shifting service, these large electrification outlays have been beneficial not only in relieving passenger terminal congestion in New York City but in making it possible for your company to move more and heavier passenger trains on its main line between that city and New Haven."

The work of electrifying the main line tracks from Stamford to New Haven, according to the report, is sufficiently advanced to permit electric operation early in 1914. This work was seriously delayed on account of strike and flood conditions. New equipment to the value of $4,268,385, an increase of nearly 33 1/3 per cent, has been purchased during the year, the entire amount being charged to equipment account.

Concerning the New York, Westchester & Boston Railway the report says that the business of this company has shown a satisfactory increase month by month and that it is now handling at the rate of 3,000,000 passengers per year. It is estimated that considerable revenue will be received from the freight service inaugurated during the year and by a contract lately entered into with the Adams Express Company granting this company express privileges over its lines. The earning power of this subsidiary, it adds, cannot be fully demonstrated until various connections with the New York City transportation lines are completed.

The gross earnings of the New York, Westchester & Boston Railway for the year were $290,000; expenses, $470,000; fixed charges, $1,130,000, and the deficit from operation, $1,405,000. The Berkshire Street Railway was operated at a deficit of $92,000. The Connecticut Company had a surplus of $109,000 after the payment of $1,500,000 in dividends. The Millbrook Company lost $180,000. The New York & Stamford Railway lost $36,000, but the Rhode Island Company earned $670,000 over interest charges. The deficit of the Westchester Street Railroad was $55,000.

Questions and Answers Under Uniform System of Accounts

Another series of tentative answers to questions raised in connection with the uniform system of accounts established by the Interstate Commerce Commission is published below. Agreement on these answers, as on those published previously in the ELECTRIC RAILWAY JOURNAL, has been reached by members of the committee on a standard classification of accounts of the American Electric Railway Accountants' Association and representatives of the commission. As these answers have not yet received the formal approval of the commission, however, it should be understood that the decisions do not represent its final conclusions and that they are subject to such revision as may be thought proper before final promulgation in the accounting bulletins of the commission.

Q. What account should be charged with the cost of caring for switch lamps, including cleaning, lighting and filling with oil?

A. Operating Expense Account No. 68, "Operation of Signals and Interlocking Systems."

Q. To what account should the cost of keys for switch locks be charged?

A. Operating Expense Account No. 63, "Miscellaneous Car-Service Expenses."

Q. What accounts should be charged with the cost of repairs to switch stands, locks, targets and lamps?

A. The cost of repairs to switch stands and locks should be charged to Operating Expense Account No. 6, "Special Work," and that of targets and lamps to Account No. 17, "Signal and Interlocking Systems."

Q. To what account should the cost of driving a well to furnish water for condensers be charged?

A. Account No. 24, "Power Plant Buildings," in the classification of "Expenditures for Road and Equipment of Electric Railways."

Q. What account should be charged with the cost of restoring a trestle destroyed by fire in excess of the amount of insurance recovered?

A. Operating Expense Account No. 15, "Bridges, Trestles and Culverts," except that any excess in the cost of the new trestle over the cost of the old as carried in the construction accounts should be charged to Road and Equipment Account No. 15, "Bridges, Trestles and Culverts."

Q. An electric railway company is required to lay improved paving and before doing so puts its tracks in good repair. What accounts should be charged with the cost of the track work and of the paving?

A. The cost of labor and material used in the track work should be charged to the appropriate operating expense accounts. The excess cost of the new and improved paving over the original cost (estimated, if not known) of the paving replaced should be charged to Road and Equipment Account No. 10, "Paving," and the remainder of the cost to Operating Expense Account No. 9, "Paving."

Q. What disposition should be made of charges for depreciation made to cover the entire period from the beginning of a company's operations to the present?

A. Such portion of the charges as apply to periods prior to the current fiscal year should be included in profit and loss, while the operating expense accounts should be adjusted to cover the monthly charges applicable since the beginning of the fiscal year.

Q. What account should be credited with the value of the scrap recovered in making renewals of trolley brackets not to be sold until later, perhaps after the close of the fiscal year?

A. The estimated salvage value should be credited to the appropriate operating expense account at the time of their removal. Any adjustment necessary when the material is sold should also be made through operating expenses.

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Q. What account should be credited with the revenue derived from the sale of berths in sleeping cars operated in electric railway trains?

A. Operating Revenue Account No. 3, "Parlor, Chair and Special Car Revenue."

Q. To what account should be charged the wages of persons engaged in checking up the riding on various routes with a view to changing the schedules?

A. Operating Expense Account No. 48, "Superintendence of Transportation."

Valuation of Iowa Interurban Railways

The forty-second annual report on the assessed valuation of railroad, equipment and express companies' property in the State of Iowa, compiled by the Executive Council, includes a tabulation of valuations for the principal electric interurban railways in the State as follows:

Names of Systems and Divisions	Total Miles of Road	Assessed Valuation
Albia Interurban Ry.	10.00	$25,000
Cedar Rapids & Marion City Ry.	17.49	148,665
Centerville Light & Traction Co.	7.84	23,520
Charles City Western Ry.	16.33	32,660
Davenport & Muscatine Ry.	25.27	75,810
Fort Dodge, Des Moines & Southern R.R.	159.10	395,040
Inter-Urban Ry.	64.18	224,630
Iowa & Illinois Ry.	33.05	122,285
Iowa Railway & Light Co.	31.22	115,514
Mason City & Clear Lake Traction Co.	14.62	65,790
Oskaloosa & Buxton Electric Ry.	2.30	8,510
Waterloo, Cedar Falls & Northern Ry.	67.59	304,175

The report also contains the following abstract of the financial reports of the electric interurban railways for the year ended Dec. 31, 1912:

Names	Gross Earnings	Operating Expenses	Net Earnings
Albia Interurban Ry.	$31,197	$19,136	$12,062
Cedar Rapids & Marion City Ry.	269,895	162,617	107,277
Centerville Light & Traction Co.	45,705	24,879	20,826
Charles City Western Ry.	37,115	38,227	*1,111.81
Davenport & Muscatine Ry.	12,955	5,897	7,057
Fort Dodge, Des Moines & Southern R. R.	649,679	522,163	127,516
Inter-Urban Ry.	299,819	207,086	92,732
Iowa & Illinois Ry.	187,743	129,235	58,506
Iowa Railway & Light Co.	232,519	147,438	85,085
Mason City & Clear Lake R. R.	109,790	58,126	51,664
Oskaloosa & Buxton Elec. Ry.	9,115	7,875	1,239
Waterloo, Cedar Falls & Northern Ry.	369,631	163,827	205,803
Totals for the State	$2,255,163	$1,486,503	$768,659

* Deficit.

Progress of Second Avenue Railroad Receivership

The Second Avenue Railroad, New York, N. Y., which has been operated by a receiver since the fall of 1908, has extended for another year the $3,140,000 of 5 per cent receiver's certificates which matured on Oct. 1. It is stated by bankers interested in the company that steps toward the reorganization of the company will be taken within the next year. The Second Avenue Railroad is the most important subsidiary of the old Metropolitan Street Railway that has not been reorganized and placed on a permanent basis.

For the year ended June 30, 1913, the surplus earnings of the company after the payment of charges, including the interest on the receiver's certificates, is estimated at $55,756, compared with $33,027 for the previous year. The special franchise tax, which is in litigation, is not included in the charges, nor is interest on the $5,631,000 of 5 per cent consolidated first gold 5's and the $89,000 of 5 per cent debentures. The record of results for the past four fiscal years is as follows:

Year	Gross Earnings	Surplus After Charges
1913	$1,032,467	$55,756
1912	975,016	33,027
1911	890,062	* 14,277
1910	829,403	* 1,680

* Deficit.

The Guarantee Trust Company, New York, N. Y., is offering for sale at 99¾ and interest, yielding 6¼ per cent, one-quarter of the entire issue of $3,140,000 of 6 per cent receiver's certificates, the remaining three-quarters of which have already been sold at private sale. The certificates are dated Oct. 1, 1913, due Oct. 1, 1914, and are in coupon form, $1,000 par value each. They are a first and paramount lien on all the property of the company and are issued under an order of the Supreme Court of New York authorizing $3,200,000 to refund the amount of $3,140,000 originally maturing on Oct. 1, 1913, the remainder being held in reserve for future orders from the court. The court expressly provides that no additional receiver's certificates can be issued on the company's property unless they shall be subordinate to the lien of these $3,200,000 of certificates or unless this issue be expressly provided to be discharged in full out of the proceeds of such additional certificates. The principal items of the property subject to the lien of these certificates, according to recent appraisements by the engineers of the Public Service Commission, are valued at $5,748,271.

Brooklyn & North River Railroad, Brooklyn, N. Y.—The Brooklyn & North River Railroad has applied to the Public Service Commission of the First District of New York for the authorization of the issue of $500,000 of capital stock. Another application has been also made by the New York Railways, the Coney Island & Brooklyn Railroad, the Third Avenue Railway, the receiver of the Dry Dock, East Broadway & Battery Railroad, the Brooklyn Heights Railroad and the Nassau Electric Railroad for permission to purchase all this stock, as soon as it is issued, and to divide it among themselves, according to the proportions to which the companies have agreed. Then the new company seeks the approval of the commission to exercise the franchise granted it by the Board of Estimate on Sept. 9. The hearing before the commission has been set for Oct. 15.

Brooklyn (N. Y.) Rapid Transit Company.—Up to Sept. 8 $11,733,000 of Brooklyn Rapid Transit Company first refunding convertible 4 per cent bonds have been exchanged par for par for Brooklyn Rapid Transit stock. In the ELECTRIC RAILWAY JOURNAL of May 10, 1913, note was made of the fact that up to that time the holders of $2,130,000 of these bonds had exercised their right to exchange the bonds for the stock. At present there is left $23,106,000 of the bonds still outstanding in the hands of the public, and approximately $16,000,000 additional issued and in the hands of the company, pledged as collateral in the treasury or reserved to retire bonds of constituent companies. Conversion during the past five weeks has amounted to approximately $4,000,000. As a 6 per cent return is received on the stock against only 4 per cent on the bonds, and as the conversion privilege, which expires July 1, 1914, makes the bonds sell at least 7 points above a normal investment level, as indicated by other Brooklyn Rapid Transit bonds, it is to be expected that most of the remaining bonds will be turned in for stock before the privilege expires.

Detroit (Mich.) United Railways.—Macpherson, Weiss & Company, auditors, on the basis of business in the past, estimated some weeks ago that the percentage of increase of passengers carried by the Detroit United Railway in the last six months of 1913 would be slightly more than 18 per cent over the same period of 1912. For the first month that seven tickets were sold for a quarter, Aug. 15 to Sept. 14, inclusive, 18,897,980 revenue passengers were carried and for the same period last year 15,853,580, an increase of slightly over 19 per cent. For the first month of the seven-for-a-quarter tickets the revenue from passengers carried amounted to $694,634 and for the same period last year $695,271. While the company carried about 3,000,000 passengers more than in the same period last year the receipts from the passengers fell behind $637.

Electric Properties Company, New York, N. Y.—The plan for the reduction and readjustment of the capital stock of the Electric Properties Company, referred to in the ELECTRIC RAILWAY JOURNAL of Aug. 23, 1913, has been accomplished by the reincorporation of the enterprise under the laws of Virginia under the name of the Electric Properties Corporation. The new company has the same assets as the old, except the $298,258 of cash, which is to be distributed on account of accumulated and unpaid dividends upon the preferred stock of the old company. The preferred stock of the new company is the same as that of the old, but the common stock has been reduced from $6,000,000 to $4,000,000. Holders of certificates of deposit are requested to surrender them immediately to the Equitable Trust Company, New York, N. Y. Upon such surrender they will receive cash or new securities as follows: For old preferred stock, certificates of an equal amount of new preferred stock and

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cash obligations of the new company aggregating an amount equal to the dividends accumulated and unpaid on the old preferred stock to Sept. 1, 1913, and for old common stock, certificates for new common stock at the rate of two shares of the new for three shares of the old. Fractional interests in common stock of the new company will be adjusted by the depositary for the account of the committee until Nov. 1, 1913, on the basis of $21 per share.

Halifax (N. S.) Electric Tramway.—The Board of Commissioners of Public Utilities has refused to grant the application of the Halifax Electric Tramway to issue $600,000 of new capital, mentioned in the ELECTRIC RAILWAY JOURNAL of Sept. 6, 1913. Permission was received by the company to amend the application and present it at a later date. The board declared that while reluctant to hamper the financing of any public utility, in the present case it has not information enough to satisfy it as to the propriety of the proposed plan.

Interborough Rapid Transit Company, New York, N. Y.—J. P. Morgan & Company, New York, N. Y., announced on Oct. 1, 1913, that a syndicate headed by Lee, Higginson & Company, Harris, Forbes & Company and Kissel, Kinnicutt & Company had purchased a large block of the new Interborough Rapid Transit Company first and refunding mortgage fifty-three-year 5 per cent bonds. The proceeds of this sale will be used to retire the balance of the $33,000,000 issue of the Interborough Rapid Transit Company first mortgage forty-five-year 5 per cent bonds, called for payment on Nov. 1 next, and for carrying on construction work upon the new subway. The new bonds, in addition to being secured on property in which the city of New York will have an investment estimated at more than $66,000,000, will be protected by unusually strong sinking fund provisions. Beginning July 1, 1918, the company will set aside every six months a sum equal to one-half of 1 per cent of the par value of the bonds issued and outstanding, including bonds held in the sinking fund. The sinking fund will buy bonds at not exceeding 110 and interest, and bonds held by the sinking fund will be kept alive. The sinking fund payment for the first year will exceed $1,600,000, and by accumulation the annual income of the sinking fund to be used for the purchase of bonds will increase from $1,600,000 the first year to about $10,000,000 in 1958.

Milwaukee Northern Railroad, Cedarhurst, Wis.—The Milwaukee Northern Railroad has been authorized by the Railroad Commission of Wisconsin to issue $95,500 of 5 per cent bonds, the proceeds to be used to reimburse the company for expenditures made for the improvement and extension of its interurban lines.

Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company, Minneapolis, Minn.—The Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company, known as the Dan Patch Electric Line, has announced that it has leased the branch of the Chicago Great Western Railroad from Randolph to Mankato, Minn., for fifty years and expects to operate cars over the newly acquired line beginning April 1, 1914. The Dan Patch line is already operating cars over leased tracks of the Great Western Railroad between Northfield and Faribault, running trains from Minneapolis to Faribault, a distance of 52 miles. The additional leased mileage amounts to 54 miles. When the newly leased tracks are put into use it is expected that the Minneapolis terminal, which will be used jointly by the Dan Patch line and the Electric Short line, will be finished. The road is now using a station on the outskirts of Minneapolis for its terminal.

New York, Auburn & Lansing Railroad, Ithaca, N. Y.—H. W. Fitz, chairman of the reorganization committee of the New York, Auburn & Lansing Railroad, has announced that a plan of reorganization has been prepared for the company and for the Ithaca Street Railway, and has been deposited with the Columbia-Knickerbocker Trust Company, New York, N. Y.

San Diego & Southeastern Railway, San Diego, Cal.—As a result of an application made to the Railroad Commission of California by the San Diego & Southeastern Railway for authorization to issue $600,000 of thirty-year 5 per cent mortgage bonds, the company has received permission to issue $343,000 face value of such bonds. They are to be issued under and in pursuance of the terms of a trust deed or mortgage to be made and executed by the company to the Bank of Commerce & Trust Company, San Diego, as trustee, on condition that the company shall sell the bonds so as to net not less than 85 per cent of the par value of the principal thereof, besides interest accrued thereon. The proceeds from the sale of the bonds is applicable only as follows: (a) The proceeds from the sale of the bonds in an amount not to exceed $170,286 shall be expended to pay notes in the amount of $35,000 and cash advances of $100,978 and to reimburse the company for expenditures amounting to $34,307 for construction and betterments made from income during the period from May 2, 1912, to Jan. 31, 1913. (b) The proceeds from the sale of the bonds not to exceed $121,000 shall be expended for proposed additions and betterment expenditures during the year 1913 subsequent to Jan. 31, 1913.

Twin City Traction Company, Uhrichsville, Ohio.—Joint application has been made to the Public Utilities Commission by the Twin City Traction Company, operating the street railways of Uhrichsville and Dennison, and the Ohio Service Company for authority to consolidate. The Ohio Service Company proposes to purchase the holdings of the Twin City Traction Company for $100,000, paying therefor its entire capital stock of $30,000 and giving notes aggregating $70,000, which are to be converted into first mortgage and refunding bonds after one year. The Twin City Traction Company represents that its outstanding capital stock is $100,000 and that it has demand notes outstanding, aggregating $75,000, besides unpaid current debts of $10,736. The holders of the notes agree to accept $70,000 in notes of the Ohio Service Company in payment of their claims and the latter agrees to pay the current debts. The plan is to connect the two street railway systems.

United Gas & Electric Corporation, New York, N. Y.—In connection with the purchase of the common stock of the American Cities Company by the United Gas & Electric Corporation Bertron, Griscom & Company, New York, N. Y., have sent a letter to common stockholders of the American Cities Company requesting that their holdings be forwarded to the Pennsylvania Company for Insurance on Lives and Granting Annuities, Philadelphia, Pa., on or before Oct. 20, for which they will receive negotiable certificates of deposit of the company just mentioned. The banking firm recommends that the stockholders of the American Cities Company deposit their stock at once, as the United Gas & Electric Company may at any time after Oct. 20 terminate its offer should it be determined that the amount of stock deposited is not sufficient to warrant its carrying out the transaction.

United Light & Railways Company, Grand Rapids, Mich.—Notice has been sent to holders of the second preferred stock of the United Light & Railways Company, asking them to exercise, within sixty days beginning Oct. 1, their option to convert their holdings into either common stock or first preferred stock, on a share-for-share basis.

United Properties Company, Oakland, Cal.—Judge Dunne of San Francisco has granted a temporary injunction to R. G. Hanford restraining the trustees of F. M. Smith from entering into an agreement with N. W. Halsey & Company to extend the time for payment of $2,500,000 of notes of the San Francisco-Oakland Terminal Railways, a subsidiary of the United Properties Company, due last June. Mr. Hanford has an option on stock owned by Mr. Smith from the trustees of the United Properties Company and is endeavoring to form a syndicate to take over the San Francisco-Oakland Terminal Railways. The injunction was obtained on the ground that the proposed agreement between the trustees and N. W. Halsey & Company contained a clause which made the notes due and payable in event of Mr. Smith being declared a bankrupt. Mr. Hanford contends that such a provision in the agreement would make it impossible for him to complete negotiations which he has under way with a syndicate for taking over the property and that his option entitles him to purchase the property unencumbered.

Washington-Virginia Railway, Washington, D. C.—The stockholders of the Washington Utilities Company will meet on Oct. 10 to take action on a plan to re-create the Washington-Virginia Railway and restore conditions as

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they existed prior to the absorption of that company by the Washington Utilities Company. This action is the outcome of the recent decision of the Public Utilities Commission of the District of Columbia on the application of the Washington Utilities Company for the right to issue $10,000,000 of bonds, as mentioned in the ELECTRIC RAILWAY JOURNAL of July 12, 1913. The commission held that the relations of the two companies were contrary to the terms of the anti-merger law.

Dividends Declared

Green & Coates Streets Passenger Railway, Philadelphia, Pa., quarterly, $1.50.

Massachusetts Consolidated Railways, Greenfield, Mass., one-half of 1 per cent, common.

Memphis (Tenn.) Street Railway, quarterly, 1¼ per cent, preferred.

Metropolitan West Side Elevated Railway, Chicago, Ill., quarterly, 1¼ per cent, preferred.

Milwaukee (Wis.) Northern Railway, 3 per cent, first preferred.

Ottawa (Ont.) Electric Railway, quarterly, 3 per cent.

Ottumwa Railway & Light Company, Ottumwa, Ia., quarterly, 1¾ per cent, preferred.

Rio de Janeiro Tramway, Light & Power Company, Toronto, Ont., quarterly, 1¼ per cent.

South Side Elevated Railroad, Chicago, Ill., quarterly, 1½ per cent.

Springfield & Xenia Railway, Springfield, Ohio, quarterly, 1½ per cent, preferred.

West Penn Traction Company, Connellsville, Pa., quarterly, 1½ per cent preferred.

Youngstown & Ohio River Railroad, Leetonia, Ohio, quarterly, 1¼ per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

CLEVELAND, SOUTHWESTERN & COLUMBUS RAILWAY, CLEVELAND, OHIO

Period			Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1 mo.	August	'13	$129,052	$70,909	$58,142	$32,593	$25,549
1 "	"	'12	117,208	62,691	54,518	32,011	22,506
8 "	"	'13	824,768	495,521	329,247	252,115	77,132
8 "	"	'12	768,531	453,510	315,021	245,523	69,498

INTERBOROUGH RAPID TRANSIT COMPANY, NEW YORK, N. Y.

1 mo.	August	'13	$2,390,387	$1,009,329	$1,381,058	$1,106,447	$274,611
1 "	"	'12	2,362,556	1,044,709	1,317,847	1,097,392	220,455
2 "	"	'13	4,774,220	2,043,239	2,730,981	2,212,665	518,316
2 "	"	'12	4,656,970	2,094,764	2,562,205	2,190,474	371,731

JOPLIN & PITTSBURG RAILWAY COMPANY, PITTSBURG, KAN.

1 mo.	August	'13	$50,405	*$29,295	$21,110	$12,542	$8,568
1 "	"	'12	48,475	*25,661	22,814	12,542	10,272
12 "	"	'13	565,241	*336,486	228,755	150,500	78,255
12 "	"	'12	516,378	*301,882	214,496	154,245	60,241

LEHIGH VALLEY TRANSIT COMPANY, ALLENTOWN, PA.

1 mo.	August	'13	$175,964	$67,314	$108,649	$46,872	$61,777
1 "	"	'12	151,181	59,037	92,144	42,089	50,055
12 "	"	'13	1,711,309	723,855	987,453	543,576	443,877
12 "	"	'12	1,459,371	635,902	823,469	492,507	330,902

MONONGAHELA VALLEY TRACTION COMPANY, FAIRMONT, WEST VIRGINIA

1 mo.	August	'13	$87,561	$31,522	$56,038	$25,558	$30,480
1 "	"	'12	76,981	29,728	47,254	23,642	23,612
8 "	"	'13	610,624	212,280	398,344	194,745	203,599
8 "	"	'12	543,827	220,688	323,140	162,081	161,059

NEW ORLEANS RAILWAY & LIGHT COMPANY, NEW ORLEANS, LA

1 mo.	August	'13	$538,354	$300,800	$237,554	$209,069	$28,484
1 "	"	'12	511,804	285,625	226,179	190,987	35,192
8 "	"	'13	4,544,294	2,402,856	2,141,438	1,616,280	528,158
8 "	"	'12	4,357,103	2,284,541	2,072,563	1,478,533	603,260

NORTHERN OHIO TRACTION & LIGHT COMPANY, AKRON, OHIO

1 mo.	August	'13	$339,306	$188,171	$151,135	$60,312	$90,823
1 "	"	'12	305,322	160,243	144,879	59,526	94,353
12 "	"	'13	2,155,676	1,305,816	853,860	463,766	390,094
12 "	"	'12	1,979,793	1,111,169	868,623	363,743	504,880

TWIN CITY RAPID TRANSIT COMPANY, MINNEAPOLIS, MINN.

1 mo.	August	'13	$776,841	$393,109	$383,732	$150,016	$233,716
1 "	"	'12	716,979	354,384	362,594	142,079	219,515
8 "	"	'13	5,780,872	2,948,867	2,832,005	1,178,735	1,653,270
8 "	"	'12	5,358,228	2,758,223	2,600,005	1,141,633	1,458,372

*Includes taxes.

Traffic and Transportation

Philadelphia Re-routing Plan Results

While the great benefit of the re-routing plan of the Philadelphia (Pa.) Rapid Transit Company will not be fully evident until the entire plan is accomplished and the public becomes accustomed to the new lines of travel, it is apparent that the changes which are being made are meeting with the approval of the majority of riders. The pairing of the single-track north and south streets through the business district and the more direct routing of the former irregular lines afford to a larger number of patrons direct service from their homes to and through the entire length of the business district. The re-routing system will create sufficient reserve capacity in the delivery district to care for the future growth of those outlying districts that can be satisfactorily served by surface street car transportation. Many passengers who were formerly obliged to pay 3 cents additional for an exchange ticket will now, because of the re-routing, be carried direct to their destination for a single 5-cent fare, without the use of either an exchange ticket or transfer. In thus re-routing the cars the management has also, by establishing new transfer points, endeavored to restore the nearest possible equivalent to the former route. This has necessitated increasing the number of points at which transfers are receivable from 210, which was the number of transfer points in effect at the incoming of the Stotesbury management, to a total of 270, all of which were in effect as of the date of Oct. 5.

Pending the publication of the complete guide book containing descriptions of all lines, with index to route numbers, now in preparation for free distribution to the public, the management, for the information of its patrons and to overcome any temporary confusion due to the re-routing changes, carried in the advertising sections of all the Philadelphia newspapers of Oct. 2 a description of the routes, including the transfer privileges of all the lines as re-routed to Oct. 1.

Hearing on Lynn-Salem Fares

The Massachusetts Public Service Commission gave a hearing on Oct. 1 upon the petition of various citizens of Lynn and Salem for the establishment of a 5-cent fare on the lines of the Bay State Street Railway. The petitioners contended that there is a large interurban travel over the two routes in question and that the distance of 5 miles between the centers of the two cities warrants the proposed 5-cent rate. For the company, James F. Jackson pointed out that the conditions on the Lynn-Salem lines are practically unchanged since 1909, when the former Railroad Commission ruled that the existing 10-cent fare was in no degree unreasonable in view of the company's investment in the line and the density of traffic which prevailed. He pointed out that transfer privileges at each end of the routes enable a passenger to travel 9 or 10 miles for 10 cents, or from any point in Lynn to the center of Beverly, beyond Salem. As former chairman of the board Mr. Jackson had voted that petitioners on fare matters almost invariably overlook the increased length of ride afforded on transfers, a point of great importance in considering the service rendered for a given fare. It was shown that although the company charges a 5-cent fare for the 5-mile trip between Salem and Peabody, no transfer privilege is included. Superintendent Gray, of the Lynn and Salem lines, stated that the traffic over the Highland Avenue cut-off line between Salem and Lynn is made up of a large proportion of through passengers between Salem and Boston and that the volume of local business on this route is comparatively small. Already a workingman's rate of 7 cents during morning and evening rush hours applies on the Highland Avenue line, and a similar 5-cent rate is granted on the other Lynn-Salem route. Chairman McLeod closed the hearing after stating that unless fresh evidence is presented by the petitioners to add further strength to their case the board can see no reason for requiring the company to alter its rates.

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Prize Contest of Illinois Traction System

The Illinois Traction System has extended an invitation to persons in Illinois to suggest three words beginning consecutively with the letters "I. T. S." and expressing in a terse phrase what the company stands for in the transportation world. In this connection it arranged for a "phrase contest" to be held during the State Fair at Springfield, Oct. 3-11.

During the fair the company maintained on the grounds a building in conjunction with the information bureau of the State Board of Agriculture, at which representatives of the company received the written suggestions of participants. Cash prizes were offered for the three best suggestions as follows: First, $25; second, $15; third, $10. A committee of capable newspaper men will select the most available suggestions and will report their selections to the company. The only requirement is that the person entering the contest make the trip to the State Fair over the lines of the company. Slips to be used in offering sugestions were supplied at the fair grounds, and the suggestions were deposited in a sealed box at the building of the company upon exhibiting the return portion of a round-trip ticket from any point to Springfield over the lines of the Illinois Traction System.

Elaborate preparations were made by the company to handle fair traffic this year. Augmented schedules were arranged, and the usual low rates prevailed. The block signal and safety devices which the company has installed were demonstrated at its building on the fair grounds.

Preliminary Expenditure Authorized in Toronto Safety Campaign.—The Ontario Safety League, which aims to educate the public to avoid street accidents, at a meeting held on Sept. 30 approved $7,540 in estimates for the first six months' campaign. The campaign committee was ordered to expend $1,000 at once. It is estimated that $20,000 will be required for the first year's work.

Increase in Wages on Canadian Line.—The Lethbridge Municipal Railway has adopted the following wage schedule for motormen and conductors: First six months, 25 cents an hour; second six months, 28 cents an hour; second year, 30 cents an hour; third year, 32 cents an hour. On public holidays the men are paid time and a half, and on Sundays receive nine hours' pay for seven and a half-hours' work.

Complaint Against New York Roads Closed.—The Public Service Commission of the Second District of New York has entered an order closing upon its records the complaint of the Board of Supervisors of Chautauqua County against the Buffalo & Lake Erie Traction Company and the Chautauqua Traction Company with reference to the lack of connections between cars of the company at Westfield, N. Y. A satisfactory connection between cars of these two lines has been agreed upon by the two companies.

Near-Side and Far-Side Stops in Detroit.—Some time ago the Detroit (Mich.) United Railway asked the people to decide whether they wanted near-side or far-side stops. In spite of the heavy balloting the issue remains undecided. First, the far-side gains a lead of a few and then it is supplanted by the near-side. The vote has not indicated any general uprising against the near-side stop, although, on the other hand, it has developed many warm advocates of the far-side stop. To give further opportunity for expression of opinion the ballot has been reprinted.

Vote in Favor of the "Skip-Stop" Idea in Denver.—Patrons of the Colfax lines of the Denver (Col.) City Tramway are overwhelmingly in favor of the "skip-stop" system of scheduling cars for that section. John A. Beeler, general manager of the company, reports the result of a postal card investigation made by the company among patrons of the lines. Those favoring the new plan were seven to one for it when the cards were counted. The answers to the original circular letter announcing the plan were overwhelmingly in its favor. The skip-stop plan, as followed in Denver, was described on page 857 of the issue of this paper on May 10, 1913.

Safety Campaign in Schools of Buffalo.—With the opening of the public schools, the International Railway, Buffalo, N. Y., has entered again upon its campaign for the safety of school children which was carried on with good results last spring. The company's lecturers are being sent to the various grammar and high schools throughout the city and are teaching the students "don'ts" in connection with street car traffic and crossing streets during the rush hours. The superintendent of education and the public instruction department of the city are co-operating with the company. Large placards with series of "don'ts" are posted in the coat rooms of the schools.

Toilets in Interurban Cars.—As a result of an application made to the Railroad & Warehouse Commission of Illinois by the Alton, Granite & St. Louis Traction Company, the order of Sept. 16, 1912, requiring the railway company to provide toilets and drinking water on its interurban cars was modified on July 8, 1913. As amended the last section of the order required the Alton, Granite & St. Louis Traction Company to install in its interurban cars suitable toilets for the accommodation of passengers, it being provided, however, that this order should not apply to cars operating a less distance between termini than 16 miles or to cars operated in other than regular schedule service.

Freight Service Between Rochester and Lockport.—Freight service between Rochester and Lockport has been inaugurated by the Buffalo, Lockport & Rochester Railway, Rochester, N. Y. H. J. Clark, traffic manager of the so-called Beebe lines, says that from the time the Buffalo, Lockport & Rochester Railway was opened for traffic, it has had complete equipment for handling freight matter, but the question of terminal facilities and traffic agreements at Rochester and Lockport was not settled until recently. Tariffs naming class and commodity rates similar to those which apply to the Empire United Railways have been filed with the Public Service Commission of the Second District.

Company's Answer Filed in Seattle Fare Case.—James B. Howe, counsel for the Puget Sound Traction, Light & Power Company, Seattle, Wash., has filed an answer to the petition of the city to the Public Service Commission for an order to direct the company to sell car tickets on all its Seattle cars at the rate of six for 25 cents and twenty-five for $1. The franchise under which the company operates provides that tickets shall be sold at certain of the company's offices and at other locations but does not require the sale of tickets on cars. Mr. Howe makes it plain that he does not waive his right to urge a motion which he proposes to make to the commission at an early session to dismiss the petition.

Through Service Demanded on Unprofitable Kansas City Line.—The Missouri State Public Utilities Commission, after hearing requests of Fairmount Park residents at Kansas City for through car service during the winter months, adjourned until Oct. 10, when the hearing will be resumed. Robert J. Clark, comptroller of the Metropolitan Street Railway, offered figures showing that the company loses about $6,000 monthly during the winter by running to Fairmount Park. The company has heretofore operated a dummy service after the park closes. Twenty dummy tickets are sold for 50 cents, only those without tickets being forced to pay the regular fare of 5 cents. Residents of Fairmount Park want through service, or at least transfer service.

Brief Filed in Washington Fare Case.—The Capital Traction Company, Washington, D. C., has filed its brief in the case of S. T. J. Price and others against the Washington & Old Dominion Railroad and the Capital Traction Company, in which the complainants are seeking a reduction of rates from stations on the Great Falls line to Thirty-sixth and M Streets Northwest. The company declares that an agreement between it and its co-defendant calls for an exchange of passengers by transfer and that the slips are redeemed at 2½ cents each. The company says in its brief: "It is respectfully submitted that in no event would the Interstate Commerce Commission have jurisdiction to pass any order affecting the Capital Traction Company, which is admittedly purely an urban railroad. Without undertaking any extended argument or the citation of any other authority, it is deemed sufficient to refer to the very recent case of the Omaha & Council Bluffs Street Railway against the Interstate Commerce Commission, decided by the Supreme Court of the United States on June 9, 1913."

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Personal Mention

Mr. John Pearson, formerly assistant superintendent of the Hamilton (Ont.) Street Railway, has been appointed superintendent to succeed the late Duncan Miller.

Mr. Leon Snyder has been appointed assistant division superintendent of the Baker, Sherman, Harper, Springwells and Chene extension lines of the Detroit (Mich.) United Railway to succeed Mr. Boyd S. Brown, resigned.

Col. Harry C. Trexler, who has been elected chairman of the board of the Lehigh Valley Transit Company, Allentown, Pa., was vice-president of the company during the connection of Mr. R. P. Stevens with it. He was elected president of the company on its re-organization and held that place for a year, being succeeded by Mr. Stevens, who resigned from the company recently. Colonel Trexler is president of the Lehigh Portland Cement Company, Allentown, and senior partner of the Trexler Lumber Company, Allentown, Pa., and Newark, N. J.

Mr. Norman McD. Crawford, the retiring president of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, and its subsidiaries, was the guest at a farewell banquet tendered to him on the evening of Sept. 29 by the officers of the companies and the employees. Among the speakers were Mr. Crawford, Mr. J. F. Wessell, general manager of the company; Mr. G. J. A. Paul, general superintendent; Mr. M. E. McElligott, chief clerk; Mr. R. A Sauce, representing the trainmen, and Mr. Thomas Bannon. Mr. Crawford was presented with a watch and chain and a diamond stickpin by the employees as tokens of esteem.

Mr. Harrison R. Fehr, whose election as president of the Lehigh Valley Transit Company, Allentown, Pa., to succeed Mr. R. P. Stevens was noted in the ELECTRIC RAILWAY JOURNAL of Oct. 4, was born near Nazareth, Pa., in 1863, and was educated at the Moravian parochial schools in that city. For three years he taught in the public schools in Pennsylvania. In the spring of 1883 Mr. Fehr accepted a position with the engineering corps of the Lehigh Valley Railroad and later became assistant engineer. In the fall of 1891 he was elected to the office of city engineer of Easton, Pa., and occupied that position for eight years. He next engaged in engineering construction work on electric railways and in general contracting. In May, 1904, he was appointed general manager of the Easton Transit Company and the following year was elected as president of the company. Mr. Fehr has made an extremely successful record in the management of the property of the Easton Transit Company, which now is part of the Lehigh Valley Transit Company's system. When he took charge of the property in Easton in 1904 it was in poor physical condition and the relations of the company with the public were somewhat strained. The property has been thoroughly re-established and the administration under Mr. Fehr's direction has been so successful that dividends have been paid for several years. Mr. Fehr has spent the greater part of his life in the Lehigh Valley district and is intimately acquainted with the territory along the lines of the Lehigh Valley Transit Company. In 1911 Mr. Fehr was elected president of the Pennsylvania Street Railway Association. He is a member of the American Society of Civil Engineers.

H. R. Fehr

Mr. R. P. Stevens, the retiring president of the Lehigh Valley Transit Company, Allentown, Pa., was the guest at a banquet tendered to him at the Elks' Club, Allentown, on Sept. 30 by the officers' club, an organization made up of the heads of the departments of the company. Mr. Charles N. Wagner, the secretary and treasurer of the company, acted as toastmaster and responses were made to toasts by Mr. C. C. Collins, the traffic manager; Col. H. C. Trexler, newly elected president of the board of directors; Mr. E. M. Young, vice-president of the company, and Mr. Reuben J. Butz, attorney for the company. Mr. Butz, on behalf of the club, of which Mr. Stevens has been the head for almost six years, presented Mr. Stevens with a silver loving cup. Mr. Stevens in acknowledging the gift paid tribute to the various men in the organization and bespoke for his successor the same earnest co-operation and fealty that had been shown him. On the cup that was presented to Mr. Stevens are engraved the names of the members of the officers' club and an etching of the Eighth Street bridge appears beneath, the men considering that this marks his greatest achievement. Among those in attendance at the banquet were Mr. Charles C. M. Walters, Mr. E. C. Spring, Mr. W. W. Wysor, Mr. G. E. Miller, Mr. Harry Branson, Mr. H. L. Coker, Mr. Thomas L. Gibson, Mr. C. L. Murray, Mr. R. J. Pike, Mr. F. A. Burgess, Mr. William Trythall, Mr. J. B. Stewart, Mr. C. C. Collins, Col. H. C. Trexler, Mr. Reuben J. Butz, Mr. S. B. Stevens and Mr. R. P. Stevens.

OBITUARY

William Clark Wood is dead. Mr. Wood was president of the New York Switch & Crossing Company, Hoboken, N. J., a director of the Hoboken Trust Company, a member of the Board of Trade of that city, and interested in the development of the street railway properties in Catskill, N. Y. At his works at Hoboken Mr. Wood manufactured a great deal of track material for electric railways. Previous to his establishment of the New York Switch & Crossing Company, some twenty years ago, Mr. Wood was connected with the Lewis & Fowler Girder Rail Company, formerly of Brooklyn.

William M. Larned, the engineer who had charge of the construction of most of the Geary Street Municipal Railroad, San Francisco, Cal., and who designed the cars and equipment for that system, succumbed to an attack of pneumonia in San Francisco on Sept. 20, 1913. For many years Mr. Larned was chief draftsman for the United Railroads of San Francisco and left that position to accept the appointment of assistant city engineer. He designed the reinforced concrete cisterns which form an important part of the city's auxiliary water supply system for fire protection and helped to select the route for the municipal railway. Mr. Larned was a native of Washington, D. C. He was forty-eight years of age.

R. D. Apperson, until recently president of the Lynchburg Traction & Light Company, Lynchburg, Va., died on Oct. 6 at Santa Monica, Cal., where he had gone in the hope that the climate would be beneficial to him. Mr. Apperson was born in 1863. He entered the office of the Pullman Palace Car Company in 1875. In 1886 he became connected with the Little Rock & Citizens' Street Railway, Little Rock, Ark., remaining with that company until 1890, when the property was sold. He then went to Staunton, Va., and in five months an electric railway was built in the interest of his New York and Arkansas associates, who insisted on Mr. Apperson assuming the management of the property. While thus engaged he carried on a contracting business and later built and operated an electric light and gas plant in Staunton for the same interests. In 1899 Mr. Apperson and his associates purchased the property of the Petersburg Gas & Light Company, Petersburg, Va., and the Lynchburg Gas Company. Two years later they purchased the property of the Lynchburg Electric Railway & Light Company and the Lynchburg & Riverton Street Railway, and these properties and that of the gas company were consolidated as the Lynchburg Traction & Light Company. In 1903 the Apperson interests purchased the property of the Roanoke Railway & Electric Company. In January, 1910, the American Railways acquired the property of both the Lynchburg Traction & Light Company and the Roanoke Railway & Electric Company, Mr. Apperson continuing as president and general manager of both of the companies and becoming a director of the American Railways. Mr. Apperson resigned a few months ago as president of the Lynchburg Traction & Light Company, but continued as chairman of the board of directors of the company and of the Roanoke Railway & Electric Company.

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Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

Birmingham (Ala.) Rapid Transit Company.—Incorporated in Alabama to build an electric railway in Birmingham and Jefferson County. Capital stock authorized, $2,000. Incorporators: George B. Kelley, president; W. E. Kelley, vice-president; Carl Steiner, secretary and treasurer. [E. R. J., March 15, '13.]

Twin Falls (Idaho) Railroad.—Incorporated in Idaho to build electric and steam railways in Twin Falls. The immediate purpose is an interurban line from Twin Falls to Shoshone Falls on the Snake River. Capital stock, $1,000,000. Directors: S. D. Perrine, R. R. Spofford, L. C. Moore, all of Twin Falls. [E. R. J., Nov. 30, '12.]

***Evanston (Ill.) Street Railway.**—Incorporated in Illinois to build an electric railway in Evanston. Capital stock, $10,000. Incorporators: Bertram W. Rosenstone, Claude O. Netherton and Jacob E. Repiogle.

***Elkhorn & Arnold's Fork Railway, Frankfort, Ky.**—Incorporated in Kentucky to build a 20-mile interurban railway in Floyd and Knott Counties. Capital stock, $5,000. Incorporators: John F. Hager, John S. Hager, James G. Serey, Charles Russell and H. S. Smith, Ashland.

***Limestone Railroad, Elkins, W. Va.**—Chartered in West Virginia to build an interurban railway in the Beverly and Leedsville district, Randolph County. Capital stock, $15,000. Incorporators: E. A. Cody, Buckhannon, W. Va.; J. H. Isherwood, Elkins, W. Va., and Robert Connell, Washington, D. C.

FRANCHISES

Little Rock, Ark.—The Little Rock & Argenta Railway has received a three-year extension of time on its franchise in which to begin the construction of its line in Little Rock.

Los Angeles, Cal.—The City Council has been recommended by the Board of Public Works that the Pacific Electric Railway be granted a forty-year franchise for its proposed elevated structure from the rear of the main street station to conect with the new San Pedro Street line, in Los Angeles. The elevated railway will cost, together with right-of-way, close to $500,000.

Pittsburg, Cal.—The Oakland, Antioch & Eastern Railway, Oakland, has received a fifty-year franchise from the Council over certain streets in Pittsburg.

San Diego, Cal.—The San Diego Electric Railway has received a franchise from the Council to extend its lines in San Diego from Twelfth Street and F Street through Balboa Park.

San Francisco, Cal.—The Park-Richmond Improvement Club has asked the Supervisors to construct a loop for the Geary Street Municipal Railway by laying tracks from the Golden Gate Park terminus of the line at Tenth Avenue and Fulton Street, so that the cars may run along Fulton Street, between Tenth and Fifth Avenues, and along Fifth Avenue to Geary Street, in San Francisco.

Idaho Falls, Idaho.—The City Council recently granted the Idaho Falls Electric Railway a franchise to build a 40-mile interurban railroad through Idaho Falls and into the adjacent country. Work will begin within ninety days and the line will be completed and in operation within two years. One consideration of the franchise is the granting to the promoters of the right to secure electric power from the municipal hydroelectric power plant, provided that the promoters increase the capacity of the plant sufficiently to take off the additional power used. Local stock to the amount of $1,000 to the mile is being subscribed, that being one of the conditions of the contract. The franchise covers a period of fifty years. J. L. Milner, Idaho Falls, president. [E. R. J., April 6, '13.]

Lewiston, Idaho.—An ordinance to revive the franchise of the Lewiston Terminal Company was passed by the City Council recently. The Terminal Company is the owner of the tracks now laid within the city limits of Lewiston, and its franchise was forfeited when the Sturm franchise was repealed some time ago. The new franchise will permit the company to negotiate with any enterprise desiring to operate over the tracks, and three applicants—the Nez Perce & Idaho Railway, F. L. Sturm, who has been promoting an electric line from Lewiston to Asotin via Clarkston, and H. L. Powers, vice-president and general manager of the Lewiston Orchards Company—are seeking this privilege.

Farmington, Ill.—The Peoria, Canton & Galesburg Railway, Peoria, has received a franchise from the Fulton County Board of Supervisors to use certain roads in Farmington for an electric line. Horace Clark, Peoria, president. [E. R. J., Oct. 4, '13.]

Topeka, Kan.—The Topeka Railway has asked the County Commissioners for a twenty-year franchise over the Eighth Street line from the city limits of Topeka on the west to Gage Park.

Brandon, Man.—The City Council has decided to extend the present lines of the Brandon Municipal Railway, which have only recently been completed, on several streets in Brandon.

Detroit, Mich.—The Detroit United Railway has received a franchise from the Common Council for its new Junction Avenue north and south line in Detroit.

***Minneapolis, Minn.**—The City Council of Minneapolis has voted to build a municipal electric railway in Minneapolis to the filtration plant. The estimated cost including cars is $26,000.

St. Joseph, Mo.—The St. Joseph Railway, Light, Heat & Power Company has asked the Council for a franchise to extend its Frederick Avenue line from its present terminus at Twenty-sixth Street to the state hospital in St. Joseph.

***Ely, Nev.**—A. B. Witcher, Ely, has asked the Council for a franchise to build an electric railway through Ely.

Akron, Ohio.—The Northern Ohio Traction & Light Company will ask the Council for a franchise to build 6 miles of extensions in Akron.

Bucyrus, Ohio.—The Cleveland, Southwestern & Columbus Railway, Cleveland, has received a franchise from the Council in Bucyrus through Charleston Street to the plant of the American Clay Working Machinery Company.

Cleveland, Ohio.—The Cleveland Railway has asked the Council for a franchise for an extension from London Road east to Dille Road in old Collinwood. Right-of-way is being obtained and work will soon be begun.

Gladstone, Ore.—Stephen Carver has asked the Council for a franchise to build an electric railway in Gladstone.

Portland, Ore.—The Portland & Oregon City Electric Railway recently petitioned the City Council for a franchise to construct a line on East Seventeenth Street, in Portland.

Portland, Ore.—George F. Heusner, Portland, has asked the Council for a twenty-five-year franchise in Portland. [E. R. J., July 19, '13.]

Sharon, Pa.—The Sharon & Wheatland Street Railway will ask the Council for a franchise to build a line through the hill district in Sharon.

Westmount, Que.—The Montreal Tramways has received a franchise from the Council on Sherbrooke Street from Green Avenue to the city limits of Montreal.

Nashville, Tenn.—The Nashville Traction Company has received a franchise from the Council in Nashville. The company plans to build a 34-mile line in Nashville. Walter O. Parmer, Nashville, is interested. [E. R. J., Oct. 4, '13.]

New Braunfels, Tex.—The San Antonio & Austin Interurban Railway, San Antonio, has asked the Council for a franchise in New Braunfels. This 27-mile line will connect Austin, San Antonio, Kyle, Manchaca, Hunter and New Braunfels. Vories P. Brown, San Antonio, president. [E. R. J., Aug. 16, '13.]

Seattle, Wash.—The Puget Sound Traction, Light & Power Company recently petitioned the City Council for permission to relay its tracks in Leary Avenue, from Kilbourne Street and Second Avenue Northwest to Sixth Ave-

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nue Northwest and between West Forty-second and West Forty-third Streets. An ordinance now before the Council granting this petition has been put over in order that the residents of the district involved may be heard. The company has petitioned the City Council for permission to extend its line on Fourth Avenue south from the Seattle Boulevard to Holgate Street in Seattle.

Tacoma, Wash.—C. E. Muckler and E. K. Murray, of the Tacoma-Seattle Electric Short Line Railway, recently appeared before the Council and asked for an extension of time on their franchise in which to enter Tacoma. The grant has been withheld for further consideration. The promoters aver that the line could not be built into Tacoma in the time of the present franchise, which expires January, 1914, and ask that they be given until Dec. 31, 1915.

Kenosha, Wis.—The Wisconsin Gas & Electric Company has received a franchise from the Council to build an electric railway in Kenosha.

TRACK AND ROADWAY

Birmingham (Ala.) Rapid Transit Company.—This company, the incorporation of which is noted elsewhere in this issue, has awarded the contract for the construction of its line in Birmingham and Jefferson County to the Cortlandt Engineering Company, 146 Liberty Street, New York, N. Y., George B. Kelly, Birmingham, president. [E. R. J., March 15, '13.]

Birmingham Railway, Light & Power Company, Birmingham, Ala.—This company placed in operation on Oct. 5 its 1-mile extension of its East Lake line through the properties of the East Lake Land Company, a suburb of Birmingham known as Roebuck.

Calgary (Alta.) Municipal Railway.—Seven extensions in Calgary are being planned by this company of from ½ mile to ¾ mile each and aggregating about 4 miles.

British Columbia Electric Railway, Vancouver, B. C.—The work of laying the 2-mile extension of the tramway line from Boundary Road along Hastings Street east is being carried on by this company as rapidly as possible, and it is declared that this section of the line will be in operation by Dec. 1. The proposed line will be extended as far as Holdom Avenue at Capitol Hill. Plans were submitted to the Board of Works recently showing a proposed line to be built on Forty-third Avenue in South Vancouver, from Bridge Street to Main Street, being an extension of the new line from Kerrisdale to Point Grey. The plans were approved and the line will be constructed to Main Street this year and extended to Victoria Road next year.

Victoria, B. C.—Tenders will be received until noon Oct. 20, 1913, by the purchasing agent in Victoria, B. C., for the delivery of about 555 gross tons of 25 lb. to the yard rails in 20-ft. lengths as follows: 8 miles of single track to Goldstream, B. C.; 1⅛ miles to Fitzgerald, B. C.; 8⅔ miles to Cooper Cove Wharf, B. C., together with necessary splice bars, bolts and ½-in. x 3½-in. track spikes, 10,700 to the mile. W. G. Alt, purchasing agent.

Northern Electric Railway, Chico, Cal.—Plans are being made by this company to extend its line to Princeton and Butte City. Eventually the company will build a line from Colusa northward along the Sacramento River to Hamilton City.

***Fresno, Cal.**—An interurban railway from Fresno to Clovis and one that will probably be extended past Clovis and take in the foothills of the Sierra Nevada Mountains and open up a great orange belt of the San Joaquin Valley is under consideration. F. S. Granger, promoter of the Fresno, Hanford & Summit Lake Railroad, is interested in the project.

Fresno (Cal.) Traction Company.—Plans are being considered by this company to build an extension of its Arlington Heights line from its present terminus through Arlington Heights and the Belmont Addition.

Geary Street Municipal Railway, San Francisco, Cal.—The Board of Supervisors has voted the passing of the ordinance for the sale of $3,400,000 in bonds for the construction of additional units of this municipal railway in San Francisco.

Stockton (Cal.) Electric Railway.—Work has been begun by this company on the extension of the Poplar Street line through Yosemite Terrace in Stockton.

Sacramento Valley West Side Electric Railway, Willows, Cal.—Surveys have been completed by this company from Red Bluff to Woodland and the survey was extended to Dixon and a point 7 or 8 miles from Sacramento to connect with the Oakland, Antioch & Eastern Railway, with which traffic arrangements have been made. A survey has also been made from a point near Dixon to Solano City. The company has secured about 80 per cent of the right-of-way, and within the next thirty days bids will be asked for grading the line. C. L. Donohoe, Willows, president. [E. R. J., Aug. 16, '13.]

East St. Louis & Suburban Railway, East St. Louis, Ill.—Work has been begun by this company on the 1-mile extension of its Washington Park line from Forest Boulevard and King's Highway, to the Alton & Southern Railway in East St. Louis.

Rock Island Southern Railroad, Monmouth, Ill.—This company plans to build extensive improvements and extensions of its lines. Among the improvements will be the construction of a line into Rock Island from the present terminus of the line upon the outskirts of the city, and tracks and right-of-way into Galesburg.

Capital Circuit Traction Company, Indianapolis, Ind.—Interest has again been revived in this company. Financial backing has been secured and franchises have been extended in the seven county seat towns through which the projected line is to extend. It is the intention of the company to begin the construction of the line in the spring. This line will encircle Indianapolis and take in all towns within a radius of 30 miles. C. E. Worth, Indianapolis, is interested. [E. R. J., Jan. 4, '13.]

Indianapolis, Linton & Vincennes Traction Company, Indianapolis, Ind.—Preliminary work is being done by this company for a line from Indianapolis to Patoka, via Mooresville, Linton, Bicknell and Vincennes. William C. Thompson, Indianapolis, secretary. [E. R. J., Sept. 27, '13.]

Pineville, Ky.—The Clay County Land & Lumber Company, Pineville, which recently acquired a large block of timber in eastern Kentucky, is planning the operation of a line between the timber and Barbourville, Ky. It is proposed to operate storage battery cars.

Brandon (Man.) Municipal Railway.—It is reported that this company will extend its line to the experimental farm, industrial school and Lake Percy Park, in the early spring.

Commonwealth Power, Railway & Light Company, Grand Rapids, Mich.—This company announces that it will place in operation on Nov. 1 its new line between Saginaw and Bay City.

***Grand Rapids, Mich.**—Plans for a new interurban line between Grand Rapids and Detroit have been completed. Andrew Fyfe and associates from Cincinnati, Pittsburgh and New York have purchased the right-of-way of the Detroit, Lansing & Grand Rapids Railway of Dr. Oliver H. Lau, Detroit, and the work of constructing the line will begin next spring. The length of the railway will be 174.4 miles, and it will pass through twenty-five important cities. The company now holds franchises from fourteen cities and fifty-two townships through which the line will pass.

Iron River-Stambaugh-Crystal Falls Railway, Iron River, Mich.—Work has been begun by this company on its line to connect Iron River, Spring Valley, Crystal Falls and Stambaugh. F. D. Sullivan, Iron River, is interested. [E. R. J., July 12, '13.]

Electric Short Line Railroad, Minneapolis, Minn.—This company has awarded a contract to H. F. Balch & Company, Minneapolis, to grade a section of its line.

Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company, Minneapolis, Minn.—A 15-mile extension from Faribault to Owatonna will be built by this company in the near future.

Twin City Rapid Transit Company, Minneapolis, Minn.—This company has just opened an extension into the outlying residence districts, giving service to a large district which has recently been built up.

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Red Lodge (Mont.) Electric Railway.—Capitalists of Red Lodge recently organized and incorporated this company, which has for its object the construction of an electric railway from Red Lodge to Bear Creek, a distance of 9 miles. The company is capitalized at $100,000, and it is reported construction will begin shortly. C. L. Mayo, Seattle, is interested. [E. R. J., Sept. 27, '13.]

St. John (N. B.) Suburban Railway.—This company plans to have its extension to Kane's Corner, near East St. John, in operation this month. A further agreement has been made between the company and the City Council to extend the line from Kane's Corner along the Marsh Road, so as to complete the circuit for which the people lately petitioned.

Public Service Railway, Newark, N. J.—This company has awarded the contract to the Newark Paving Company for grading its new Hawthorne Avenue line. The company's franchise for this line has been approved by the Public Utility Commissioners at Trenton.

Middletown, Reasing & Cincinnati Interurban Railway, Middletown, Ohio.—Surveys are being made by this company on its 30-mile line between Middletown and Cincinnati. This is part of a plan to build a 50-mile line between Dayton and Cincinnati. E. H. McKnight, Middletown, chief engineer. [E. R. J., June 21, '13.]

Temiskaming & Northern Ontario Railway, North Bay, Ont.—Plans are being made by this company to electrify its line between Cobalt and Haileybury.

Niagara, St. Catharines & Toronto Railway, St. Catharines, Ont.—Of the 11 miles to be covered by this line between St. Catharines and Niagara-on-the-Lake, Ont., rails have been laid for a distance of 8 miles, while 5½ miles of the line is entirely completed and before the next ten days will be in operation. A freight service has been inaugurated between McNab, the principal fruit section on the south shore of the Niagara River, and St. Catharines.

Portland & Oregon City Railway, Portland, Ore.—This company announces it will extend its lines into Milwaukie and that a new route has been surveyed east of the first one decided upon, by which it will enter East Milwaukie.

Regina (Sask.) Municipal Railway.—The City Council has under consideration plans for the extension of the municipal railway into the Canadian Pacific Railway annex, crossing the Grand Trunk Pacific Railway at Thirteenth Street. The line is also being extended on Young Street to the new power house at Winnipeg and Twentieth Streets in Regina.

Greenville, Spartanburg & Anderson Railway, Greenville, S. C.—This company, which is completing an extension from Greenville to Spartanburg, with a prospect of soon starting construction on another link from the latter point to Gastonia, N. C., thus connecting up the two sections of the Piedmont Northern lines, will be connected from Greenwood via Edgefield, S. C., with the Carolina & Georgia Railway, which James U. Jackson and others plan soon to build from Augusta, Ga., to Columbia, S. C., via Johnston and Batesburg. The connection will be constructed by the Carolina & Georgia Railway, and it will supply the demand for an interurban line from Greenwood via Edgefield to Augusta.

***Austin, Tex.**—Bird M. Robinson, president of the Tennessee Railway Company, is promoting the construction of an electric railway between Roswell, N. M., and San Antonio, via San Angelo.

Bryan & Brazos River Railway, Bryan, Tex.—Steps have been taken by this company to build a 22-mile extension from a point near Clay to Breham, via Independence.

Gulf, Freeport & Northern Railway, Freeport, Tex.—Grading has been begun by this company on its line from Freeport, situated at the mouth of the Brazos River, to Sealy, about 100 miles. It will connect with the Missouri, Kansas & Texas Railroad and the Gulf, Colorado & Santa Fé Railroad at Staley. C. L. Sharp, general manager. [E. R. J., July 12, 13.]

Ogden (Utah) Rapid Transit Company.—Work will be begun at once by this company double-tracking its Washington Avenue line between Twenty-eighth Street and Thirty-second Street in Ogden.

Utah Light & Railway Company, Salt Lake City, Utah.—Surveys have been begun by this company on the extension from Holiday to Big Cottonwood Canyon along the county road.

South Richmond & Chesterfield Railway, Richmond, Va.—Right-of-way has been secured and financial backing has been obtained by this company for its 3-mile electric railway from the intersection of Broad Rock Road and Hull Street, Richmond, to Falling Creek. John C. Robertson, Richmond, is interested. [E. R. J., Aug. 2, '13.]

SHOPS AND BUILDINGS

Pacific Electric Railway, Los Angeles, Cal.—Plans are being made by this company to build a new depot at Hermosa Beach. The cost is estimated to be about $5,000.

Illinois Central Electric Railway, Canton, Ill.—Work has been begun by this company on its new carhouse in Farmington. The structure will be 18 ft. x 22 ft. and of cement block construction. There will be a waiting room and a baggage room.

Rock Island Southern Railroad, Monmouth, Ill.—This company plans to improve its terminal station in Galesburg in the near future.

Springfield (Ill.) Consolidated Railway.—This company, together with the other utilities operated by the Hodenpyl-Hardy syndicate, has taken a lease on the first two floors of the Odd Fellows' Building at Fourth Street and Monroe Street in Springfield to be used as general offices.

Kentucky Traction & Terminal Company, Lexington, Ky.—This company is preparing to lease a building on Main Street for use as an interurban depot and also for the general offices of that company and its local subsidiary, the Lexington Utilities Company. It is planned to remodel the building along modern lines, the ticket office and waiting rooms on the first floor to be improved, while the second floor would be used as a club room for employees, with a reading room, billiard and pool tables and other facilities for recreation. F. W. Bacon, vice-president of the company, is in charge of the plans for the changes.

Port Arthur & Fort William Electric Railway, Port Arthur, Ont.—The city of Fort William is advertising for bids to build an addition to the Walsh Street carhouses. The structure will be 260 ft. x 30 ft. and of brick construction.

Canadian Northern Railway, Toronto, Ont.—Negotiations by agents of this railroad for the purchase of a plot of land near the Canadian end of the upper steel arch bridge over the lower gorge of the Niagara again indicate that this company proposes to build a terminal for the Niagara Falls end of the electric line which it proposes to construct between Niagara Falls, Ont., and Toronto. The MacKenzie-Mann interests are said to have offered $30,000 for the site under consideration.

Ohio Valley Electric Company, Huntington, W. Va.—This company, which operates interurban lines in the upper Ohio Valley, has leased a building in Catlettsburg, Ky., which will be remodeled for use as a depot and waiting room.

POWER HOUSES AND SUBSTATIONS

Tidewater & Southern Railroad, Stockton, Cal.—Negotiations are under way by this company to move its passenger and freight depot to 829 Ninth Street in Modesto.

Tampa (Fla.) Electric Company.—New equipment has been installed by this company in its power plant on West Jackson Street in Tampa.

Idaho Traction Company, Boise, Idaho.—This company has completed the installation of a 750-kw motor-generator set in its power plant.

Jamestown (N. Y.) Street Railway.—This company plans to build an addition, 75 ft. x 62 ft., to its power station to house additional equipment. Eighteen transformers are to be placed in the new structure, which will probably be completed before the end of the month. The concrete foundations are now being laid. The building will be of steel and concrete construction throughout. In December the company expects to install a great 5000-kw Westinghouse-Parsons turbo-generator in the power plant being operated at present.

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Manufactures and Supplies

ROLLING STOCK

Union Street Railway, New Bedford, Mass., has ordered twelve 30-ft. double-end cars from the Osgood Bradley Car Company.

North Carolina Public Service Company, Greensboro, N. C., has ordered six single-truck cars from the Southern Car Company.

Lewiston, Augusta & Waterville Street Railway, Lewiston, Maine, has ordered three flat cars from the Laconia Car Company.

London (Ont.) Street Railway has ordered six single-truck, single-end pay-as-you-enter cars from the Preston Car & Coach Company.

Canadian Northern Railways, Montreal, Que., has placed an order with the General Electric Company for seven locomotives and eight multiple-unit car equipments, to be used in the Montreal Tunnel & Terminal. The locomotives will weigh 80 tons each, all weight being on the drivers. They will be equipped with two four-wheel trucks articulated together, with four motors geared to the drivers through twin gears. The motors will be of the commutating-pole type, wound for 1200 volts and insulated for 2400 volts, operating two in permanent series. The control will be multiple-unit series-parallel, the current for the contactors being furnished by a motor-generator set. The motors for the multiple-unit four-motor car equipments are rated at 125 hp and 1200 volts each. The control is in general similar to that of the locomotives.

TRADE NOTES

Universal Safety Tread Company, Boston, Mass., is erecting a large cement factory in Waltham, Mass.

H. H. Althouse, New York, N. Y., consulting engineer, has opened an office in the Woolworth Building.

Railway Utility Company, Chicago, Ill., has received an order for 240 Utility honeycomb-type ventilators to equip thirty cars recently purchased by the Toledo Railways & Light Company.

Allis-Chalmers Manufacturing Company, Milwaukee, Wis., announces the removal of the sales and engineering offices of its mining machinery department from Chicago to the Milwaukee works at West Allis.

Hambleton & Company, Baltimore, Md., will open a New York office at 43 Exchange Place on Nov. 1, and will take into the firm as resident partners Fairman R. Dick, formerly with Dick Brothers & Company; Nicholas L. Tilney and Ernest T. Gregory, formerly with Lee, Higginson & Company, and William F. Ladd, formerly with Kissel, Kinnicutt & Company.

Verne W. Shear, Akron, Ohio, has opened an office as commercial engineer and manufacturer's agent, representing the Condit Electrical Manufacturing Company, Pittsburgh Transformer Company and other manufacturers, at 609 Flatiron Building, Akron, Ohio. Mr. Shear was for five years commercial engineer with the Westinghouse Electric & Manufacturing Company, and during 1912 and part of 1913 was electrical engineer of the Northern Ohio Traction & Light Company, Akron, Ohio.

Lord Manufacturing Company, Brooklyn, N. Y., has received an order from the Brooklyn Rapid Transit Company to equip all of its new center-entrance cars with Spencer or Lord screenless air cleaners. This cleaner is used as an intake to the air compressors, in lieu of a hair strainer. The dirt and dust is removed from the intaken air through a special arrangement whereby it is thrown against the surface of an adhesive liquid, such as oil, the clean air then being free to enter the compressor.

ADVERTISING LITERATURE

National Tube Company, Pittsburgh, Pa., has issued N. T. C. Bulletin No. 17, describing and illustrating its Shelby seamless steel tubing.

Hart & Hegeman Manufacturing Company, Hartford, Conn., has issued Catalog K, listing its various types of H & H switches and accessories.

Walter A. Zelnicker Supply Company, St. Louis, Mo., has issued Bulletin No. 142, listing its cars, and all kinds of railroad and contractor equipment.

General Electric Company, Schenectady, N. Y., has issued Bulletin No. A4142, which deals minutely with the various operating conditions which affect the efficiency and life of incandescent lamps.

Pawling & Harnischfeger Company, Milwaukee, Wis., has issued a catalog describing and illustrating its Type U traveling electric hoist for handling and transporting materials of every description.

Rooke Automatic Register Company, Providence, R. I., has issued a catalog composed chiefly of advertisements which explain in a general way its system of automatic fare collection and registration.

F. D. Spotswood, Lexington, Ky., has written a booklet explaining his copyrighted system for preventing accidents on street railways by means of distributing accident blotters, and by the use of car signs and safety plates.

Trolley Supply Company, Canton, Ohio, has issued a catalog describing its safety fenders, which are of heavy wire apron and cushion construction and are so designed as to prevent pedestrians who are knocked down by the car from being forced under the trucks.

Electric Railway Improvement Company, Cleveland, Ohio, has leased its electric weld-bonding cars to the following railways: Hudson & Manhattan Railroad, New York, N. Y.; Interstate Public Service Company, Indianapolis, Ind., and Calgary (Alta., Can.) Street Railway. Cataluna (Spain) Railways has placed an order through the Pearson Engineering Corporation, Ltd., New York, N. Y.

Q-P Signal Company, Needham Heights, Mass., has issued Catalog No. 5, describing its ball trolley catcher. When the trolley leaves the wire its rapid rise unwinds the rope from the reel with sufficient speed to make the square boss on the hub of the reel throw the ball to the top of the groove, in which position it engages with the next approaching projection on the reel, locking it against further unwinding and holding the trolley pole in that position until released.

Spencer Otis Company, Chicago, Ill., has issued a handbook on track supplies and construction costs. The book is divided into three sections. Section 1 presents in a very comprehensive manner tables relating to track laying and rail renewals. Section 2 contains data and information in regard to spikes, accompanied by a table showing the average holding power in pounds of different forms of spikes in different woods. Section 3 deals entirely with tie plates and their function in track construction. This subject is presented both from the design standpoint and from that of possible economies obtainable in the use of tie plates. A portion of this section is devoted to a brief treatise on iron and steel metallurgy and includes a summary of the processes which result in various kinds of products from iron ore to finished forms.

NEW PUBLICATIONS

Electricity for the Farm and Home. By Frank Koester. New York: Sturgis & Walton Company. 274 pages. Price, $1.

This book is a detailed discussion of the various uses to which electricity may be put on the farm and in the home. It takes up in full the benefits of electricity in agriculture and describes central station service, the methods of generating electric power and the application of the electric motor. The power cost and labor cost are estimated on the basis of a 100-acre farm. The uses of electricity in the manufacture of farm by-products and the preservation and transportation of farm products and in diverse cases such as electric plowing, milking and incubation are taken up in detail. Mr. Koester has been wise in adding to this book chapters that deal with the general utilization of electricity in the farm districts for purposes such as electric lighting, telephone, irrigation service and the stimulation of vegetation. The book is profusely illustrated with halftones of the principal apparatus described. One praiseworthy feature of the publication is the placing at the end of each chapter of a series of questions which serve to bring out for the benefit of the reader the most striking parts of the ground covered.

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TUESDAY, OCTOBER 14, 1913

PROGRAM FOR TO-DAY

CONVENTION MEETINGS

9:30 a.m. Opening Meeting of Accountants' Association, Accountants' Hall, Second Floor of Convention Pier.
9:30 a.m. Joint Session of Engineering and Transportation & Traffic Associations, Engineers' Hall, Convention Pier.
9:30 a.m. Session of Claims Association, Claims Hall, Second Floor of Convention Pier.
2:00 p.m. Opening Meeting of American Association, Greek Temple, Convention Pier.

ENTERTAINMENT

Golf, Qualifying Round for A. E. R. M. A. Tournament, Country Club, Northfield, N. J.
11:00 a.m. Concert by William Fenrich and Orchestra, Lobby, Convention Pier.
1:00 p.m. Get-Together Luncheon, Accountants' Association, Marlborough-Blenheim Hotel.
3:00 p.m. First and Second Rounds, Ladies' Auction Bridge Tournament, Persian Garden, Convention Pier.
3:00 p.m. Ladies' Euchre and Five Hundred Contests, Persian Garden, Convention Pier.
9:00 p.m. Informal Dancing, Ballroom, Convention Pier.

Time and the Program

It is difficult for the chairman of a large association meeting to make the proper distribution of time so as to complete the full program of papers and reports within the session allotted to them. It is especially difficult to do this in the case of our association meetings, where the length of the reports and the time which ought to be given to the discussion necessarily differ so greatly. A plan has been adopted successfully in some associations of appointing an official time keeper, of giving each subject a certain period of time, and then of discontinuing further consideration after the expiration of the period thus fixed. This is neither practicable nor desirable here. It suggests, however, an informal plan of action which the presidents of the various associations may find they can carry out without the loss of matters that should be brought to the attention of the association and without the loss of time which might be fatal to the completion of the whole program. This is a careful survey of the known business to be transacted at each session, a rough estimate of the proportion of time that can fairly be given to each topic and then an effort to approximate this rough schedule. It is better to restrict slightly the discussion on all of the papers than to reach the end of the session, as happened on one occasion in the past, before any consideration had been given to an important report that unfortunately occupied the last place on the program.

The Entertainment This Year

The isolation of Atlantic City is an excellent thing from the standpoint of convention efficiency, but this condition also makes the compilation of a satisfactory entertainment program an important matter. To be sure, the annual meeting of the American Electric Railway Association is primarily a business gathering, but the entertainments further this end by promoting the spirit of sociability and relaxation among people who see each other only at rare intervals. Atlantic City is especially well suited for the improvement of the social side of the convention because of the proximity of the hotels and the opportunities for social gatherings in the large pier ballroom.

The entertainments for the week were auspiciously begun last evening by the brilliant annual ball and reception extended to the officers and ladies of the main and affiliated associations. The rest of the entertainment program promises to be equally attractive. Each morning and each afternoon, except Friday, daily concerts will be given in the reception room on the pier by the large orchestra. The great evening event yet to come, of course, will be the promenade concert and ball on Thursday evening. The remaining evenings will be devoted to dancing in the ballroom this evening and a trip to Steeplechase Pier on Wednesday. This takes the place of the usual vaudeville entertainment or ball game and promises to be even more popular and funny, because all may actively participate. Since the ladies are not likely to find much interest in the business sessions of the convention, their daylight hours will be made to fly under the allurements of auction bridge and euchre. And, to crown all, the golfers will have an opportunity to seek in their ranks for another Schmidt or Ouimet.

The Exhibits

The annual five-day exhibit of the American Electric Railway Manufacturers' Association may be likened to a very short but highly profitable course at a university. To the newcomer this year, the exhibit is a veritable revelation of the technical complexities of electric railroading, while even the most experienced veteran annual must find something new worthy of his study.

Even before the visitor enters the pier his attention is attracted to the group of near-side vehicles on the exhibition track opposite. The first is a double-truck car for two-man service, the second, a single-truck car for one-man operation, and the third, a double-deck bus, which illustrates the adaptation of trackless transportation to American conditions. Once upon the pier, the visitor can study the improvements of cars in detail, beginning with trucks, particularly the radical axle type. He will find further that the up-to-date car body may now have the same composition material for the floors, panels, headlinings, partitions, roofs and even the dash. It is natural to learn also that the increased use of arch-roof cars has been both accelerated and accompanied by improvements in automatic ventilators. While novelties in fare collection are not so prominent as at former conventions, many devices shown do so many diverse things well that they tend to make the conductor little more than a fare collector, street announcer and door operator. Complete operating equipments have been installed to permit the track engineer to study the practical merits of various machines for installing rail joints, for bonding, for grinding and for removing corrugations. The

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transmission engineer has been catered to by what is probably the most elaborate feature of the exhibit, namely, a complete high-tension tower and substation. "Safety First" in car operation is emphasized by diverse operating signal equipments ranging from the lightest overhead contact type to the most elaborate track circuit.

In conclusion, the promising technical advances of the industry could not be better indicated than by the showing of insulators and other equipment for operating railways on 2400-volt direct current.

Progress in Standardization

It has been said that any industry in which practice has been rigidly standardized is moribund. It cannot be denied that the absolute removal of the incentive or opportunity for introducing innovations is hardly conducive to a healthy condition. But standardization as understood in railway work means not so much standardization of design and method as standardization of dimensions. Within these limits the genius of the inventor has ample play. For instance, no part of steam railroad equipment is so thoroughly standardized as couplers, yet at every steam railroad convention there are exhibits of a great variety of improved couplers, all of which are "standard." On the other hand, the absence of standards, even of the crudest kind, is a serious handicap. This condition is always in evidence in the development of any comparatively new art or process, an instance in kind being found in automatic block signaling, where practice is so varied that not even the fundamentals can be agreed upon.

The electric railways have suffered for a long time from this lack of universally established practice and design, although in view of the comparative youth of the industry this was only to be expected. Of late, however, sufficient agreement by majorities has been reached in many cases, so that the field for standardization has become a wide one. The work of the committee on standards for the past year has shown no exception to this tendency, for the committee's report contains recommendations for the adoption of standards of the most direct importance to the industry.

The Manual of Standards

The work of the committee on standards was not confined to this report, however, for time was also found for the development of a new code of procedure and the compilation of a manual of existing standards and practices. The reason for this new method of publication is that the action of the standards committee on each subject brought before it has been incorporated in the report of that standing committee which has developed the proposed new standard or practice, and the findings will appear only in this manner.

Among these findings will be found approved designs for 7-in. and 9-in. girder-grooved and girder-guard rails, standards which cannot fail to have a marked influence in reducing the cost of track construction and maintenance. Accompanying them are designs for splice bars and joint plates and a revised specification for girder and high T-rails, which have been approved as recommended practices. The tendency toward permanent standardization is further indicated by the revision of the present standard design of brakeshoes and the approval of a standard cap and cone design.

The value of standard designs as permanent records of committee work and their universal use depend almost entirely upon a thorough representation and a careful consideration of their merits. It seems therefore that the committee has treated wisely the proposed standard for 600-volt overhead construction, a most comprehensive and valuable specification prepared during the year by the committee on power distribution. Action on this, on account of the opportunity for introducing the personality of the individual into construction even so susceptible of standardization as overhead work, was deferred by the committee to permit discussion on the floor of the convention and thus allow opportunity for the presentation of the possibly divergent views of the different member companies.

The Man Who Stays at Home

The electric railway man obliged by circumstances to remain away from the convention makes a serious mistake if he concludes that the great gathering in Atlantic City has no message for him. He will do well to realize that in any industry of national scope only a comparatively small proportion of its workers can be spared at any one time and place for attendance at a convention of the organization as a whole and that as the meetings are held in different parts of the country the personnel of the delegates is bound to vary widely. This may disabuse his mind at once of any feeling that convention privileges are limited to certain groups of men who are in attendance year after year. It should also help him to realize that even if he cannot attend this year he may be able to do so next time, particularly if the convention city selected happens to be in his section of the country. The real question for the man who stays at home is how to profit by the convention when not in its midst, how to maintain his interest in its deliberations—in short, how to get the maximum good out of the entire occasion.

Certainly no thoughtful man can long entertain the belief that the convention is planned and carried forward solely for the benefit of those fortunate enough to attend it. The good of the industry is its object, even when the proceedings become local in character, as in occasional committee work and discussions on the floor. If a company has one or more representatives present as delegates, there are a number of very direct ways in which the man who has had to stay behind can benefit thereby. In the first place, by studying the program, he can often communicate with his associates in time to get a good deal of information from them along special lines before they leave for home. Even if they have no specialized knowledge of the subjects with which the man at home is familiar, they may still have the opportunity to submit written discussions and contributions of pertinent interest from the fellow left behind, to put others in his line of work in touch with him through the wire or mails and to send him plenty of data from the exhibits if he will only take the trouble to ask for the material. Thus, an engineer of motive power forced this year to remain close to a plant in process of reconstruction may write or telephone to his company's auditor asking the latter to send or bring home all the printed data he can pick up in the exhibit hall on the subject of condensing apparatus, mentioning the principal companies supplying this sort of equipment. The immediate gains might be greater if the engineer himself could see the exhibits, but he can acquire some valuable information through his company's delegate if each one utilizes the possibilities of co-operation.

We hardly need to point out that one of the chief purposes of the Convention Daily issue of the ELECTRIC RAILWAY JOURNAL is to give the man at home a faithful record of all the "high spots" touched in the convention, and whether others of his company are in attendance or not, it will pay him to run hastily over each day's proceedings as fast as the daily issues come to hand. In this way he easily can size up the trend of interest in all the important subjects covered. He can then mark special features for further investigation by mail or in person, and in not a few instances he can set about new lines of practice at home as a direct result of ideas gathered from the convention. In some ways the man at a distance has a better opportunity to review the proceedings as a whole than has the man in the midst of the crowd. The latter gets the stimulus of personal contact with other delegates and thereby gains a sense of common interests that in itself is worth the cost of the trip, but the former by a few moments' reading surveys quickly the work of many minds without the expenditure of time in the meeting hall. As a result he obtains ideas which will not only help to increase his efficiency, but will also give him a wider knowledge of current practice in the industry that will be of immense value when his time for attendance comes.

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Conventionalities

Back again, eh! How'd ya like the air?

Have you seen Hawley's new center-entrance car?

Bill Sawyer's here! Pipe the magenta Norfolk jacket. SOME rags!

United States Senator Claude Swanson, of Virginia, is the guest of President Harries.

Terre Haute has sent us Mr. and Mrs. Grover, of the T. H., I. & E. Many thanks, Terre Haute.

Coming in on the St. Louis special More-Jones Evans said he wasn't going to shave beyond Pittsburgh. What part of his chin is that?

This is some busy convention. Fifty-eight committee reports are to be made, twenty-three addresses delivered and nine papers read.

One of our correspondents has propounded to us the question: "Can the Board walk?" Our answer to this is: "Yes, sometimes after midnight."

One of our friends, a motorman, got fired recently for failing to ring his gong. He says that the rest of the platform men are going to strike ———.

Vice-president S. K. Colby, of A. E. R. M. A., is a close second to the Million Dollar Pier sea-lions. He may be seen disporting in the tank opposite the Pickle Pier almost any evening from six until seven.

It seems impossible—to wit, Harry Donecker attending a convention unfettered and happy; but have you noticed the joyous insouciance of Bernie Swenson every time he takes a peek at the annual hurly-burly?

As usual, R. E. Danforth has brought a lot of his men here for convention week. He says that when they get back from the trip they're always full of ginger. Guess they must do a lot of snappy work.

S. Walter Mower, now snugly ensconced as general manager of the Otsego & Herkimer Railroad, has the honor to announce to all of his friends that he has now resumed the dignities, burdens and emoluments of American citizenship.

Harlow C. Clark, publicity agent of the association, is an enthusiastic baseball fan. He also has a genial, breezy manner and is a good blower for the association—not a vacuum or an exhaust fan, but a high-pressure blower.

H. J. Kenfield, publisher of *Electric Traction*, whose presence here has come to be looked upon as indispensable at the convention, is detained in Chicago by the grave illness of Mrs. Kenfield, who suffered a paralytic stroke on Wednesday of last week.

We don't know and can't even conceive what an Atlantic City convention would be like without "Nate" Garland pointing out the straight and narrow path to the erring caddie and "Pa" Wilkinson directing the maneuvers of the Black Horse Brigade.

Among the famous visitors from foreign shores is Bill Wood, of the New York & Queens County Railway Company, who is reported to have come all the way from Long Island City to attend the convention. However, we rather doubt the rumor. It's too long a trip.

Charles Rufus Harte, construction engineer, Connecticut Company, meandered in on Monday. If he is convinced that the pier is a safe place for his assistants, five of them—Messrs. Young, White, Bates, McDonough and Kellas—will be found among the attractions on Tuesday.

Have you seen the Poultry Exposition just beyond the seal cage? Several earnest railroad men, whose wives were evidently at home, complained, after hanging around there yesterday, that all the chickens had men with them. We think it's a funny way to run a poultry show ourselves.

B. B. Davis, dean of the Claim Agents' Association, is one of those who like to visit Atlantic City 'tween conventions, too. Our genial secretary opines that while they have crowds in Columbus, they are smaller than those in Atlantic City. Hence he prefers this town because of the greater diversity factor in "mugs."

Large portraits of the association's presidents hang over the desks of the presiding officers in the various meeting rooms. President Schreiber of the Engineers gazed with admiration upon his presentment and declared it to be so true to life that there was no real reason why he should attend the meetings while it was in position.

James W. Perry, general manager of the electrical department of the H. W. Johns-Manville Company, and E. B. Hatch, president of the Johns-Pratt Company, Hartford, were among the very early arrivals. They went out to the golf grounds on Saturday afternoon, but according to special reports they didn't think very much of the course.

A happy anticipation expressed in the year 1607: "We must especially observe that compression and similar violence have a most powerful effect in producing locomotion, and other motions of the same nature, as may be observed in engines and projectiles."—From Francis Bacon's "Novum Organum," Book II, Aphorism L.

A correspondent of our revered contemporary *Motorman and Conductor* says, "The company has men around visiting the joy places and taking pictures of any found in them in uniform. They have a camera about the size of a watch. You can avoid being mugged by keeping out of those places." Sure! But where else can you get a drink?

S. M. Wilson buttonholed us on Saturday, and in commenting on the fine new Brill sign—sure, its fine—became somewhat sarcastic about our dear old relic of the first convention. We neglected at the time to call attention to the fact that the flight of years has eliminated from our sign errors such as reversed "N's." Look your sign over again, Sam, and fire your proofreader.

Professor Richey, the genial instructor of Worcester youth, has fallen for the efficiency engineering idea to the extent of inaugurating a personal bookkeeping scheme. He enters the time devoted to each client in a little notebook, charging accordingly, and balances a time account each week. Grand scheme! But whom does he soak for the time he spends at his meals?

The weather, whatever it is, is no better than it ought to be to recompense for its didoes on Saturday night, when the wind and rain "messed up" a lot of the exhibits in the Annex. Director McConnaughy had provided for a storm from all directions but the west. This particular storm came from all directions, but especially from the west. The director, of course, at once thought of Chicago as partly west, and then he thought of wind, and then he didn't say what he had in mind.

Thomas E. Finigan, of San Francisco, appears at this convention a changed man. He is now "on the other side of the fence." Instead of being the purchasing agent of the United Railways of San Francisco, buying things, he is vice-president of Pierson, Roeding & Company, and his particular purpose and delight in life is to sell things. Mr. Finigan succeeded that other Adonis of the industry, S. K. Colby, who is now allen and pecking in the Far East of the United States.

The annual meeting of the Manufacturers' Association will be held at 4 p. m. on Wednesday, in Engineers' Hall. At

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this meeting members of the executive committee will be elected to succeed the following, whose terms expired with the present convention: E. H. Baker, Galena-Signal Oil Company; Scott H. Blewett, American Car & Foundry Company; William H. Heulings, Jr., The J. G. Brill Company; J. L. Replagle, Cambria Steel Company, and E. M. Williams, Sherwin-Williams Company.

President W. H. Heulings, Jr., of the Manufacturers' Association, surprised and delighted his friends by appearing at the Marlborough-Blenheim on Sunday. He has been very ill and it was feared that he would not be able to attend the convention at all. But the kindly fates, together with a power for rapid recuperation and a somewhat assertive will, have enabled him to grace the occasion. Mr. Heulings is far from being the only one who is pleased at his recovery and his presence at the convention.

After Friday it will no longer be Secretary Donecker, but Assistant General Manager Donecker. The Public Service Railway has tapped the association's high-tension line and taken to itself a supply of energy which is going to be mighty useful to the New Jersey corporation. It might seem as if operation in the A. E. R. A. would be slowed up a trifle. But—There is E. B. Burritt, the secretary-elect, who is being tested out for voltage. Special committees on power generation and distribution are in charge. It may be stated confidentially that there is some current flowing over the new live wire and that there isn't much danger of a suspension of service at 29 West Thirty-ninth Street.

The very attractive and finished appearance of the lobby, which so impressed the early visitors to the Convention Pier yesterday morning, was not only pleasing in itself, but it was indicative of the general condition of finish and completeness of the exhibits as a whole. Director McConnaughy and the entire membership of the Manufacturers' executive committee deserve all of the congratulations and thanks which were showered upon them yesterday for the excellent fruition of their great labors during recent months of preparation for this convention. The exhibits are not only gratifying from the fact that they are of more than usual educational value and represent a larger number of exhibitors than were ever brought together at previous electric railway conventions in Atlantic City, but also from the fact that the show was ready on time for the opening yesterday morning.

Here's enterprise for you! The Public Service Railway of New Jersey has sent no less than ninety men to the convention, renting a floor of the Hotel Dennis for their accommodation and making, wherever possible, special provisions for their transportation. Most of them will stay for the two days of the convention on which are discussed the subjects of special interest to them, although a number will remain for the whole week, assisting the registration committee and otherwise helping out in the hard detail work of the various associations. During an interview on the subject, R. E. Danforth, general manager Public Service Railway, said in his characteristically forceful manner: "When we started sending men to the convention it was largely out of a sense of duty, but we soon found that everybody came back chock full of new ideas and renewed interest and fairly loaded with good old 'pep.' Now we are sending everyone who can get away without actually crippling the service, and we are all keen about the scheme. About one-third of our company section will attend the present convention at some time during the week." There may be more enterprising companies in this regard than the Public Service Railway, but it doesn't seem to be possible. However, if anyone can beat this record at the present convention, or any other, it would be an interesting fact to be brought to light and due prominence will be given to it in these columns. In the meantime, the congratulations of friends and the thanks of the association are in order.

ENTERTAINMENTS OF THE WEEK

A glance over the program of the entertainments, with notes of general information, which has been prepared by the entertainment committee, will convince the visiting delegates that unusual provision for their amusement and comfort during free hours has been made. These programs are being distributed from the registration booth and contain in addition to the program of entertainment an outline of the special privileges which have been accorded to the wearers of the official badge.

The entertainments, which began yesterday with concerts in the morning and afternoon and the annual reception in honor of the officers and ladies of the American Association and the affiliated associations, will be continued this morning with a concert in the lobby of the Convention Pier, by Fenrich's orchestra, well known on account of the prestige which it has attained in New York City through its rendition of music for the present popular dances. This orchestra, it might be added, has been permanently engaged this winter to play before a number of the exclusive dancing clubs in New York. This afternoon the preliminary rounds for an auction bridge tournament for ladies will be commenced, and in addition arrangements have been made for euchre and "500" contests for ladies who prefer these games.

Moving pictures will be displayed in the lobby of the Convention Hall during the entire week, but, contrary to the usual custom, these will be of educational character. Scenes of special interest to the electric railway industry will be displayed as a supplement to the various exhibits shown upon the Convention Pier.

Medal play for golfers will be continued at the links of the Country Club of Atlantic City, Northfield, N. J., during the whole week, and any of the delegates who wish to play should qualify on Tuesday and Wednesday afternoons for the blind handicap which will be held on Thursday afternoon.

On Tuesday evening informal dancing will be held at the ballroom, Convention Pier, and at this time Mr. Chidsey and Miss Judson, whose spectacular entrance at the dance last night was a feature of the evening, will again be present.

On Wednesday Fenrich's orchestra will give concerts in the morning and afternoon, and the final consolation round of the auction bridge tournament will be held in the Persian Garden, Convention Pier. Wednesday evening has been designated as "Steeplechase night," when all visiting delegates and guests are invited to appear at the Steeplechase Pier on the Boardwalk, opposite Haddon Hall, for an informal evening. This will be a unique entertainment as well as one of the most enjoyable of the week. Admission to the pier will be by badge only, as the entire pier with all of the amusement devices has been leased by the entertainment committee for the whole evening and is placed at the convenience of the delegates and their guests.

On Thursday concerts will be given in the morning and afternoon, and in the evening the annual promenade concert and ball of the association will be given at the ballroom, Convention Pier.

ROLLING CHAIRS

Delegates and others in attendance at the convention should bear in mind that one of the services supplied by the Manufacturers' Association this year, as formerly, is the free service of rolling chairs. The chairs available for this use will carry signs indicating that they are at the disposal of those in attendance at the convention. All that is necessary to secure this service is to show the official badge to the attendant. W. H. Wilkinson, Pressed Steel Car Company, who has most efficiently handled this portion of the entertainment program at past conventions, is the chairman of the chair committee this year.

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OUR GOING AND COMING SECRETARIES

When in April of this year the announcement was made that H. C. Donecker would resign on July 1 as secretary-treasurer of the American Electric Railway Association to become assistant general manager of the Public Service Railway, Newark, N. J., regret at his departure was mingled with felicitations at his advancement. Few men have shown such devotion and enthusiasm for their work as Harry Donecker. His diplomacy and executive power have insured the smooth running of the association machinery through a period of tremendous expansion, while his grasp of details has endeared him to more than one committee chairman overwhelmed by masses of undigested data. These qualities did not remain unobserved by his new executive chief, Thomas N. McCarter, during the latter's presidency of the American Electric Railway Association. Mr. Donecker has been in charge of association work since February, 1910. Previous to that he had spent twenty years in the operating and commercial sides of the electric railway field. He resigned officially on July 1, as noted, but by special arrangement with Mr. McCarter he was enabled to give the association as much of

H. C. Donecker

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E. B. Burritt

his time as necessary up to the end of the present convention. Harry Donecker enters his new work with the hearty godspeed of all who are acquainted with his unfailing good humor and his readiness to advance the standing of the electric railway industry.

There is every reason to believe that the association's happy selection of Mr. Donecker in years past will be repeated in the choice of E. B. Burritt as his successor. As secretary to Gen. George H. Harries, now president of the American Electric Railway Association, Mr. Burritt has already obtained the necessary insight into the traditions and executive policies of the association. His service with the Washington Railway & Electric Company dates from January, 1907, and is coincident with his service in the electric railway field. It is an interesting fact, however, that he began professional life in the steam railroad field, by employment with the Southern Railway at Washington in 1893. After six years with that company he enlisted in 1899 as a member of Troop A of the United States Cavalry and served with distinction with the cavalry branch of the army in the Philippines until compelled to resign after eighteen months because of disability. After some time in an army hospital he entered the commissary division of the transport department at Manila and soon after was advanced to the position of head of the manifest department, Manila depot. Later he was transferred to the subsistence department at Washington, where he remained until he entered the service of the Washington Railway & Electric Company in 1907. While with that company his work has been largely of an administrative character and he has also had an opportunity through his close association with General Harries to become thoroughly acquainted with and to participate in association work, so that with his experience, his pleasing personality, executive ability and energy, it is safe to say that he will worthily maintain the high standard set for the secretaryship of the American Electric Railway Association.

THE ANNUAL RECEPTION

Last evening's reception in honor of the officers and ladies of the various associations proved to be a great success in every respect, and the excellence of the arrangements gave forecast of an unusually pleasant week to come. Gen. George H. Harries for the American Association, assisted by the officers of the affiliated associations, together with a number of ladies, received the visiting delegates and their guests in the ballroom of the Convention Pier, the length of the line which passed before them showing that the attendance at this year's convention bids fair to exceed all previous records.

One of the features of the evening most noticeable to the onlooker was the large number of ladies in attendance, their modish gowns forming a striking contrast to the somber black and white worn by the men. In addition, the lighting scheme of the ballroom assisted in imparting brilliance to the spectacle, as the ceiling of the room was illuminated by subdued rays from colored lamps, while the brighter white lights were arranged around the sides of the main hall and in the booths.

At the conclusion of the reception informal dancing began, and, judging from the enthusiasm dsplayed by the devotees of the art, the reputation of Fenrich's orchestra was fully sustained. Incidentally it should be said that Fenrich plays for many of the most important dances in New York, and the entertainment committee is to be congratulated on its foresight in securing his services during the entire convention week.

A spectacular feature of the evening was the entrance of Miss Judson and Mr. Chidsey, who had been brought from New York by the entertainment committee to give interpretations of the present fashionable dances. This was the unexpected feature of the program, as the general dancing was suddenly stopped by the lowering of the lights, and a brilliant spot-light was turned on the booth in which the two dancers appeared, the light being kept focused upon them during their dance. The generous applause with which this was received was fully warranted by the grace of both dancers and the refined quality of their exhibition. This, of course, was to be expected, as the dancers have followed a rule to accept engagements only before private audiences and have, in consequence, never appeared upon the stage.

After the exhibition, general dancing was resumed, and it was continued until an hour as late as was consistent with the prospective hard work in convention during the following day. Especially prominent among the most expert dancers was the ex-secretary of the American Association. However, it is reported that Mr. Donecker was seen practising on Sunday afternoon so that his skill and verve may be partly accounted for on these grounds.

SUNDAY MORNING ON THE JERSEY CENTRAL

The Jersey Central train that reaches the shores of Atlantic City at 1.10 p. m., or just in time to cheat the local hotels out of a meal, brought a goodly group of "conventioners." Among them were some New Englanders who did not join the trolley party, namely, Professor Richey, of Worcester Polytechnic; Lee Parker, of Stone & Webster; Clarence and Mrs. Sprague, and G. W. Palmer, Jr., Bay State Street Railway. Others in the party were Major and Mrs. Evans, W. C. Wilson, Charles R. Ellicott, James H. McGraw, E. H. and Mrs. Mason, C. G. ("Cliff") and Mrs. Chamberlin, J. P. Barnes, Syracuse & South Bay Railway;

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J. L. Crouse, New York, New Haven & Hartford Railroad; J. J. Dempsey, transportation department, and Messrs. Goss and Clifford, mechanical department Brooklyn Rapid Transit System. Last, but not least, a caddie bag, accompanied by "Nate" Garland.

BADGES AND BADGE PRIVILEGES

The departure from the ribbon type of badge which was inaugurated at the 1912 convention has been retained this year, square badges with marine blue center being used to distinguish members of the Railway Associations and pentagonal badges with coquelicot red center those of the Manufacturers' Association. Each type of badge in turn is differently colored at the corners to indicate further subdivisions as follows: For the square badges—marine blue corner, American Association; brown corner, Engineering Association; orange corner, Accountants' Association; gray corner, Transportation & Traffic Association; green corner, Claims Association; light blue corner, American Association guest; white corner, American Association lady; purple corner, American Association individual member. The pentagonal badges with coquellicot red centers indicate the Manufacturers' Association; light blue corner, Manufacturers' Association guest; white corner, Manufacturers' Association lady.

BADGE PRIVILEGES

The arrangements described hereinafter have been provided for the exclusive use of members and guests of the American, affiliated and allied associations, but it is requested that the official badge be worn at all times in order that the special privileges may be obtained. Notes on the individual privileges follow:

Information Bureau—Left of entrance, Convention Pier. Open from 8:00 a.m. to 11:00 p.m. All information pertaining to convention matters.

Post Office—All mail addressed care of Young's Million Dollar Pier will be received and distributed from information bureau.

Telegraph Service—Western Union and Postal companies. Apply information bureau for messenger service.

Telephones—Free local service from all exhibit booths.

Stenography—L. H. Marvel, official stenographer. Office in gallery of main building, Convention Pier. Telephone connection to all booths.

Rolling Chairs—Stations at Convention Pier, Marlborough-Blenheim Hotel, Chalfonte Hotel. Hours—9:00 a.m. to 7.00 p.m., Oct. 13 to 17 inclusive. Chairs will be in service from 8:00 p.m. to 10,00 p.m. for transportation between hotels and convention pier only on Monday and Thursday evenings. On Wednesday evening this service will be for transportation between hotels and Steeplechase Pier. A special rate of 25 cents per person has been arranged for the wearers of the official badge for Reed's or Shill's chairs which may be required after hours for direct runs from the Convention Pier or Steeplechase Pier to hotels or from hotel to hotel.

Bathing—Admission to Brighton Casino—Rooms and suits, 50 cents per person. Indoor swimming pool and surf bathing, solarium, reading room and smoking room.

Private Electric Brougham Service—M. W. Harper, chauffeuse, Coast telephone 2288-R; Bell 2733-A. Arrangements have been made with Mrs. Harper to provide this service for the convenience of members and guests. Ladies will find this luxurious service particularly desirable for shopping, sight-seeing or visiting. The following rates will apply Sightseeing tour, $1.00 for each person; hourly rate, $3.50; 50 cents for one or two persons to any place within city limits.

Taxicabs—Richard G. Edwards, 1204 Atlantic Avenue, Coast telephone 192; Bell 192. Bergdoll Taxicab Company, New York Avenue and Boardwalk, Coast telephone 1700, Bell 600. Branch station at the Shelburne hotel. Rates are 50 cents for one or two persons to any place within city limits.

Touring Cars—Richard G. Edwards, Bergdoll Taxicab Company, five-passenger touring cars $3.50 per hour; seven-passenger touring cars $5.00 per hour.

Garages—Richard G. Edwards, garage 1204 Atlantic Avenue; Bergdoll Taxicab Company, garage New York Avenue and Boardwalk. Rates—75 cents a day, $1.50 per day including washing and polishing, and $7.00 per week including washing and polishing. Other garages as follows: Atlantic Automobile Company, 12 and 14 South North Carolina Avenue, Coast telephone 364, Bell 750; Marlborough-Blenheim hotel, for guests of hotel only. The information bureau will furnish rates or additional information.

Golf—Guests' privileges may be obtained at the Country Club of Atlantic City, Northfield, N. J. The regular charge of $1 a day will be made for play. Cars to the clubhouse leave Florida Avenue and Boardwalk at quarter of and quarter past the hour; Virginia Avenue and Boardwalk, twenty and fifty minutes past the hour except 7:25 a.m., and 8:25 a.m., 12:25, 4:40 and 5:10 p.m.

Special golf events are referred to elsewhere in this issue.

LADIES' AUCTION BRIDGE TOURNAMENT

The ladies' auction bridge tournament will consist of two afternoons' play, namely, Tuesday and Wednesday; two rounds of three rubbers each to be played each afternoon. Members only can participate, and ladies will be requested to display badges at the entrance to the Persian Garden on the Convention Pier. The card committee is composed of Henry N. Ransom, chairman, H. A. Hegeman and H. H. Helms. The first day will be devoted to the first round (preliminary), for all players, and to the second round, in which the highest sixty-four net scores play for a championship prize. The others will play for a consolation prize.

The second day will be devoted to the third round (championship), in which the highest net score at each table of the second round is to play, while the consolation prize will be played for by the hightest sixteen net scores in the second round. The fourth round (both championship and consolation) will be open to the high net score at each table of the third round. The players of the fourth round at the championship table will be awarded first, second, third and fourth prizes. The winner of the highest net score in the fourth round at the consolation table will be awarded the consolation prize.

The rules for play will be as follows:

Each lady upon entering the Persian Garden will receive an identification card showing the number of the table at which she is to play the preliminary round. The player should write her full name upon this card and enter upon it at the end of each rubber the number of points won or lost. At the end of the third rubber the player should add the total number of points won and the total number of points lost and deduct one from the other, entering the net points won or lost for the three rubbers.

The individual cards will be collected by the committee as each table finishes the third rubber. Make-up of tables for second round will be announced by the committee as soon as all the players' cards have been handed in. One player at each table is to act as scorer and is to play one rubber with each of the other three players. Values of points are to be computed by the new count (Royals).

In scoring, place honor count above the line and points below the line. At the end of each rubber add total points and honors of each side and deduct the smaller from the greater total. The net result is the points won or lost for the rubber, which is to be entered by each player upon her identification card.

Players are to cut for deal at beginning of each rubber—

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ace low. In cutting, hearts are low, diamonds next, then clubs and spades in the order named. Standard bridge rules will govern. Penalties for revokes must be enforced. In event of tie high scores at any table after the first or preliminary round an additional rubber shall be played, partners and deal to be determined by cut.

SPECIAL TRAINS

The special train from St. Louis, composed of five sleepers, a library observation car, a diner, and a buffet-smoker, all of steel, arrived in Atlantic City at half-past five on Sunday evening. The entire route was over the Pennsylvania lines and a number of passengers were picked up en route, although the majority of the delegates on the train came from St. Louis and the Southwest. A total of eighty passengers made the journey. The feature of the trip was a "get-together" table d'hôte dinner on Saturday evening which the cook—we mean our E. B. Cooke—pronounced to be the finest ever prepared on a dining car even though it was largely "dry." Next to this in importance, according to the ideas of our informant, was the fact that many of the delegates were accompanied by their wives, whose conspicuousness in number was exceeded only by the high average of good looks.

Among the special features of entertainment was a shepherd-plaid cap worn by Mr. Walsh, of the United Railways of St. Louis. It had the cutest little bow in the back! Oh, safety pins! Incidentally it appears that George Smith, of Kansas City, held more threes than the number of pairs acquired by all the other students of Hoyle put together, and this created almost as much comment as the lack of patriotism shown by Nick D. Grand in drinking an orange-colored cocktail.

The Chicago special which arrived early yesterday morning made practically schedule time over the Pennsylvania System. It consisted of six standard Pullmans, two diners, two compartment sleepers and a combination observation and buffet smoking car. The train was well loaded upon leaving Chicago, but a number of railway and supply men joined a party at Fort Wayne, Mansfield and Pittsburgh, making a total of 152 passengers, including sixteen ladies.

The journey was a most enjoyable one as entertainment of various sorts had been provided. On Sunday afternoon a pink tea for the ladies was given in one of the dining cars, at which time bouquets of flowers and boxes of bonbons packed for the occasion were distributed. During the afternoon a ladies' drawing contest was given, in which the first prize, a chafing-dish set, was won by Mrs. Joseph S. Wells; and the second prize, a tea urn, was awarded to Mrs. G. W. Kalweit, the third prize, a fountain pen, being won by Mrs. E. C. Faber.

Several pools on the time of arrival of the train at given points afforded considerable excitement. The first of these was based on the time of arrival at Alliance, the first, second and third prizes being awarded to G. R. Lyman, G. W. Kalweit and W. T. Hubbard. The largest pool was made on the time of crossing the high bridge over the Delaware River, and in this the prizes were awarded to Walter Achepohl, E. L. Kirk, G. D. Casgrain and J. J. Brennan. As an educational feature of the trip the crowd learned that Ohio was 225 miles wide and "dry."

CHARLES S. MELLEN---HIS GOAT INDUSTRY

Neither Governor Foss nor the newspapers will let Charles S. Mellen rest in peace with his goat industry at Stockbridge. When Mr. Mellen left the New York, New Haven and Hartford Railroad the Boston *News Bureau* asked him concerning his future plans, and he replied:

"I am going back to Stockbridge to raise goats; there seems to be a growing demand for goats."

One of the most noticeable faults of Charles S. Mellen is his wit—so keen as not to be popularly appreciated. At Stockbridge Mr. Mellen is receiving letters from all over the country inquiring as to the size of his farm, the number of his goats, their breed, cost of raising, how many he has for sale, and the terms.—*Boston News Bureau.*

LADIES' GOLF TOURNAMENT

In addition to the men's golf tournament, mentioned elsewhere in this issue, the golf committee of the A. E. R. M. A. decided on Sunday evening to hold a ladies' tournament this week at the grounds of the Country Club, Northfield, N. J. Any lady in attendance at the convention is eligible to enter. It was found that a number of ladies who are present at the convention had brought clubs, prepared to play, and it was believed that if an announcement was made promptly of such a tournament there would be a number of entries.

There will be two trophies for the ladies, one first prize and one second prize. The prize for which they are to enter is a blind handicap, subject to the same conditions as the men's blind handicap, as set forth in the official entertainment program. The ladies may play for this competition at any time during the week up to Thursday evening and are to turn in their score cards to some member of the golf committee. They are limited, however, in the competition to one round, which must be declared before the start. It is understood, of course, however, that, preliminary to this round they may play as many practice rounds as they please. Under the rule adopted by the committee also, any competitior for the ladies' prize in the tournament round must also declare her club handicap to her partner before playing the tournament round.

The official program contained no reference to this ladies' tournament, because the decision to hold one was not reached until after the official program was printed.

DEATH OF C. E. FLENNER

C. E. Flenner, auditor of the Aurora, Elgin & Chicago Railroad Company, Wheaton, Ill., and secretary of the Illinois Electric Railways Association, died suddenly at his home in Wheaton, Oct. 12, 1913. He had been slightly ill for a short time, afflicted with acute indigestion, and the direct cause of death was from heart failure. Mr. Flenner assumed the position of auditor of the Aurora, Elgin & Chicago Railroad when it began operation in 1902. He has also served as secretary of the Illinois Electric Railways Association since its inception. Mr. Flenner leaves a wife but no children.

REPORT OF COMMITTEE ON INDIVIDUAL MEMBERSHIP*

BY L. C. BRADELY CHAIRMAN

Your committee desires to report that, pursuant to the instructions of your executive committee, it has endeavored to increase the individual membership of the Transportation & Traffic Association. In this work it has co-operated with a similar committee of the American Association and has been aided greatly by President Stevens.

During the year the membership has been increased by close to 225 members, so that the total membership is now well in excess of the 500 mark.

This work is such as to seem to demand the individual touch, though it is hard to understand why, with the returns provided for the exceedingly small amount of dues, there should be any difficulty in substantially boosting the membership.

*Report presented before the American Electric Railway Transportation & Traffic Association, Atlantic City, N. J., Oct. 13-17, 1913.

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ADDRESS OF PRESIDENT SCHREIBER OF THE ENGINEERING ASSOCIATION

A brief perusal of the advance papers and reports sent out by our efficient secretary will convince most of you that the association is making substantial progress. This is well attested by the reports of the standing and special committees which are submitted for your consideration. We should be very grateful that our members have been willing to turn from the press of regular duties and assail the problems before us in such a thorough and painstaking manner, for it should be borne in mind that the work was voluntary and was often done at considerable personal sacrifice.

Your executive committee has not instigated many radical departures from the ordinary routine followed in the past. Still, marked improvements were accomplished by the committee in assigning specific duties to the vice-presidents. The personnel of the standing and special committees and the subjects assigned to them were thus definitely determined upon before the first of the year. Proper direction of the committees' activities was made possible by a systematic supervision of expenditures.

Also, important developments in deriving and improving methods for adopting standards and recommended practice and the introduction of the "Manual" should not be passed over unnoticed. These have been thoroughly and ably carried out, even to the most minute detail, by a special committee reporting to the standards committee.

I would call your attention to the fact that our association was the first to take up the study of the subject of electrolysis and that finally the investigation was made a joint one at the request of the American Association. The large interest that is being taken in the topic of electrolysis is evidenced by the fact that a national committee has been created to investigate it in connection with other interested national societies and technical bodies. I am pleased to be able to state that our association will be well represented on that committee.

The progress that has been made by the co-operation of our committees with other technical bodies similar to our own is also worthy of your consideration. The reports show that at least two specifications recommended for adoption by our association have been standardized by others. To my mind this is very significant. Such co-operation not only clearly broadens our point of view but certainly strengthens our conclusions and recommendations.

Permit me to suggest that we remember that the *Aera* is the official publication of the American Electric Railway Association. The members of the Engineering Association can do much to assist in establishing the true position of this periodical. Electric railways, even to the most minute details, are being surrounded by new laws and governmental regulations. Some of these regulations are beneficial and wise; others are created by irresponsible persons and are a menace to the public, for they check development. In this connection it is the duty of the members of the association, even as citizens, to contribute to the education of the public to the realization of the just rights of the electric railway.

Although splendid results are being attained by co-operation with other technical associations, a valuable suggestion has been made for improving the method of carrying on this work. It has been our custom to appoint a number of individuals to represent us, but this procedure has not met with proper success. Conflicting opinions on their part, which are natural when there are two or more representatives, were noticeable at committee conferences with other organizations. Why not definitely determine our own position first and then appoint but one representative to confer with the foreign society along those definite lines as far as possible? Any compromise of importance may then be made, if it is deemed wise, after a consultation with the committee having jurisdiction over the subject. I heartily approve of this plan and feel that better results will be obtained by its introduction.

In conclusion, I wish again to thank the executive committee for its hearty and loyal co-operation, the secretary for his untiring devotion to duty, and the other committees for the splendid work which they have accomplished.

*Abstract of address delivered before the American Electric Railway Engineering Association, at Atlantic City, N. J., Oct. 13-17, 1913.

ADDRESS OF PRESIDENT AVANT OF THE CLAIMS ASSOCIATION*

Our second president hit upon the advisability of this association maintaining a national index bureau, and every president since has advocated it. At our last midwinter meeting your president was instructed by our executive committee to take the matter up with Secretary Donecker to sound the managers of the different properties as to the advisability of the scheme. I regret to report no tangible results, but the matter will be followed up to a successful termination. Your president, by virtue of his office, was placed on the executive committee of the parent association and brought the matter up at our first meeting. He has been hammering on it ever since, and some tangible results may be forthcoming during the present convention.

In an article published in the *Aera* I pointed out the advantages obtained by membership, and since then I have followed this up with a personal letter to each of the nonmember claim agents and others whom I knew personally In these letters I used the argument (giving names and circumstances) that I had saved the Birmingham Railway, Light & Power Company large sums of money by being connected with the association, and I suggested that a button on the coat lapel would point the way to friends and success in a strange land.

We have a short program for this meeting, but it embraces important subjects handled by able men, and I venture the prediction that our time will be spent hearing the best papers and discussions on the most important subjects of all. Our executive committee very wisely avoided any repetition and confined the work to four subjects, but each paper is to be criticised in writing. Afterward you are all expected to discuss them verbally. In this way, we shall get out of the convention all that is to be had.

During the life of our association we have handled a great many subjects. Possibly some have the same titles as those just referred to, but we have a new subject entitled "Motor Vehicles and Their Bearing on Damages." This should have careful attention, as we are living in an age of gasoline, which plays a part in the injuries and enables the snake feeder to get on the grounds at once. I desire to make a few suggestions as to our future, with the hope of their meeting with your approval.

In making laws governing our organization, we should go slowly as lawmaking bodies are prone to enact unjust and unreasonable statutes, and no law at all is better than a bad law. We should be careful concerning the selection of our officers, bearing in mind the fact any vice-president is liable to become president, and above all things we should shun politics. Our conventions have, so far, been free from such influence, but it might be well to have it as our unwritten law that politics should not be indulged in at all. In making your selections give preference to those in line of promotions, provided all other things are equal.

In conclusion, permit me to thank you, one and all, for the many courtesies extended me, and say that I have endeavored to steer the boat so as to avoid breakers. I have had for my assistants a very able and efficient executive committee and have benefited from the untiring efforts of Mr. Davis and the retired presidents. If this is not our banner convention, we shall all be disappointed.

*Abstract of an address made before the American Electric Railway Claims Association at Atlantic City, N. J., Oct. 13-17, 1913.

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ADDRESS OF PRESIDENT STEVENS OF THE TRANSPORTATION & TRAFFIC ASSOCIATION*

It is my desire briefly to review the activities and progress of this association during the past year. The plan of forming the various committees early in the association year, so strongly recommended by President Shannahan at the 1912 convention, was adopted, and at the first meeting of your executive committee in New York on Dec. 3, 1912, the chairmen of practically all of the committees were present. Their presence greatly assisted the executive committee in reaching conclusions as to the scope of the work to be undertaken by the various committees.

At the meeting of Dec. 3 it was decided to consolidate the two committees on rules, the personnel of the consolidated committee to be three representatives of city systems, three representatives of interurban systems and one representative of combined city and interurban systems. It was deemed advisable to divide the work of the committee on train operation and a new committee was formed to take up the subject as relating to interurban service. The executive committee recommended that it should be the policy of the association in future to reappoint a proportion of old members of committees to succeed themselves in order that committee work might be continuous and duplications of investigation be avoided. The efforts of your committees have produced very gratifying results, as shown in their reports. I feel certain that you will discover from them that real progress has been made during the past year by your association.

The growing membership of the association is very gratifying. Special effort has been made during the past year to increase the membership, and great credit is due L. C. Bradley, chairman of the membership committee, for his excellent and successful work. [Mr. Stevens then referred briefly to the report of each committee, calling special attention to that of the committee on rules.]

I sincerely trust there will be a liberal and broad discussion of all papers and reports submitted, as it will be impossible to secure the best results without free expressions of opinion from those present.

The development of the association magazine, the *Aera*, into a most valuable adjunct to the association work has been remarkable. The magazine, now under the direction of an experienced editor, is increasing in usefulness with every issue. I wish to impress all members with the necessity for their co-operation in providing articles for the magazine and questions and answers for the Question Box. This is the association magazine, each member has a distinct interest in it and every one should aid in its support.

Valuable publicity work, both of a general and local character, has been inaugurated by the association this year. Press clipping sheets have been sent to hundreds of newspapers throughout the country, and comments have been sent to member companies and their co-operation requested in having these comments published in their local papers.

A matter of great importance to the association was the resignation of H. C. Donecker as secretary-treasurer. Mr. Donecker very kindly, however, agreed not to sever his official connection with the association until after the 1913 convention. The question of a successor to Mr. Donecker was a matter of grave importance. The executive committee finally selected E. B. Burritt, Washington representative, for this position. Mr. Burritt consented to accept the position of secretary-treasurer of the American Electric Railway Association and thus automatically becomes the secretary-treasurer of the Transportation & Traffic Association. His selection by the executive committee is sufficient guarantee of his fitness, and his previous experience is such as to insure his carrying out the work of the association in a highly satisfactory manner.

I feel that all the members of the association share in the regrets of the officials of this association in the loss of Mr. Donecker's efficient services as secretary-treasurer. Mr. Donecker's ability and work have meant much to the successful growth and progress of the American Electric Railway Association, and also of the affiliated associations. I know that every one wishes Mr. Donecker the greatest success in his new field of activities. I wish to ask for Mr. Burritt the hearty co-operation of the members of the Transportation & Traffic Association.

The members of this association will not secure the full benefit they should receive from this convention unless they attend the meetings of the American Association which will be held in the Greek Temple on the afternoons of Oct. 14, 15 and 16. The program for this year's work is most instructive and interesting.

I wish to thank the officers and members of the association and the members of the various committees for their co-operation and splendid work during the year.

*Abstract of address presented to American Electric Railway Transportation & Traffic Association, Atlantic City, N. J., Oct. 13, 1913.

REPORT OF THE SECRETARY-TREASURER OF THE ENGINEERING ASSOCIATION*

BY H. C. DONECKER

There is one matter concerning which I want to say a few words—that is the question of your secretaryship. One year ago you paid me a real compliment by asking me to serve in the capacity of secretary-treasurer. At that time I hoped that what I might be able to do for you would warrant your continuing to have me serve as one of your officers. It has been decreed otherwise, however, as probably most of you know that at the conclusion of this convention I will devote my whole time to duties with the Public Service Railway of New Jersey. My connection with your association during the past year and before that time has been of a nature that will not be forgotten by me. It is a great privilege to be allowed to meet and treat with those who can point to actual accomplishments such as shine in the records of the Engineering Association. You have a great and efficient organization; you have given time to the details of procedure and are continually improving in execution. Your proceedings speak for themselves, and your joint work with affiliated associations and with other great national bodies points to a recognition of your standing that cannot be controverted. As for myself, lacking in the technical training with which your members have been favored, association with you all has been doubly appreciated. I want to thank each and every one of you for the many things you have done for the association and for me at my request and to ask your pardon if these demands of mine have at times seemed somewhat insistent. Be assured that whatever I have asked of you has been for what in my judgment seemed to be for the best interests of your association. If in the future any efforts of mine can be applied for the good of the Engineering Association, you will not have to wait to ask me to put on the pressure.

*Abstract of a report read before the American Electric Railway Engineering Association, at Atlantic City, N. J., Oct. 13-17, 1913.

The Spanish Government has abrogated the concession for construction of the horse tramway at Badajoz, as less than half a mile of line, out of a total of about 3 miles, has been built within the time allowed in the concession. The concession of the Sociedad General de Ferrocarriles Vasco-Asturiana for a steam tramway from the right bank of the Trubia River in Oviedo to the freight station at Trubia, the suburban tramway at Cordoba, and several small lines in Barcelona has also been abrogated for the same reason.

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REPORT OF THE SECRETARY-TREASURER OF THE TRANSPORTATION & TRAFFIC ASSOCIATION*

BY H. C. DONECKER

While the present year has shown considerable increase in membership, due in large measure to the work carried on by your president and L. C. Bradlee, the total enrolment is very disappointing. The transportation departments of the member companies undoubtedly embrace a tremendously large number of individuals, much greater than the engineering departments, and are made up of men, we must conclude, who are as eager to keep up to date and in touch with new developments as those in any other branch of our business. Nevertheless, there is a decided lack of response to the calls for enrolment as individual members of the association. These appeals for increases in the individual membership are not from any selfish motive; the returns certainly justify the exceedingly small amount of dues involved. The Transportation Association investigates subjects many of which are new and in a formative state; and those which are not new, as, for instance, the question of fares and transfers, involving the collection and safeguarding of the company revenue, would seem to be topics on which the latest information would be almost a necessity to the operating officials and employees. There are some 300,000 persons connected directly with the electric railways of the country, a very large majority of this number being attached to member companies, which represent more than 80 per cent of the capital invested in our business. In spite of this army, our total membership at this time is only 3000, and I am frank to say that this number would soon appear insignificant if the heads of the transportation departments of our companies would interest themselves in the development of this class of membership. I refer especially to the heads of departments, for the reason that the subordinate officials and employees would quickly appreciate the advantages to be derived from participation in association work if the attitude of their superiors denoted interest in the development of our plan.

I hope that at the next convention your association will be able to report a membership at least equal to that of our allied Engineering Association, which now has 2000 members.

A second matter that should have your undivided support is the *Aera*. It is not necessary for me to direct attention to the great improvement wrought in the association's magazine during the past year. Harlow C. Clark, an editor of long experience and great capabilities, has performed exceptional work in carrying on this publication. The plan recently instituted of sending clipping sheets to some 1200 to 1300 newspapers throughout the country containing material from the *Aera* and touching upon matters which reflect electric railway conditions and are of real news value has brought about excellent results. One little evidence of this is the advance notices of our convention, a small portion of which are shown in the frame in this room. *Aera* is now recognized, but to maintain its status requires your interest and participation in the development of material for its columns. It is to be hoped and expected that you will assist in maintaining the magazine, the publication of which your membership makes possible. Therefore, when the *Aera* advisory committee makes a request of you, won't you endeavor to find the time to grant it, despite the fact that you, like other electric railway men, are busy? As a matter of fact, it is usually the busy man that finds the time to do things.

A third matter that it seems to me is important is the need for a periodical study as to the desirability of changes in your standing committees. I do not mean in the personnel of these committees but in the nature of their work. It will not do for this association to be content to let itself run along from year to year without close study of whether the work allotted is the most important that can be done. Changes in conditions of operation, the closer scrutiny of those that result from public service regulation, changes in the relations with employees, developments in new designs of cars, necessitating new operating methods, are only a few things which occur to me as showing the necessity for our association being "on the job" so as to be at the head and not trail the procession. In this regard, after considerable thought, it has seemed to me that it would be a wise plan to institute again a committee on subjects, giving to this committee a rather broad scope, not alone as to proper subjects to be taken up but as to the committees to consider them, this committee to report to the executive committee. A somewhat similar plan is now in force in the Engineering Association and has worked out to very good advantage.

Another matter to which your attention should be directed is the danger that your committees may resolve themselves into investigating committees only. While it is true that whatever work the committees perform will require work of an investigatory character, it should be borne in mind that such studies should, as much as possible, be of a nature that would lead to definite recommendations, and these recommendations should be made. I do not state this in a spirit of criticism, but simply as one of the things that should be avoided, and it appears also that such avoidance might come from having the subjects committee, which would carefully consider topics before the executive committee meets to decide upon the work for the year.

Let me again call attention to the value of our annual proceedings. How many of you read these books after they are received? If the work of your committeemen and the recommendations that they make are simply to be placed in a nicely bound book and stored away on a shelf, then the functions of this association fail. Our organization is not a five-day affair, but one that is at work throughout the whole year. Such activities cannot be justified, however, unless the results of your committee's work are in some way applied to the operations of your companies. This year the Engineering Association has reprinted every one of its standards and recommended practices in the form of a manual, which will be revised from year to year. It makes an impressive book and should do much to bring about a full realization of what that association has done and lead to the general application of its recommendations. It would be wise for the Transportation & Traffic Association to follow a similar plan, the ultimate result probably being that the American Association and its affiliated bodies would reprint yearly their various conclusions.

Before concluding, there is another subject which I trust you will pardon me for bringing up—that is the matter of my resignation as secretary-treasurer of the American Association, which carries with it severance of my official connection with your body. After the close of this convention, Mr. Burritt will be your secretary, and I want to ask for him the same co-operation and assistance that you have always given me. You will find Mr. Burritt anxious to please you and to do those things which will work to the benefit of the organization, but while his spirit may be willing, it will be a hard job to get results without the aid that you can give. I sincerely hope that such assistance will not be denied him.

In conclusion allow me to express my deep obligation to all the members of the association and to the officers with whom I have worked for all that they have done for the association and for me, to which effort is alone to be credited whatever success may have been gained during the years when I have been your secretary. It has been a great privilege to meet and to work with you all, and I think I need not say to you that it was most difficult to make the decision to leave.

*Abstract of a report read before the American Electric Railway Transportation & Traffic Association, at Atlantic City, N. J., Oct. 13-17, 1913.

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MONDAY SESSION OF THE TRANSPORTATION & TRAFFIC ASSOCIATION

President Dana Stevens called the annual meeting of the American Electric Railway Transportation & Traffic Association to order in the Greek Temple at 2:45 o'clock yesterday afternoon.

The annual address of the president was then read by Mr. Stevens. An abstract of this is published elsewhere in this issue.

E. B. Burritt presented the report of the executive committee. This report consisted of the minutes of the meeting of the executive committee during the early part of the year, at which the committee settled upon the work of the association and the various committees of the association during the coming year.

H. C. Donecker read the annual report of the secretary and treasurer, which is published elsewhere in this issue.

J. N. Shannahan said, in connection with the report of Mr. Donecker, that he thought that a great deal of the credit for the work done by the association in past years arose from the efficient efforts of the retiring secretary. He moved the appointment of a committee to express the appreciation of the services rendered by Mr. Donecker for the association.

President Stevens appointed as the committee Mr. Shannahan, C. Loomis Allen and C. D. Emmons.

The chairman also appointed the following committee on resolutions: Charles L. Henry, J. L. Adams and N. W. Bolen.

In the absence of L. C. Bradley, chairman of the committee on individual membership, his report was read by the secretary. This report is published elsewhere in this issue.

As Matthew C. Brush, chairman of the committee to develop uniform definitions, is not expected to be present until Wednesday, the presentation of this report was postponed.

F. A. Boutelle, chairman of the committee on rules, then presented the report of that committee. An abstract of the report is published elsewhere.

D. A. Hegarty, New Orleans Railway & Light Company, in opening the discussion, said he believed that a suggestion had been made to take the vote by mail concerning the adoption of the rules rather than during the meeting of the association.

President Stevens said that such a suggestion was made, but he thought that the committee decided that it would be better to try to have a general discussion and reach some conclusions at the meeting.

C. D. Emmons, Chicago, South Bend & Northern Indiana Railway, said he appreciated the work of the committee on rules, as he had been on previous committees. He felt that if the association was to try to change the language of the rules from time to time it meant that whenever a new chairman was appointed a new set of rules would be presented. It seemed to him when he looked over the rules in the short time he had to do that work that a great many changes were presented which might be debated. Usually it was a question of wording due to the use of different terms for the same purpose in different places.

Under rule No. 113, which had been changed, Mr. Emmons would agree with the committee if the amendment was made to have the new rule applied to double track only while the old rule was retained for single track. Mr. Emmons was opposed to the recommended change in rules of the motormen's signal bell. The committee had previously changed this rule so as to make the back-up signal different from the stop-at-once signal. Under the circumstances, he thought it would be very unwise to change again to the previous rule.

Mr. Boutelle said that the committee was entirely satisfied with the safety of the original rule No. 113. Mr. Boutelle, however, believed that a yellow flag should be used as a caution flag and a green one should be used to indicate safety. The committee thought that it would be advisable to avoid any misunderstanding of signals. In regard to the criticism of the bell signal the committee was instructed by the executive committee to harmonize the rule. The use of three whistles for a back-up signal had been of such long standing and general use that it would be impossible to get the American Railway Association to change.

Mr. Emmons said his understanding was that the question of harmonizing the rules was brought up because the American Railway Association had been unwilling to meet the rules committee of the American Electric Railway Association. Therefore, as he understood the instructions of the executive committee, it was a question of harmonizing the city and interurban rules of the American Electric Railway Association. The use of four bells for the back-up signal was in harmony with the city rules, which had long provided for this signal.

Mr. Donecker said that the intention of the executive committee was not to harmonize with the American Railway Association, because that body had not shown any interest in the efforts made by the American Electric Railway Association to bring the two sets of rules together.

J. L. Adams said he had used the American Railway Association rules. He found that they worked satisfactorily and he would not be willing to adopt the suggestion of the Electric Railway Association.

Mr. Adams added that he was in favor of adopting the American Railway Association standards for everything that the association could.

Mr. Morrison said that he thought conditions were different between the two classes of lines and that the limitations should be taken into account in the adoption of the rules.

J. H. Hanna, Capital Traction Company, Washington, D. C., said that the operation of electric railways differed in so many ways from that of the steam lines that it would be pretty hard for the association to find its way clear to adopt all of the American Railway Association rules. It did not follow because some electric railways adopted the rules that all would do well to adopt them. As a general practice he thought that the interurban lines were nearer city lines than steam lines in operating practices.

Continuing, Mr. Hanna said that the questions which had been discussed illustrated the differences. The steam roads did not pick up passengers as the interurban roads were required to do. He thought that different signals ought to be adopted for backing up and immediate stops. He did not know of any better practice than that provided by present rule No. 113. He did not want to use both a yellow and a green signal.

Mr. Adams said that he was not advocating the use of the same signal for immediate stops and for backing up. He gave two signals for the immediate stop and three to back up.

President Stevens said it was his understanding that the work of the committee was to attempt to harmonize as far as possible the city and the interurban rules and further to harmonize where possible with the American Railway Association rules. Effort had been made for the last several years to get a conference with the American Railway Association on that subject but it had been unsuccessful, though perhaps the association came nearer to the accomplishment of something in the way of results this year in

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getting that association to agree to consider recommendations from this association. If it were possible or feasible to have one set of rules governing both city and interurban operation, it would be a wonderful accomplishment.

J. W. Brown, Police Service Railway, Newark, N. J., said that the affiliation of the interurban lines seemed to be more nearly with city lines than with steam roads for the reason that the men were drawn from city service. He questioned the advisability of the recommendation of the committee "that divergent practice for the stop signal for the next station or street as between city and interurban railways be allowed." He thought that no attempt should be made to follow the American Railway Association code in that particular. He also believed that the right of direction was too serious a matter to leave in the hands of trainmen.

Edward Dana, Boston Elevated Railway, said it seemed to him that it would be better to let the rule governing bell signals stand as it was in the old code.

Mr. Donecker suggested that the rules be taken up as they appeared in the code and that discussion be devoted to those in which changes were recommended.

On motion of Mr. Emmons, the suggested change in rule No. 113 was rejected.

Mr. Hegarty renewed the suggestion that a vote be taken by mail.

Charles L. Henry thought that definite action should be taken on the code and that if any postponement took place it would make any adoption of the rules difficult to accomplish. After asking a question of a member of the committee in regard to the treatment of the code Mr. Henry said that the rules did not change methods of operation. However, he did not like the use of the word "must" in place of "shall" by the committee. He would rather use "will" or "shall."

J. E. Duffy thought it was manifestly unfair for the committee to postpone action for another year.

President Stevens thought that definite action ought to be taken at this meeting.

L. H. Palmer, New York, said that the investigations of the committee showed that the word "must" was used by most roads.

Mr. Dana read the rules and they were discussed separately by the association where changes had been made. Among those who took part in the discussion were Simon Bamberger, Salt Lake City, L. H. Palmer, New York, Cyrus Ching, Boston, C. E. Learned, Boston, H. A. Nicholl, Anderson, Ind., and J. V. Sullivan, Chicago.

The meeting was then adjourned.

MEETING OF THE CLAIMS ASSOCIATION

Following its regular program, the Monday afternoon session of the Claims Association was called to order by President Avant at 3 o'clock. After the reading of the presidential address, the next order of business was the report of the executive committee and also the report of the secretary and treasurer, the ways and means committee and the employment committee. The first paper read was that by John J. Reynolds and M. P. Spillane, of the claim department of the Boston Elevated Railway, entitled "Mechanical Devices for Preventing Accidents." The second paper was that by W. P. Christiansen of the Chicago Railways Company, on "The Investigation of Street Railway Accident Cases." Both papers were actively discussed. The final business was the appointment of H. R. Goshorn, H. V. Brown, E. C. Carpenter, E. K. Bennett, and Peter C. Nickel as a nominating committee, which will report on Wednesday morning. President Avant urgently requested the members present to take part in all meetings of the American Association, commencing Tuesday afternoon. The meeting was one of the largest first-day sessions ever held by the Claims Association.

YESTERDAY'S SESSION OF THE ENGINEERING ASSOCIATION

The American Electric Railway Engineering Association held its opening session yesterday afternoon in Engineers' Hall, on the pier. President Schreiber called the meeting to order at 2:30 p. m. and presented his annual address. This is published elsewhere in this issue. He then announced the appointment of the following committees:

Committee on nominations—H. H. Adams (chairman), W. J. Harvie, A. O. Ackerman, R. C. Cram and H. C. Donecker.

Committee on resolutions—Prof. A. S. Richey and W. G. Gove.

He then called for the report of the committee on standards. This was presented by H. H. Adams in the absence of Paul Winsor, chairman. This report is published in abstract elsewhere in this issue.

STANDARDS

President Schreiber first suggested that it would be desirable to vote upon whether the association approved the Engineering Manual. This motion was put and unanimously carried. He then explained the plan of submitting the recommendations of the committee on standards after the report of each standing committee. He then called for the report of the executive committee.

REPORT OF EXECUTIVE COMMITTEE

This report consisted of the minutes of the meeting of the executive committee during the early part of the year, at which the committee settled upon the work of the association and the various committees of the association during the coming year.

The report of the secretary and treasurer was then read. It is published elsewhere in this issue.

POWER DISTRIBUTION

G. W. Palmer, Jr., chairman of the committee on power distribution, then presented the report of that committee. It is published elsewhere in this issue. President Schreiber first asked for a discussion on the specifications for rubber and insulated wire and cables.

William A. Del Mar, New York Central Railroad, criticised several clauses in these specifications, as contained in Appendix A. One criticism was in regard to the thickness of insulation specified. Thus, in the clause specifying the number of braids he thought there should be a reference to the service for which the cable was intended. He also criticised the formula for the analysis of rubber grade B, which he thought empirical. He also criticised the specific gravity specified for rubber. the wording of the specification for the steel in the armor covering and other points.

W. B. Jackson, consulting engineer, Boston, asked whether there were any portions of the report which were not in accordance with the practice recommended by the other associations. He thought that if there were it would be well to make every effort to secure unanimity with the other associations.

H. G. Stott, Interborough Rapid Transit Company, New York, suggested the adding of a short paragraph reading somewhat as follows: "In awarding contracts based on these specifications, due regard to the reputation of the manufacturer should be given as an element to be considered."

C. F. Woods, A. D. Little Company, Boston, a member of the sub-committee on cable specifications, replied for that sub-committee. In regard to rubber insulation, he thought it very desirable to have a definite statement as to the ingredients of the insulation. At present when 20 per cent of Para rubber is specified it may mean a variety of ingredients for the rest of the insulation. The procedure of the Board of Fire Underwriters in analyzing the so-called code wire did not go into details of rubber, but it enabled one to find out within relatively accurate quantities the amount of rubber in the compound.

Mr. Del Mar had said it would be unfortunate to have two

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distinctly different kinds of analyses attached to the same specifications; but if one simply abandoned the specification until the association could get the method of analysis the members would be unprotected in this matter in the interim. It was therefore found desirable to draw some kind of a specification which would, within certain limits, assure the consumers that they were getting something near the same kind of rubber. These specifications would be strengthened by severe electrical and physical tests. Eventually the requirements could be elaborated. As to the method of figuring the thickness of insulation, the committee had simply endeavored to put in a minimum factor of safety, but one which could be increased at the discretion of the engineer.

Mr. Woods also said that the point made in regard to specific gravity was well taken. But this could be corrected by the insertion of the words "specific gravity," where mention is made of the compound, and that it should conform in chemical limits with the requirements prescribed. He hoped that eventually it would be possible to arrive at the ideal condition where the manufacturer would be allowed to make his rubber compound out of any substance he pleased and in any way he pleased, provided the cable would give the life and service desired. The purpose of all-chemical and physical tests of cable insulation was merely to determine the probable life of the compound. The committee had hoped in its specifications, particularly in that relating to the second grade compound, that the companies would not only buy under them but would keep track of the life of the wire and also would save samples of purchases to test the rubber physically and sometimes electrically at certain definite periods of time, say six months, noting the depreciation. But it seemed advisable to stick to a definite compound that was known about rather than to throw down the bars in the hope of allowing some manufacturer to develop a little better compound.

Mr. Palmer, Bay State Street Railway, Boston, pointed out that the power distribution committee was a continuous standing committee and was concerned not only with new subjects but also with the revision of previous specifications which had been adopted. Hence adoption of any specifications at this time would not prevent the committee from later reviewing and changing such specifications. Continuing, he believed that the thickness of insulation required by the specifications was adequate and equal to those required by the fire underwriters. The braids specified were minimum braids. No attempt was made to specify the number or kind for any special purpose. Upon motion by Mr. Kimball the report was referred back to the committee.

Upon motion of Professor A. S. Richey, the recommendation for a standard design of cap and cone insulator, as approved by the committee on standards, was adopted. The meeting also adopted the amended definition for "strand" and the new definition for "rope lay cable" as moved by C. S. Kimball.

Upon the recommendation of the committee, further consideration of lattice poles was dropped. The specification for tubular steel poles, however, as approved by the committee on standards, was adopted as moved by C. S. Kimball. Upon motion of J. H. Hanna the recommendation on specifications for wood poles, as approved by the committee on standards was adopted; also the specifications on reinforced concrete poles.

GENERAL DISCUSSION

J. H. Hanna, representing the committee on standards, said that the recommendations on trolley guards had not been approved as matured, although the pioneer work of the committee on power distribution was fully appreciated.

G. W. Palmer, Jr., said that he did not expect that the specifications would be satisfactory to every individual member in their entirety but that they would at least afford a basis for discussion.

E. J. Dunne called attention to the provision that trolley wires on interurban lines should be at a height of 19 ft. above the top of the rails unless local conditions prevented. This would impose a hardship on roads that could not put up a wire higher than 18 ft. and it would be unnecessary to do so in most cases. Personally he thought that 17.5 ft. or not more that 18 ft. would be desirable. As to placing strain insulators 5 ft. from the pole, the practice of the Public Service Railway was to place them right at the pole or sometimes 2 ft. or 3 ft. from the trolley wire. Hence if a strain wire broke at the hanger it would be close to the pole and there would be no danger to life. He did not understand the objection to not grounding the lightning arresters on the track. It was his company's practice to ground on to the track in about 75 per cent of its installations.

After a general discussion on the subject Mr. Sproul, representing the National Electric Light Association, said that the position of that body was that whenever this report is used as a standard this rider should be included: "Upon the whole, however, we consider the report as a body the best that has been adopted, with the qualification that it should not be regarded as a standard that cannot be modified in particular cases in whole or in part."

Mr. Palmer said that inasmuch as the resolution of the N. E. L. A. referred to by Mr. Sproule was incorporated in the minutes of the Engineering Association last year and inasmuch as the article "J" in question has been considered as recommended practice for the past year, there could be no doubt as to the advisability of adopting the section as revised with the improvements which experience had taught for the current year.

After animated discussion the matter was put to a standing vote of the convention and carried by 30 to 7. The meeting was then adjourned.

WHERE TO FIND THE CONVENTION MANAGERS

The association offices for registration and the transaction of other association business are located at the right and left of the entrance to the Convention Pier. The representatives on hand are the following: E. B. Burritt, present, and H. C. Donecker, past secretary-treasurer American Electric Railway Association, Traffic & Transportation Association and Engineering Association; M. R. Boylan, secretary-treasurer Accountants' Association; B .B. Davis, secretary-treasurer Claims Association; H. G. McConnaughy, secretary-treasurer and director of exhibits American Electric Railway Manufacturers' Association. The committee offices are at the left of the Convention Pier entrance.

Meetings of the executive committee of the American Electric Railway Manufacturers' Association will be held daily at 12 o'clock at the left of the entrance to the Convention Pier for the report and adjustment of complaints of any nature.

CHANGE IN ACCOUNTANTS' PROGRAM

On account of the death of a member of his family Mr. W. H. Forse, Jr., secretary-treasurer Union Traction Company of Indiana, Anderson, Ind., will not be able to reach the convention before Wednesday. Mr. Forse was to have read a paper on "Sinking Funds" at the Tuesday morning meeting of the Accountants' Association, but by action of the executive committee of the association he will present it at the Friday morning meeting of the Accountants' Association instead. The paper of Mr. G. W. Kalweit, auditor the Milwaukee (Wis.) Electric Railway & Light Company, on the subject of "A Unit Cost Work Order System," scheduled for Friday morning, has been brought forward to the Tuesday morning session to take the place left vacant by the postponement of Mr. Forse's paper.

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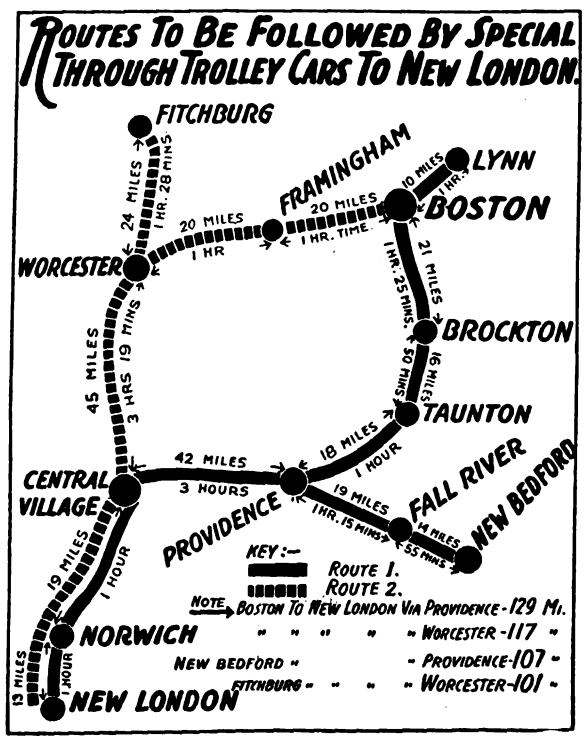
EN ROUTE TO THE CONVENTION BY TROLLEY

Traveling to conventions by trolley is by no means a novelty in the electric railway field, but the adoption of this method of transportation by representative delegates from New England over a portion of the route to Atlantic City marks a new departure in trips from that particular section of the country and deserves comment on account of the local conditions prevailing. As early as Wednesday of last week about 100 delegates had registered for the trip from Massachusetts points to New London, Conn., under the auspices of the New England Street Railway Club's "personally conducted tour," and the publicity attending the affair gave the electric railways taking part in this service some excellent advertising. In view of the fact that the street railway systems of New England are by no means homogeneous in equipment and operating methods, and considering the extent to which this territory is broken up into unrelated groups of lines, the possibilities of through trolley travel by large parties in special cars equipped for really comfortable journeying have in the past been little realized. If the trip to New London showed nothing else, it demonstrated to the



Map Showing Routes of Special Cars from Boston to New London

public at large that here is a new resource for those who wish to travel in private cars over considerable distances on the New England network and at moderate cost in comparison with the expense of automobile touring.

The trip was made in six special passenger cars and an electric express car for the baggage, the cars leaving Park Square, Boston, about 8.45 o'clock Saturday morning. The cars furnished by the Nahant & Lynn and Boston & Worcester street railway companies, with the express car, went by way of Worcester and thence by Central Falls and Danielson to New London. The two Bay State Street Railway Company cars, one from the Union Street Railway Company of New Bedford and one from the Rhode Island Company of Providence, went from Park Square through Brockton, Taunton, Providence and Danielson, joining the route of the former cars at Elmville. The crews were furnished by the various companies which provided the cars and, after leaving the Boston line, operated their cars through to New London. As the cars entered upon the line of a different company a pilot boarded each car to give such instructions as were necessary to the motorman. In spite of the fact that there was some delay on account of reconstruction work in Boston, the schedule was carried out almost exactly upon time, the cars by way of Worcester reaching New London exactly at 5 o'clock and the cars by way of Providence being but fifteen minutes late. A timetable and map were furnished to each passenger. The map is reproduced herewith.

A feature of the trip was the luncheon which was served en route. By the use of electric stoves and plate warmers on the cars the party enjoyed the pleasures of an excellent luncheon, the mince pie being an especially popular feature. A number of short scheduled stops greatly reduced the fatigue incidental to many hours' travel upon connecting lines.

More than one hundred members of the New England Street Railway Club and the ladies of their families made the trip. The cars were especially fitted and made comfortable in every way, each company vying in providing something novel in the way of interior fitting.

Some of the cars were returned to their respective companies that night, while others went back in the morning. Fifty-seven of the party boarded the Norwich line boat *City of Lowell*, which was at the dock upon their arrival in New London and continued on to New York, arriving there at 7 o'clock Sunday morning. The party was immediately transferred to the Pennsylvania Railroad station, and the 8:12 express took them to Atlantic City, where they arrived at 11:15 a. m. The smoothness with which the entire trip was made, there being no hitch in any particular, was a cause of very general favorable comment.

The trip shows that a highly desirable class of business might be developed with proper publicity and close operating agreements in this field, on account of the large mileage available and the number of excellent hotels and inns in the country districts. For parties of limited size there is no question that comfortable and enjoyable trips by the score could be arranged. Even the question of baggage is not a serious one, considering the efficient manner in which trunks and grips were handled on the recent New England trip by the express cars of the Bay State company.

FOR FRIENDS OF THE NIBLICK

The annual golf tournament of the American Electric Railway Manufacturers' Association will be held at the Country Club of Atlantic City at Northfield, N. J., under the auspices of a committee composed of N. M. Garland, chairman, H. A. Hegeman, H. G. Barbee and R. W. Read. All day Thursday, Oct. 16, will be open to members and guests of the several associations. Entrants may be handicapped on the basis of their home club handicap, or may turn in to any member of the golf committee not less than two attested eighteen-hole cards, made on the Country Club course either Sunday, Monday or Tuesday of convention week, upon which cards their handicap will be based. If a player has made more than two rounds, the cards he turns in shall represent his average score.

Players may select their own partners, and the first round played on Thursday shall count as their tournament round. Cards must be attested. For the blind handicap, players select their own handicap, based on a number to be drawn between eighty and eighty-five, inclusive, but the handicap must be declared to a member of the Golf Committee or to the attendant at the club before starting. The handicap tournament round only is to count for this prize. The prizes will comprise two each for classes A, B and C in addition to a blind handicap prize. American Golf Association rules are to govern, except when modified by local ground rules.

At a meeting of the golf committee held Sunday evening it was decided that the seven prizes to be given in the men's tournament at the Country Club would be appropriate cups. A ladies' tournament is told of elsewhere.

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REPORT OF THE COMMITTEE ON RULES*

F. A. BOUTELLE, CHAIRMAN; W. R. W. GRIFFIN, GEORGE KUEMMERLEIN, JR., B. J. JONES, L. H. PALMER, EDWARD DANA, W. H. COLLINS

Attention is directed at this time to the action of the executive committee in authorizing the consolidation of the committee on city rules and the committee on interurban rules to form a standing committee on rules which will be composed of three members selected from among operators of city systems, three members selected from among operators of interurban systems and one member appointed from among those whose operations cover both city and interurban lines.

While some consolidations and eliminations might be made in the present city and interurban codes, there appears to be no actual conflict apart from the matter of bell signals, which it is recommended shall be made uniform as indicated later. In addition, the committee recommends that rule No. 113, interurban code, be amended to read as follows:

"Rule 113. A yellow flag by day and in addition a yellow light by night placed beside the track on the right-hand side indicates that the track ..... feet in advance is in condition for speed not to exceed ..... m.p.h., and the speed of the train must be controlled accordingly. A green flag by day and in addition a green light by night placed on the same side of the track at a point beyond the slow track indicates that normal speed may be resumed."

Investigation conducted by the committee indicates that 75 per cent of the 260 member companies responding have adopted the standard codes of rules as a whole or in large part, with necessary modifications to fit local conditions.

The sub-committee in charge of rules governing operation of prepayment cars and train operation found in its investigations that it was not feasible to comply literally with its instructions in this regard, and as a result determined to recommend that the city code be rewritten for several reasons. It must be understood, however, that the changes do not inolve any radical departures from the old code. These changes have eliminated thirteen rules by consolidation.

As further comment, the sub-committee calls attention to a rearrangement of the bell signal and starting and backing rules in what the committee considers to be a more logical and consistent order, the endeavor being to make these rules clear and in sequence. Also, in rule No. 12, "Habits," the sub-committee has recommended the use of the similar rule in the interurban code, except that the several interurban rules which covered "Habits" have been consolidated into one.

The development of a set of rules to cover block signal operation was considered by a sub-committee representing the joint committee on block signals for electric railways and the committee on rules. Briefly, the joint sub-committee has developed only rules for automatic block and interlocking signals, not taking up at this time rules for manual and controlled manual block signals, as these types of signals are not as far as known in use on electric railways.

The sub-committee of the special committee appointed to confer with the American Railway Association found, after a careful examination of the standard code of each association, but little to recommend changing.

The American Railway Association uses three whistle cord signals to back train, whereas the present American Electric Railway Association codes call for four signals, although some interurban roads are using three and thus agree with the steam road practice.

The signal to stop at the next station or street given while the train is running is one for the city companies, two for interurban companies and three for steam railroads, although some interurban roads use three and thus agree with the steam road practice. The signal to stop at once for city and interurban roads is three. On steam roads it is two.

After considerable discussion, it was tentatively agreed to recommend to the American Electric Railway Association that for both city and interurban practice the signal to back be made three bells or whistle cord signals, thus conforming to the American Railway Association practice and that divergent practice for the stop signal for the next station or street as between city and interurban railways be allowed. In other words, the city rule will stand as at present, one bell or whistle cord signal being the recognized signal to stop, while two bells or whistle cord signals will be the indication to the motorman on interurban trains to stop at the next station or street. The practice of the American Railway Association is three bells at the present time and it is recommended that the committee appointed by President Harries take this up with the American Railway Association and ask it to change to two signals. This would necessitate the steam railroads changing their emergency stop signal, while the train is running, from two to three; also it is desirable that the acknowledgment of the audible signal calling attention to signals displayed for a following section should be different from the answer to other signals, and it is recommended that the above mentioned committee ask the American Railway Association to adopt the signal designated in A.E.R.A. code rule No. 95 k.

PROPOSED REARRANGEMENT OF SIGNALS BETWEEN CONDUCTOR AND MOTORMAN.

	Present Code			Proposed Code		
Conductor to Motormen	City Rules	Interurban Rules	American Railway Association	City Rules	Interurban Rules	American Railway Association
For standing train:						
To start	2	2	2	2	2	2
To back	4	4	3	*3	*3	3
Release air brakes	..	4	4	..	4	4
Call flagman	..	4	4	..	4	4
For running train:						
Stop at next station or street	1	1	3	1	*2	*2
Stop at once	3	3	2	3	3	*3
Reduce speed	4	4	4	4	4	4
Increase speed	5	5	5	5	5	5
Motorman to conductor:						
Come forward	1	1	..	2	2	..
Pull down trolley	2	2	..	2	2	..
Back car	3	3	3	3	3	3
Set rear brake	4	4	..	4	4	..

*Changes proposed.

The question of displaying markers on the rear of trains of but a single car is one which has caused some discussion, since on a double-end car which might be displaying signals for a following section and which might be standing on a siding to meet an opposing train there would be some uncertainty as to the direction in which such train was bound. While some electric roads have substituted red in place of green markers, the committee suggests that this question of markers be discussed with the A.R.A. committee.

The American Railway Association's practice of giving trains right by direction is one of long standing and firmly intrenched, and because some electric railways have adopted this practice and others may do so, the committee does not believe that it is advisable to suggest the elimination of the practice. The changes in signals as recommended appear to be reasonable and logical and it is recommended that the American Electric Railway Association continue its negotiations with the American Railway Association, with a view to obtaining approval and adoption of the suggested changes.

APPENDICES

The report was accompanied by two appendices, of which the first, Appendix A, consisted of a comparison of existing and proposed standard rules for city service. Appendix B consisted of a proposed code of standard block signal rules governing train operation by automatic block and interlocking signals.

*Abstract of a paper read before the American Electric Railway Transportation & Traffic Association at Atlantic City, N. J., Oct. 13-17, 1913.

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REPORT OF THE COMMITTEE ON POWER DISTRIBUTION*

G. W. PALMER, JR., CHAIRMAN; A. S. RICHEY, C. B. HARTE, R. H. RICE, GAYLORD THOMPSON, W. E. SALBER, C. L. CADLE, EDWARD HEYDON, J. Q. BROWN

The committee on power distribution in presenting specifications for rubber-insulated wire and cable states that there is not only a demand for wire and cable insulated with a grade of rubber compound equivalent to 30 per cent Para but also for a wire and cable, for line and equipment purposes, insulated with a lower grade of compound which would be perhaps equivalent to what has been designated in the past as "20 per cent Para compound." The committee has confined itself to a study of specifications for wire and cable of not more than 2500 volts working pressure, and two grades of compound have been designated. The specifications are published in part on a following page under the sub-caption "Appendix A."

TABLE I—SAG IN SPAN WIRES—DOUBLE-TRACK LINE.

Pull on Span (P) in Pounds	Maximum Sag in Inches for Various Lengths of Span										
	30	35	40	45	50	55	60	65	70	75	80
500	12.0	15.0	18.0	21.0	24.0	27.0	30.0	33.0	36.0	39.0	42.0
600	10.0	12.5	15.0	17.5	20.0	22.5	25.0	27.5	30.0	32.5	35.0
700	8.6	10.7	12.9	15.0	17.1	19.3	21.4	23.6	25.7	27.9	30.0
800	7.5	9.4	11.3	13.1	15.0	16.9	18.8	20.6	22.5	24.4	26.3
900	6.7	8.3	10.0	11.7	13.3	15.0	16.7	18.3	20.0	21.7	23.3
1,000	6.0	7.5	9.0	10.5	12.0	13.5	15.0	16.5	18.0	19.5	21.0
1,100	5.5	6.8	8.2	9.6	10.9	12.3	13.6	15.0	16.3	17.7	19.1
1,200	5.0	6.3	7.5	8.8	10.0	11.3	12.5	13.8	15.0	16.3	17.5
1,300	4.6	5.8	6.9	8.1	9.3	10.4	11.5	12.7	13.8	15.0	16.2
1,400	4.3	5.4	6.4	7.4	8.6	9.6	10.7	11.8	12.9	13.9	15.0
1,500	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0
1,600	3.8	4.7	5.6	6.6	7.5	8.4	9.4	10.3	11.3	12.2	13.1
1,700	3.5	4.4	5.3	6.2	7.1	7.9	8.8	9.7	10.6	11.5	12.4
1,800	3.3	4.2	5.0	5.8	6.7	7.5	8.3	9.2	10.0	10.8	11.7
1,900	3.2	4.0	4.7	5.5	6.3	7.1	7.9	8.7	9.5	10.3	11.1
2,000	3.0	3.8	4.5	5.3	6.0	6.8	7.5	8.3	9.0	9.8	10.5
2,100	2.9	3.6	4.3	5.0	5.7	6.4	7.1	7.9	8.6	9.3	10.0
2,200	2.7	3.4	4.1	4.8	5.5	6.1	6.8	7.5	8.2	8.9	9.5
2,300	2.6	3.3	3.9	4.6	5.2	5.9	6.5	7.2	7.8	8.5	9.1
2,400	2.5	3.1	3.8	4.4	5.0	5.6	6.3	6.9	7.5	8.1	8.8
2,500	2.4	3.0	3.6	4.2	4.8	5.4	6.0	6.6	7.2	7.8	8.4

All sags are computed from the formula $c = \frac{3W\ (S-a)}{P}$

c = maximum sag of the span in inches.
W = weight of span and supported wires in pounds.
S = length of span in feet.
a = distance between trolley wires in feet.
P = horizontal pull on poles at points of attachment of span, in pounds.

In the table W=100 and a=10 for double track. The points of attachment of wires are at the same level. For any other value of W, determined from Table II, multiply the above value of c by the "loading factor" shown in Table II.

TABLE II—LOADING FACTORS FOR CALCULATING SAGS IN DOUBLE-TROLLEY SPAN WIRES. FACTORS TO BE USED AS MULTIPLIERS OF THE SAGS FOR STANDARD LOADING AS GIVEN IN TABLE I TO DETERMINE THE SAG FOR ANY OTHER LOADING.

Span Wire	¼-in.				5/16-in.				⅜-in.				7/16-in.			
Safe Working Stress in Pounds	1,150				1,900				2,500				3,250			
Trolley Wire	0	00	000	0000	0	00	000	0000	0	00	000	0000	0	00	000	0000
30 ft.	.85	1.01	1.22	1.49	.87	1.04	1.25	1.51	.90	1.06	1.25	1.54	.93	1.10	1.31	1.60
35 ft.	.85	1.02	1.23	1.49	.88	1.05	1.26	1.52	.91	1.08	1.27	1.55	.96	1.12	1.33	1.62
40 ft.	.86	1.03	1.24	1.50	.89	1.06	1.27	1.53	.93	1.09	1.28	1.57	.98	1.14	1.35	1.64
45 ft.	.87	1.03	1.24	1.51	.90	1.07	1.27	1.55	.94	1.11	1.30	1.58	1.00	1.16	1.37	1.66
50 ft.	.87	1.04	1.25	1.51	.91	1.08	1.28	1.56	.96	1.12	1.31	1.60	1.02	1.18	1.39	1.68
55 ft.	.88	1.04	1.25	1.52	.93	1.09	1.29	1.57	.97	1.14	1.33	1.61	1.04	1.20	1.41	1.70
60 ft.	.89	1.05	1.26	1.52	.94	1.10	1.30	1.58	.99	1.15	1.34	1.63	1.06	1.23	1.43	1.72
65 ft.	.89	1.06	1.27	1.53	.95	1.11	1.31	1.59	1.00	1.17	1.36	1.64	1.08	1.25	1.46	1.74
70 ft.	.90	1.06	1.27	1.54	.96	1.12	1.32	1.60	1.02	1.18	1.37	1.66	1.10	1.27	1.48	1.76
75 ft.	.90	1.07	1.28	1.54	.97	1.13	1.33	1.61	1.03	1.20	1.39	1.67	1.12	1.29	1.50	1.78
80 ft.	.91	1.08	1.29	1.55	.98	1.14	1.33	1.62	1.06	1.21	1.40	1.69	1.14	1.31	1.52	1.80

In determining the safe working stress, a factor of safety of 2 was used.
The factors multiplied by 100 give the approximate total weight of the span and two trolley wires.

The matter of specifications for trolley wire is considered in connection with certain changes in the American Society for Testing Materials hard-drawn-copper wire specification with relation to tensile strength, elongation and torsion, covering sizes of 00, 000 and 0000 round trolley wire. However, pending the formulation of an agreement which will be acceptable to both parties, the committee recommends that no revision be made in the present A. E. R. A. standard specifications.

TROLLEY POLES

Specifications for steel tubular and wooden poles are also submitted, including a discussion upon the matter of selecting poles to suit varying conditions. This is not an extremely accurate treatment of the subject but is well adapted to general use for estimating purposes and to enable a pole of closely approximate weight to be selected. A final choice may be limited by local conditions.

Table I shows the sag resulting in spans of various lengths when subjected to the tensions given, a standard span weight of 100 lb. being assumed. This is a convenient standard weight for a ⅜-in. steel-strand span which supports a length of 100 ft. of two 00 trolley wires, insulators and ears.

For other sizes of wire strand or trolley wire the weight of the span will be different. Table II shows the "loading factor" or ratio of weight of various spans to the weight of the assumed standard span of 100 lb. The sag given in Table I when multiplied by the proper factor from Table II will give the sag in any desired span. For single-track lines a separate computation has been made as shown in Table III.

In the first columns of Tables I and III will be found the horizontal pull exerted on each pole of the span, under the given conditions of span length and loading. The pole of the desired length must be selected to withstand the pull as determined in the sag. If the pole selected has a deflection of say 3 in. for the required pull, then the pole must be given a 3-in. rake if it is desired to pull it up vertically when the span is completed. In case a different pole is desired, say one giving 4-in. deflection, then this pole must be given a rake of 4 in.

In the tables no provision is made for the change in length of wire due to stretch or change in temperature and the horizontal pull on the pole is computed instead of the actual tension in the span wire. However, both of these causes produce less than 1 per cent difference in the final results, and the increased accuracy does not justify the increased complexity of the computation. Ice and wind loads have not been considered as the length of wire between adjacent spans has been taken as 100 ft. only. If desired, allowance for it may be made by increasing the term W in the formula.

The specification given in Appendix C covers all requirements for tubular steel poles for ordinary electric line construction, and requires no special pipe or construction. The

*Abstract of report read before the American Electric Railway Engineering Association, at Atlantic City, N. J., Oct. 13-17, 1913.

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variation of lengths of the sections of a pole within commercial limits have but little effect upon its strength, stiffness or weight, and the section lengths given conform closely to those usually employed.

Table IV gives the description of steel poles, in lengths varying from 28 ft. to 35 ft., and shows the probable deflection in inches produced by applying the loads specified. The necessary pull on the pole, calculated from the allowable sag as explained above, will fix the load to be applied to the pole. In general, a number of poles will satisfy the requirements, and choice must be made from those of the proper length. Usually the lightest weight pole would be selected unless the deflection was considered too great, in which case the choice would be determined finally by the deflection.

TABLE III—SAG IN SPAN WIRE—SINGLE-TRACK LINE.

Pull on Span (*P*) in Pounds	Maximum Sag in Inches for Various Lengths of Span										
	30	35	40	45	50	55	60	65	70	75	80
500	9.0	10.5	12.0	13.5	15.0	16.5	18.0	19.5	21.0	22.5	24.0
600	7.5	8.8	10.0	11.3	12.5	13.8	15.0	16.3	17.5	18.8	20.0
700	6.4	7.5	8.6	9.6	10.7	11.8	12.9	13.9	15.0	16.1	17.1
800	5.6	6.6	7.5	8.4	9.4	10.3	11.3	12.2	13.1	14.1	15.0
900	5.0	5.8	6.7	7.5	8.3	9.2	10.0	10.8	11.7	12.5	13.3
1,000	4.5	5.3	6.0	6.8	7.5	8.3	9.0	9.8	10.5	11.3	12.0
1,100	4.1	4.8	5.5	6.1	6.8	7.5	8.2	8.9	9.5	10.2	10.9
1,200	3.8	4.4	5.0	5.7	6.3	6.9	7.5	8.2	8.8	9.4	10.0
1,300	3.5	4.0	4.6	5.2	5.8	6.3	6.9	7.5	8.1	8.7	9.2
1,400	3.2	3.8	4.3	4.8	5.4	5.9	6.4	7.0	7.5	8.1	8.6
1,500	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0
1,600	2.8	3.3	3.8	4.2	4.7	5.2	5.7	6.1	6.6	7.0	7.5
1,700	2.6	3.1	3.5	4.0	4.4	4.9	5.3	5.7	6.2	6.6	7.1
1,800	2.5	2.9	3.3	3.7	4.2	4.6	5.0	5.4	5.8	6.2	6.7
1,900	2.4	2.8	3.2	3.6	4.0	4.3	4.7	5.1	5.5	5.9	6.3
2,000	2.3	2.6	3.0	3.4	3.8	4.1	4.5	4.9	5.3	5.6	6.0
2,100	2.1	2.5	2.9	3.2	3.6	3.9	4.3	4.7	5.0	5.4	5.7
2,200	2.2	2.4	2.7	3.1	3.4	3.8	4.1	4.4	4.8	5.1	5.5
2,300	2.0	2.3	2.6	2.9	3.3	3.6	3.9	4.2	4.6	4.9	5.2
2,400	1.9	2.2	2.5	2.8	3.1	3.4	3.8	4.1	4.4	4.7	5.0
2,500	1.8	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.2	4.5	4.8

All sags are computed from the formula $c_1 = \frac{3\ WS}{P}$ in which $W = 50$ for single track lines.

The standard tubular steel pole is to be made up as shown in Table IV. The calculation of deflections has been made from the formula:

$$x = \frac{Pl^3}{3\ EI}$$

in which x = deflection in inches, 18 in. from top of pole.
P = horizontal pull, 18 in. from top of pole.
l = length of pole from point of application of P to ground line (6 ft. from base end) in inches.
E = modulus of elasticity of steel (26,000,000).
I = moment of inertia of base section.

The committee felt that the study of the question of poles would not be complete without the consideration of wood poles, and, as the specifications of the American Telephone & Telegraph Company and of the National Electric Light Association represent the best modern standards, specifications were submitted which conformed closely to these established standards.

The committee also submits a reinforced concrete pole design which is intended as a suggestion for trial, as concrete poles for electric line construction are not in extensive use and the committee had but few data upon which to base any opinions.

The committee reports that for some time it has had under consideration the subject of material and methods of construction of 600-volt direct-current overhead trolley line, but that no specification for line construction could be prepared which would be followed in its entirety by the membership of the association. Specifications are presented, however, which may be considered as typical and such as will enable the construction of lines by parties not acquainted with the requirements or desirous for other reasons of following general specifications. These are submitted for comment from the association at the convention.

In the matter of cap and cone insulators the committee reports that it has measured a large series of samples of different makes, determining the dimensions preventing interchange, and submits as Appendix H a comparison, shown in Table V, giving the important measurements of the series. With one exception (from whom no comment has come in spite of repeated inquiries) the manufacturers have stated that they will conform to these limits if adopted.

OVERHEAD CROSSINGS OF TRANSMISSION LINES

At the 1912 convention the specification for overhead crossings of electric light and power lines, as recommended by the committee on power distribution, was passed for adoption as recommended practice, but with instructions to the committee on power distribution to endeavor to secure further joint action by the different associations concerned in an endeavor to straighten out minor difficulties in the specifications as they had been adopted by various associations. It was found that various members of the joint committee knew of a number of difficulties which had been encountered in the actual trial of the specifications as proposed two years ago, and it was, therefore, decided that the specification should be rewritten in a number of sections to include the suggested changes which met with the approval of the joint committee. In the revised specification the words "or constructed over" have been omitted from the original paragraph on scope as many questions arise in connection with construction requirements where constructed lines do not actually cross but are in close proximity to one another.

This joint committee recommended that a specification should be developed to cover the construction of constant potential lines of over 5000 volts which are necessarily constructed parallel with or in close proximity to lines of telephone or telegraph wires, and that this matter should be referred to some national joint committee for development of such a specification. It is therefore suggested that a national joint committee on overhead line construction should be organized and that the work which is now being done by committees of the National Electric Light Association and of the American Electric Railway Association and other similar committees of other associations might well be loaded on this national joint committee, the special matters pertaining to one association only being handled by sub-committees of the general committee, the sub-committee being composed of the representatives on the joint committee of the association interested.

ELECTRIC WIRE AND CABLE TERMINOLOGY

The committee recommended the following revision of the standard electric wire and cable terminology adopted last year in order to harmonize it with that finally adopted by the United States Bureau of Standards and other bodies:

The definition "No. 5. Strand:—One of the component conductors of a cable; or one of the wires or groups of wires of any stranded conductor," to read: "One of the wires or groups of wires of any stranded conductor." Insert new definition, "No. 10. Rope Lay Cable: A single conductor cable composed of a central core surrounded by one or more layers of helically laid groups of wires." Change existing definition numbers accordingly.

APPENDICES

APPENDIX A—SPECIFICATIONS FOR RUBBER INSULATED WIRE AND CABLE

Rubber compound shall be thoroughly and properly vulcanized. The vulcanized insulation shall be homogeneous in character, tough and elastic. All laps or joints in the insulation shall be as strong mechanically and electrically as the rest of the insulation. The grade of the compound shall be grade A or grade B as may be specified.

The rubber compound of grade A shall be that generally known as "30 per cent Para rubber insulation" and shall be made exclusively from dry, fine Para rubber of the best quality which has not been previously used in a rubber compound, solid waxy hydrocarbons, suitable mineral matter and sulphur. The compound shall not contain red lead or

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lamp-black. It shall conform in chemical limits with the requirements of the committee appointed by the rubber conference of Dec. 7, 1911, New York.

The rubber compound of grade B shall show, when analyzed by the procedure hereinafter specified, not less than 27 per cent of rubber gum.

The braid shall be closely woven cotton thoroughly saturated with an insulating waterproof compound, which shall be neither injuriously affected by or have injurious effect upon the braid at any temperature up to 90 deg. C. (194 deg. Fahr.) The tape shall be of cotton thoroughly saturated with a waterproof rubber compound and of proper weight and width.

The working pressure on the conductor or cables insulated with grade A compound shall not be in excess of 40 per cent of the test potential shown in Table VII for any given size and not in excess of 32 per cent of these potentials when the insulation is of grade B.

To determine the thickness of insulation for any given size of conductor or cable and working pressure multiply the working pressure by two and one-half for grade A insulation and by three and one-eighth for grade B insulation, and use the proper insulation thickness found in Table VI.

If the wire or single conductor cable is to be finished with a braid, all cables smaller than No. 8 A.W.G. shall be double-braided No. 8 and larger to be double-braided or single-braided as required. The outside braids shall be not less than 1/32 in. thick and the inside braid not less than 1/64 in. thick. Single braid shall be not less than 1/32 in. thick.

When multiple-conductor cables are specified the rubber insulation on each conductor shall be covered with a layer of tape overlapping not less than one-quarter of its width. In the case of two conductor cables the separate conductors thus finished shall be laid side by side and an outer covering of single braid not less than 1/32 in. thick shall be then applied. In the case of three or more conductors the taped conductors shall be twisted together with a suitable lay of at least one complete twist in 24 in., the interstices being filled with sufficient jute to make the core of circular cross-section. Over this core shall then be applied a tape with an overlap of at least 1/8 in. and the outer covering of braid not less than 1/32 in. shall then be applied.

If the wire or cable is to be furnished with a lead sheath, the rubber compound shall be that designated as grade A, and instead of an outer covering of braid as provided in the preceding paragraph there shall be tightly formed about the core a lead sheath of uniform thickness not less than that indicated in the following table:

Diameter of Core in Mils	Thickness of Sheath, In.
Under 1,999	1/64
2,000—2,699	3/64
2,700 and over	1/16

Table IV—Tubular Steel Poles—Deflections and Loads.

Description of Poles								Probable Deflections when Pole is Set 6 ft. in Ground and Load is Applied and Deflection Measured 18 in. from Free End													Greatest Safe Load in Pounds	Length in Feet
Length in Feet	Size and Kind of Pipe: Butt Std.	Butt Ex. Hvy.	Middle Std.	Top Std.	Weight of Pole	Section Lengths—Feet: Butt	Middle	Top	Top Line Gives Loads in Pounds Applied 18 in. from Free End of Pole: 500	600	800	1,000	1,200	1,400	1,600	1,800	2,100	2,400	2,700	3,000	3,300		
28	5	.....	4	3	384	18	7	6	6.27	....	....	....	....	....	....	....	....	....	....	....	....	524	28
28	.....	5	4	3	495	18	7	6	4.63	....	....	....	....	....	....	....	....	....	....	....	....	604	28
28	6	.....	5	4	509	18	7	6	3.29	4.07	....	....	....	....	....	....	....	....	....	....	....	690	28
28	.....	6	5	4	681	18	7	6	2.54	2.94	3.92	4.90	....	....	....	....	....	....	....	....	....	956	28
28	7	.....	6	5	644	18	7	6	2.05	2.46	3.28	4.10	....	....	....	....	....	....	....	....	....	1,033	28
28	.....	7	6	5	905	18	7	6	1.34	1.60	2.14	2.67	3.20	3.74	....	....	....	....	....	....	....	1,460	28
28	8	.....	7	6	793	18	7	6	1.32	1.58	2.10	2.63	3.16	3.68	....	....	....	....	....	....	....	1,367	28
28	.....	8	7	6	1,060	18	7	6	0.90	1.08	1.44	1.80	2.16	2.52	2.88	3.44	....	....	....	....	....	2,000	28
28	9	.....	8	7	951	18	7	6	0.89	1.06	1.42	1.77	2.12	2.48	2.83	3.19	....	....	....	....	....	1,828	28
28	.....	9	8	7	1,218	18	7	6	0.64	0.77	1.02	1.28	1.53	1.79	2.04	2.19	2.56	2.93	....	....	....	2,550	28
28	10	.....	9	8	1,137	18	7	6	0.59	0.71	0.95	1.19	1.43	1.67	1.90	2.14	2.50	2.86	....	....	....	2,517	28
28	.....	10	9	8	1,394	18	7	6	0.45	0.54	0.72	0.90	1.08	1.26	1.44	1.62	1.89	2.16	2.43	2.70	2.97	3,300	28
30	5	.....	4	3	406	18	9	6	....	....	....	....	....	....	....	....	....	....	....	....	....	480	30
30	.....	5	4	3	517	18	9	6	6.10	....	....	....	....	....	....	....	....	....	....	....	....	550	30
30	6	.....	5	4	538	18	9	6	4.49	5.38	....	....	....	....	....	....	....	....	....	....	....	629	30
30	.....	6	5	4	711	18	9	6	3.24	3.89	5.18	....	....	....	....	....	....	....	....	....	....	870	30
30	7	.....	6	5	682	18	9	6	2.71	3.25	4.34	5.42	....	....	....	....	....	....	....	....	....	941	30
30	.....	7	6	5	943	18	9	6	1.77	2.12	2.82	3.53	4.24	....	....	....	....	....	....	....	....	1,330	30
30	8	.....	7	6	840	18	9	6	1.74	1.99	2.78	3.48	3.97	....	....	....	....	....	....	....	....	1,245	30
30	.....	8	7	6	1,107	18	9	6	1.20	1.43	1.91	2.39	2.87	3.35	3.82	....	....	....	....	....	....	1,664	30
30	9	.....	8	7	1,009	18	9	6	1.17	1.40	1.86	2.33	2.80	3.26	3.73	....	....	....	....	....	....	1,665	30
30	.....	9	8	7	1,275	18	9	6	0.94	1.02	1.35	1.69	2.03	2.37	2.70	3.04	3.55	....	....	....	....	2,303	30
30	10	.....	9	8	1,205	18	9	6	0.78	0.94	1.25	1.56	1.87	2.18	2.50	2.81	3.28	3.74	....	....	....	2,295	30
30	.....	10	9	8	1,462	18	9	6	0.60	0.72	0.96	1.20	1.44	1.68	1.92	2.16	2.52	2.88	3.24	3.60	....	3,000	30
32	5	.....	4	3	429	19	9	7	....	....	....	....	....	....	....	....	....	....	....	....	....	440	32
32	.....	5	4	3	545	19	9	7	7.90	....	....	....	....	....	....	....	....	....	....	....	....	505	32
32	6	.....	5	4	566	19	9	7	5.79	....	....	....	....	....	....	....	....	....	....	....	....	578	32
32	.....	6	5	4	750	19	9	7	2.50	5.00	6.67	....	....	....	....	....	....	....	....	....	....	800	32
32	7	.....	6	5	720	19	9	7	3.50	4.20	5.60	....	....	....	....	....	....	....	....	....	....	864	32
32	.....	7	6	5	996	19	9	7	2.28	2.74	3.65	4.56	5.47	....	....	....	....	....	....	....	....	1,220	32
32	8	.....	7	6	887	19	9	7	2.25	2.69	3.59	4.49	5.39	....	....	....	....	....	....	....	....	1,147	32
32	.....	8	7	6	1,169	19	9	7	1.54	1.85	2.46	3.08	3.70	4.31	4.93	....	....	....	....	....	....	1,668	32
32	9	.....	8	7	1,066	19	9	7	1.51	1.81	2.41	3.01	3.61	4.22	4.82	....	....	....	....	....	....	1,530	32
32	.....	9	8	7	1,348	19	9	7	1.09	1.31	1.74	2.18	2.62	3.05	3.49	3.92	4.58	....	....	....	....	2,115	32
32	10	.....	9	8	1,274	19	9	7	0.97	1.16	1.55	1.93	2.32	2.71	3.09	3.48	4.06	....	....	....	....	2,072	32
32	.....	10	9	8	1,545	19	9	7	0.53	0.64	0.85	1.07	1.28	1.49	1.70	1.92	2.24	2.56	2.88	....	....	2,750	32
34	5	.....	4	3	453	20	10	7	....	....	....	....	....	....	....	....	....	....	....	....	....	406	34
34	.....	5	4	3	576	20	10	7	....	....	....	....	....	....	....	....	....	....	....	....	....	467	34
34	6	.....	5	4	601	20	10	7	7.33	....	....	....	....	....	....	....	....	....	....	....	....	534	34
34	.....	6	5	4	793	20	10	7	5.30	6.35	....	....	....	....	....	....	....	....	....	....	....	740	34
34	7	.....	6	5	763	20	10	7	4.43	5.32	7.09	....	....	....	....	....	....	....	....	....	....	800	34
34	.....	7	6	5	1,053	20	10	7	2.89	3.47	4.62	5.78	....	....	....	....	....	....	....	....	....	1,130	34
34	8	.....	7	6	933	20	10	7	2.84	3.41	4.54	5.68	....	....	....	....	....	....	....	....	....	1,057	34
34	.....	8	7	6	1,236	20	10	7	1.95	2.34	3.12	3.90	4.68	5.46	....	....	....	....	....	....	....	1,542	34
34	9	.....	8	7	1,128	20	10	7	1.90	2.28	3.04	3.80	4.56	5.32	....	....	....	....	....	....	....	1,362	34
34	.....	9	8	7	1,425	20	10	7	1.38	1.65	2.20	2.75	3.30	3.85	4.40	4.95	....	....	....	....	....	1,972	34
34	10	.....	9	8	1,345	20	10	7	1.28	1.53	2.04	2.55	3.06	3.57	4.08	4.59	5.38	....	....	....	....	1,947	34
34	.....	10	9	8	1,634	20	10	7	0.97	1.16	1.55	1.94	2.33	2.72	3.10	3.49	4.07	4.66	....	....	....	2,543	34

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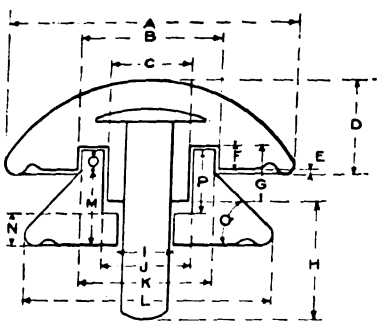
If the cable is lead-sheathed, a heavy serving of tarred jute shall be placed over the sheath. Over this jute an armor of galvanized steel wire to conform to the following table shall be applied spirally and closely in such manner as completely to envelop the cable:

Outside Diameter Over Lead Sheath and Jute (In.)	Size of Armor Wire (B.W.G.)
1	10
1¼—1½	8
1¾—2¼	6
2½—3	4

In the case of steel-tape-armored cables two overlapping galvanized steel tapes of proper weight and dimensions shall take the place of the wires. If required, a heavy serving of tarred jute shall be applied over the armor and finished by the application of a coating of lime and sand.

TABLE VI—COMPARISON BETWEEN PRESENT DIMENSIONS AND PROPOSED STANDARD DIMENSIONS FOR CAP AND CONE DESIGN



TYPE	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
	INCHES																
1	3 32/64	1 41/64	38/64	1 24/64	6/64	16/64	38/64	1 16/64	42/64	1 4/64	40/64	2 62/64	6/64	34/64	14/64	50/64	50°
2	3 33/64	1 42/64	64/64	1 8/64	1/64	22/64	46/64	1 22/64	42/64	1 2/64	40/64	2 56/64	60/64	22/64	12/64	52/64	49°30
3	3 32/64	1 42/64	63/64	1 12/64	4/64	16/64	40/64	1 20/64	44/64	1 2/64	40/64	2 62/64	58/64	20/64	10/64	48/64	49°30
4	3 36/64	1 41/64	64/64	1 16/64	5/64	20/64	48/64	1 18/64	42/64	1 2/64	40/64	3	58/64	26/64	6/64	48/64	50°
5	3 38/64	1 42/64	64/64	1 2/64	4/64	16/64	45/64	1 12/64	42/64	1 4/64	40/64	2 62/64	59/64	23/64	16/64	52/64	49°30
6	3 37/64	1 42/64	62-64/64	1 10/64	5/64	16/64	40/64	1 18/64	42/64	1 2/64	56/64	2 60/64	62/64	24/64	10/64	46/64	50°
7	3 32/64	1 42/64	62-64/64	1 20/64	4/64	20/64	48/64	1 20/64	42/64	1 2/64	58/64	3	1 3/64	36/64	16/64	47/64	51°
8	3 32/64	1 41/64	62/64	1 16/64	4/64	18/64	46/64	1 8/64	42/64	1 2/64	38/64	2 58/64	57/64	22/64	16/64	51/64	49°
9	3 32/64	1 41/64	60/64	1 20/64	0/64	19/64	48/64	1 5/64	42/64	1 2/64	39/64	2 54/64	58/64	22/64	16/64	52/64	49°
10								1 8/64		62/64	1 39/64	2 56/64	60/64	26/64	6/64	46/64	49°
11	3 34/64	1 42/64	64/64	1 8/64	4/64	16/64	40/64	1 20/64	43/64	1 2/64	57/64	2 60/64	58/64	20/64	10/64	48/64	49°30
12									41/64	1 2/64	36/64	3	50/64	12/64	10/64	48/64	49°30
STANDARD	3 32/64	1 42/64	64/64	1 24/64	4/64	16/64	48/64	1 16/64	42/64	1 2/64	40/64	2 58/64	3°	62/64	24/64	16/64	56/64	50°

■ A VARIATION OF NOT OVER 1/64 ALLOWABLE.
* NOT MORE THAN
† NOT LESS THAN
▲ VARIATION OF NOT OVER 1/32 ALLOWABLE.

If the cable is to be furnished without a lead sheath, the core shall be finished with tape and an outer protective covering then applied. Two servings of tarred jute in reverse layers shall be applied over the taped core, hove on smoothly with even thickness and without gaps between the strands. The thickness of double serve on each side is to be about 1/8 in. Over this jute an armor of galvanized steel wire shall be placed, which shall conform to the requirements of the preceding paragraph.

The cable shall be sufficiently flexible between the temperatures of 18 deg. C. (0 deg. Fahr.) and 38 deg. C. (100 deg. Fahr.), so that it may be bent without injury to an arc of a circle having a radius ten times the outer diameter of the finished cable.

The contractor may be required to test such samples as may be selected at the discretion of the inspector and must furnish to the company certified reports of such tests. These tests shall consist of resistivity test, voltage test, test for insulation resistance and such other chemical and mechanical tests as will determine the quality of the material. After the installation of the cables, or within a period of time specified, further tests may be made as indicated below.

In general, all tests, except chemical, shall be made at the place of manufacture, with suitable equipment provided by the contractor. All reasonable facilities shall be given to the inspector to determine the accuracy of the equipment furnished, and its suitability for the purpose.

Each length of conductor or cable insulated with the compound shall be tested for dielectric strength and insulation resistance before the application of any outer covering other than tape or braid, after at least twelve consecutive hours' submersion in water and while still immersed. The conditions and conduct of the electrical tests shall conform to the recommendations of the American Institute of Electrical Engineers unless otherwise stated in the contract.

A resistivity test shall also be made upon the wires making up the cable.

An alternating current of not less than twenty-five cycles not more than 100 cycles and approximating as closely as possible to a sine wave shall be applied between each conductor and the water for a period of five minutes. For a thirty-minute test 80 per cent of the specified voltage shall be used. Lead-sheathed cables after being finished shall have the test voltage applied between their conductors and also between all of the conductors and the sheath. The voltage to be applied shall be in accordance with Table VI. The cable must not show any weakening of its insulation or any other injury under this test, which is to be made before the test for insulation resistance.

The insulation resistance shall be measured after the high-potential test and following a one-minute electrification with a battery of not less than 100 nor more than 500 volts and the results corrected to the standard temperature of 15.5 deg. C. All tests for insulation resistance shall be made at a temperature within 10 deg. C. of this standard temperature. The resistance of multiple conductor cables shall be measured between one conductor and the other conductor grounded to the sheath. The insulation resistance shall not be less than given in Table VII, and the change of insulation resistance with temperature shall be at a rate not exceeding 4.5 per cent per deg. C. variation from the standard temperature.

TABLE VI—TEST POTENTIAL FOR DIELECTRIC STRENGTH OF RUBBER-INSULATED CABLES.

Thickness of Insulation in 64ths of an inch....	Test Potential in Volts.							
	3	4	5	6	7	8	10	12
(Cir. mils)								
2,000,000	....	....	....	....	....	5,000	10,500	15,500
1,750,000	....	....	....	....	....	6,500	11,500	16,500
1,500,000	....	....	....	....	....	7,000	12,000	17,000
1,250,000	....	....	....	....	....	7,500	12,500	17,500
1,000,000	....	....	....	....	5,500	8,000	13,000	17,500
750,000	....	....	....	....	6,500	9,000	14,000	18,500
500,000	....	....	2,500	5,000	7,500	10,000	14,500	19,000
250,000	....	....	4,000	6,500	9,000	11,000	15,500	19,000
B. & S. Gage...								
0000	....	....	4,500	7,000	9,000	11,500	15,300	19,000
000	....	....	5,000	7,500	9,500	11,500	15,500	19,000
00	....	....	5,000	7,500	9,500	11,500	15,500	18,000
0	....	....	5,500	8,000	10,000	12,000	15,500	18,500
1	....	4,000	6,000	8,000	10,000	12,000	15,500	18,500
2	....	4,000	6,000	8,000	10,000	12,000	15,000	18,000
4	....	4,500	6,500	8,500	10,000	11,500	14,500	17,000
6	....	5,000	6,500	8,500	10,000	11,500	14,000	16,000
8	....	3,000	5,000	7,000	8,000	9,500	11,000	13,000	15,000
10	....	3,000	5,000	6,500	8,000	8,500	10,000	12,000	14,000
12	....	2,500	5,000	6,000	7,500	8,500	9,500	11,500	13,500
14	....	2,500	5,000	6,000	7,000	8,000	9,000	11,000	13,000

Potential given in this table shall be applied for five minutes.
For a thirty-minute test use 80 per cent of tabulated voltage.
For grade A insulation, use 100 per cent of the above tabulated values for test.
For grade B insulation, use 80 per cent of the above values for test.

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For grade A compound, the chemical tests to determine the quality of compound shall be made in accordance with the recommendations of the committee appointed by the rubber conference of Dec. 7, 1911. For grade B compound the following determinations shall be made upon the vulcanized compound: Acetone extract, alcohol potash extract, chloroform extract, ash, total sulphur. The sum of the percentages of these five ingredients subtracted from 100 per cent shall show a residue of rubber gum as above specified. The ash test shall be supplemented by tests to determine the quantity of substances, other than vulcanized rubber, which are combustible but are not soluble in acetone, alcoholic potash or chloroform, and such substances, if any, shall be counted as ash. The method of analysis employed in making the above tests shall be that specified in the Underwriters' Laboratories "Method of Procedure for Chemical Tests of Rubber Compound Used on Wires and Cords."

The specific gravity of the vulcanized compound, in sections as stripped from the conductor, shall be not less than 1.75 as compared with distilled water at 20 deg. C.

Table VII—Insulation Resistance of Rubber-Insulated Cables.

Thickness of insulation in 64ths of an Inch	Megohms per Mile							
	3	4	5	6	7	8	10	12
(*Cir. mils*)								
2,000,000	....	....	....	....	....	200	275	325
1,750,000	....	....	....	....	....	275	300	375
1,500,000	....	....	....	....	....	300	325	400
1,250,000	....	....	....	....	....	325	375	425
1,000,000	....	....	....	....	300	325	400	475
750,000	....	....	....	....	325	400	475	525
500,000	....	....	300	375	400	475	575	675
250,000	....	....	400	475	575	625	725	875
B. & S. Gage								
0000	....	....	450	550	600	650	800	950
000	....	....	500	600	650	750	850	1,000
00	....	....	550	650	750	850	950	1,050
0	....	....	600	700	800	950	1,050	1,200
1	....	600	650	750	850	1,000	1,150	1,350
2	....	650	750	850	950	1,050	1,250	1,450
4	....	750	850	1,000	1,150	1,250	1,450	1,650
6	....	850	1,050	1,200	1,350	1,450	1,750	1,950
8	850	1,050	1,250	1,450	1,650	1,750	2,050	2,200
10	1,150	1,350	1,600	1,800	2,000	2,150	2,400	2,650
12	1,350	1,600	1,850	2,050	2,250	2,400	2,750	3,000
14	1,550	1,850	2,150	2,350	2,550	2,650	3,050	3,350

Measurements to be made at or corrected to 60 deg. Fahr., 15.5 deg. C, after one minute electrification.
For grade A insulation, use 100 per cent of the above tabulated values for test.
For grade B insulation, use 80 per cent of the above values for test.

From any wire on which the wall of insulation does not exceed ⅛ in. a sample of the vulcanized compound not less than 4 in. in length and of uniform cross-section shall be cut from the wire and marks placed on it 2 in. apart. The sample shall be stretched longitudinally at the rate of 12 in. per minute until the marks are 6 in. apart and then immediately released. One minute after such release the marks shall not be over 2⅜ in. apart. The sample shall then be stretched until the marks are 9 in. apart before breaking.

In case the wall of insulation exceeds ⅛ in. the return required shall be 2⅜ in., but the stretch before breaking shall be 8 in. instead of 9 in.

The vulcanized compound shall have a tensile strength of not less than 1000 lb. per sq. in. for grade A and 800 lb. for grade B based on the original cross-section of the test piece before stretching. The test shall be made at a temperature not less than 10 deg. C.

Short samples of the finished conductor or cable shall be placed on a piece of clean white paper in an oven and shall be subjected to a temperature of 125 deg. Fahr. (52 deg. C.) for one-half hour. The compound shall not become sufficiently fluid to form a ridge upon the paper perceptible to the fingers, or, in case the compound shall be absorbed by the paper, to show a greasy or oily spot upon the paper, nor shall the compound show a tendency to flow toward the bottom of the wire, thus exposing the cotton fiber of the braid at the top.

Appendix C—Specifications for Tubular Steel Poles

Joints shall be 18 in. in length and shall be made hot without reducing the diameter of the smaller pipe more than ⅛ in. and without any reduction in the thickness of either pipe. The completed joint shall caliper the same outside diameter for its entire length, shall be free from cracks or flaws and shall be water-tight. Variations in weight of poles shall not exceed 5 per cent over or 5 per cent under the weights specified in the order.

If required, 5 per cent of the poles of any one size on any order shall be subjected to the tests for deflection, set and the drop test as specified. If any of the poles so tested fail to conform to the requirements, an additional 5 per cent shall be tested at the contractor's expense. A failure in any pole of this second 5 per cent shall be cause for rejection of the lot of that size. The contractor may, at his expense, test all of the poles so rejected and those poles which conform to the requirements will be accepted for shipment if such tests are made immediately.

The deflection shall not exceed the limit specified on the order sheet when subjected to the load given. The load shall be applied at right angles to the axis of the pole 18 in. from the top, with the lower 6 ft. of the pole held rigidly. Any pole when dropped three times from a height of 6 ft. upon a solid wooden block on a rigid base shall not show any telescoping at the joints.

Any poles which fail to meet the above requirements may be rejected.

Other Appendices

The report also contained, under the caption "Appendix B," derivations for the formula used in working out the results in Table I together with a derivation of the formula for the deflection of steel and concrete poles. Under the caption "Appendix D" specifications for wood poles were submitted and specifications for reinforced concrete poles were submitted under "Appendix E." Specifications for 600-volt d. c. overhead trolley construction with complete drawings were submitted under "Appendix F," and revised specifications for overhead crossings of electric light and power lines were given under "Appendix G."

Recommendations of the Committee

The committee on power distribution made the following recommendations for adoption as standard by the association:

Specification for rubber-insulated wire and cable.
Design of cap and cone insulators.
Revision of deflections in standard terminology.
Specification for tubular steel poles.
Specification for wood poles.

All of these recommendations were approved by the committee on standards for adoption as standard by the association.

The committee on power distribution recommended for adoption as recommended practice the following:

Specification for 600-volt overhead trolley construction.
Revised specifications for overhead crossings of electric light and power transmission lines.

The standards committee approved the latter recommendation but recommended that action on the specifications for 600-volt overhead trolley construction be deferred until it should be discussed and acted upon by the convention.

The committee on power distribution requested more time for investigation of the subject of reinforced concrete poles and suggested that further consideration of the subjects of lattice poles and of trolley guards as a subject by itself was not warranted. This action for all three matters was approved by the committee on standards.

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REPORT OF COMMITTEE ON STANDARDS*

PAUL WINSOR, CHAIRMAN; H. H. ADAMS, J. M. LARNED, J. H. HANNA, B. J. WOOD, E. B. KATTÉ, F. R. PHILLIPS, GEORGE H. PEGRAM, E. R. HILL, F. B. H. PAINE, R. H. PINKLEY, CHARLES H. CLARK, G. W. PALMER, JR.

The findings of this committee in regard to the various matters placed before it for approval are published in abstract as a part of the report of that committee to the work of which the findings apply. In addition to its regular work, however, the committee on standards took up the new matter of procedure and of the compilation of existing engineering practices of the association.

At the meeting of the committee held during the mid-year conference the procedure for adoption of standards and recommended practices was discussed at considerable length, it being the unanimous opinion of the members of the committee that the present plan was in many respects unsatisfactory and did not produce the best results, particularly in the matter of the letter ballot.

The matters of standard forms for specifications and the publication of standards and recommended practices were also considered and all three subjects were turned over to a sub-committee. The primary object of the appointment of this sub-committee was the development of a possible revision of procedure for adoption of standards and the study of various recommendations of standards and recommended practices or other methods or practice adopted by this association since organization, together with the compilation of the material in book form, this book to be revised and brought up to date annually.

The committee decided upon the inclusion of such material as could be classified under the following three divisions:

(a) "Standards," to include such recommendations of the association as bear its formal approval as a standard.

(b) "Recommended practices," to include such recommendations of the association as bear its formal approval as a recommended practice.

(c) "Miscellaneous approved methods and practices," to include all other definitely approved recommendations.

The sub-committee recommended that the new publication should be called the "A.E.R.A. Engineering Manual," and should have a binder of loose-leaf form with all sheets properly numbered and a complete index, which shall be revised each year, one binder complete with all printed matter to be furnished to each member company, and printed matter only to be furnished to individual members of the Engineering Association.

The matter of definitions was then taken up and the following suggestions are herewith submitted:

"Standard": Standard articles, designs, specifications, units, terminology, measurements or methods adopted shall be those which are applicable to general use and represent the best practice.

"Recommendation": Recommended articles, designs, specifications, units, terminology, measurements or methods adopted shall be those which represent good present practice or progress of the art but which because of the formative state of the art and the likehood of changes, or for other reasons, do not admit of adoption as "standard" at the time of consideration.

Proposals are requested for the construction of an electric tramway in Madird, Spain, to run from El Paseo de las Delicias to the bridge of the Princesa. If succesful in bidding against La Sociedad Tranvia del Este de Madrid (petitioner for the line and owner of the approved project), the concessionaire must pay $452 for the project with interest of 5 per cent from the date the project was filed.

*Abstract of report read before the American Electric Railway Engineering Association, at Atlantic City, N. J., Oct. 13-17, 1913.

BABBITT TESTING MACHINE ONE OF WESTINGHOUSE ATTRACTIONS

It is natural that control systems and motors should form the biggest and ever-interesting part of the Westinghouse exhibit at space 21, but this year presents some departure from orthodox standards. Thus the Westinghouse Electric & Manufacturing Company is showing a babbitt-testing machine from its laboratory to demonstrate the care which it takes to insure perfection in this part of its equipment. The same company has also prepared a model of a portable substation and of a typical outdoor transformer substation. The portable substation is a reproduction to scale of a 300-kw, sixty-cycle rotary converter outfit with 3300-volt incoming lines, and the accessibility of parts and simplicity of arrangement are admirably illustrated. The transformer substation shows the construction for 33,000-volt work. In connection with these models, the full-size outdoor substation of the Transmission Engineering Company equipped with Westinghouse oil-insulated, self-cooled transformers will be found instructive. Among the control equipments, the light-weight HL control is deservedly prominent in view of the growing demand for remote control for city cars. The sturdy character of this control is demonstrated by the exhibition of details such as the line switch, overload trip relay, blowout coil, cylinder and magnet valve, etc. An operating equipment of the new type PK control is on view for the first time. This control has been developed for street railway conditions where it is very important to have heavy currents removed from the platform and also to reduce the control failures. It is even more compact than HL control and largely for that reason was chosen for the 175 stepless cars of the New York Railways. Commutating-pole motors are well represented by the No. 306, 307-C-4 field control, 323-A, 328 and 332-B-2 motors; also a complete working rack of the No. 328 and 307-C-4 motors, the former operating with HL and the latter with PK control.

The relation of parts in a 5000-kw, 3600-r.p.m. turbine, as arranged on a platform, is the striking exhibit of the Westinghouse Machine Company. The complete spindle with its blading is mounted in screens upon which the sectional view of the casing has been laid off.

The Westinghouse Traction Brake Company displays an important line of air-brake devices and appliances such as motor-driven air compressors, automatic car and air couplers, motorman's brake valves, electric compressor governors, air reservoirs, complete car equipments, etc.

A complete assortment of insulating and repair materials completes the showing of the Westinghouse interests.

ELECTRIC SERVICE DISPLAYS—CARHOUSE TOOLS

The exhibit of the Electric Service Supplies Company at space No. 414 comprises many of its standard manufactures, together with articles shown this year for the first time. Among the exhibits are Garton-Daniels lightning arresters, the automotoneer, "Protected" rail bonds, Keystone trolley catchers, Keystone steel gear cases, Keystone portable and stationary lamp guards, Keystone overhead material, Peerless heavy-duty banding lathes, Peerless portable commutator slotters, Peerless portable tension machines and winding stands, Keystone pneumatic gong ringers, vacuum sanders and leakless valves, Keystone motorman's seats, Keystone car destination signs, Keystone truss pins, Locke insulators and the Automatic trolley guard. The new lines of Peerless carhouse tools will be especially interesting to the representatives of the mechanical departments. The representatives present are the following: W. A. Armstrong, G. W. Cox, A. H. Englund, T. H. Henckle, H. G. Lewis, J. R. McFarlin, T. F. McKenna, F. C. Peck, L. H. Pipe, J. W. Porter, C. J. Mayer and J. V. E. Titus.

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JOHNS-MANVILLE COMPANY AT THE CONVENTION

The exhibit of the H. W. Johns-Manville Company is one of exceptional interest. The booth, comprising an area of 722 sq. ft., contains an attractive display of overhead line material, rail bonds and special insulating materials of all kinds, arranged on wall boards, while third-rail insulation and J-M fiber conduit is shown on a pyramid in the center of the booth. The "Noark" line of fuses, protective device boxes and meter equipment form an interesting part of this exhibit, together with fireproof cable insulation, Niagrite and friction and rubber tapes.

J-M transite asbestos wood, a fireproof wood made of asbestos fiber and binding cements, and extensively used for fireproofing electric cars, is naturally attracting much favorable attention. Somewhat similar to this product is ebony asbestos wood, a hard, durable, highly resistant material with asbestos as its base, used for switchboards, panelboards, switch and fuse boxes, car floor lining, electric heater insulation, etc.

For the first time the company is showing the J-M metallic sand spout. This spout is made of remarkably strong metal ribbon wound spirally. During the winding the edges are turned in to form a continuous interlocking metal spout that can be bent to the desired curve without fear of kinking or fracture. The J-M spout is made in stiff or flexible form and is furnished with plain couplings or couplings for De Witt or Ridlon sand boxes.

Other products of railway interest are J-M transite asbestos shingles, the fireproof shingles made of asbestos and cement; J-M asbestos roofing, the all-mineral roofing that never requires coating and affords perfect fire protection, and the well-known line of J-M pipe coverings for insulating low and high-pressure steam systems; packings for all purposes, etc.

Those in attendance are J. W. Perry, general manager electrical department; S. G. Meek, assistant general manager electrical department; George A. Saylor, manager electrical department Milwaukee branch; H. L. Steiner, manager Cincinnati office; H. H. McManus, New York office; H. M. Voorhies, manager electrical department Philadelphia branch; C. E. Fairbanks, manager electrical department Baltimore branch; H. I. Morse, Boston branch; A. J. Finlay, Cuban representative; E. B. Hatch, president Johns-Pratt Company, Hartford, Conn.; R. C. Buell, secretary, and R. B. Lattin, electrical engineer of the same company.

WESTERN ELECTRIC VACUUM-TYPE CAR CLEANERS

The Western Electric Company occupies spaces 341 and 335, where it is displaying telephone apparatus, vacuum-type car cleaners and a great variety of miscellaneous supplies. The first layout consists of a complete line of telephones for use in car operation, such as stationary iron-clad telephones for the right-of-way, portable car telephones and standard inside equipment; also telephone selector apparatus for car dispatching, equipment for protection of telephone lines, exposed high-potential power circuits, etc. The vacuum cleaners are of the Western Electric-Sturtevant portable type for car cleaning. The miscellaneous supplies include Electrose high-tension insulators, Thomas porcelain insulators, Pyrene fire extinguishers, sleet cutters, Western Electric insulating tapes and compounds, Kalamazoo trolley wheels and harps, General Electric rail bonds and line construction material, Faraday 500-volt car buzzers and signal bells, trolley retrievers and catchers, trolley bases, Samson trolley cord and bell rope, Shelby trolley poles, C-H arc and incandescent car headlights, Gold electric car heaters and Benjamin specialties. The company's represenatives are as follows: M. A. Oberlander, assistant supply sales manager; R. H. Harper, railway department; F. D. Killion, G. K. Heyer, G. Brown, A. G. Kingman, general department, New York; Messrs. Enders, Maxon and Spamer, New York; Messrs. Hallstrom, Coller and Greenfield, Philadelphia; Mr. Phillips, Pittsburgh; Messrs. Davis and Guest, Chicago; Mr. Bertke, Cincinnati; Mr. Crouch, St. Louis; Mr. Cathright, Atlanta; Mr. Marchmont, Richmond; Mr. Collins, Boston, and Mr. Shiveley, Kansas City.

POWER PLANT SIGNALS A GENERAL ELECTRIC NOVELTY

Perhaps the most striking feature of the General Electric Company's display in space 20 is the remote signaling device for transmitting signals between switchboard and distant generating rooms. This equipment resembles that in the Mississippi River Power Company's station, Keokuk, Ia., where the distance from the switchboard room to the farthest generator is more than 800 ft. This system will also be employed on the Panama Canal to indicate the position of the lock machinery. Signals are transmitted by "position" indicators, which are similar to small induction motors. Transmitters and receivers with dials for indicating the desired signals are located both at the switchboard and in the generator room. The transmitter is actuated by a handle, and like positions are indicated electrically on its dial and on the dial of the corresponding receiver in the generator room. In conjunction with the simultaneous operation of the transmitters and receivers, push-button switches may be employed to operate signal lamps, whistles or bells as desired.

Of course, railway motors have the usual extensive showing in complete, exploded and detail form. Maintenance worth is demonstrated by the GE-205 110-hp motor from one of the cars of the Washington, Baltimore & Annapolis Railway. This motor, as shown, has run with the original brushes and linings 225,000 miles in every-day service and is representative of the average condition of all the equipments. The Sprague-General Electric Type MK all-electric control on exhibit has armature type contactors and is designed for operating four 50-hp motors on city cars. The company's combined straight and automatic air brake equipment is shown with the CP-27-B type air compressor, which has been provided with a special glass cover and lamps in order to illuminate the interior and show the flow of oil. The new CP-25-C air compressor is shrown exploded to exhibit construction details. A number of separate valves entering into the equipment, including a new rotary straight-air motorman's valve, form part of this exhibit. K-51 and K-35 types of controllers are also shown, the K-35 controller being provided with a set of four field tappers in the box with the relay. The 40-ton electric switching locomotive on view is provided with Sprague-General Electric Type M control, geared for slow speed and equipped with four GE-207 165-hp 600 volt commutating-pole motors.

A complete assortment of line material is grouped on a large frame. All line parts subject to corrosion are protected by sherardizing. Headlamps for electric railway service include luminous arc lamp with semaphore lens for high-speed interurban service, a 2-amp luminous arc lamp with semaphore lens for suburban service, a stationary incandescent headlamp with semaphore lens for city service, a portable incandescent lamp with plain glass floor for high-speed interurban service and a 4-amp luminous arc lamp with plain glass door and parabolic reflector for slow-speed interurban service. Three types of air, water and steam flow meters—the indicating-recording with integrating device, the recording with integrating device, and the indicating—are shown either in service or in section to show the working parts.

During the entire week a lantern slide exhibit will be given illustrating the "spirit of progress" throughout the electric railway field the past year. More than seventy-five pictures, which have been made from actual photographs taken in various parts of the country, will be shown.

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TRUCK DEVELOPMENTS PROMINENT AT BRILL EXHIBIT

Prominently located in spaces 4, 6, 8 and 10, the exhibit of The J. G. Brill Company is a center of more than passing interest. Much of the attention is devoted to the four different types of trucks on view. One of these is the No. 39-E type, of which, according to the company's records, nearly 10,000 have been sold. After exhaustive experiments, the builders have recently improved this noted truck still further by adopting a combination plate and coil spring in place of the heavy plate spring formerly used to support the bolster. The new spring combination thoroughly cushions the shock and the differing action of the plate and coil springs gives particularly desirable service under light cars, especially in large cities. As the recently adopted arrangement works out, the motor is supported on the frame, the frame on the journal springs and the car weight on the bolster and the truck frame. By this system the deadening effect of the motor is communicated only to the journal springs.

Another noteworthy truck is the "Radiax," the J. G. Brill Company's standard radial axle type. The brake rigging of this truck has been simplified without detracting in any way from its efficiency. The truck is shown with a motor case on one end to demonstrate the part that the motor plays in the brake connection. The wheels, with brake shoes and hangers, motors and axles at each end, form a unit all radiating together. This produces no strain on the motor case that it is not fully capable of bearing and, of course, there is no undue wear upon the motor bearings and pinions as the thrust is in the opposite direction to the force exerted by its tractive effort. Careful investigation has shown that where such wear occurs it is negligible. The truck is exhibited with the end bearing the motor shell turned so as to show it in the extreme position. The solid forged side frames are peculiarly appropriate on account of the length of the wheelbase and the width of the yokes. A recently issued pamphlet shows that this truck is in use on large and small systems throughout the world.

The nameboard upon the No. 27-MCB2 truck offers the interesting information that four orders totaling 386 trucks of this type were received from the Boston Elevated Railway. The new Brill truck catalog, which is having its initial distribution at the convention, shows the three most largely used types of this truck and shows also the variations which give it seven distinct classifications. Like the other types of Brill trucks this has a one-piece cast-steel bolster which is of a form that will greatly interest mechanical experts. The half-ball brake hangers, also characteristic of all Brill trucks, are very well worth examining in connection with this huge truck, which weighs 11,100 lb. and measures 9 ft. 8 in. from end to end of the solid forged side frame.

Among this brilliant assemblage of trucks is the oldest member of the truck family in the exhibition—the No. 27-G. Wherever the use of a four-motor equipment is desirable, this is usually found. Up to comparatively recent years when city development had not reached a point where it was as generally suited to the single-motor truck as at present, the No. 27-G was the most prominent pivotal type in the world. On this truck, as on the other pivotal types exhibited, the Brill oil-retaining center bearing is a feature which is receiving deserved attention.

A very interesting part of the exhibit is a solid forged side frame of the No. 21-E truck. This is fitted up with other side members and is used to show the Brill wide-wing journal box. It is asserted by the builders that this does for the single truck what a long wheelbase and long spring centers do for a high-speed truck, as it brings all vertical strains in the side frames into straight lines, because the coil springs which bear the weight are directly underneath each other instead of off center.

Besides the trucks, the company is showing an extensive line of specialties. Among these are three motorman's seats mounted on a platform, as they would be in use. One of these is of the stationary saddle type while the others show movable seats of the saddle and circular types.

SCHUTTE & KOERTING EXHIBIT INCLUDES CONDENSER IN OPERATION

The striking display of the Schutte & Koerting Company, Philadelphia, Pa., at space 154, includes its engine stop systems, oil-burning system, various forms of valves, injectors and a condenser of the eductor type. This condenser is in operation under a head of only 8.5 lb. water pressure. Among the valves shown is the throttle valve used almost exclusively by the General Electric Company for its turbines.

The special feature of the Schutte automatic engine stop systems is the "falling weight" principle. In the butterfly valve, a falling weight which may be fitted on either side of the valve is used for holding the disk shut after being tripped by another falling weight arranged on top of the valve. These valves are arranged with solenoid for operation with 110 volts or 220 volts d.c. open-circuit system; also with magnet for open or closed circuit, with storage battery for emergency service or with open-circuit system dry batteries. A complete outfit includes valve, speed limit governor, switchboard, storage battery, hand-push switches and sheave on engine shaft.

The Schutte combined balanced throttle trip valve is the one used most frequently for engine stop systems as it combines the throttle valve required for engines with the engine stop feature. The advantages of the gate valves shown are summarized as follows: no scraping on the valve seats, no tendency to deform the shape of the body and easy operation as friction is reduced to a minimum. The "Quietite" reducing valve, said to be entirely frictionless, is fully described by a special blueprint. The mechanical oil-burning system, including burner and register, is of the type which has been adopted for the most modern battleships as well as for stationary plants. Steam jet siphons, water-jet eductors, exhausters, blowers and blast nozzles and spray or atomizing nozzles complete this valuable exhibit.

LIVE EXHIBIT OF OHIO BRASS COMPANY

The Ohio Brass Company, occupying spaces 614 and 618, has a strictly testing operating exhibit of its new devices. It is showing a continuous test of O-B Hi-Tension insulators, and a Riehle testing machine is used for mechanical breakdown tests of line materials. It is also giving electrical breakdown tests. The operating exhibit includes the company's electric car signal system, trolley bases, trolley catchers, trolley retriever, M. C. B. automatic coupler, automatic electric and air-connecting coupler, air sanders, etc. Further, the company gives practical demonstrations of the installation of its Type J and all-wire rail bonds. New catenary devices, third-rail insulators and the National railroad trolley guard are also on display. The following members of the home-office organization are present: C. K. King, vice-president; A. L. Wilkinson, secretary; E. F. Wickwire, general sales agent; C. T. Anderson, A. B. Edes, A. L. Price, E. B. Snyder, M. P. Wolcott, C. E. Young, W. C. Starkey, R. G. Averill, C. C. Beck, G. H. Bolus, C. E. Gierding. Also the following traveling salesmen: N. M. Garland, Nathan Shute, G. W. Cooper, J. E. Slimp, G. A. Kroener, F. E. Johnson, R. J. Deneen, E. C. Brown, F. V. Cook, W. H. Bloss, C. P. Leibold, C. H. Tomlinson, F. A. Strail, P. A. Hinds, G. E. Willis; also A. O. Austin, electrical and ceramic engineer of the O-B insulator plant, and R. D. Holabird, California sales agent.

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Among the Exhibits

Cornell S. Hawley, president of the Laconia Car Company, Boston, Mass., is at the convention meeting his many customers and friends.

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W. R. Kerschner, New York, is representing his own interests at the convention as well as those of the Columbia Machine Works & Malleable Iron Company, Brooklyn, N. Y.

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Mica Insulator Company, New York, has on display in space 383 samples of its Empire oiled paper and cloth, ground mica, Micanite rings and shapes, India plate and Amber plate. Samples of insulating varnishes, cements and compounds are also shown, as well as a line of Micanite rheostat tubes.

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After a year's absence as an exhibitor E. G. Chamberlain, representing the Southern Exchange Company, New York, is back again. His booth at space 612 has a certain Southern flavor about it. Instead of showing poles and crossarms, the booth is decorated with sprigs of long-leaf pine, green and fresh from Southern forests. In the background are also displayed green branches of persimmons and the cotton plant.

* * *

Watson-Stillman Company, New York, is utilizing space 501 for some interesting hydraulic machinery. It shows a portable rail bender weighing 1150 lb. with pressure capacity of 75 tons; one hydraulic pit jack with a stroke of 37 in. and 3000 lb. capacity; a small car jack weighing 45 lb. of 10 tons capacity; a Universal hydraulic beam punch, for punching 1-in. holes in beams up to ⅞-in. thickness; a sectional view of a 30-ton base jack for car lifting; one hydraulic press for plugged rail bonds of 30 tons capacity.

* * *

The Standard Underground Cable Company, space 388, has a large staff on hand to demonstrate its well-standardized output of junction boxes, pot-heads and cables. Chief interest centers in the 50,000-volt varnished cloth, single-conductor cable which has just been made. It has a 1-in. insulation. The Winnipeg Electric Railway is putting in a three-conductor, 25,000-volt, paper-insulated cable of standard manufacture. Samples of this can be seen at the exhibit, which is cozily housed in a large alcove.

* * *

Charles S. Crowell, representing the Under Feed Stoker Company of America, space 375, states that the new self-cleaning stoker is making excellent progress. It is being used at the Ingersoll-Rand plant at Phillipsburg, N. J., by the Milwaukee Electric Company, by the American Diamalt Company, the Louisville Water Works and others. The features of the new stoker are the operation of the dumping device from outside, a clinker breaker which prevents choking of the ash outlet and the automatic closure of this outlet to prevent the admission of an excess of air during dumping.

* * *

In the Ohmer Fare Register Company's spaces, 301 to 305, is shown for the first time the new recorder upon which experiments have been in progress for several years. Tools are now being made for the manufacture of the recorder and deliveries will be made in six months. The records made include division number, time, direction, day, month, conductor's number, number of 5-cent and 3-cent fares, total cash, number of transfers and serial number of run. Operating exhibits of the well-known standard types are set up for convenient inspection. The exhibit was set up by C. W. Ketteman and will be demonstrated by J. F. Ohmer, J. F. Ohmer, Jr., and several other members of the staff.

Prepayment Car Sales Company, New York, has an attractively decorated booth and reception room at space 414. Photographs and floor plans of the prepayment cars for the following roads are shown: Washington Railway & Electric Company, center entrance; Chicago Railways Company, standard prepayment; Capital Traction Company, Washington, D. C., standard prepayment; Lehigh Valley Traction Company, Allentown, Pa., full convertible standard prepayment; Central Pennsylvania Traction Company, Harrisburg, Pa., short platform reconverted car; Third Avenue Railway, New York, standard full convertible prepayment car, and New York Railways Company, center-entrance, double-deck center-entrance and center-entrance battery car.

* * *

Hunter Illuminated Car Sign Company, Flushing, N. Y., is showing at space 36 a new twin-operating deck sign, both side signs of which can be operated simultaneously with one handle. A new interior sign for use in subway cars is also shown. This sign is suspended in the center of the car, both front and rear faces bearing the indications. A combination route and destination sign is shown, having two faces at right angles for side and end roof indication. New features in a dash sign on display are a dustproof compartment for the curtain and a compartment for the lamps opening on the inside of the vestibule. Regular hood signs with interior indicators, a Philadelphia combination sign and a train order sign are also exhibited. The steel boxes containing these signs make them waterproof and dustproof.

* * *

The "Watch the Heat Pour" device shown by the Consolidated Car Heating Company, space 22, is creating much interest, and all visitors wonder where the water comes from. Among other interesting devices exhibited, this company is featuring its new thermostatic control, which is emblematic of simplicity in the design of devices for this service. It has no contactors, magnets in the operating switch, resistance relays or trip switches to complicate its operation. This thermostat has been tested up to 500,000 operations without fatigue. Another prominent feature in this exhibit is a new type of door-operating mechanism with electro-pneumatic control and pneumatic trip. This is applied to car doors of the sliding type, to demonstrate it in operation. One door-operating device is undergoing a test without lubrication during the period of the exhibition, and at the time this article was prepared it had performed 152,000 movements without any detrimental effects.

* * *

Among the new features being introduced by the Dayton Fare Recorder Company, Dayton, Ohio, in spaces 386 and 387, is the Dayton registering fare box. This fare box is designed to meet the most severe operating demands and at the same time to embody all the characteristics necessary to produce simplicity and durability in construction as well as accuracy in recording. Mutilated coins and slugs are readily detected in the inspection chamber, run through the machine and removed from the cash box. Coins are dropped from the inspection chamber into a sealed coin compartment by pressing a lever. By turning an operating handle the coins, including dimes, nickels and pennies, are counted automatically and the total amount in dollars and cents is shown on the face of the register. All counted coins are available to the conductor for change. If desired by the purchasers, the registering element on this box may be arranged to record money in dollars and cents and the total number and kind of fares collected. With this addition the result of the registrations is fully computed in detail and total. The details and totals are printed on records which embrace distribution to 5-cent fares, transfers, 3-cent fares, tickets and passengers under the former, and money, transfers and total fare registrations under the latter.

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Poole Brothers, Chicago, Ill., are exhibiting in spaces 510 and 512 a line of their illustrated and colored railway booklets, timetables, folders, tickets and maps.

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E. P. Sharp is representing the interests of the Lumen Bearing Company, Buffalo, N. Y., at the convention. The Ideal trolley wheel is exhibited by the R. D. Nuttall Company, spaces 142-144.

* * *

M. Welte & Sons, Inc., New York, N. Y., have on exhibit in Aquarium Court a large-size Welte automatic full brass band of the type supplied for band stands or dance pavilions in parks. The instrument is operated by a G. E. motor. A C. Terwilliger is the representative in charge.

* * *

Although Le Carbone Company, Paris, France, has an elaborate exhibit of seven cases of carbon brushes of every kind, shape, size and use, W. T. Jeandron, its United States agent. says, "I am only exhibiting a brush of uniform quality and universal use." Space 12 is the home of this exhibit.

* * *

Flood & Conklin Company, Newark, N. J., are showing at space 18 their four-coat Simplex system of car painting. Three car sections, one in green, one in yellow and an interurban car section in red, show each coat separately. These sections have been exhibited at four consecutive annual conventions without refinishing or touching up.

* * *

Among the new features of the exhibit of the American Mason Safety Tread Company this year at space 541 are the Stanwood non-slipping, self-cleaning car steps and the Mason non-slipping safety ladder shoes. The Mason company finds the use of safety treads is increasing rapidly. Its business up to date for this year shows an increase of 50 per cent over that done during the same period last year.

* * *

Railway Improvement Company, New York, has spaces 586-588, where it is displaying two types of coasting time recorders, the elapsed time and the standard recorders; two types of Ferranti car watt-hour meters, German current clocks and Hedley anti-climbers. A number of types of sanitary car straps are also displayed. More than 100,000 of these straps have been sold within the past two years, and they are now standard on a number of roads.

* * *

Edgar Allen American Manganese Steel Company, Chicago, Ill., is showing a complete line of "electric special ground manganese steel" gears and pinions in space 500. In order to demonstrate the strength, toughness and peculiar hardness of its manganese steel products, several gears and pinions on exhibit have been subjected to pressure tests. Other special products included in this exhibit are a number of manganese steel samples required by industries outside the electric railway field.

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Joseph Dixon Crucible Company, Jersey City, N. J., is showing at space 16 a full line of its products, including flake graphite for general use, graphite grease especially prepared for various parts of electric railway mechanisms as well as for general manufacturing purposes, Dixon's silica-graphite paint, one quality, four colors; graphite crucibles for the foundry, boiler graphite, foundry facings, belt dressing, generator brushes, resistance rods and a full line of Dixon pencils, crayons, erasers, etc.

* * *

The Acme Indicator Company, space 514, believes it has the most striking device at the convention, namely, a working exhibit of a street announcer and changing advertisement sign. The device is operated by small contactors located over the track which controls the supply of current of a solenoid and plunger device. The announcer is just being put on the market after having been tried out experimentally for ten years or more. A unique feature of this device is that the machine is controlled by the movement of a cloth belt.

* * *

The National Malleable Castings Company, Cleveland, Ohio, is exhibiting in spaces 505, 507 and 509 its automatic radial coupler and draft gear for electric cars, which will meet all M. C. B. requirements. The radial feature of this coupler allows it to spring freely on curves. Coupling or uncoupling is operated with perfect safety by means of levers placed on both sides of the car. The company is also exhibiting a combination anti-rail creeper, tie plate and rail brace. The brace is effectually held against movement from vibration by a key driven through the slot and brace into engagement with a curved slot in the tie plate.

* * *

At space 522 the Armstrong Cork Company makes its first public exhibition of a new brick, which is a non-conductor of heat. This is made of pulverized cork and diatomaceous earth or chalk. The cork is burned out, leaving a very porous brick, the heat-resisting qualities of which are about eight times as good as firebrick. It is so light that it floats in water. The company has control of a German patent for a pipe covering, using the above-mentioned chalk and asbestos. This is used without chemical treatment, preserving the natural air cells. To show what can be done in the way of covering large pipe a section of 36-in. pipe covering has been made for exhibit. Pipe covering of this kind is being used by the Pennsylvania Railroad, New Haven railway and others.

* * *

As general sales agent Charles N. Wood Company, Boston Mass., is using space 129 to present the Chapman automatic signal for electric railway service. The salient features of the demonstrations given are as follows: that the signal is entirely automatic, that it is strictly a semaphore signal, that the contactors are positive in their action and cannot give a false indication, that grounding of the line wires gives a stop signal, that it is impossible to get a clear signal at either end with a car in the block, that the maintenance of the signal is low because its construction is right, and that its parts are interchangeable and easy of access. Charles N. Wood will be glad to see visitors, while W. N. Chapman, O. E. Chapman and George H. MacGilroy will explain how the signals operate and why so many railways are buying them.

* * *

The Gold Car Heating & Lighting Company, New York, is up to the minute with its automatic temperature control exhibited in spaces 316 and 318, together with a full line of electric heaters and ventilators. This temperature control shuts off the heaters the moment the car reaches a certain set temperature and can be adjusted to any degree desired. It is composed of two principal parts a thermostat and an automatic switch. The thermostat has a temperature sensitive diaphragm containing a volatile liquid which expands with rise in temperature and contracts with fall in temperature. This diaphragm actuates a lever which flies back and forth according to the expansion and contraction of the diaphragm, making a wide quick break in either direction. The automatic switch has a solenoid-operated mechanism which operates the main switch and is so arranged that the current is on the operating mechanism for a brief period only when cutting in or out. The distinctive features are a quick and wide break with no sparking or arcing at contact points at the thermostat; the current is on the operating mechanism of the switch only momentarily during the period of change from on or off, and no resistance coils are necessary. The apparatus is on exhibition in operation on a 550-volt circuit. An electric thermostat for steam-heated cars is another feature of the exhibit.

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The Bonney-Vehslage Tool Company, Newark, N. J., is displaying in space 386 a neat case of all types of B-V ticket punches, some of which are standard on many electric railways in this country and abroad.

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L. O. Duclos, A. E. Duclos and R. F. Norvelle are attending to the Massachusetts Chemical Company's interests at the convention. An attractive reception room has been made of the booth at space 335, where customers and friends are cordially welcome.

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The cordial smile and familiar figure of Walter Chur prevails at space 526 of the American Railway Supply Company, New York. Mr. Chur's showing is a neat and attractive exhibit of ticket punches, badges and buttons in all varieties of finish and colors. Walter Chur is one of our oldest exhibitors. May he still be with us for many years to come.

* * *

A feature of the exhibit of the Lord Manufacturing Company, New York, at space 537, is a full-size air compressor demonstrating the operation of the company's screenless air cleaner for air brakes. Demonstrations of lightning arresters for railway service are also given. Grounding devices, Earll trolley retrievers and catchers, controller regulators and rail bands are some of the other specialties exhibited.

* * *

American General Engineering Company, New York, is represented at the convention by George E. Austin and Fred La Chance. This company has recently taken over the New York office and warerooms of the Walpole Tire & Rubber Company and the Massachusetts Chemical Company. In conjunction with Charles D. Anthony it will represent these interests in New York and for export business.

* * *

A railing of neat Samson cordage forms an appropriate decoration for the booth of the Samson Cordage Company, Boston, Mass., at space 502. A large variety of trolley cord, bell and register cord, waterproof cord and wire center bell and register cord compose the exhibit. To match the interior decoration of cars, this company is prepared to furnish various colors of cord, blue, red, drab and white. The famous Samson trade mark in a plaster cast is conspicuous on a table in the center of the booth.

* * *

A feature of the exhibit of the Automatic Ventilator Company, New York, in space 317 is the Royal Worcester renewable metal hand broom for track and general purposes. The head of the broom is made of pressed steel, which is practically indestructible. The wire fillers are renewable and can be changed cheaply, quickly and easily. The company is also showing its standard automatic car ventilators and with a working model of a car shows the various movements of air currents which take place when the car is in motion.

* * *

The Waclark Wire Company, New York, has an interesting exhibit in spaces 380-381. A remarkable example of drawn copper wire is shown, consisting of a "whip" of wire drawn in one piece from ⅞ in. to 0.001 in., the size of a hair. The following items are also in the exhibit: a solid bar of copper weighing 25 lb., from which wire is drawn; all sizes of weatherproof wire; trolley wire, figure 8 and American standard grooved; lightning rod cable, underwriters' insulated wires and cables; square and flat magnet wire; large reels of bare and insulated wires and cables.

* * *

A feature of the exhibit of Albert & J. M. Anderson Manufacturing Company, Boston, Mass., in space 319, is a new locking device for disconnecting switches. It locks the switch so that it cannot blow open under short-circuits. Another feature is a 20,000-amp. remote-control switch and a malleable-iron insulated overhead crossing. There is also exhibited a renewable frog for overhead construction. The frog can be replaced without disturbing the guy wires by simply removing three bolts and substituting the new for the old frog. Besides these specialties there are exhibited the standand Aetna insulated overhead line material, line specialties and the Sprague rotary sander.

* * *

At the entrance to Machinery Hall, space 107, the United States Wood Preserving Company, New York, has an attractive booth in which it is exhibiting samples of treated and untreated wood paving blocks. To illustrate the durability of this product a block is on exhibition taken from a piece of pavement laid eleven years ago in Boston, Mass., and still in service. This block is splendidly preserved and is worn less than ⅛ in. The popularity of wood block as a pavement is shown by the fact that the city of Detroit has now nearly 30,000 sq. yds. of wood pavement. Chicago has nearly 30 miles of wood block paved streets, and is now planning to pave the entire loop district with wood blocks. Philadelphia has 80,000 sq. yds. of wood block pavement.

* * *

As usual, the Goldschmidt Thermit Company's exhibit is attracting the attention of railway delegates to space 211. The features of this exhibit include Thermit rail welding and rail grinding. This company's standard rail-grinding machine, embodying all the latest developments, is shown in actual operation on a track section. The recent improvements in the rail grinder include a power derailing attachment, increased speed in cutting and automatic return for use in the grinding process. Among the samples of "Thermit standard rail welding" this company is showing its new type of insert joint installed in a short track section. Samples of all the other types of Thermit rail welds, compromise joints and special metals manufactured by the "Alumino-Thermic" process are included in the exhibit.

* * *

At spaces 587-588 the Consolidated Car Fender Company, Providence, R. I., shows working models of type C Providence fender and H-B life guard and type A Providence fender and Providence wheel guard. The H-B life guards, of which there are now in daily service more than 60,000 equipments, have been considerably improved since this company took over the business about eighteen months ago. The knees of the basket are now made of malleable iron separately, and the frame of the basket is bolted to knees, which in turn are bolted to the support attached to the car. This construction has greatly lowered the maintenance cost, as any broken part can be quickly replaced. Formerly, the whole basket was made in one piece, so that when damaged the whole equipment had to be discarded. The lowering and raising of the apron is now accomplished quickly by means of a set screw, instead of unscrewing four bolts and nuts and changing to required height as was formerly customary. The platform pin which raises the guard after it has been dropped has also been simplified in a like manner. Improvements made in the fenders also tend to lower maintenance cost. The old rubber bumpers have been replaced by light malleable-iron bumpers. Instead of a spiral spring at each end of the basket, the last finger of the basket has been slightly straigtened and raised, thus keeping objects caught by the fender from rolling off. To obviate mistakes in ordering fenders or wheel guards the company requires blueprints from the railroads. From these blueprints and measurements the company's draftsmen design an equipment which is sure to fit the car perfectly. There are also on exhibition two types of Narragansett steel lockers. A. J. Thornley, A. E. Thornley and G. H. Hollingsworth, as well as the staff of Wendell & MacDuffie, the general sales agents, are representing the company at the convention.

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E. G. Long Company, New York, is using space 374, where E. H. Mays and Frank Van Anden are meeting their customers and friends. Spiral and elliptic springs, brake pins, and long-wear bushings are exhibited.

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W. Meeteer, of the Wallace Supply Company, New York, calls attention to some extra fine bronze car trimmings similar to those furnished to the Jewett Car Company for the 100 cars it recently built for the Boston Elevated Railroad.

* * *

Sterling Fare Register Company, Newark, N. J., holds forth at space 386 with its standard types of fare registers, Sterling double No. 16; two types of Sterling single Nos. 5 and 15, and two types, F and G, of recording registers. Various types of register fittings are also shown.

* * *

Worn-out brake pins, a small but very important part of car equipment, are most instructive exhibits of the Bennis Car Truck Company, Springfield, Mass. Brake pins that last and never wear out or break are also shown. These are made of case-hardened forged manganese steel. Flint stone steel brake heads and brake levers and bronze motor and journal bearings are also exhibited. Warren L. Boyer and T. S. Adams are attending the convention.

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The Chillingsworth seamless sheet-steel gear cases, so extensively used in Europe, are exhibited at space 511 at the convention for the first time under the auspices of Thayer & Company, Inc., New York. A Westinghouse 101 two-point and suspension, seamless, rivetless gear case merits special attention. The smoothness of the solid-drawn sheet-steel gear case is shown by two halves of a gear case before the lugs are put on. The company is represented at the convention by George K. Wannamaker.

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The familiar face and figure of J. G. Buehler, the president of the Columbia Machine Works & Malleable Iron Company, Brooklyn, N. Y., is missed by his friends at space 622. Mr. Buehler is out in the Far West and will not be able to attend the convention. The interests of the company are, however, well taken care of by James Brady, W. R. Kerschner and M. F. Zigler. On exhibition are some fine samples of sheet-steel gear cases. A Westinghouse 56 welded gear case is particularly noticeable by its neat and substantial appearance. Columbia car replacers and a new coil taping machine are also on exhibition.

* * *

Barnes & Kobert Manufacturing Company, New Haven, Conn., is a newcomer at the national conventions. It is showing a new method of manufacturing wood strain insulators, with cold-drawn steel fittings and a one-piece cap that is uniform and practically indestructible. Cable hooks of an original design are also shown. The cable rack for manhole service is strongly constructed. It is claimed that a rack 10 in. long will sustain a weight of 200 lb. at the extreme end. A new mushroom guy anchor that "stays put" when in the ground is also exhibited. A new type of malleable iron insulator pins, designed to fit present types of wood cross-arms, is also shown. The company is represented at the convention by Frank Kobert, Fred Nason, E. R. Bryant and Charles Schmitt.

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A sample truck of a set of 500 built for the Boston Elevated Railway by the Taylor Electric Truck Company, Troy, N. Y., is the subject of much favorable comment among the railway men who have visited the Taylor exhibit in Machinery Hall. This truck, although weighing only 7500 lb., has the strength and stability of trucks of much greater weight. It is built on the Taylor swing motion principle, with approved three-point motor suspension and inside-hung brakes. There are also exhibited three other types of trucks—the improved short-wheelbase truck with outside-hung motors and inside-hung brakes, the M. C. B. triple spring truck, and the extra heavy single truck. Truck and car spiral and elliptic springs of the company's own manufacture are also exhibited.

* * *

The central feature in the exhibit of the Independent Lamp & Wire Company, space 517, is a demonstration of the effects of heat on cotton wire coverings. A transformer core is arranged so that loops made of half cotton and half asbestos-covered wire, No. 21, can be linked with it. When current is applied to the primary, the loops are heated up to incandescence and the effects of the two coverings are clearly shown. The apparatus is arranged for a secondary submerged in water and connected to a 220-volt lamp to show the waterproof qualities of the insulation. The company also has exhibits of tungsten lighting of cars and automobiles and a large frame showing the entire development of an asbestos-covered wire.

* * *

Ackley Brake & Supply Company, New York, in spaces 117-119, is a feature of the exhibit of the Acme Limit-Stop brake staff. To illustrate the application of this device a working model is shown. This brake staff is designed for light cars which are usually operated with the old plain brake staff. The device regulates the number of turns of the brake handle after the pawl is released from the floor ratchet. It can be regulated according to the number of turns to which it is desired to limit the staff. By a simple adjustment of the limit-stop rings any desired travel of the handle can be obtained. It is equipped with roller bearings, and as the operating shaft is solid, the exact pressure exerted at the handle is delivered to the eccentric chain drum. It is extensively used in England and on the Continent.

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In space 309 the Drew Electric & Manufacturing Company, Indianapolis, Ind., is showing its new "Samson" pipe insulator. This device consists of a dense porcelain tube 8 in. to 18 in. in length, depending on service requirements, which is capped at each end with bronze castings. The porcelain is heavily glazed inside and out. Circular and longitudinal grooves at the ends, into which lead is poured after the caps are applied, furnish a bond between them. The dimensions of the tube and end caps provide a liberal factor of safety against pressure and mechanical strains. This insulator is installed in gas and water service pipes which have been subject to electrolysis and serves as an insulating medium between it and the main pipe system. The caps at each end of the insulator provide an easy means of installing it in pipe service lines.

* * *

A demonstration of the comparative heat-resisting qualities of Salamander asbestos-covered wire and cotton-covered wire is a feature at space 517 of the Independent Lamp & Wire Company, New York. This is shown by a coil made up of asbestos-insulated wire and cotton-insulated wire attached to the secondary of a transformer. The cotton insulation is quickly disintegrated while the asbestos insulation remains intact. To show the damp-resisting and waterproof qualities of asbestos-covered wire, a coil immersed in water is attached to the pole of a transformer and a 250-volt lamp is connected between the ends of the coil. There are also exhibited forty-five different sizes of incandescent tungsten lamps from 6 watts to 500 watts in capacity. To illustrate the most advantageous way to illuminate the interior of a street car, a model of the inside of a car is shown lighted with miniature lamps. Asbestos tape from ½ in. to 4½ in. width is displayed, as well as reels of Salamander wire of various sizes and a neat case in which are shown all sizes of wire from No. 36 to No. 000. Those present at the convention are R. K. Dana and F. A. Duff.

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The Cooper Heater Company, Carlisle, Pa., is represented at the convention by W. F. Pascoe, managing director, and C. S. Brinton, secretary.

* * *

The American Engineering Company of Philadelphia, Pa., at space 148 is exhibiting a quarter-size model of the Taylor stoker and drawings illustrating typical applications.

* * *

Sidney H. Wheelhouse, sales manager, Buckeye Engine Company, Salem, Ohio, and anywhere else a Buckeye-mobile can be sold, spent most of yesterday looking for a room. He got a good one at the Dennis.

* * *

The National Insulator Company of Pittsburgh, located at Ford City, Pa., manufacturer of high-potential porcelain insulators, is represented at the convention by Messrs. Davis and Patterson.

* * *

The Standard Motor Truck Company, Pittsburgh, Pa., has space 536, where it is prepared to show aluminum models of the various types of trucks manufactured; also framed photographs of the various types of trucks.

* * *

The Duff Manufacturing Company, Pittsburgh, Pa., space 637, is exhibiting its genuine Barrett jacks, Duff ball-bearing screw jacks, Duff improved high-speed ball-bearing screw jacks, Duff-Bethlehem forged steel hydraulic jacks, and Barrett motor lifts.

* * *

The Bayonet Trolley Harp Company in space 545 is showing the Bayonet Everlasting trolley base with detachable pole clamp. Some features of this base are shown for the first time. In addition, this company exhibits a complete line of its trolley wheels and sleet cutters.

* * *

An attractive reception room with numerous hosts composed of its representatives largely makes up the exhibit of the Rail Joint Company in spaces 350-355. A complete line of sample rail joints of the various types manufactured by this company to meet the requirement of electric railway service is arranged conspicuously about the booth.

* * *

Edwin S. Woods & Company, Chicago, Ill., are making their first appearance with an exhibit in space 543. They are featuring a new type of anti-friction center-bearing of original design and maximum carrying capacity. They are also showing two new developments in side bearings in addition to the well known "Woods" roller side bearing.

* * *

The Nickel-Chrome Chilled Car Wheel Company, space 529, is represented by Robert C. Totten. He is demonstrating his one-wear, tired, chilled 33-in., and 36-in. N. C. one-wear tire. Broken pieces of nickel-chrome 33-in. wheels which have made 80,000 miles are also in the exhibit as well as specimens of nickel-chrome alloy and nickel-chrome chilled iron.

* * *

The exhibit of the Atlas Railway Supply Company in spaces 118-120 includes, among its standard line of tie plates, braces and special and standard rail joints, the Fancher portable track grinder, a new device for grinding down rail joints. It is easily fastened to the track and is operated by one man. Its simplicity seems to be a pretty strong recommendation for low maintenance cost.

* * *

The Trigger Lock Reversible Controller Finger Company has on display in space 149 a controller obtained from F. J. Doyle, master mechanic of the Schenectady (N. Y.) Railway. This controller contains a set of fingers that have been in actual use over a year. There may also be seen in the booth numerous samples of fingers, especially K-34-35 main and reversible fingers.

* * *

Transportation Utilities Company, New York, N. Y., in space 611 is exhibiting a stand representing a car platform fitted with a National steel trap doors and lifting devices and Flexolith composition flooring. Samples of National standard roofing, Chanarch flooring, "Tuco" friction curtain rollers and fixtures, are shown as well as an Acme pressed steel door.

* * *

The Chicago Pneumatic Tool Company, spaces 101-3-5, is showing a new pneumatic chain-driven reversible corner drill for reaming and drilling steel, said to be the only drill of this kind. Its two 150 ft. gasoline-driven air compressors furnish the air for all the exhibitors using compressed air. In addition the company has its standard line of pneumatic and electric-driven drills on exhibition.

* * *

The new Van Dorn automatic car and air coupler of the pivot tight-lock type is attracting unusual attention at the W. T. Van Dorn Company booth, space 533. This new coupler is shown in two types, one conforming to M. C. B. standards and another of the old type to meet more flexible service requirements. The features included in this new coupler are arrangements for through-train line connections by way of the coupler head and provision for wide vertical and horizontal variations without affecting its operation.

* * *

In space 519 the O. M. Edwards Company is exhibiting padlocks, window locks and catches, a full line of window fixtures with both raised and dropped sashes, and also trap doors permitting the loading and the unloading of passengers at high station platforms. The most striking feature of the exhibit is a window model showing fixtures particularly adapted to steel cars. Steel posts, steel stop casings and steel curtain grooves are used, and instead of a plain piece of rubber at the top of the sash for a weather strip a piece reinforced by a strip of spring brass is employed in order to add strength and to avoid a permanent set to the rubber.

* * *

The DuPont Fabrikoid Company, Wilmington, Del., is displaying at space 323 something entirely new in railway curtain material. This company offers material that should be of interest to all mechanical departments for the following reasons: it can be washed cleaned and reglazed; more uniformity of color; prominent embossing; not affected by heat or cold; wide variety of patterns, harmonizing both with any interior or exterior; fully guaranteed for one year against peeling, cracking or blistering. The company asks: "Are you, and have you been entirely satisfied with the present products?" It believes that the use of this material will lower the cost of curtains through giving longer service.

* * *

The Nachod highway crossing signal shown at the Nachod Signal Company's space, No. 147, has an interesting feature whereby the motorman is assured that he has started the bell ringing at the crossing even though he cannot hear it. This is a flashing light run from the bell to the starting contactor, the flashes being caused by the movement of the bell clapper itself. The operation is shown on a miniature track plan, and trolley cars moved over this easily demonstrate the universal control of the system. The company is also exhibiting by means of miniature track plans two types of its single-track and double-track signals, the latter having the signals overlapped, together with relays, signal parts, high-speed, standard and short trolley contactors for operating various devices. The exhibit is in personal charge of C. P. Nachod.

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The Standard Roller Bearing Company, of Philadelphia, Pa., has no exhibit at the convention this year, but is represented by J. G. Cooley, manager railway department, and C. H. Machen, sales manager.

* * *

Pittsburgh Insulating Company, Pittsburgh, Pa., is presenting in space 524 a full line of insulating cloth, paper and tape. P. F. Norvell and Clifton F. Schmidt, Jr., are representing the company.

* * *

John A. Roebling's Sons Company, Trenton, N. J., are showing in spaces 325 and 327 a complete line of wire products, including bare iron, steel and copper wire, wire rope and wire-rope fittings, wire cloth and netting, alligator wrenches and insulated wires and cables of every kind.

* * *

The Electric Traction Supply Company, space 151, is showing a new coupler known as the Bonney automatic car coupler, which has the exclusive feature of a double grip, is self-centering and has a gravity hold. They are also exhibiting the Berg folding fender and the Security wheel guard.

* * *

The Flexible Compound Company, Inc., Philadelphia, Pa., is represented at space 313 by T. H. Downward. It is showing samples of a flexible compound, which is an oil product and not a paint or varnish. The claim is made for this product that it is acid-proof and waterproof, and that it makes a perfect paint binder and thinner.

* * *

The Hess-Bright Manufacturing Company, of Philadelphia, Pa., is showing in spaces 143, 145 a general line of ball bearings of all sizes suitable for railway work. They are also exhibiting various types of journal boxes, and housings for motors to which ball bearings have been applied, a large pair of typical interurban wheels and axles running on ball bearings, and a 75-hp motor similarly mounted.

* * *

The Coin Controlled Lock Company, in space 532, is showing for the first time a new all-steel parcel checking locker for waiting rooms and terminal stations. It is automatic in action and guarantees perfect safety of parcels because the owner carries the key with him till he returns. It is made in three sizes containing eight, twelve and sixteen compartments to meet the requirements of different services.

* * *

The National Lock Washer Company's exhibit in spaces 525 and 527 includes the new "National" wedge lock and other devices of this company's manufacture. All sash locks are equipped with safety features to prevent opening under severe vibration, and each is arranged to lock in the lowered position. This company is also showing its complete line of "National" lock washer for general use on electric railways.

* * *

At space 23, the Pennsylvania Steel Company has a characteristically varied assortment of switch pieces for street railways in addition to several types of switch stands, spring boxes and miscellaneous material. Among the most important items are the hook heel tongue switch, the pinless tongue switch, the rapid renewable hard-center frog, T-rail frogs for interburban and steam road traffic, and samples of Mayari steel which is adapted for many uses from light, strong forgings to Mayari bessemer rails.

* * *

The Yarnall-Waring Company, Chestnut Hill, Philadelphia, space 139, shows a full-sized 25,000-lb. per hour "Lea" V-notch recording meter in continuous service operated by means of a direct-connected motor-driven centrifugal pump. In addition to this working exhibit, there are sectioned Simplex seatless blow-off valves showing the internal construction of an actual valve; also sections of Simplex pipe joint clamps and the clamps complete as installed on pipes; also the Simplex Caskey hydraulic valve, which is largely in use in big steel and rubber mills.

* * *

American Safety Signal System, Louisville, Ky., is exhibiting at space 152 a movable street car signal device which is carried at the front and rear of each car to warn passengers alighting from one car and stepping immediately in front of an approaching car on the opposite track. As the fronts of the cars pass each other, the automatic contactors on the roof of each car set an electric relay, which in turn sets an electrically operated bell. This bell is continuously rung until the near contactors pass each other, which in turn energizes a circuit breaker, opens the bell circuit and resets the mechanism for the following car.

* * *

The Allis-Chalmers Manufacturing Company, Milwaukee, Wis., at space 134, is exhibiting a complete straight-air equipment. The chief feature is the new type AC-3 gearless air compressor, which weighs only 390 lb., and which is only 14 in. high. The elimination of gears and pinions prevents the breakage of armature and crank shafts. Type AA-7 geared compressor contains gears cut in one piece. Clamp bearings reduce the trouble of strained armatures. This company is also exhibiting its type "C" engineer's valve, of poppet valve construction, and without ground joints. A. J. Cooper, who has been recently transferred as sales representative of the Boston office of the company, is in charge of the exhibit.

* * *

The National Brake Company, Inc., is using an instructive device for testing the tension in the brake chain produced by various types of brakes. Several of these are mounted on a platform beneath which provision is made for connecting a dynamometer in the brake chain. The tension can thus be read as different pressures are applied to the brake handle. The special feature of the exhibit is the new Peacock brake, which differs from the older form in several important particulars. In the first place, it is 5 lb. lighter, gain in weight being secured by cutting out a part of the lower bearing support which is still ample for its purpose. The pinion is also carried in a cup bearing at the bottom of the socket by means of an extended hub. The pinion carries a stop which engages with a corresponding stop on the gear and insures the return of the gear to its proper place when the brakes are released. This insures a saving of time in applying the brakes and thus obviates danger of accident. To insure uniform wear on the gear teeth, the gear ratio is made odd so that the same teeth do not mesh.

* * *

The combined exhibit of the United States Metal & Manufacturing Company, the Tool Steel Gear & Pinion Company and the Pollak Steel Company is situated in spaces 620, 621 and 623. The exhibits are displayed in an attractively arranged and furnished booth, a portion of which is covered by a Japanese pergola. Among the most interesting products exhibited by these companies are samples of gears and pinions loaned by different electric railway companies which have made an average of 200,000 miles each in city service where untreated gears and pinions made about 10,000 miles. Another feature included in this exhibit is a number of samples of heat-treated and oil-tempered axles for street and interurban railway cars. These axles are treated by a special process which gives maximum tensile strength, greater elastic limit and consequent reduction in the metal area required for given conditions. One axle, after being in service one year, has been bent flat without heating to demonstrate the elasticity resulting from the special treatment. Another axle is shown in the form of a billet finished at one end and forged at the other.

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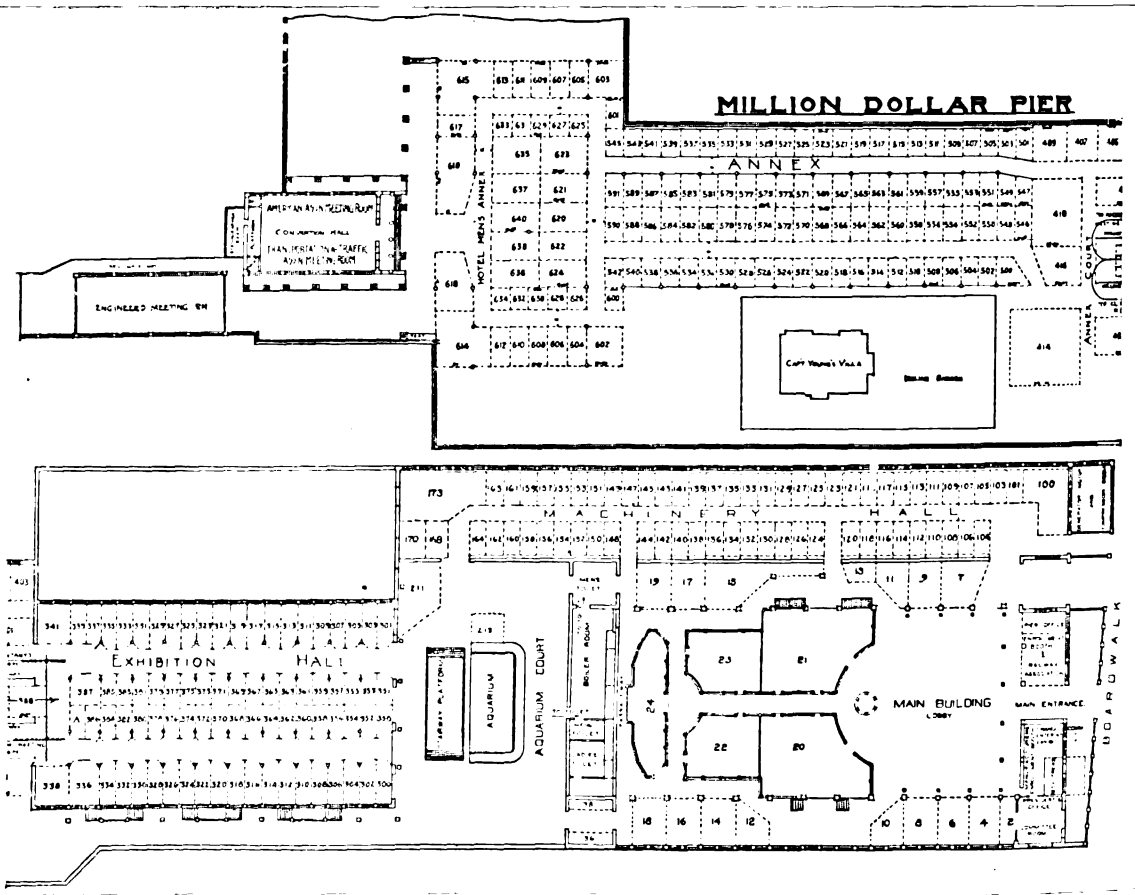
List of Exhibits

The exhibits at the American Electric Railway Association convention on Young's Pier are so arranged that a systematic trip can easily be made to see them all. The best route for a delegate to take is that leading to the right into Machinery Hall directly upon entrance from the Boardwalk. Here, ranged on the left and right sides respectivelly, will be found booths 104-164 and 100-163. Turning the corner then, past the aquarium on the left and booths 173-211 on the right, the delegate will find his way into the right-hand aisle of Exhibition Hall, past booths 301-341 and 351-387. An incline at the end of this aisle leads into the Annex Court, from which another incline, leading backward, opens



into the Claim Hall and the Accountants' Hall. Going ahead from the first incline, however, the delegate will see exhibits 405-545 on his right and 547-591 on his left on the right-hand aisle of the Annex. Around the corner to the right from booth 545, in the Hotel Men's Annex, in booth 603, will be found a gentlemen's smoking and rest room. In the rear right-hand corner, in booth 615, is the ladies' reception and rest room. Turning to the left at this point, the delegate comes to the entrance on his right, which he may take in getting out to the Greek Temple, the home of the American Association and the Transportation & Traffic Association, or farther out to the Engineering Hall. The exhibits, however, lead straight ahead, and with the first turn to the left the trip back on the other side of the pier is begun—past booths 612-602 and 634-626 in the Hotel Men's Annex, booths 542-500 and 500-546 in the Annex, and booths 338-300 and 386-350 in Exhibition Hall. At this point the aquarium is passed on the other side and the delegate may wander down the side aisle of the Main Building, past booths 18-2, or else first visit booths 24-20 in the center and 19-15 on the opposite side, or vice versa, and thus find himself back at his starting point, the main entrance from the Boardwalk.

Ackley Companies, New York, spaces 117, 119. Anger improved automatic brake adjuster, "Tool Steel" gears and pinions, "Limit Stop" brake staff, "Automatic" trolley guard, Monarch refillable fuse, Sjoberg car vestibules. Represented by Griffin S. Ackley, E. E. Daglish, George Herman Anger, James Arthur Noble, L. W. Horne, Jerome J. Jacoby.

Acme Indicator Company, Cleveland, Ohio, space 514. Street indicator and advertising machine. Represented by S. W. Small, M. D. Wells, Moses C. Davis, N. T. Porter, C. C. Johnson.

Allen, Edgar, American Manganese Steel Company, Chicago, Ill, space 500. Gears and pinions of electric special ground manganese steel for electric railway motors of various types and sizes; manganese steel castings of various character. Represented by Walter S. McKee, Walter H. Evans.

Allis-Chalmers Manufacturing Company, Milwaukee, Wis., space 134. Operating exhibit rack of air brake apparatus including gearless air compressor type AC-3; type AA-7 geared compressor; new engineer's valve, improved type of governor and other equipment. Represented by A. J. Cooper, J. T. Cunningham, H. W. Cheney, W. W. Power.

American Brake Shoe & Foundry Company, Mahwah, N. J., space 416. A. E. R. A. standard brake shoes and brake heads, types of brake shoes. Represented by F. W. Sargent, E. L. Janes, E. B. Smith.

American Car and Foundry Company, New York, N. Y., space 619. Vendor of freight and passenger cars, cast iron chilled wheels, forgings, valves and castings. Represented by Scott H. Blewett, Clark Dickerson, C. D. Eaton, B. Wilson, John McE. Ames, A. E. Ostrander, William C. Dickerman, John L. McDowell.

American Engineering Company, Philadelphia, Pa., space 148. Model "Taylor" stoker. Represented by M. Alpern, Robert O'Shea, E. G. Marble, R. W. E. Leach, A. H. C. Dalley, W. G. Stephen, S. J. Lenher, H. N. Scofield, William M. Chatard, J. H. DeVisser, G. J. Zanke, H. J. Malochee, H. D. Turing.

American Mason Safety Tread Company, Boston, Mass., space 541. Mason safety tread, Empire safety tread, Karbolith composition car flooring, Stanwood-Mason non-slipping structural car steps, Stanwood self-clean-

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ing, non-slipping car steps and treads, Mason non-slipping safety ladder shoes. Represented by Henry C. King, L. H. Myrick, Ralph C. Davison.

American Railway Guide Company, Chicago, Ill., space 13. Bureau of Railway Information, Inquiries answered gratuitously and parlor car reservations made for the homeward trip. Represented by George E. Armstrong, E. Bjerregaard.

American Railway Supply Company, New York, space 526. Metal cap and coat badges and buttons for employees of electric railway companies, also convention badges. Represented by Walter Chur.

American Safety Signal System Company, Louisville, Ky., space 152. Full size model of signaling device to be attached to cars in actual operation. Represented by George C. Murphy.

American Steel & Wire Company, Chicago, Ill., spaces 558, 559, 560, 561. Rail bonds, installing machinery for rail bonds, vibrating machine, signal and trolley wires. Represented by Thomas H. Taylor, George A. Craigin, C. S. Knight, F. A. Keyes, C. A. Vaill, R. C. Moeller, Benjamin H. Ryder.

Anderson Brake Adjuster Company, Omaha, Neb., spaces 356, 358.

Anderson A. & J. M., Manufacturing Company, space 319. Switches, locking device for switches, 20,000-amp switch, rotary sander, overhead frogs, line material, trolley wheels, Aetna insulation, malleable-iron insulated overhead crossing. Represented by Ernst Woltmann, Alfred Anderson, A. H. Burns.

Armstrong Cork Company, Pittsburgh, Pa., space 522. Nonpareil high-pressure coverings for steam lines, boilers, breechings and other heated surfaces, insulation for underground steam lines and Nonpareil cork covering for refrigerated drinking water lines. Represented by George R. Herrick, John R. Livezey, H. W. Prentis, Jr.

Atlas Railway Supply Company, Chicago, Ill., spaces 118, 120. Atlas rail joints, compromise joints, double or twin joints, insulated joints, special joints, Atlas braces and tie plates, Fancher track grinder, Vixen rail planer. Represented by J. G. McMichael, D. Thomson, M. T. Kilroy.

Automatic Register Company, Chicago, Ill., space 378.

Automatic Signal & Appliance Company, space 153. Spacing signal, controller, street intersection crossing signal. Represented by James B. Hoge, Charles W. Ward, G. Henry Nierman.

Baldwin Locomotive Works, Philadelphia, Pa., spaces 540, 542, 600. City truck class "M," suburban truck class "K." Represented by S. A. Bullock, C. F. Dodson, M. T. Kirschke, Jr., W. B. Keys.

Barnes & Kobert Manufacturing Company, New Haven, Conn., space 379. Wood strain insulators, guy clamps, cable hook racks, guy anchors, insulator pins. Represented by Frank Kobert, F. W. Nason, E. R. Bryant, Charles T. Schmitt.

Bayonet Trolley Harp Company, Springfield, Ohio, space 545. Trolley bases with detachable pole clamps (anti-friction), trolley harps (detachable), trolley wheels and self-lubricating trolley axles, sleet cutters (reversible, detachable). Represented by R. A. Garlough, J. M. Olinger.

Bemis Truck Company, Springfield, Mass., space 503. Brake heads, brake levers, forged manganese steel brake pins, case-hardened brake pins, bronze motor and journal bearings, samples of worn brake pins. Represented by Warren L. Boyer, T. S. Adams.

Brach, L. S., Supply Company, New York, space 150. Crossing signals, hydro grounds, lightning arresters. Represented by L. S. Brach, A. G. Brach.

Brill, The J. G., Company, Philadelphia, Pa., spaces 4, 6, 8, 10. Trucks No. 27-GE-2, Radiax E-1, No. 39-E-1 and No. 27-MCB-2; seats, cane and wood, 18-in. back "Winner," cherry slat, stationary rattan-covered, one roll lined and one roll unlined rattan, large and small model brake hanger, exhaust ventilator, "Dumpit" sand box, "Dedenda" gong, folding gate, ratchet brake handle, set of springs, track scraper, stand of motormen's seats and side bar of No. 21-E truck, including wide wing journal box. Represented by S. M. Curwen, W. H. Heulings, Jr., J. W. Rawle, S. T. Bole, G. M. Haskell, A. N. Hargrove, J. E. Brill, W. S. Adams, M. J. Oswald, S. M. Wilson, F. L. Markham, J. A. Dawson, T. Finnigan, H. A. Heulings, G. H. Tontrup, R. H. Thompson, E. T. Bronenkamp, F. W. Brill, D. B. Dean, H. E. Smith, A. H. Pease, C. F. Johnson, R B. Liddell, C. F. Rice.

Buda Company, Chicago, Ill., space 311. Manganese center switches, mates, frogs, switch-locking devices. Represented by William Prescott Hunt, Jr., H. S. Evans, R. B. Fisher, F. W. Marvel, D. C. Smith.

Burroughs Adding Machine Company, Detroit, Mich., spaces 582, 583. Burroughs adding, listing and non-listing machines, hand or electrically operated, Burroughs seventeen-column machine, electrically operated, designed to make daily statements covering distribution of car earnings; also machine designed for pay-roll work. Represented by F. A. Willard, David Lesseig.

Buyers' Index Company, Chicago, Ill., Railway supply index catalog, an index of railway supplies for steam and electric railways. Represented by D. J. Beaton, C. W. Cozzens, N. F. Rehm.

Cambria Steel Company, Johnstown, Pa., space 518. Represented by J. L. Replogle, C. B. McElhany, M. G. Baker, L. B. Morris, W. S. Ottinger, E. Hoover Bankard.

Carnegie Steel Company, Pittsburgh, Pa., spaces 546 to 553. Piece of track showing various stages of concrete construction with use of steel cross ties; Duquesne rail joints, rolled steel wheels, rolled gear blanks and finished gears, steel-sheet piling, Vanadium steel specialties, sample of heavy steel tie being manufactured for the Pennsylvania Railroad, automatic stereopticon showing views of steel cross ties and steel sheet piling installations. Represented by N. M. Hench, Robert Coe, John C. Neale, and representatives from district offices at Chicago, Cincinnati, Cleveland, Buffalo, Boston, Philadelphia and New York.

Champion Recording Machine Company, Chicago, Ill., space 329. Transfer issuing machines. Represented by S. F. Champion, Jr., Robert B. Craig, Theron H. Goodspeed.

Cheatham Electric Switching Device Company, Louisville, Ky., space 159. Automatic switch point throwing device designed to allow the motorman to throw the switch point electrically from the controller while car is in motion. Represented by Messrs. Stewart, Cheatham, Olmsted, Augustus and Bowman.

Chicago Pneumatic Tool Company, Chicago, Ill., spaces 101, 103, 105. Dunthy electric track drills and grinders, general line portable electric drills and grinders, pneumatic drills and grinders, riveting and chipping hammers, electric spike drivers, electric wood-boring drills. Represented by Thomas Aldcorn, A. M. Andresen, F. S. Eggleston, Jr., J. B. Corby, George A. Barden, R. D. Haworth.

Chicago Varnish Company, Chicago, Ill., spaces 584, 585. Ce-Ve process of painting and varnishing cars. Represented by George S. Bigelow, Fred. N. Gundrum, Jr., George G. Porter.

Cleveland Frog & Crossing Company, Cleveland, Ohio, spaces 562, 563, 564, 565. Special work, Porter derailing switch, splice offsetting machine. Represented by George Stanton, L. G. Parker.

Coin Controlled Lock Company, Chicago, Ill., space 532. Parcel checking locker. Represented by S. B. Cochrane, L. B. McKenny, Lawrence McGreal.

Columbia Machine Works and Malleable Iron Company, New York, space 622. Sheet-steel gear cases, coil-winding machine, car repacers. Represented by James Grady, W. R. Kerschner, F. M. Zigler.

Consolidated Car Fender Company, Providence, R. I., spaces 587, 589. Providence fender, Providence wheel guard, H. B. wheel guard. Represented by Albert E. Thornley, George Hollingsworth, Henry E. Osterreich.

Consolidated Car-Heating Company, Albany, N. Y., space 22. Electric ventilating units, coal burning ventilating units, special fuse panels, special jumper connectors, high-voltage buzzer signal system, motorman's signal light system, push-button switches, magnetic air valves, pneumatic door operators, thermostatic control of car heaters, car-starting relays, tilting heat deflectors, special resistances. Represented by Thomas Farmer, Jr., W. S. Hammond, Jr., James F. McElroy, C. C. Nuckols, H. L. Hawley, M. C. Carpender, J. H. McElroy, F. Avery, G. E. Oakley.

Corliss Carbon Company, Bradford, Pa., space 513. Machine for testing carbon brushes and display cases illustrating various types and kinds of carbon brushes. Represented by Otto Koch, A. Mullhaupt, Jr., H. C. Gooding.

Curtain Supply Company, Chicago, Ill., space 638. Car Curtains, car curtain fixtures, curtain rollers, brackets, cab and vestibule curtains, diaphragms, sash balances. Represented by R. F. Hayes, George E. Fox, S. W. Midgley, F. M. Egolf, W. H. Forsyth.

D. & W. Fuse Company, Providence, R. I., space 333. In-

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closed fuses and cut-outs (all voltages), fuse boxes, service switches, Deltabeston magnet wire, Deltabeston coils and insulating materials and a new line of magnetic chucks. Represented by Willard S. Sisson, Herman F. MacGuyer.

Dalton Adding Machine Company, Poplar Bluff, Mo., spaces 572, 573. Dalton adding, listing, and calculating machines. Represented by C. J. Nelis.

Dayton Fare Recorder Company, Dayton, Ohio, spaces 386, 387. Fare recorders, combination fare recorders and fare boxes, and fare boxes. Represented by F. A. Groves, Victor Courtright, F. B. Kennedy, C. N. Yates.

Dixon, Joseph, Crucible Company, Jersey City, N. J., space 16. Dixon graphite brushes, silica-graphite paint, lubricating graphite, greases, crucibles, pencils, belt dressing and various graphite products for electric railway use; gear and pinion with more than 225,000 miles service lubricated with the Dixon graphite wood grease. Represented by H. W. Chase, J. A. Condit, J. M. Willitts, L. H. Snyder.

Drew Electric & Manufacturing Company, Indianapolis, Ind., space 309. Samson pipe insulator (for electrolysis), protective and reclaiming sleeves for iron and steel poles, Drew motormen's mirror, bronze and malleable trolley frogs, Samson trolley splices. Represented by James H. Drew.

Drouvé G., Company, Bridgeport, Conn., space 607. "Anti-Pluvius" puttyless skylights, "Straight-Push" sash operator. Represented by William V. Dee.

Duff Manufacturing Company, Pittsburgh, Pa., space 637. Barrett jacks, Duff ball-bearing screw jacks, Duff improved high-speed ball-bearing screw jacks, Duff-Bethlehem forged-steel hydraulic jacks, Barrett motor lifts. Represented by E. A. Johnson, G. E. Watts, C. A. Methfessel.

Du Pont Fabrikoid Company, Wilmington, Del., space 323. Fabrikoid car curtain material, Fabrikoid upholstery leather. Represented by C. Hallock Silkman, H. W. Wivel.

Eclipse Railway Supply Company, Cleveland, Ohio, spaces 567, 569. Eclipse life guard, Eclipse wheel guard, Acme fender, Eclipse trolley retriever. Represented by Ross Forward.

Edwards, O. M., Company, Inc., Syracuse, N. Y., spaces 519, 521. Window fixtures, metal trap doors, sash balances and shade rollers for street and interurban railway equipment. Represented by E. F. Chaffee, C. H. Rockwell, W. C. Bradbury, T. P. O'Brian.

Electric Railway Improvement Company, Cleveland, Ohio, spaces 566, 568. Electric weld rail bonding car in operation, apparatus for copper-welding feeder cables and bonds of large capacity, sample rail bonds of various types and sizes. Represented by E. E. Schmid, M. T. Stanton, Gerald Howatt, L. J. Rinker, William E. Huber.

ELECTRIC RAILWAY JOURNAL, New York, spaces 7, 9, 11. Copies of the ELECTRIC RAILWAY JOURNAL, Annual Convention Number, Convention Daily issues, *Electrical World, Engineering Record, Metallurgical and Chemical Engineering*, McGraw Electric Railway Manual, Electric Railway Dictionary, McGraw Electrical Directories (electric railway and central station editions). Represented by James H. McGraw, Hugh M. Wilson, H. W. Blake, F. Kingsley, W. Jackson, H. H. Norris, E. M. Haas, F. Nicholas, G. J. MacMurray, F. J. Armeit, R. R. Bruster, L. I. Grinnell, A. J. Cleary, L. E. Gould, C. A. Babtiste, G. W. Elliott, W. K. Beard, E. J. Hunt, E. B. Cooke, J. C. Raymond, C. A. Henley, L. W. Seeligsberg, P. T. Coburn, F. C. Wells and the Misses Phelps and Johnson.

Electric Service Supplies Company, Philadelphia, Pa., space 414. Garton-Daniels lightning arresters, the Automotoneer, "Protected" rail bonds, Keystone trolley catchers, Keystone steel gear cases, a complete line of Keystone lamp guards, both portable and stationary types, Keystone overhead material, Peerless heavy-duty banding lathes, Peerless portable commutator slotters, Peerless portable tension machines and winding stands, Keystone pneumatic gong ringers, vacuum sanders and "leak-less" valves, Keystone motorman's seats, Keystone car destination signs, Keystone truss pins and Locke insulators and the "Automatic" trolley guard. Represented by C. J. Mayer, W. A. Armstrong, G. W. Cox, A. H. Englund, N. P. Hall, T. H. Henckle, H. G. Lewis, J. R. McFarlin, T. F. McKenna, F. C. Peck, L. H. Pike, J. V. E. Titus.

Electric Traction Supply Company, space 151. Berg folding fender, security wheel guard. Represented by O. W. Uthoff.

Esterline Company, Indianapolis, Ind., space 104. Golden-Glow headlights. Represented by W. McK. White.

Flexible Compound Company, Inc., Philadelphia, Pa., space 313. Flexible compound system for car painting and finishing, water, rust and acid test demonstrations, paint and varnish demonstrations, insulating demonstrations, fabric waterproofing. Represented by Thomas H. Downward.

Flood & Conklin Company, Newark, N. J., space 19. Simplex four-coat seven-day system of finishing street railway equipment. Represented by L. A. Williams, H. J. Kuhn, L. H. Conklin.

Forged Steel Wheel Company, Pittsburgh, Pa., space 538. Leading types of solid wrought-steel wheels for electric railway service, including wheels which have been withdrawn after long periods of service and new wheels cut and drilled to demonstrate uniformity of material. Represented by J. B. Brady, R. L. Gordon, C. G. Bacon, H. G. Macdonald, W. G. Cory, J. P. Rapp.

Galena-Signal Oil Company, Franklin, Pa., space 24. Reception room where representatives of the company will receive delegates and guests during the convention. Represented by delegates from various offices throughout the country.

General Electric Company, Schenectady, N. Y., space 20. GE-200-C, 40-hp split frame motor; GE-203-L, 50-hp motor; GE-261-G, 60-hp motor; GE-233-A, 75-hp motor; GE-240-A, 100-hp motor; GE-205, 110-hp motor removed from a car of the Washington, Baltimore & Annapolis Railway; Sprague General Electric type MK control equipment, combined straight and automatic air-brake equipment, C-P27-B and CP-25-C types of air compressors, motormen's valves, 40-ton electric switching locomotive, sherardized line material, headlamps, flow meters, remote signaling device for signaling between switchboard and distant generating rooms, lantern-slide exhibit entitled "The Spirit of Progress." Represented by J. G. Barry, C. E. Barry, A. K. Baylor, J. C. Calisch, W. G. Carey, F. E. Case, W. J. Clark, S. T. Dodd, C. Dorticos, C. E. Eveleth, F. H. Gale, E. H. Ginn, W. J. Hanley, C. W. Hobson, G. H. Hill, C. A. Ives, H. N. Latey, J. F. Layng, J. R. Lovejoy, H. L. Monroe, R. E. Moore, C. C. Pierce, W. B. Potter, E. D. Priest, L. W. Shugg, C. E. Sprague, S. W. Trawick, O. E. Turner, E. P. Waller, W. A. Woolford, R. E. Wooley.

General Vehicle Company, Long Island City, N. Y., space 100A. One 2-ton storage battery emergency wagon; one electric industrial truck, depot and warehouse type. Represented by E. W. Curtis, F. H. Wright.

Globe Ticket Company, Philadelphia, Pa., space 314. City and interurban railway tickets in books, strips and sheets; Pope patent P. M. coupon and other styles of transfers, cash fare receipts, trip passes, one-way and round-trip tickets, mileage books. Represented by W. C. Pope, P. C. Snow, R. C. Osman, Earl Elliott.

Gold Car Heating & Lighting Company, New York, spaces 316, 318. Gold's thermostatic control for electric heaters, thermostatic control for steam heating, ventilated core electric heaters, magnetic valves, electric switches, cyclone ventilators. Represented by E. B. Wilson, F. H. Smith, F. O. Bailey, F. T. Kitchen.

Goldschmidt Thermit Company, New York, space 211. Goldschmidt Thermit rail grinder with power derailing device in operation; materials required for welding rails by new insert method, with samples of rail joints and compromise joints welded in this manner; metals free from carbon produced by the thermit process; samples of thermit, manganese thermit and nickel thermit; photographs of repairs to crank shafts, motor cases, etc., and samples of such welds. Represented by William Cuntz, F. W. Cohen, J. H. Deppler, H. S. Mann, J. G. McCarty, W. R. Hulbert.

Griffin Wheel Company, Chicago, Ill., spaces 155, 157. Chilled-iron car wheels, F. C. S. wheels for city and interurban service. Represented by C. K. Knickerbocker, A. A. Hale, A. W. Brown, C. P. Dennett, H. N. Scott, W. A. Bennett.

Hale & Kilburn Company, Philadelphia, Pa., spaces 576, 577, 578, 579. Walkover pressed-steel car seats, interurban car seats with and without arm rests, "Head-on" car seats, folding car seats, motormen's car seats, woven twill weave rattan seat covering, steel electric and interurban car framing, pressed-steel interior car finish, dressed-steel "Integral" window frames, steel sash frames, steel car doors. Represented by V. von Schlegell, A. F. Old, C. W. Laskay, H. R. Rochester, F. C. Edson, W. F. Cutler, R. H. Pilson, F. F. Robb, Christopher Eccles, George R. Barker.

Hartshorn, Stewart, Company, East Newark, N. J., space 515. Car curtain rollers, vestibule rollers, sash balances and shade roller sundries. Represented by B. E. Bushnell.

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Herr Fender Company, New Orleans, La., space 530. Herr car fender. Represented by William Dickenson.

Hess-Bright Manufacturing Company, Philadelphia, Pa., spaces 143, 145. Ball bearings for railway application, ball-bearing journal boxes, ball-bearing wheels and ball-bearing motors. Represented by W. L. Batt, E. W. Rubencame.

Heywood Brothers & Wakefield Company, Wakefield, Mass., space 636. Pressed-steel car seats, canvas-lined rattan webbing. Represented by Bertram Berry, Scot Wade, E. C. Lang.

Holland Trolley Supply Company, Cleveland, Ohio, space 357. Trolley bases, harps, wheels, pin plates, mine bases, wheels, air sander traps, valves, hoppers, overhead splices, fare boxes. Represented by H. W. Cole, J. G. Connally.

Home Rubber Company, Trenton, N. J., space 359. Black sheet packing, automobile tires. Represented by A. R. Foley.

Hunter Illuminated Car Sign Company, Flushing, N. Y., space 36. Destination car signs. Represented by Lytle J. Hunter, Fenley Hunter, E. R. Mason, S. I. Wailes, H. F. Keegan, Harry Reisiger.

Independent Lamp & Wire Company, Inc., New York, space 517. Asbestos insulated magnet wire, asbestos tape sleeving, asbestos insulated armature and field coils, drawn tungsten wire lamps, carbon lamps. Represented by R. K. Dana, F. A. Duff.

Indianapolis Switch & Frog Company, Springfield, Ohio, space 173. Indianapolis portable electric welders, Indianapolis portable electric grinders, Indianapolis corrugation removers, manganese crossings, general track work, demonstrations of reclaiming by electric welding and grinding; various types of electrically welded joint and bonding plates. Represented by E. C. Price, J. A. Foulks, E. S. Brannaman, W. H. Thomas, Thomas Finigan, F. J. Venning.

International Register Company, Chicago, Ill., spaces 300, 302, 304. Coin registers and coin counting fare boxes with mountings for same, single and double fare registers, foot ringing devices, brackets, cord pulls, detachable cranks, handles and other car fittings, Heeren enamel cap and coat badges, and International conductors' ticket punches. Represented by Arthur H. Woodward, John Benham.

International Steel Tie Company, Cleveland, Ohio, spaces 168, 170. International steel and concrete substructure for railroad crossings, International twin steel ties for paved street track, International composite insulated twin steel ties for open track and for subways, International rail joint construction and method of direct and cross bonding for twin steel ties. Represented by William P. Day, J. J. O'Donnell, George Harpham, William C. Mahon, L. C. Shank.

Jamison Rail Bond & Electrical Supply Company, Pittsburg, Pa., space 365. Rail bonds. Represented by F. S. Haller, John A. Jamison.

Jeandron, W. J., New York, space 12. "Le Carbone" carbon brushes. Represented by W. J. Jeandron, J. C. Kyle.

Johns, J. N., Manufacturing Company, New York, space 371. Guaranteed type check plates, pivot journal bearings and wedges, standard journal bearings, general line castings brass and bronze, detachable wrench jaw, replaceable center trolley wheels, Flower brush holders, air and controller handles, steel tube bushings for air and controller handles and stems, Babbitt metal, three grades, Col-R-01 car curtain and hand strap renewer, "Rub-on" varnish, car cane seat finisher. Represented by J. N. Johns, F. W. Roth, D. B. Flower.

Johns-Manville, H. W., Company, New York, N. Y., spaces 336, 338. Overhead line material, rail bonds, special insulating materials, underground fiber conduit and fittings, third-rail insulation, J-M flexible sand hose, "Noark" line of fuses, protective device boxes and meter equipment, together with fireproof cable insulation. Niagrite, friction and rubber tapes, ebony asbestos wood for switchboards, asbestos transite for fireproofing electric cars, asbestos roofings, pipe coverings, shingles. Represented by J. W. Perry, S. G. Meek, George A. Saylor, H. L. Steiner, J. H. McManus, H. M. Voorhis, C. E. Fairbanks, H. L. Morse, A. J. Finlay, E. B. Hatch, R. C. Buell, R. B. Lattin.

Johnson Coin Counting Machine Company, New York, N. Y., spaces 320, 322, 324. Registering fare boxes for both coins and tickets; coin-counting machines. Represented by C. H. Birdsall, W. P. Butler, J. M. Johnson.

Joliet Railway Supply Company, Chicago, Ill., spaces 570, 571. Perry-Hartman anti-friction truck, centering center plates and wide bearings on bolsters, Hartman center plates, Perry and Joliet side bearings, Huntoon brake beam. Represented by C. M. Forline, E. A. Laughlin, C. F. Huntoon.

Kenfield-Davis Publishing Company, Chicago, Ill., space 2. *Electric Traction.* Represented by H. J. Kenfield, W. J. Field, H. L. Brown, H. E. Smith.

Keystone Grinder & Manufacturing Company, Pittsburgh, Pa., spaces 331, 333. Keystone hand-power tool grinders. Represented by William L. Munk, Sewall A. Musser.

Lackawanna Steel Company, Lackawanna, N. Y., spaces 407, 409. Abbott rail joint plates, Lackawanna hook shoulder tie plates, Lackawanna steel sheet piling. Represented by C. R. Robinson, H. H. Barbour, W. Breeden, F. E. Abbott, A. P. Van Schaick, A. H. Weston.

Long, E. G., Company, New York, space 374. Elliptic and spiral springs, brake pins and bushings. Represented by E. H. Mays, Frank Van Anden.

Lorain Steel Company, Johnstown, Pa., space 418. Girder and high T-rails, special track work, frogs, crossings, "Tadpole" type tongue switches, electrically welded and Nichols composite rail joints. Represented by P. M. Boyd, J. M. Brown, Carroll Burton, S. J. Cotsworth, E. B. Entwisle, H. C. Evans, H. L. Gleeson, W. B. Gresham, William W. Kingston, H. F. A. Kleinschmidt, A. S. Littlefield, Joseph MacCarroll, Jr.; S. P. McGough, John A. McHugh, John A. Stacey, H. C. Stiff, A. L. Verner.

Lord Manufacturing Company, Brooklyn, N. Y., space 537. Trolley retrievers and catchers, controller handles, controller regulators, trolley guards, lightning arresters, grounding devices, rail bonds and air cleaners. Represented by W. R. Garton, A. V. Arnold, E. A. Lightner, V. D. Stearns.

McCabe, J. J., 30 Church Street, New York, N. Y., spaces 124, 126, 128. McCabe's "2-in-1" new design motor-driven double-spindle lathe with wheel-holding attachment and special wheel-turning rest. Represented by H. P. McCabe, Frank Sheeran, George L. Bennett, Frederick Kompass, Wilson Priestley.

McGraw Publishing, Company, Inc., New York, N. Y., spaces 7, 9, 11. Copies of the ELECTRIC RAILWAY JOURNAL, Annual Convention Number, Convention Daily issues; *Electrical World, Engineering Record, Metallurgical and Chemical Engineering*, McGraw Electric Railway Manual, Electric Railway Dictionary, McGraw Directories (electric railway and central station editions). Represented by James H. McGraw, Hugh M. Wilson, H. W. Blake, F. Kingsley, W. Jackson, H. H. Norris, E. M. Haas, F. Nicholas, G. J. MacMurray, F. J. Armeit, R. Bruster, L. I. Grinnell, L. E. Gould, C. A. Babtiste, G. W. Elliott, W. K. Beard, E. J. Hunt, E. B. Cooke, J. C. Raymond, C. A. Henley, L. W. Seeligsberg, P. T. Coburn, F. C. Wells and the Misses Phelps and Johnson.

McQuay-Norris Manufacturing Company, St. Louis, Mo., space 321. "Leak-Proof" piston rings. Represented by W. K. Norris, E. H. Hill, H. P. Marsh.

Mica Insulator Company, New York, N. Y., space 383. Insulation for the armature winding and commutator builder, including Micanite commutator insulation, rings, segments, tubes, cones, sheets, plate, paper tape, Micanite cloth, paper, spools, washers, bushings; Empire oil-treated cambric, tapes, canvas, duck, linen papers, silks, etc.; Kablak insulating cambrics, papers, tape; untreated rope papers, fullerboard, fish papers, fiber, linen, cambric, muslin, canvas, linen tape, silk tape, cotton sleeving, friction tape, splicing compound, insulating varnishes, shellac, cement and glues. Represented by Edward C. Wood, Charles E. Coleman, Charles H. Bell, August F. Tinnerholm.

Midvale Steel Company, Philadelphia, Pa., space 640. Steel-tired wheel (cast-iron spoke center), rolled-steel wheels, rolled-steel wheel (one wear). Represented by H. M. Deemer, G. Aertsen, A. E. Goodhue, A. W. Illingworth, M. D. Hayes, Thomas Price, W. S. Edger.

Nachod Signal Company, Philadelphia, Pa., space 147. Automatic signals operated by trolley contactors for single and double track; highway crossing bell equipped with flashing lights, trolley contactors, directional relay and signal parts. Represented by C. P. Nachod, F. W. Kulicke, H. C. Knerr.

National Brake Company, Inc., Buffalo, N. Y., spaces 368, 369. Peacock brakes, Peacock improved brakes, Ackley adjustable brakes. Represented by Frank D. Miller, W. D. Brewster, T. C. Boyce.

National Brake & Electric Company, Milwaukee, Wis., space 15. Straight-air-brake motor-car equipment with direct suspended type compressor, governors and motorman's valves, 550 ft. 3VD, 300 ft. 3VS and 75 ft. E-3 motor compressors with complete automatic control, other

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types of belt and motor-driven d. c. compressors of smaller capacity. Represented by representatives from all district offices.

National Carbon Company, Cleveland, Ohio, space 315. Railway motor brushes of Laclede, Columbia and Partridge grades; generator and stationary motor brushes of carbon and graphite grades, Cophite brushes, inclosed are carbons, flaming carbons, solid homogeneous flame carbons, Columbia batteries, Columbia track batteries, Helios storage batteries. Represented by Messrs. Kathe, Weaver, Martindale.

National Car Wheel Company, Pittsburgh, Pa., space 528. Two Star Special electric railway wheels. Represented by J. H. Yardley, J. F. Weisbrod, H. E. McClumpha, J. D. Cunningham, E. H. Chapin.

National Lamps Works of General Electric Company, Cleveland, Ohio, spaces 606, 608. Street railway lamps and reflectors, lamps for general illumination, 110-volt and 220-volt lamps, 750-watt Mazda lamp. Represented by Messrs. C. W. Bender, R. W. Tavey, J. R. Colville and J. A. Hamilton.

National Lock Washer Company, Newark, N. J., spaces 525, 527. National lock washers, car curtains, curtain fixtures, sash locks, sash balances. Represented by W. C. Dodd, F. B. Archibald, C. P. Williams, D. Hoyt, R. F. Horsey, J. H. Horn.

National Malleable Castings Company, Cleveland, Ohio, spaces 505, 507, 509. National radial coupler and draft gear, journal boxes and wedges, National anti-rail creeper, tie plate and rail brace, rail braces, bridge castings, automatic couplers. Represented by J. J. Byers, P. J. Howard, Mr. Pray.

National Tube Company, Pittsburgh, Pa., spaces 556, 557, 558, 559. National tubular street poles, Shelby overhead trolley poles, malleable and brass fittings, Shelby tubing, Kewanee unions, flange unions and regrinding valves, testing machines for Kewanee specialties and Shelby trolley poles, national casing. Represented by L. F. Hamilton, W. S. Billing, J. E. Fleming, W. L. Schaeffer.

Naugle Pole & Tie Company, Chicago, Ill., space 330. White cedar ties, section of white and red cedar poles. Represented by J. W. Benham, L. E. Morier.

Near-Side Car Company, New York, N. Y., space 385. Near-side cars. Represented by P. J. Mitten, George A. DuCasse.

Nelson Valve Company, Philadelphia, Pa., space 137. Iron and bronze gate globe and check valves, steel valve for superheated steam. Represented by Harry C. Baynard, R. G. Ward.

Newman Clock Company, New York, space 516. Portable watchman's clocks. Represented by Herbert C. Davis.

Nickel Chrome Chilled Car Wheel Company, Pittsburgh, Pa., space 529. One-wear tire plated wheel, one-wear tire, samples of nickel-chrome alloy. Represented by Robert C. Totten, Jay G. McCarthy.

Northey-Simmen Signal Company, Ltd., Indianapolis, Ind., spaces 160, 162. Dispatcher's desk, car equipment and a light signal to give indications in paved streets where it is impossible to provide a third-rail. Represented by F. E. Brown, George Broughall, P. J. Simmen, S. L. Gibson, Edward Moore.

Nutall, R. D., Company, Pittsburgh, Pa., spaces 142, 144. Gears, pinions, trolleys, couplings. Represented by F. A. Estep, G. E. Watts, L. H. Keim, W. H. Phillips.

Ohio Brass Company, Mansfield, Ohio, spaces 614, 618. O-B Hi-Tension insulators, electric car signal system, trolley bases, trolley catchers, trolley retrievers, M. C. B. automatic couplers, automatic electric and air connecting coupler, air sanders, catenary devices, third-rail insulators, National railroad trolley guards, type J bonds, all-wire rail bonds. Represented by C. K. King, A. L. Wilkinson, E. F. Wickwire, C. T. Anderson, A. B. Edes, A. L. Price, E. B. Snyder, M. P. Wolcott, C. E. Young., W. C. Starkey, R. G. Averill, C. C. Beck, G. H. Bolus, C. E. Gierdding, N. M. Garland, Nathan Shute, G. W. Cooper, J. E. Slimp, G. A. Kroener, F. E. Johnson, R. J. Deneen, E. C. Brown, F. V. Cook, W. H. Bloss, C. P. Leibold, C. H. Tomlinson, F. A. Strail, P. A. Hinds, G. E. Willis, A. O. Austin, R. D. Holabird.

Ohmer Fare Register Company, Dayton, Ohio, spaces 301, 303, 305. Totalizing register for city service, recording and printing fare box, rapid transit operating device for prepayment cars, recording and printing registers for recording fares from two to sixty different classifications, Universal fare recording and printing register. Represented by John F. Ohmer, J. H. Stedman, H. B. Ohmer, W. J. Kuhns, C. W. Ketteman, C. V. Funk, J. Q. Chase.

Okonite Company, New York, N. Y., spaces 332, 334. Insulated wires and cables, including steel taped and steel wire braided insulating tape, Manson friction tape, Candee potheads. Represented by J. D. Underhill, W. G. Hovey, Romaine Mace.

Pantasote Company, New York, N. Y., space 400. Pantasote curtain and upholstery materials, Agasote headlining, roofing, flooring and interior trim material. Represented by John M. High, William L. Lake, William Anderson.

Pennsylvania Steel Company, Maryland Steel Company, Philadelphia, Pa., space 23. Switch pieces for street railways, solid Manard switches, mates and frogs, Manard anvil face frogs, switch stands, spring boxes, "Mayari" track and frog bolts, model of "Hook Heel" switch. Represented by John C Jay, Jr., Robert W. Read, G. S. Vickery, W. M. Henderson, representatives of the various sales offices.

Philadelphia Holding Company, Philadelphia, Pa., space 520. Halsey radial trucks. Represented by W. H. Stevenson, John R. Dickey.

Phillips Manufacturing Company, New York, N. Y., spaces 156, 158. Commutator truing devices. Represented by T. E. Chappell, D. Bischoff.

Pittsburgh Insulating Company, Pittsburgh, Pa., space 524. Insulating cloth, paper, tape. Represented by P. F. Norvell, Clifton F. Schmidt, Jr.

Pittsburgh Steel Company, Pittsburgh, Pa., space 164. "Pittsburgh Perfect" electrically welded right-of-way fence, galvanized barb wire, galvanized plain wire, galvanized staples, wire nails, galvanized telegraph and telephone wire. Represented by M. E. Johnson, E. Sidney Lewis.

Pollak Steel Company, Cincinnati, Ohio, space 620. Forgings and axles, Pollak special heat-treated axles, steel standard M. C. B. axles, standard A. E. R. A. axles. Represented by Messrs. Pollak and Buck.

Poole Brothers, Chicago, Ill., spaces 510, 511, 512. Electric railway tickets, cash fare receipts, commutation and pass books, mileage books, parcel and baggage checks, ticket cases, dating stamps, conductors' punches; complete service, writing, designing, engraving and printing; illustrated folders and booklets, timetable folders, maps. Represented by S. K. Poole, R. W. Hunter.

Protective Signal Manufacturing Company, Denver, Col., space 133. Highway crossing signals with bells, lights and horns, annunciators, oscillators for signal work, single stroke and vibrating bells, quick-acting relays. Represented by D. B. Turner, W. C. Nehr.

Rail Joint Company, New York, N. Y., spaces 350, 351, 352, 353, 354, 355. Continuous and Weber type joints for T-rails, high T-rails, girder rails and guard rails, Continuous compromise joints, Continuous frog and switch joints. Represented by L. F. Braine, W. E. Clark, R. R Seward, J. A. Greer, W. A. Chapman, E. A. Condit, Jr., H. C. Holloway.

Railway & Industrial Engineering Company, Pittsburgh, Pa., space 609. Switches, fuses, lightning arresters; typical out-door substation at end of pier; portable substation in Westinghouse booth. Represented by Messrs. Kerr, Lemmon, Hart, Burke, Barnes.

Railway Improvement Company, New York, N. Y., spaces 586, 588. Coasting recorders, anti-climbers, sanitary straps. Represented by Andrew J. Pizzini, W. Ogden Wade, Charles W. Hall, Clark Morrell.

Railway Materials Company, Chicago, Ill., space 535. Reception booths, brake shoes, Rymco overhead trolley switch. Represented by J. F. Schurts, E. C. Folsom, G. F. Allen, Mr. Lesh.

Railway Roller Bearing Company, Syracuse, New York, N. Y., space 140. Roller bearing car wheel No. F-400, roller bearing car wheel hubs, different types of roller bearing journal boxes, roller bearing center plates, roller bearing end shields for industrial motors, roller bearing frame heads for railway motors. Represented by Raymond H. Carhart, John W. Hulburt.

Railway Track-Work Company, Philadelphia, Pa., spaces 161-163. Track-grinding machinery, reciprocating track grinder, sample grinding corrugated rail, sample cupped joint surfaced, sample rail depression built up by a welding process ground with above machine; flexible shaft track grinder. Represented by Messrs. Gherky, Goodall and Nardini.

Railway Utility Company, Chicago, Ill., space 617. Utility car ventilating systems, Utility thermometer control for electric car heaters. Represented by William J. Pine, Lee P. Hynes, E. J. Magerstadt, J. H. Denton.

Recording Register & Fare Box Company, New York, N. Y.,

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spaces 386, 387. Fare boxes. Represented by Charles N. Yates, F. A. Groves, F. B. Kennedy, Victor Courtright.

Roebling's Sons, John A., Company, Trenton N. J., spaces 325, 327. Bare wire, wire rope and fittings, wire cloth and netting, alligator wrenches, and insulated wire and cables. Represented by F. J. Newbury, William L. Doyle, G. W. Swan, D. F. Ivens, F. E. Whelan, W. W. Affleck, William H. Slingluff, John E. Nolan, A. V. Errickson.

Rooke Automatic Register Company, Providence, R. I., space 312. Three types of Rooke fare registers, including hand-held, portable registers. Represented by George F. Rooke, Jilson J. Coleman, Walter A. Williamson.

Root Spring Scraper Company, Kalamazoo, Mich., space 506. Root spring snow scrapers, Root spring wheel guard. Represented by F. N. Root, Newton Root.

Samson Cordage Works, Boston, Mass., space 502. Spot trolley cord, signal cord, other braided cords. Represented by F. J. Coakley, W. G. Webb, W. G. Woodworth, R. G. Whiting.

Sangamo Electric Company, Springfield, Ill., space 610. Wattmeters, switchboard meters and instruments, ampere-hour meters, polyphase meters. Represented by M. B. Chase, Ray D. Lillibridge.

Schutte & Koerting Company, Philadelphia, Pa., space 154. Schutte trip throttle valve for steam turbine; trip throttle and butterfly valve as engine stops, electrically operated; gate valve, Educator condenser, rotary air pump, "Airex" small valve, Auld reducing valve, mechanical oil burner, air register, Koerting injector, siphon, jet exhauster, blower and spray nozzles, blast nozzles. Represented by J. J. Gessleman.

Scientific Railway Appliance Company, Chicago, Ill., space 127. Automatic safety devices for electric railway cars. Represented by Oscar Johnson, H. R. Chadwick.

Shepherd Automatic Switch Company, Montgomery, Ala., space 141. Shepherd pneumatic track switch, non-electrical and operated by motorman from car platform. Represented by M. L. Shepherd, W. L. Shepherd.

Simmons-Boardman Publishing Company, New York, N. Y., space 10-A. Copies of the *Railway Age Gazette* and the *Signal Engineer;* railway books. Represented by Roy V. Wright, C. R. Mills.

Smith, Peter, Heater Company, Detroit, Mich., spaces 366, 367. Forced ventilation hot-air car heaters, including new magazine type of coal-burning heater; electric forced ventilation heater with thermostatic control. Represented by Daniel W. Smith, Elmer J. Smith, H. S. Williams, E. P. Doyle, W. E. Hinmon, M. J. Phelan, W. M. McKee.

Southern Exchange Company, New York, space 612. Poles and cross-arms. Represented by E. G. Chamberlain.

Speer Carbon Company, St. Mary's, Pa., spaces 382, 384. Carbon and graphite brushes; metallic brushes. Represented by J. S. Speer, Charles J. Lion.

Spotswood, F. D., Accident Preventor, Lexington, Ky., space 138. Overhead car fixtures for showing fourteen accidents in rotation; brass plates for use in open cars; electrotypes showing accidents; blotters showing accidents of a general character; blotters showing accidents to children; brass plates for steam roads. Represented by C. A. Blethen.

St. Louis Car Company, St. Louis, Mo., spaces 590, 591. Car bodies, trucks and specialties. Represented by John I. Beggs, Edwin B. Meissner, Nic Le Grand, George L. Kippenberger, W. L. Alt, G. Koch.

St. Louis Steel Foundry Company, St. Louis, Mo., space 14. Solid manganese track work, consisting of 400-ft. switch, 20 ft. long; 100-ft. center radius standard switch and mate, standard branch-off frogs, standard electric over electric and steam over electric crossings. Represented by J. H. Steedman, F. N. Rumbley, D. H. Young.

Standard Motor Truck Company, Pittsburgh, Pa., space 536. Aluminum models of trucks. Represented by Arthur W. Field, W. G. Cory, P. W. Wendt, R. Hammerstrom.

Standard Paint Company, New York, N. Y., space 504. P. & B. insulating products, cement floor finishes, paints, roofings and waterproofing materials. Represented by Charles E. Smith, John H. Thomas, Joseph E. Brown.

Standard Steel Works Company, Philadelphia, Pa., space 635. Space used as reception booth. Represented by Robert Radford, W. H. Pugh, Jr., H. G. Pearce, R. Sanderson, W. B. Keys, C. F. Dodson, C. H. Peterson, A. R. Green.

Standard Underground Cable Company, Pittsburgh, Pa., space 388. Lead-covered and armored cable, bare and insulated wires, cable accessories, including indoor and outdoor cable terminals, subway junction boxes, jointing material. Represented by representatives from Boston, New York, Philadelphia, Pittsburgh and St. Louis offices.

Star Brass Works, Kalamazoo, Mich., space 508. Kalamazoo trolley wheels and harps. Represented by O. P. Johnson.

Sterling Fare Register Company, New York, N. Y., spaces 386, 387. Single and double fare registers, conductors' punches and railway supplies. Represented by F. B. Kennedy, F. A. Groves, Charles N. Yates, Victor Courtright.

Sterling Varnish Company, Pittsburgh, Pa., space 574. Coils, varnishes, iron enamel, paints for bridges and structural steel work. Represented by Henry C. Todd, W. V. Whitfield, Alvin S. King.

Symington, T. H., Company, Rochester, N. Y., space 575. Journal boxes, dust guards, ball-bearing center plates. Represented by C. J. Symington, R. W. Gwaltney, T. C. de Rosset, C. R. Naylor, A. H. Weston.

Taylor Electric Truck Company, Troy, N. Y., space 109, 111, 113, 115. E. H. single truck, S. B. double truck, M. C. B. double truck, H. L. B. double truck. Represented by John Taylor, G. A. Tupper, Walter E. Taylor.

Templeton, Kenly & Company, Ltd., Chicago, Ill., space 624. Simplex track jacks, ballast jacks, bridge jacks, journal jacks, car jacks, coach jacks. Represented by Alfred E. Barron, Arthur C. Lewis, Harry M. Hood.

Thayer & Company, Ltd., New York, space 511. Chillingworth sheet-steel gear cases. Represented by George K. Wannamaker.

Thompson, Ernst H., Waverly, Mass., space 372. Fare-box and money changer combined. Represented by Ernest H. Thompson.

Tool Steel Gear & Pinion Company, Cincinnati, Ohio., space 621. Steel gears and pinions. Represented by C. E. Sawtelle, E. S. Sawtelle, Leroy Brooks, Jr.

Transportation Utilities Company, New York, N. Y., space 611. National standard roofing, National steel trap door, Tuco friction curtain, Chanarch metal floor plates, Flexolith composition flooring, special steel door. Represented by W. L. Conwell, H. B. Chamberlain, T. K. Dunbar, Jr., W. S. Humes.

Trigger Lock Reversible Controller Finger, Niagara Falls, N. Y., and Toronto, Canada, space 149. Trigger lock reversible controller fingers. Represented by R. Russell, E. W. Bennett, F. O. Grayson.

Trolley Supply Company, Canton, Ohio, spaces 360, 361. Peerless No. 10, Simplex and Star trolley bases, Ideal trolley catcher, Knutson No. 2 and No. 5 trolley retrievers, Peerless check valve, Peerless, Jr., arc headlight, No. 14 and 15 pressed steel headlights, trolley cord, Hollis safety fender. Represented by J. E. McLain, Joseph Hollis, M. A. Wernet.

Under-Feed Stoker Company of America, Chicago, Ill., space 375. Reception room, with advertising matter. Represented by C. S. Crowell.

U. S. Metal & Manufacturing Company, New York, N. Y., space 623. Reception booth. Represented by B. A. Hegeman Jr., Charles C. Castle, E. D. Hillman, H. A. Hegeman, H. K. Porter, E. R. Shoenberger, J. W. Creveling.

United States Electric Signal Company, West Newton, Mass., space 401. Automatic electric block signals, car-counting block signals, spacing signals, counting light block signals, crossing signals, track switches. Represented by Roland F. Gammons, 2d, Roy V. Collins, Robert S. Bowen, Ralph Mosher.

United States Wood Preserving Company, New York, space 107. Treated and untreated wood paving blocks. Represented by G. O. Strothers, Alexander Reed.

Universal Lubricating Company, Cleveland, Ohio, space 135. Tulc lubricant for different railway purposes. Represented by C. B. Arthur, S. W. Schofield, J. C. Daigen.

Universal Safety Tread Company, Boston, Mass., space 601. Safety treads. Represented by F. W. Langford.

United States Wood Preserving Company, space 107.

Vacuum Car Ventilating Company, Chicago, Ill., space 539. Reception booth. Represented by D. I. Cooke.

Valentine & Company, New York, N. Y., spaces 580, 581. Railway colors and varnishes, Valspar varnish. Represented by Landgon B. Valentine, McKim Hollins, Irvin H. Munford, Captain Van de Watering.

Van Dorn, W. T., Company, Chicago, Ill., spaces 531, 533. Standard automatic couplers with draft gears, M. C. B. couplers with draft gears, two sizes automatic air and car couplings with draft gears. Represented by W. T. Van Dorn, H. E. Van Dorn, John Sjoquist.

Voglesong-McKenzie Company, San Francisco, Cal., space 370.

Waclark Wire Company, New York, N. Y., spaces 380, 381. Bare and weatherproof copper wire and cable, grooved trolley wire, weatherproof and bare strand, flat square and telephone wire. Represented by E. L. Goldschmidt.

Wallace Supply Company, New York, space 434. Trolley

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bell and register cord, bronze hardware, sweeper rattan, car seat rattan. Represented by W. Meeteer, E. H. Meeteer.

Walpole Tire & Rubber Company, Boston, Mass., space 331. Massachusetts Chemical Company products, including liquids and rubber insulation, Armalac, Enamelac, clear insulating varnishes, friction tapes, splicing compound, molded rubber specialties. Represented by R. F. Norvell, A. E. Duclos, L. O. Duclos.

Watson Stillman Company, Aldine, N. J., space 501. 3000-lb. telescopic motor lift, 35-ton hydraulic bond compressor, universal beam punch, 7-ton swivel claw jack, 15-ton 12-in. claw jack, No. 4 girder rail bender. Represented by E. A. Stillman, R. R. Harrison, Sterling G. Turner.

Welte & Sons, New York, space 219. Welte orchestrion. Represented by A. C. Terwilliger.

Western Electric Company, New York, N. Y., spaces 341, 355. Telephones, railway selective train dispatching equipment, vacuum cleaners, Electrose high-tension insulators, Thomas porcelain insulators, Pyrene fire extinguishers, sleet cutters, Western Electric insulating tapes and compounds, Kalamazoo trolley wheels and harps, General Electric rail bonds and miscellaneous equipment, trolley line construction material, Faraday 500-volt car buzzers and signal bells, trolley retrievers and catchers, trolley bases, Samson trolley cord and bell rope, Shelby trolley poles, C-H arc and incandescent car headlights, Gold electric car heaters, Benjamin specialties. Represented by M. A. Oberlander, R. H. Harper, F. D. Killion, G. K. Heyer, G. Brown, A. G. Kingman, and Messrs. Enders, Maxon, Spamer, Hallstrom, Coller, Greenfield, Phillips, Davis, Guest, Bertke, Crouch, Cathright, Marchmont, Collins, Shively.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., space 21. Light-weight HL control rack, HL control line switch, HL control details, type PK control rack, Nos. 306, 307 C-4, 323-A, 328 and 333-B-2 railway motors, No. 306 motor rack, No. 307-C-4 field control motor rack, railway motor commutator, pressed steel gear case, field coils, railway motor bearings, armature coils, brush holders, model portable substation, model outdoor transformer substation spare parts for railway motors, insulating material, railway line material, airbrake devices, motor-driven air compressors, automatic car and air couplers, motorman's brake valves, electric compressor governors, air reservoirs, complete car equipments. Represented by S. L. Nicholson, C. S. Cook, G. B. Griffin, J. Brett, M. B. Lambert, J. W. Busch, J. P. Alexander, G. C. Ewing, F. H. Shepard, G. M. Eaton, E. P. Dillon, N. W. Storer, C. Renshaw, A. W. Lomis, J. G. Miles, H. L. Garbutt, J. McA. Duncan, A. A. Brown, T. A. McDowell, P. H. Smith, W. A. Swift, D. E. Drake, O. T. Smith, H. C. De Camp, H. C. Stier, H. A. Coles, T. R. Langan, J. C. McQuiston, H. W. Beaumont, D. H. Ackerson, A. H. McIntire.

Weston Electrical Instrument Company, Waverly Park, Newark, N. J., spaces 17, 19. Electrical measuring instruments and appliances, including instruments for switchboard, portable and laboratory uses. Represented by Charles P. Frey.

Wharton, William, Jr., & Company, Inc., Philadelphia, Pa., spaces 626, 628, 630, 632, 634. Switches and frogs, spring boxes. Represented by V. Angerer, T. R. Bolgiano, Wm. Hulbert, G. R. Lyman, R. C. McCloy, H. F. McDermott, J. C. Robinson, C. N. Shaffner, W. C. Wilson, W. L. Wright.

Wheel Truing Brake Shoe Company, Detroit, Mich., space 523. Abrasive brake shoes. Represented by J. M. Griffin, F. F. Griffin.

Whitmore Manufacturing Company, Cleveland, Ohio, spaces 121, 123, 125. Gears and pinion. Represented by S. W. Whitmore, William Beaser, Jr., R. R. Hertzog, W. M. Lawyer, Henry Stuckenholt.

Wilson Remover Company, Newark, N. J., space 213. Wilson varnish remover. Represented by J. MacNaull Wilson, J. W. Wilson.

Wood, Charles N., Company, Boston, Mass., space 129. Chapman automatic signals. Represented by Charles N. Wood, George H. MacGilvray, W. M. Chapman, O. E. Chapman.

Woods, Edwin S., & Company, Chicago, Ill., space 543. Antifriction side bearings, flat-sided ball anti-friction center plates. Represented by Charles D. Jenks, H. M. Perry.

Yarnell-Waring Company, Philadelphia, Pa., space 139. "Lea" V-notch recording meter, blow-off valves, pipe joint clamps, hydraulic valves. Represented by Joseph Esherick, R. G. Ward.

SAFETY FEATURES OF D & W FUSE BOX—OTHER DISPLAYS

D & W Fuse Company, Providence, R. I., in addition to its regular line of standard "D & W" inclosed fuses, fuse blocks and boxes, is showing in space 337 a new "D & W" fused switch box, combining a fuse and switch box for 250-volt circuits. This box may be permanently locked after the fuses are installed, preventing tampering with the connections or increasing capacity of the fuses. One of the protective features of this new box is the automatic opening of the switch when the box is opened, eliminating danger to the workman when renewing fuses.

The box can be used as a switch also, because the circuit can be opened or closed at will by moving a lever at the side of the box. Provisions are made, however, to lock this lever when in open position by means of a disk with holes to receive padlocks, so that the several men working on the same line must be approached for their padlock keys before the switch can be closed, thereby getting a warning. A magnetic chuck for machine shop use is also shown; the flat chuck on exhibit has a horizontal face and is equipped with adjustable end and side stops for fixing the location of the work under heavy duty. Auxiliary plates are furnished to fit the chucks and are adapted for holding special or irregularly shaped pieces, allowing one chuck thereby to cover a wide range of operations. These chucks are oilproof and waterproof and are equipped with demagnetizing switches of special design attached directly to the chuck, which by a simple movement of the hand automatically and positively demagnetize it. This type of switch affords mechanical protection to the switch posts and safety to the operator, rendering it reliable and safe, outwearing the exposed type.

Attention is being called to the heat-resisting insulation material "Deltatape" and "Delta" sheeting—in which asbestos fiber is used as a base impregnated with a special compound. Other "Delta" insulating materials are also shown in addition to the reels and coils of "Deltabeston" magnet wire. Samples of flat "Deltabeston" wire and the new "Deltabeston" standard wire for heater-cord switchboards and fixture wiring are also displayed. W. S. Sissons and H. F. MacGuyer are in charge.

AN ELECTRICALLY OPERATED FARE BOX

A unique feature of the exhibit of the Johnson Fare Box Company is a new box, never before exhibited, by which the conductor is relieved of all mechanical operations after he deposits the coin or ticket in it. In general appearance, the new box resembles the present standard box, but hidden in the lower part is a special electric motor which operates continuously. This motor consumes energy of a value of about 3 cents a day. The motor has two functions—first, it operates the coin-dumping device, ordinarily operated by a hand lever, and it also drives two grooved, rubber-covered rollers, rotating just below a ticket slot at the top of the box. These rollers are inked, and they not only grasp the ticket when the latter is inserted in the slot but cancel it in indelible ink on both sides. The tickets are then deposited in a small receptacle above the coin box. This box is the result of a long series of experiments, including a commercial test at Evansville, Ind. It is intended for use with an overhead register so as to form a double check on fare and ticket collections.

The Eclipse Railway Supply Company utilizes spaces 567 and 569 to show the Eclipse life guard and Acme fender. Its Eclipse trolley retriever, also on exhibit, has a new feature not shown in any other retriever, namely, it is controlled by a push pin which regulates the power spring.

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WEDNESDAY, OCTOBER 15, 1913

PROGRAM FOR TO-DAY

CONVENTION MEETINGS

9:30 a.m. Joint Session of Accountants' and Transportation & Traffic Associations, Greek Temple, Convention Pier.
9:30 a.m. Session of Engineering Association, Engineers' Hall, Convention Pier.
9:30 a.m. Session of Claims Association, Claims Hall, Second Floor of Convention Pier.
2:00 p.m. Session of American Association, Greek Temple, Convention Pier.
4:00 p.m. Annual Meeting of Manufacturers' Association, Engineers' Hall, Convention Pier.

ENTERTAINMENT

Golf, Qualifying Round for A. E. R. M. A. Tournament, Country Club, Northfield, N. J.
11:00 a.m. Concert by William Fenrich and Orchestra, Lobby, Convention Pier.
3:00 p.m. Championship and Consolation Rounds, Ladies' Auction Bridge Tournament, Persian Garden, Convention Pier.
9:00 p.m. Steeplechase Night, Informal Dancing at Steeplechase Pier, Boardwalk opposite Haddon Hall.

Address of President Harries

The address of President Harries before the American Association is a notable presentation of the current work and problems of the industry. It ought to be read thoughtfully by all who were not fortunate enough to be present at the meeting. Those whose daily activities are remote from the headquarters of the association and who are not in constant touch with the wide extent of its influence in the industry are in danger of forgetting what a strong force it is that represents them. President Harries, however, does not exaggerate when he describes the real association. Observers who appreciate its work know that he paints it as it actually exists and not as the idealist thinks it ought to be. General Harries did not want the fact to be overlooked that there is more serious work ahead of the association than it has had to confront at any time in the past. Its officials have met the demands placed upon them when acute situations have developed in other years and these precedents will be followed in the future. It has been characteristic of the American Electric Railway Association that men of large interest and responsibilities, like General Harries, have given their time freely to its needs and so the industry has continued to benefit from their experience year after year. New difficulties arise but the guiding minds under whose care the association has prospered and been of service to its membership do not lessen their interest in its cause. By his words General Harries will inspire the friends of the association to greater efforts in its behalf.

Train Operation on Interurbans and on City Systems

Decidedly different degrees of optimism in regard to the advantages of train operation will be evident to those who read carefully the two committee reports on that subject which were presented yesterday. This is the perfectly logical outcome of the consideration of the same problem applied to two totally different sets of conditions, and the results in both cases, as might be expected, are also totally different, even though the matter is taken up under a common title.

In interurban service the stopping points are to a very great extent rigidly established, and the intermediate or cross-road traffic is a very small proportion of that which is carried between the small towns or hamlets along the line. Essentially the number of stops per mile is almost negligible. The number of interurban roads which average in cross-country runs more than one stop per mile is small compared to those which make less than one; hence passenger loading time and acceleration after stops are subordinate factors.

With the surface cars of the ordinary city system, however, these subordinate factors acquire a really vital importance. Anything which increases the time of passenger interchange, or anything which increases the number of stops, exercises a baneful influence on schedule speed except under the most extraordinary circumstances. In turn, anything which decreases schedule speed adds to the number of cars on the street, increases platform expense, involves greater maintenance and overhead charges and, in fact, causes a decrease in practically nothing but receipts. Indeed, it is safe to say that there are plenty of city systems to-day for which a 10 per cent slower schedule would spell bankruptcy.

Here, then, are two applications of the single problem of train operation in which the minor considerations in one become in the other features of the greatest magnitude. On the interurban road, where the stops are to all intents located at fixed points, the desirability of adding one or two cars to the original single unit becomes largely a question of whether the extra seats can be kept filled over the whole route or whether a less frequent service will cause a serious loss in business. With the city system, however, the stops have to be made at the will of the passengers so that this factor becomes a function of the capacity of the car or train, and if it together with the direct time loss due to passenger interchange be increased by doubling the size of the unit, the possibly disastrous effect on the schedule outweighs every other consideration.

On the interurban road the features peculiar to all train operation, such as reduction in platform expense, the introduction of a new type of control, the necessity for switching in making up trains and the like, may logically be treated on their merits, but in city operation it is impossible to base final conclusions upon them when, as shown by the curves accompanying the committee's report, the use of two-car trains in Newark added over 20 per cent to the number of stops if each car carried its proper load of seventy passengers, and when in the same city the time of passenger interchange on the trains, due to the transmission of bell signals, unequal loading of cars or what not, was approximately twice as great as on the single car.

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The Value of Safety Committees

The report of G. Carson on the safety committee work of the Puget Sound Traction & Light Company is an authoritative and welcome addition to the data already existing in this field. It is well known that the advisability of forming safety committees has been looked at askance in certain circles and that some of the larger companies are closely watching the practical working out of the plan before they adopt it. The various advantages claimed for the safety committee system, the fostering of the spirit of co-operation between the company and the men, the inculcation of more humanitarian feelings toward the riding public on the part of the employees and other similar virtues, have often been discussed. But in the end the all-important question to the ultra-conservative companies has been: Will the installation of a safety committee system mean the actual reduction of broken limbs and bruised bodies?

Now there have come to our hands data on this very point that will be interesting to such companies. In 1911 there were 5305 accidents reported on the Puget Sound Traction & Light Company, but in 1912 only 4193, a decrease of 1112. The number of accidents per 100,000 miles in 1911 was 43.15, in 1912, 33.24; per 1,000,000 passengers in 1911, 70.18, in 1912, 55.07. These are decidedly encouraging figures for the first year's safety committee campaign. It cannot be said with certainty, of course, that this entire decrease was brought about by the work of the safety committee, but to a great extent it doubtless was. During the first year's trial 431 reports were turned in by the committee men and others, covering in the main defects in car operation, platforms and landings and also general car defects. As a result of these reports seventy-eight platforms and landings were made safe, twenty-nine changes in operation were adopted, seventy trainmen were warned about mistakes and 102 defective cars were repaired. It can be said with the utmost truth, we believe, that every single one of these defects remedied had within it the potentiality of an accident, and that if it had not been corrected when it was more than one accident might have resulted therefrom. A mathematical equation of defects remedied and accidents decreased may not be possible, but the effect of the former upon the latter seems to be unmistakable. This safety committee work is more than an attempt to apply a theory of industrial co-operation; it is an effective means of preserving and protecting human life and health, giving evidence of this fact through concrete, tangible results.

An interesting point that may be mentioned in connection with the work of the safety committee is the time of service thereon. Companies in the East and in the West have generally adopted a uniform organization of a central committee of superintendents and division committees headed by the station masters and otherwise composed of employees. It has been noted, however, that some companies advocate a service of three months on the committees, others six months. It is asserted in some cases that the employees believe membership on the safety committee to make possible an easy expression of opinion regarding fellow workmen and that the suggestions of committee men receive the preference. This is probably an evil existing more in imagination than in reality, but where such a condition is found the shorter membership period is without doubt the better. In general, however, six months' time is not too long for the men to become well acquainted with the detail work of the system and to have imprinted on their minds and manifested in their actions a greater respect for human life.

One objection seriously raised by some employees against committee work is that it requires the making of reports concerning fellow workmen, or, as it is sometimes sneeringly called, "spying" on them. Evidently some companies have coddled this feeling on the men's part, but we believe not only that the best ethical teachings permit the giving of such information but also that there would be a far healthier state of mind on the part of the employees toward public safety were such information offered. At the worst, the question is one of comparative values, and there can be no hesitancy in placing the welfare of the public above any fancied allegiance to the fellow workman. There are undoubtedly workmen who cannot make this ethical distinction, but this fact should not have recognition by the company's insisting that no reports concerning employees be filed. The subsequent action of the safety committee is a sufficient check on the justification of these reports. The success of the safety committee campaign depends to a large extent upon the placing of the public interest above all else, and in view of this all reports, whether in an employee's own department or not, whether about other employees or not, should be insisted on, and then the safety committee, in an orderly, systematic and efficient manner, will work them out for the benefit of all concerned.

Automatic Stops

The data submitted by the committee on block signals on the matter of automatic stops shows that a surprising amount of effort is being devoted by inventors to the subject and, at the same time, that the trend of ideas is not along any specific line. The list of devices presented in the report does not, of course, include all of the multitudinous schemes, mostly impracticable, which have been suggested or even patented, but in view of the acknowledged prominence of the members of the sub-committee handling this work it is safe to say that the list is thoroughly representative, so that the fact that no general type predominates is interesting.

An analysis shows that third-rail, contact-shoe systems with an external electric circuit have a slight advantage numerically, although they seem to be largely experimental in the present stages of development. Seven of these systems are listed against four of the mechanically operated track-trip type, the latter having the advantage of being used on two of the most prominent installations in the country, namely, the New York subway and the Hudson & Manhattan Railroad. This type of stop, it should be recalled, has also been installed on the inter-bridge loop of the Brooklyn Rapid Transit System. Its obvious field, therefore, appears to be on subways and other lines protected from external intereference, although the Hudson & Manhattan Railroad, as noted in the report, runs partly in the open country.

The mechanically operated trip which is mounted on the roof of the car appears on the list in three instances, and of these, two, the Washington Water Power Company and the San Francisco-Oakland Terminal system, are very prominent installations as regards both traffic and successful operation. This scheme appears to be well adapted to open-country operation, and the simplicity of its application gives it a distinct advantage in the question of cost. Like all of the foregoing types, however, it is inherently dependent upon the existence of a complete signal system. Here is, of course, the ground upon which so many signal engineers stand in condemning the automatic stop, the position being that until the approved forms of automatic block signaling have reached sufficiently general use to limit accidents due to poor judgment as well as carelessness any agitation in favor of automatic stops is, to paraphrase a revered ex-president, a "red herring drawn across the trail." Needless to say, we do not agree with this argument.

Of the inductive or Hertzian wave systems, three are mentioned, and all of them are in an experimental state. All appear to possess possibilities, but the handicap of complication in comparison with the mechanical trip, either on the ground or overhead, seems at present to be very heavy, although it is quite within their inherent capabilities to be operated without the necessity for the installation of a system of automatic block signals or the equivalent. In conclusion, it is well to mention, without comment, that the only commercial installations of automatic stops have been made by electric railways.

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Conventionalities

Ich gebibbil!

Attention, Cornellians! Look at page 755.

Badges 5356 and 5922 are lost. Finder please report at registration booth.

W. R. W. Griffin and his velour are with us to give the keynote to the style of convention week.

Some day someone will call Charlie Ellicott's bluff and there'll be a golf game before breakfast.

Did you fall for that "official A. E. R. A. dancing instructor's" sign before Pearce gave it the "bum's rush"?

Did you see "Association" Stocks ladied over the Boardwalk on Sunday by two peaches? O happy sandwich!

After looking at the blank left-hand pages on the new programs for the first time H. H. Adams wanted to know to whom the notes were to be sent.

Nick Le Grand is sore because we used a "D" in yesterday's comment about him. It was, of course, rather a strong expression, but he deserved it.

Two of the three busy "B's" of the Public Service Railway, Newark, N. J., Benedict and Bolen, were seen hitting the planks on Sunday, but Boylan arrived later.

The Buda "Marvel," otherwise known as Sembrich-Caruso, lost his voice between Chicago and the Convention Pier. Finder please return to the desk clerk at the Dennis, and no questions asked.

Did you see "Billy" Dee get into the more or less oval spotlight on Monday night when he got the impression that he was to take the place of the professional tangoist? Oh, Bill, this would never do for Bridgeport ears!

We're used to working under difficulties, but we looked forward with pleasure yesterday to the promised relief from the efforts of Fenrich's drummer and cornetist owing to the fact that the afternoon would be devoted to the ladies' card parties. Now we want Fenrich back.

The World's Series is over. A common, ordinary week is much too small for two such gigantic events as the interleague scrapfest and our own convention. Let us be thankful, therefore, that these doings were not in synchronism this year as they were in the Year of the Stockyards.

E. F. Wickwire, of the Ohio Brass Company, one of the two survivors of the automobile accident at Detroit last August, in which Louis Beilstein and J. P. Ross were killed and J. C. Collins was seriously injured, had the pluck to get up from a sick-bed Sunday to come to the convention.

J. A. Hanna, of the Niles Car & Manufacturing Company, is attending the convention this year with his wife and daughter. This is the twenty-sixth consecutive annual convention attended by Mr. Hanna. The first convention which he attended was held at the old Willard Hall in Washington in 1888.

Several members of the Ontario Railway and Municipal Board, Messrs. D. M. McIntyre, K. C., chairman; A. B. Ingram, vice-chairman, and H. N. Kitson, together with H. C. Small, secertary, arrived from Toronto on Tuesday, as also did Acton Burrows, secretary-treasurer Canadian Electric Railway Association.

Joseph Crawford, street railway inspector of Newark, N. J., who is vacationing here after a hard spell of work on the re-routing and terminal plans of the Public Service Railway, paid us an exceptionally pleasant visit yesterday. He also paid us his next year's subscription. Certainly! We intend this as a hint.

It was not Baker's mighty bat that caused the disturbance in the buffet car of the Chicago special as it approached Philadelphia Sunday night; it was caused by a side-swipe from a protruding door on a passing freight car. With the exception of the bad fright given some "night-owls" the only damage resulting was simply the caving in of the rear vestibule.

John E. Duffy, of Syracuse, came in on Saturday and realizes now what a lonesome place Atlantic City can be on an October morn. John is solicitous to have his first name spelled out in full to avoid confusion with James E. Duffy, the Socialist terror of Syracuse; neither does he wish to be confounded with the owner of the celebrated "Duffy—that's all."

Midgley has been decorated with the badge of the Royal Order of the Safety Pin, according to District Passenger Agent Bixby of the Pennsylvania Railroad at Chicago. He is the second Chicagoan to receive this honor, which is conferred only upon those who find it easier to misplace than to preserve their Pullman tickets. Frank Johnson also is said to be a member in good standing.

The Canadian Electric Railway Association is officially represented at this convention for the first time, the secretary-treasurer, Acton Burrows, having a desk in the A. E. R. A. booth at the entrance to the pier. The president, Patrick Dubee, secretary-treasurer Montreal Tramways Company, and the vice-president, C. B. King, manager of the London (Ont.) Street Railway, were reported to have arrived in the city yesterday.

James Dalrymple, manager of the Glasgow (Scotland) Corporation Tramways, who has been touring the United States and Canada studying electric railway practice, is a visitor at the convention. In reply to the questions of one of our unofficial interviewers he said that our famous Atlantic City ocean was fully equal, so far as its spectacular features were concerned, to that which bathed the shores of Great Britain.

Have you seen her? Chic, charming chauffeuse-chaperon! We never heard of one before, but imagine it's a new brand of peach. She's operating a private electric brougham service especially for the convenience of members and guests, and she says in the entertainment program that ladies will find her luxurious machine particularly desirable for shopping, sight-seeing or visiting. We believe it. But why discriminate against the masculine shoppers?

The broad and smiling face of our good French-Canadian friend Gaboury, general superintendent of the Montreal Tramways, is again with us to radiate good cheer on every part of pier and Boardwalk. This year he is accompanied by Mrs. Gaboury. Gabby's rotundity is ample evidence of the good care that the company is taking of its superintendent. The strain of escorting Gaboury to Atlantic City was undertaken by Messrs. Blair, Byrd and Shaw, of the same company. Messrs. Dubee and Smith arrived on Tuesday and General Manager Hutcheson will be on hand either to-day or Thursday.

On Monday night due recognition was given to the fact that it was the thirteenth of the month by forcing a dinner on Dana Stevens, vice-president of the Cincinnati Traction Company, at the Hotel Chalfonte. The non-superstitious thirteen at the table were Holmes and Pape of the Galena-Signal Oil Company, Stevens, Sundmaker, Benham and Healy of the Ohio Electric Railway, "Tom" Elliott, Berry and Slingluff of the Cincinnati Traction Company, Gaylord Thompson of the Bucks County Interurban Railway, B. J. Jones, formerly general superintendent of the Ohio Electric Railway, Brother Kasemeier of the Cincinnati Car Company, and W. E. Moore, West Penn Railways.

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ALWAYS IN GOOD HUMOR

A PROFUSION OF PERSPICACITY PRESENTED BY OUR POPULAR PRECENTOR AND PILLAR OF PROPRIETY

A poor little girl, who came to Atlantic City and the seashore for the first time, was asked what she thought of the ocean. "Gee!" she said, "it's the only thing I ever sea that there was enough of."

Visitors are advised that the seals may be homesick, but they are not seasick, regardless of the sounds from the tank.

"Cally," said the teacher. "how do you spell rat?" "R-A-T, rat." "Then how do you spell mouse?" "Jes the same only with a little smaller letters."

The hyphen in Marlborough-Blenheim recalls the lady who told her friend that Mrs. Bromley-Smith spelled her name with a syphon. Said the friend—a Congressman's wife: "She does, I know. I've seen it on her visiting cards."

"Colonel," said a man this morning, "I've got one of those 'never-agains.' You've had experience; does it pay?" I replied: "The man who wrote 'David Harum' was my personal friend and said to me the last time we met: 'My boy, as I recall the past, I seem very much more to regret the things I haven't done than the things I have done.'"

A man was visiting an insane asylum and, surprised at the flight of time as his eye caught the clock dial, he turned to a mild lunatic beside him on the corridor and said: "My friend, is that clock right?" "Right?" says Loony, "You d—n fool, if it was right, it wouldn't be here."

Speaking of lunatics—a man saw through the open fence of an asylum an inmate wheeling a wheelbarrow upside down and shouted: "Say, old man, turn that wheelbarrow other side up!" Scornfully came the reply: "I did that yesterday and they put bricks in it."

Mayor Ev—s dropped into the barber's chair in the Marlborough-Blenheim exclaiming "I want a hair cut". "No," said the barber, "you don't want a hair cut; you want a shine."

J. H. Stedman.

YESTERDAY'S CARD PARTIES

The first and second rounds of the auction bridge tournament were held yesterday afternoon in the Persian Garden, Convention Pier. These resulted in the selection of the following sixteen ladies to play at four tables for to-day's final round.

At table No. 1 will be Mrs. M. E. Latey, Mrs. G. L. Esterbrook, Mrs. William Heulings and Mrs. Newbury.

At table No. 2 will be Mrs. C. F. Crane, Mrs. L. M. Gallaher, Mrs. B. E. Bramble and Mrs. Warren L. Boyer.

At table No. 3 will be Mrs. F. C. Deming, Mrs. L. W. Shugg, Mrs. W. F. Ham and Mrs. R. B. Stearns.

At table No. 4 will be Mrs. F. D. Lyman, Mrs. C. S. Cook, Mrs. William Wampler and the winner of the play-off for sixteenth place. The tie for this place was between Mrs. N. M. Garland and Mrs. H. C. Evans, and they will play it off at 2 o'clock this afternoon, one rubber to settle the match. Partners for this rubber will be provided by the committee.

During the afternoon of play Mrs. Bramble had the highest score, 1736 points, and Mrs. Ham had the next place with 1211, Mrs. Evans and Mrs. Garland tying for sixteenth place with scores of 542 points each. While the play for the prizes this afternoon will be limited to the four tables listed above the entertainment committee has arranged for tables for any ladies who desire to play between themselves during the afternoon.

The euchre contest, which was completed yesterday afternoon, was won by Mrs. J. D. Augustus with a total score of 33 points, the first prize being a silver vanity box. The closeness of the contest will be indicated by the fact that the runners-up, Mrs. R. E. McDougall and Mrs. A. B. Metcalfe, both had total scores of 32 points.

The "500" contest, which was also completed yesterday afternoon, developed a great deal of enthusiasm. The first prize, a silver handcase, was won by Mrs. Henry George Salsbury, of Toronto, Canada, who had a final score of 1570 points. The second prize, a silver coin case, was won by Mrs. E. F. Gould, of Wheaton, Ill., with a total score of 1470 points, Mrs. A. Y. Evins having the next highest score with a total of 1270 points.

THE NEW GARDEN PIER

If the American Electric Railway Association holds next year's convention at Atlantic City, a new amusement feature for visitors will be afforded by the completion at that time of the immense Garden Pier, situated a mile north of the Million Dollar Pier. The length of the pier when completed, 3200 ft., can be more readily appreciated by the fact that it is over 1200 ft. longer than the Convention Pier. In order to allow quick and convenient access to the outer end, an automobile drive, 35 ft. wide, surmounted by a concrete trestle bearing a trolley line, will extend the distance of over a mile around the edge of the pier.

At present only 1000 ft. of length has been built. The entrance is a spacious plaza with flower beds in the centre, flanked on each side by a long low structure of ornamented Italian style for housing retail stores. At the end of the plaza stands a large amusement palace, consisting of a fireproof concrete theater and a large amusement hall, which will rival Coney Island in containing "stunts" of the eyeglass-breaking and hat-losing variety.

Beyond the amusement palace the visitor's imagination will be recalled to Venetian shores by the presence of a fresh-water lake, 2000 ft. long and 75 ft. wide, lined with flower beds and gracefully bridged over at intervals of 300 ft. On the surface of the lake the overworked convention man may enjoy the languid pleasure of a gondola trip. At the end of the pier will be erected a cafe building. The construction of the pier is in the hands of the Pier Realty & Holdings Company, Atlantic City, and Alfred E. Burke, of Philadelphia, is the owner.

ANNUAL CONVENTION OF THE RAILWAY SIGNAL ASSOCIATION

While the annual convention of the American Electric Railway Association is in progress at Atlantic City the convention of the Railway Signal Association is being held in Nashville, Tenn. A dispatch from the representative of the Electric Railway Journal who is at the Nashville convention states that the convention opened there yesterday morning with about 350 persons in attendance. No exhibits are being made at Nashville, but a large number of supply men are present.

The convention was opened with an address by Rev. Dr. James Ivance, who extended a welcome from the Industrial Bureau of Nashville.

President B. H. Mann, of St. Louis, in his opening address, pointed out that many railroads have not adopted the association's standards and specifications. He urged that less time be devoted to arguing relative importance of this or that committee and more to individual effort to induce all railroads to adopt the recommended methods of the association.

The report of the committee on signaling practice was then presented, the discussion centering upon the effect of treated ties on track circuits. The general opinion of those taking part was that the addition of creosote did not decrease the

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insulation resistance of the tie. Some doubt was, however, expressed whether the zinc chloride treatment of ties increased danger of excessive track circuit leakage. It was stated that sometimes bonding or inherent defects in the circuit itself caused trouble which was ascribed wrongly to the treatment of the tie before it was used. After a general discussion the committee's report was received as information pending further investigation.

STEEPLECHASE PIER TO-NIGHT

Have you ever been at the Steeplechase Pier at Coney Island? Well, we're glad you have, because that will give you a basis for a conception of the Steeplechase Pier in Atlantic City. This doesn't mean that the two piers are alike, however. Far from it! The Coney Island plant bears about the same relation as a fun-maker to the outfit on our own Boardwalk as an evening at Maxim's with your mother-in-law bears to one of McConnaughy's quiet little parties. Do you doubt this? All right, you'll find out to-night that it's true because the ever-active entertainment committee has invited us all to go there and spill ourselves over the bumps.

As the whole Steeplechase Pier and its attractions have been engaged for this evening and placed at the disposal of the delegates and guests we sauntered down there yesterday to give it the "once-over" in advance. At the door we were met by the suave and polished superintendent, who escorted us through the mammoth building, one of the largest structures in Atlantic City. It seems that there are the well-known "human-roulette wheel" and "barrel of fun" near the entrance. These are, in fact, located so that everyone except members of the bum-sports club will naturally have to pass through them, and after looking over the situation we made a mental note to "can" our glad rags and top hat for Wednesday evening. This, by the way, would be a good bet all around, because, although the management furnishes bloomer overalls for some of the stunts, it is safe to say that the more venturesome among the visitors won't be able to resist the temptation of trying their luck and skill at getting into and out of difficult situations as soon as they arrive.

The "soup-bowl slide" is a considerable event. It is reported to be the highest and safest slide in existence. The trip from the top to the bottom is made at a mean speed of 93 m.p.h. by the average man and 71 m.p.h. by the average lady. The record number of revolutions made about the "soup-bowl" at the foot of the slide was established at twenty-one turns last August by a man named Smith. The superintendent says that he went around so fast that he appeared to be accompanied by the whole Smith family.

The "razzle-dazzle," "hink-a-link," "disperparberation" and "umpa" are also in evidence but the "human pool-table" is, unfortunately, out of order owing to a slight settlement of its foundations, Cyrus Ching, of the Boston Elevated, having walked over it on Monday afternoon.

There is a ballroom at the end of the pier and Fenrich will be there to-night with his orchestra, but for those who do not care about the new dances there has been provided a mechanical turkey-trotter which makes one go through the motions of that last year's step. This device should prove of educational value. For those interested it may be said that it is located near the "two-faced slide," which starts on the roof and ends in the cellar and which is across the hall from the "baby slide" for big babies who are afraid to hit the high spots. Incidentally the "Mississippi ball game" will provide an opportunity for any dancers to exercise their arms also.

The exhibitions and exposés will by no means be made before the vulgar gaze as no paid admissions will be accepted at the pier to-night. Only those may enter who wear the badge. Better run over after dinner, for you can take it from us that it's going to be some party!

GET TOGETHER LUNCHEON FOR CORNELL

All Cornell men connected with A. E. R. A. interests in any way are requested to be at the Shelburne Hotel on Thursday at 12:30 p.m. to attend an informal Cornell lunch. It is hoped to make this an annual affair at future A. E. R. A. conventions. Those expecting to be present will kindly leave there names with H. C. Holloway, in care of the Rail Joint Company, space No. 350-355 on the Convention Pier.

THE MAN IN THE CASE

In an article which he contributed recently to the *Interborough Bulletin*, published in the interest of the employees of the Interborough Rapid Transit Company, of New York, S. D. Smith, superintendent of the elevated lines, reviewed at length the steps taken by the company to safeguard its patrons. How the efforts of the company miscarried in one instance Mr. Smith tells as follows:

"We do everything to warn the public against the dangers in traveling. We have safety warnings on all the platforms in the most prominent places, and yet they are violated every day and many times a day. I have been informed that a device was installed under the edge of a station platform in the subway to call out 'Watch your step!' as persons were about to enter the cars. For some hours this was very effective, but in one evil afternoon, at the beginning of the rush, three women in the crowd about to enter the cars heard the warning wafted up from below. They suddenly backed up against the crowd and actually retarded the train movement on that track for some time, while they vehemently announced that they would never, never, step into the car until that man came up from under the platform."

GET TOGETHER LUNCHEON OF THE ACCOUNTANTS' ASSOCIATION

The annual "get-together" luncheon of the Accountants' Association was held on Tuesday at the Marlborough-Blenheim Hotel. Following their usual plan the accountants went directly from the meeting to the lunch, which was successful in giving the opportunity that has been found desirable to enable the delegates to become better acquainted. An innovation was introduced in the luncheon this year. The presidents of the American and the affiliated associations were invited to be present. First Vice-president M. W. Glover of the Accountants' Association acted as toastmaster in introducing a few of the guests present. Those who responded were President Harries of the American Association, President Dana Stevens of the Transportation & Traffic Association, President Schreiber of the Engineering Association and President Heulings of the Manufacturers' Association. Mr. Glover also introduced as a "distinguished guest" James Dalrymple, manager of the Glasgow Corporation Tramways. F. W. Sweney, chief examiner of accounts, Interstate Commerce Commission, also responded to the remarks of the chairman.

With the resumption of work this fall by the Booster Club of New Albany, Ind., composed of employees of the Louisville & Northern Railway & Lighting Company, the Louisville & Southern Indiana Traction Company and other public service companies with offices in New Albany, H. H. Buckman, master mechanic of the railway companies, will continue a series of illustrated lectures on the design of electric cars and the methods of wiring. The talks are intended to acquaint the trainmen with the mechanical details of their cars, so that in case of emergency repairs becoming necessary they will be able to handle the situation. The talks have dealt with the mode of wiring, the operation of two-motor and four-motor cars and also with the design and operation of the air brakes.

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ADDRESS OF PRESIDENT HARRIES TO THE AMERICAN ASSOCIATION*

With hopes as high as they may rationally be elevated and with undiminished purpose to achieve, we have once more assembled in annual convention. Here we cement old friendships and make new ones. Here we discuss the ills we have and speculate, without gloom, as to the forms in which the adverse may sooner or later beset us. Here we plan for the constant betterment of every man and every device necessary to the liquidation of our great obligations to those whom we directly represent and to those who, not being of us and for us, take thoughtless pride in being against us. Here, without seeking, we find that comradeship which strengthens our faith, adds to our information, smooths our way and starts us homeward with determination renewed and the power to accomplish under difficulties wonderfully enhanced.

We have brought with us the spirit of mutual helpfulness and activity and are, without doubt, thankful that the period of what may be conservatively termed "financial depression" has not wrought us more of injury. In common with all who have large responsibility in this land of ours, we have been beset by grave uncertainty for several months past and still find ourselves in such an inconstant magnetic field that the needle touches true north only at rare intervals. Yet the philosophy which our business hourly cultivates and the confidence we have in our "dead reckoning" make for that courageous optimism without which success may not be achieved. Some of us have borne the added burden of labor troubles and are still distressed thereby, but of that there is no visible sign; all seem to be cheerful of countenance and strong of heart. It is a great gathering bent upon doing great things, yet mindful of the fact that nothing is so small as to be really unimportant—and therein lies the title to greatness.

Unless there be well-nigh miraculous intervention—and miracles which we would deem desirable seem to have no affinity whatsoever with the electric railway business—there is promise that to many companies will speedily come the time when the financially "irresistible" will collide with the popularly "immovable." It will not be a synchronized general catastrophe, but a succession of more or less destructive experiences; now here, now there; resulting, on one hand, from the broadening of city borders and the consequent extension of lines, forcible multiplication of transfer points, compulsory wage increases, conscienceless taxation, arbitrary and unreasonable service requirements and growing cost of construction and maintenance, and, on the other hand, from the fixed, or rather the diminishing, fare.

Never was public transportation so cheap or of such excellence as it now is. Never has desire to render the maximum of service for the minimum of cost been more sincere or effective. Never has there been so much of expensive comfort for the patron or so much of costly discomfort for the companies.

With respect to the frictional elements of present conditions, there need be no uncommon concern, for they will always exist until the coming of that never-ending day when individual aerial transportation will prevail. The grouchy and garrulous few who assume to speak for the silent and satisfied many will always be in evidence. But it behooves us immediately to look the financial situation squarely in the face. The merchant who continually sells his goods below cost cannot continue in business very long and must lose reputation as well as money. How many of us have any right to criticise that form of commercial folly? What are we doing? Of course, we have no such standing in the public marketplace as has the merchant—we operate under franchises by which we are bridled, bitted and saddled and sometimes hobbled—but while we have no present power to demand at least living wages in return for our investment and labor, there is nothing to prevent our talking "right out in meeting" of the increased rate of fare which must surely come to many company treasuries if anything like justice is to prevail and we are to survive. Every element of cost has advanced by leaps and bounds while the fare has steadily decreased. The public cannot—unless it will remit taxes—do anything to reduce costs, but it can and should and ultimately must pay a reasonable price for its consumption of our product.

How to deal effectively with this evil of an unyielding fare is really our supreme question, the answer to which we shall be compelled to seek diligently. The methods of this time and this country are practically impossible, and anything like a general changing over to European practice is beyond hope.

SUGGESTION OF MR. MORTIMER

An interesting compromise proposition comes from the ever-practical James D. Mortimer, president of The Milwaukee Electric Railway & Light Company, who, responding to my request, has furnished me the following:

"The rapid and continuous increase in operating expenses confronts the industries with new problems. The conflict of a fixed rate of fare and the increase in cost of providing service was never fiercer than it is to-day. With the limitations imposed by franchise obligations, the best we can hope to do is to stay the extension of the distance to which passengers shall be hauled for a single fare. To contract or draw in single-fare limits presents many difficulties which may be regarded as insuperable for the present at least. The next best approximation seems to lie in the fixing of single-fare limits at their present limits and arranging some system of fares outside this area that will permit the collection of additional fares proportioned to the distance traveled in the outer zones.

"The nickel zone system is to-day generally prevalent, but gives rise to serious and frequent complaints. The nickel appears to be too large a sum to charge for the short distance outside the inner zone that many passengers ride. With existing steam and interurban railroad fares of 2 cents per passenger mile there is little complaint. The smallest practicable zone, and the one that seems best generally suited to the conditions as they exist to-day, is one mile. The charge for a ride across such one-mile outer zone, if placed at 2 cents, would not be unreasonably high; in fact, it seems probable that in most suburban extensions the cost would justify a higher charge. Expediency, however, justifies a charge not in excess of 2 cents for a ride across such zone.

"Such a scheme would result in a central or city zone, surrounded by mile zones, the charge for a ride across each of which would be 2 cents when added to the city fare. Such a plan has heretofore been discussed before this association, but never, so far as I am informed, actually tried.

"The areas that are to-day included within single-fare limits are of sufficient magnitude to prevent any undue congestion of population such as has been attributed to the European zone system of car fares. While it is true that the zone system is generally applied in the European tramway system and that there is congestion of population in larger cities, it is also true that much of this congestion existed before the tramways were constructed."

The work of the committee on cost of passenger transportation service will be greatly aided by prompt and freely tendered suggestions such as this.

In searching for the remedy which must develop, we have taken a long stride toward hoped-for salvation by the organization (within the association offices) of a Bureau of Fare Research, soon to be of great importance. The plan is to place at the head of the bureau—whose work will be

*Abstract of an address delivered before the American Electric Railway Association, at Atlantic City, N. J., Oct. 13-17, 1913.

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generally directed by our secretary—a man who is thoroughly versed in every phase of the rate question, whose experience whose services will be at the disposal of member companies engaged either in rate study or rate controversy. It would be impossible to compute the value of data thus acquired or to appreciate now the powerful influences it will set in motion and move in the right direction; but it may safely be alleged that nothing planned by this association ever gave promise of more beneficial or enduring results. The financing of the bureau—in which undertaking the association participates to the extent of $2500 annually for at least three years—has practically been completed under authority granted by your executive committee and approved by the midyear meeting of January last.

More of details as to this will be found in the complete report of the committee on cost of passenger transportation service, which is successor to the old committee for determining the proper basis of rates and fares.

That trite but undeniable truth, "In union there is strength," has an added meaning so far as we are concerned. The public policy committee of the National Electric Light Association invited our committee on public relations to a dinner in New York on Feb. 19. Frank interchange of opinions combined with harmony of desire, so that the outcome was an agreement to co-operate in the good work of public education. Pending the consideration of certain essential details, the joint committee has not until now been appointed, but the organization will at once be completed and, there is every reason to believe, be highly efficient.

PUBLICITY A POTENT FACTOR

A potent factor in the broad field of public policy is publicity. As to this there has been and still exists an idea that national publicity is fundamental and that a campaign dealing with basic principles is the primary necessity. I deem that idea to be erroneous. Education of the mass, as a mass, is impracticable. We must work with the smaller units, the individuals and the communities. Country-wide argument in behalf of a doctrine in which there are as many variants as there are local situations could not, in a century, strike home at will "the word fitly spoken" in the many neighborhood controversies which are constantly being waged. No central committee, even with the best of logical literary talent at its disposal, could hope to do more than assist those who are responsible for the administration of companies that, for the time, are not on good terms with the people whom they seek to serve. Publicity is in its beginning, therefore, a local matter.

Each one of us, as necessity calls, must be an apostle. The Great Teacher once said: "Go ye into all the world and preach the gospel to every creature, beginning at Jerusalem." If the home conditions are not as they should be, it will profit the industry but little to know that there is in operation a publishing organization which, at best, cannot do more than superficially spread throughout the length and breadth of the land the outlines of principles which, to amount to anything, would first have to be applied to one or more purely local situations. It is, therefore, clear to me that we must be nearing the point where we shall agree that if effective publicity is to be achieved it will be through the executives of our member companies taking personally an active interest in the education of civic bodies, chambers of commerce, regulating commissions and the public generally, presenting the facts with respect to their own properties to those who have it in their power to right whatever wrong may have been done or might be in contemplation.

In such undertakings the association can render real assistance. The information bureau at headquarters has data files which contain a wealth of applicable facts, and where special details are needed they can be secured and furnished speedily. The machine is yours. Use it. Many a fight has been lost because the ammunition supply was insufficient for a prolonged engagement. Some of your own fights that went wrong might have terminated more to your liking had you known just what some other company did when its safety and comfort were imperiled. When in pursuit of corporate health and happiness, call for the data files and use *Aera!*

If members of the association ever had any doubt as to the necessity for *Aera*, that cloud must have long since disappeared. Each month makes more conclusive than ever before the success and value of that publication. This year it ceased to be an exceedingly heavy burden to the association's secretary; it achieved the dignity of an editor, who has proved himself to be a good editor and whose plans will add to the worth of the journal and enhance the editorial reputation—all under the wide-awake guidance and loyal care of the advisory committee, to whose members congratulations and gratitude are heartily extended. Gratitude, however, which takes material form and appears as contributions to the columns of *Aera* will probably be even more highly appreciated by the committee than mere verbal or written thanks.

And while in an atmosphere of thanksgiving, especial mention is made of the solid support given to *Aera* by the Manufacturers' Association. It would be difficult to overvalue the warm and keenly appreciated co-operative spirit and helpful deeds of our manufacturing brethren.

Incident to the creation and growth of association activities is the determination to make monthly publication of electric railway statistics, following generally the lines of statement found most useful by the Bureau of Railway Economics for the steam roads. This work cannot possibly be otherwise than of great value to our industry, for its showing of continuous growth must appreciably influence the market for our securities. The magnitude of the aggregated business is bound to be attractive to the investor who until now has looked far from home for his opportunities.

Our members will understand, of course, that the information which they furnish will be held confidential. Carefully tabulated statements will deal with totals and with the many unidentified properties represented in each computation. Willing and prompt co-operation, the best interests of our business being the only object, should therefore be a pleasant duty.

WORK AT THE CAPITAL

Of continuing importance is official representation at the national capital, an agency through which the association can keep in touch with the many legislative, executive and judicial projects and acts that concern common carriers. During the year this highly essential adjunct to the committee on federal relations has been usefully active and has done well all things that could reasonably be required. The necessity for such representation is now recognized by all organizations such as ours and by every one of the standard roads and big steamship lines. We know that the work will be heavy during the coming year and through at least half a dozen of the years immediately succeeding, for the Interstate Commerce Commission is engaged in the preliminary planning of federal valuation of interstate properties. Methods adopted by the commission will be of as much importance to intrastate companies as to those whose operation crosses state boundaries, for the final rulings of the national commission will ultimately govern the practice of all state regulatory bodies. This and other closely affiliated matters will be dealt with in the excellent report of the committee on federal relations.

And there is much to be done, and will be, toward the enlightenment of those whom we (and in this case "we" means "the public") customarily mention as our representatives in Congress or in state legislatures. Some of us remember that when the Interstate Commerce Commission was created (and later, when its powers were greatly increased) we were frequently informed that there would be

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no more of Congressional activity with respect to anything with which the commission was authorized to deal. Many more of us heard similar assurances as state commissions came into existence. It seemed as though we were nearing the place where the materially political would be compelled to give way to organizations of the expert, or reasonably expert, who, while ruling over us, would at the same time give to us our proper amount of protection. That hope is in process of realization—in spots—and its fruitage would be much more nearly universal were it not for the fact that the federal and many state legislatures are as disturbingly active as they were in the days when they supposedly deputized commissioners to relieve them of public utility matters. Has Congress accepted its own statutes? Is there any apparent willingness on the part of that body to let its chosen instruments do the work for which they were so solemnly ordained? Read the hundreds of directing and interfering bills introduced each session and note that when the Interstate Commerce Commission does not keep within the boundaries politically prescribed (or desired by individual members or groups) there is more and more of legislative pressure. And if we seek recent, definite and reliable information as to how Congress regards its instrumentalities when they proceed in accordance with law and equity, study, as part of a course in cause and effect, the birth, the brief existence and the approaching demise of the Commerce Court.

One of the minor matters of to-day may be of much importance to-morrow. In some cities the public motor bus already presents a serious proposition which if not considered promptly may develop into a problem the country over. The unfairness of competition between the cheaply licensed and mobile vehicle and the expensively franchised and restricted railway has awakened comment. Remedial measures should be framed by an association committee.

Of the midyear meeting in January it may truthfully be said that it was a marked success in every respect. It was a businesslike gathering of men who were intent on business, and the results of that assembly more than justified the time, money and energy expended upon it. As usual, there was that great event, the banquet given by the Manufacturers' Association, brilliant, of great value to the industry, satisfying.

PROGRAM OF THE CONVENTION

The program to be presented for your consideration and participation is of undoubted excellence, fully equal to any we have known. For its planning much credit is due the indefatigable committee on subjects. The topics are of to-day and to-morrow, teem with life and invite, almost compel, general debate. And this suggests the desirability of our studying the papers (so far as may be practicable) in advance of their official appearance. The second thought frequently affords better permanent foundation than the first impulsive utterance.

An acceptable yet debatable contribution to convention literature is the report of the committee on joint use of poles. The conclusions reached, whatever criticism they may evoke, are not one-sided; they are the result of conferences with representatives of other, and for the most part allied, interests. Specifications and contract forms have been standardized, so that there is promise of peace in a matter which has generated a vast quantity of strife between brethren. The adoption by state commissions of this report or some other, in a broad sense, similar report, should it please you, would completely solve a vexatious problem. The practical application of such a report as this will, moreover, take us far beyond all technical considerations. Every city in the country is interested in any proposition which will diminish the number of poles that are now as forests on some of the main arteries of city travel. Everywhere there is a marked tendency toward the beautifying of our more important centers of population, and in that desirable work this report will do yeoman service.

Working steadily toward a complete understanding and ultimate team work, the committee on relations with other electric railway associations will, through its chairman, give us its views as to what should be done at this stage of the negotiations. This report conveys to us the outcome of discussions with the parties at interest and is deserving of our careful consideration.

Organization activities by some of us on the Pacific Coast must not go unmentioned. In an effort to bring about the closest possible kinship between the Pacific Coast association and this body, we accepted hearty invitation to official conference in the matter. Definite conclusion as to the affiliation method to be followed has yet to be determined.

We must endeavor to give ample time to the report of the committee on welfare of employees, an uncommonly interesting, liberal and important document, not to be read and disposed of in a few minutes. Some of the recommendations contained therein call for deliberation. Action upon the suggestions made will definitely commit this body to policies that have for their ultimate the solution of one of the greatest of human problems.

The committee on compensation for carrying United States mail has contributed very largely to our continued, but as yet unsuccessful effort to make the federal government pay a fair price for services rendered. The chairman's energy, up to the time when he resigned his chairmanship, was noteworthy. The association is indebted to him for his activity and for much useful data now on file

Once more we are indebted to the committee on taxation matters for an illuminating treatise upon conditions which in so many places are grossly unfair. The association's indebtedness to this committee increases constantly.

In accordance with accepted practice, the committee on education has this year done much of its work in conjunction with similar committees of the Engineering and Accountants' Associations—co-operative effort that promises increased general efficiency.

The committee on insurance moves steadily along, demonstrating its value and making converts to its well-known methods. Its story is always worthy the consideration of a thoughtful audience.

We are still lagging behind with respect to company sections. Those sub-organizations have wonderful capacity for doing good, and it is surprising that there has not been more of sympathetic response to the faithful labors of the committee which is charged with the company section propaganda. Wherever such sections have been established the demonstrations made even lukewarm folks wonder why there wasn't a company section in every city in the land. Some of our member companies are missing a good thing.

OTHER ASSOCIATION MATTERS

That baleful by-product, electrolysis, is receiving, thanks in the first instance to this association, the ameliorating attention it deserves. Following the lead of our special committee on that subject, however, came proffers of co-operation, and soon there will be opinions formulated by a joint committee in which are represented, among many technical and commercial organizations, the American Institute of Electrical Engineers, the National Electric Light Association, the American Telephone & Telegraph Company, this association and our Engineering Association. As to what has been done our committee will report briefly. Incidentally, the committee of our Engineering Association will present its very clear views in more of detail.

Useful to a large percentage of our membership will be the Engineering Manual, as yet not ready for distribution. The manual is a compilation of the standards and recommended practices of our Engineering Association—put in shape by the standards committee and our secretary. The publication is of such high character and wide range as to

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make it of great value. It is an uncommonly fine work and does credit to the association.

Time would fail me were I to attempt to tell of the accomplishment or planning of the Accountants' Association, the Engineering Association, the Transportation & Traffic Association and the Claims Association. Separately or jointly they have done their work in fine constructive spirit. Their programs are attractively sound and their discussions will give added impetus to the enthusiasm with which every true association member approaches his task. Those of you who have heretofore given only slight attention to the affiliated bodies should no longer deny yourselves the profitable pleasure of attending some of the sessions of all the associations.

Figures as to our membership, nursed by the capable committees on company and individual membership, will be presented in the secretary's report. Sufficient be it to say here that there is not a single city of any size in the country that is outside our fold, and that despite losses through consolidations we show an increase. There has also been substantial gain in individual memberships. Several European companies have expressed a desire to join us. The executive committee has initiated a movement, upon which you will pass this week, likely to encourage transatlantic and transpacific affiliation.

Because proper demands upon our organization have steadily increased there has been corresponding increase in our expenditures. I believe the money has been spent wisely, and as our bank balance appears to be as satisfactory as it was a year ago, we have no present cause to be disturbed about association finances; but it is in me to say that work of such magnitude as ours must annually make greater demands than can be met out of membership dues as now assessed. Those who represent our member companies should ask themselves whether the companies are contributing as much as they should for the constantly extending service. Such an organization as this ought to be possessed of ample means. It should be able to do for itself things (it should do them anyhow) that are being done for it through the benefactions of a small minority. It will do those things when, at a suitable time, the matter is placed squarely before it.

THE CHANGE IN SECRETARYSHIP

With the adjournment of this convention the association says farewell to Mr. Donecker as secretary. That he will undoubtedly serve the organization in other capacities may afford us future gratification, but just now we are intent upon regretting the loss we suffer. For more than six years he has given incontrovertible evidence of such alert efficiency, complete devotion and highly pleasing personality that the combination is cause for wonder. He brought to the often perplexing and always arduous duties of his most responsible office qualities which stamped him as the possessor of eminent fitness and which, developed by his successful labors, made our retention of him an impossibility. He takes with him the fully earned praise to which those of us who know him can give only insufficient expression and leaves us possessors of sunny memories of a capable friend who, diligent in his business, has been called to a field where personal efficiency will assure him ample reward.

Consequent upon the outgoing of Mr. Donecker is the secretarial incoming of Mr. Burritt, who has been our Washington representative. Years of intimate business relationship with Mr. Burritt have revealed him to me as a worthy successor. Possessed of characteristics which cannot fail to merit your approval and confidence, he fills to capacity the measure which we employ when we seek the true dimensions of the competent and the courteous. I commend Mr. Burritt to you and bespeak for him that helpfulness which you have in such large store and of which you make such open-handed use.

In order that there may be smooth transition in the secretary's office Mr. Donecker has consented to act as chairman of a new committee on ways and means and as such chairman will contribute liberally of his experience in those matters which might easily embarrass during the early days of a new secretarial administration. Mr. Donecker's action as to this is just what might always be expected of him.

My sincerest thanks, insufficient as they must be, are due and tendered to all my official associates, good men and true. Thanks, also, to the highly efficient force at headquarters.

For the honor bestowed upon me a year ago and for the many honors through the many years, for the confidence reposed, for hearty, unwavering support, for courtesy and consideration past telling, I give you my unbounded gratitude and the pledge of such service as I may hereafter render as one of the elder brethren.

ADDRESS OF PRESIDENT NEAL OF THE ACCOUNTANTS' ASSOCIATION*

In this, our seventeenth convention, as you will presently learn from the report of the committee on a standard classification of accounts, we have practically reached a goal for which we started at the very first convention held by this association. Ten long years of arduous, painstaking work was performed by our committee before government regulation became a pronounced policy and the Interstate Commerce Commission began its conference with us, and now after seven years of further effort a system of electric railway accounting has been devised which is not only a complete exposition of the fundamental principles involved but is also a well-indexed, thorough reference guide of minute details. (This will later be referred to members for criticism before being promulgated.)

More than ever before in the history of railroading is such a position in accounting as we have attained desirable. Increasing regulation, the demonstration of proper rates of fare and the settlement of labor problems necessarily bring accounts more into prominence and the benefits derived from comparisons are invaluable.

Then, again, there is another feature. In all modern, big business it is gradually becoming a maxim "that a business is no better than its accounting department." This is because large employers of labor cannot come into intimate contact with their employees nor with the details of the business but are obliged to form their opinions and base their operations upon statistical and financial statements. We accountants of to-day must, therefore, keep in close touch with the various departments so that the scheme of accounting without unnecessary duplication lends itself readily to studies of efficiency. We have gained much in this respect, I believe, by our joint meetings with the Engineers' and Transportation & Traffic Associations, and the joint committees have done valuable work. I hope there will continue to be close co-operation between us, and that cost and confusion will be thereby avoided.

So many in number are the working committees of our association and so important are their reports that adequate mention cannot be made of them all in these brief remarks, but I take this occasion to thank warmly each and every one for the hard and conscientious work which they have contributed. Their reward I know will be the feeling of satisfaction which results in having participated in the creation of what is not only a working tool of business but also in reality a code of justice beneficial to the public, our stockholders and our employees alike.

*Abstract of an address delivered before the American Electric Railway Accountants' Association, at Atlantic City, N. J., Oct. 13-17, 1913.

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YESTERDAY'S MEETING OF THE AMERICAN ASSOCIATION

The opening session of the American Electric Railway Association was held in the Greek Temple yesterday afternoon and was called to order at 2:30. The president read his annual address, which is published in abstract elsewhere in this issue. The secretary then presented the report of the executive committee.

REPORT OF EXECUTIVE COMMITTEE

The report of the executive committee consisted of minutes of the meetings of the committee during the early part of the year at which the work of the association for the year was decided upon and the various committees were appointed. The report also contains an abstract of the discussion on the location of the 1915 convention, when the executive committee voted that it would be desirable to hold the meeting at San Francisco in that year. The appropriations for the work of the different associations made at the beginning of the year were: Accountants' Association, $1,250; Engineering Association, $4,000; Claims Association, $1,250; Transportation & Traffic Association, $2,250.

The president then announced that he had received a telegram from Vice-president Beeler, who found it impossible to leave Denver because Mr. Evans had resigned as president of the company.

The secretary then presented the report of the secretary and treasurer. An abstract of this report appears below:

REPORT OF THE SECRETARY AND TREASURER OF THE AMERICAN ASSOCIATION

In the report which Mr. Donecker presented yesterday as secretary and treasurer of the American Electric Railway Association he stated that there are now 401 member companies and 2997 individual members and that 450 individuals engaged in committee work during the past year. He also alluded to a new method for binding and distributing the Proceedings. This year the Proceedings will consist of six volumes, one for each of the associations and one a year book with membership lists, constitution, by-laws, etc. The maximum number of sets to which a member company is entitled has been reduced to five in the interest of economy. Another decision is to require non-member companies which have representatives in attendance at the convention to enrol their members. Another recent decision is that subsequent to this convention all individual members connected with non-member companies shall be notified that their membership will lapse unless the companies with which they are engaged shall become members of the association. Plans have also been considered for increasing the foreign membership.

The report also referred to *Aera*, for which the services of Harlow C. Clark as editor had been secured. Secretary Donecker urged the members to lend their assistance in keeping the columns of the magazine filled with material not only of interest to those engaged in the business but of the character of ammunition capable of use in publicity work.

The report then suggested that the association might with profit appoint a committee to consider possible changes in committees or else might extend the scope of the committee on subjects so that it would be empowered to suggest the formation of new committees or the consolidation or elimination of old ones.

In conclusion the secretary expressed his regret at severing his connection with the association. He referred to the work which he had performed during his term of office as most pleasant and agreeable and particularly so because of the lasting friendships it had been his privilege to make, and he thanked the members for their co-operation, support and kindness. Finally he referred to the appointment of Mr. Burritt as the new secretary and said that he hoped that to Mr. Burritt would be accorded an equal measure of assistance from all. If this was so, he felt that the new secretary would put new life, new energy and new and useful ideas into the organization.

The financial statement showed:

Receipts.

Cash on hand, Oct. 7, 1912	$17,634.21
Receipts from Oct. 7, 1912, to Oct. 14, 1913	52,935.01
Total	$70,569.22

Expenditures.

Expenditures from Oct. 7, 1912, to Oct. 14, 1913	$52,881.45
Balance, cash on hand and and bills receivable Oct. 14, 1913	17,687.77
Total	$70,569.22

The reports of the committees on company membership and on individual membership were then presented. They were as follows:

REPORT OF COMMITTEE ON COMPANY MEMBERSHIP

This committee reported that during the year thirty-eight new companies had filed applications. The work of the committee was segregated into territorial divisions and a personal touch thus given to the efforts made. Continuing, the report said:

"It is gratifying to know that at this time, with the company membership well over the 400 mark, there is not a single city of any size which is not represented in the membership of this association. While the total of companies in percentage of the grand total or operating companies may seem small, the facts are that our members operate about 80 per cent of the track mileage of the country. It can therefore be seen that the companies still unenrolled are, in almost every instance, the very small ones which would pay small amounts of dues and would receive correspondingly greater benefits from their memberships. The work that the association is doing, however, and its continual broadening scope, its recognition by the federal government and the co-operation extended by other large associations lead your committee to the belief that the non-member companies will soon see the light and extend the support that they should. It is not the question of dues involved that is important in the case of these non-members, but the extensive influence that they can wield and which should be exerted along with that of the other members.

"Your committee would suggest the great desirability of each officer of every member company storing away in his mind the thought that it is his duty to put the association and its work before the non-members in his vicinity. If a consistent campaign of this sort were conducted, your committee feels sure that the outcome would be extremely helpful."

REPORT OF COMMITTEE ON INDIVIDUAL MEMBERSHIP

"The committee on individual membership desires to report that in the fiscal year 1912-1913 it has in many ways endeavored to increase the individual membership of the association. Various methods have been utilized to put before individuals connected with the electric railways and allied businesses of the country the privileges afforded by this individual membership class. Hundreds of personal letters have been written and folders and attractive pamphlets have been utilized, and in this work your committee has been favored with the hearty support of the presidents of the different associations. The result of the campaign has been that 599 new members have been enrolled during the year. Your committee desires to recommend that the campaign be vigorously pushed to the end that the association may count among its members a great many more thousands of those who should be identified with it. The dues are nominal and hardly commensurate with the returns afforded, and because of this the committee feels that the consistent following up of the matter and the enlighten-

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ment of prospective members as to just what is afforded should bring about many additions to the present rolls."

Professor Norris then presented the report of the committee on education. This is published in abstract elsewhere in this issue.

THE CLEVELAND SITUATION

C. N. Duffy, vice-president and comptroller The Milwaukee Electric Railway & Light Company, then presented his paper on "The Cleveland Situation." This is published elsewhere in this issue.

F. W. Hild, Portland, Ore., said that it is often argued that a reduction in fare will increase the riding. He believed that there were many other much more important factors. One was the topographical condition of the city. Another was climatic conditions. Another was the temperamental habit of the people. He had statistics of seven or eight cities where the riding habit was very much higher than in Cleveland, and he did not think that the rate of fare had an important effect on the number of riders.

Mr. Duffy said that his paper related purely to Cleveland and as a general proposition he believed that Mr. Hild was correct.

J. H. Alexander, chief engineer for the city street railroad commissioner of Cleveland, also discussed the paper.

OTHER PAPERS

A paper on "Valuation: Franchise Values" was then presented by William M. Wherry, Jr., of Wherry & Mygatt, New York. An abstract of this paper is published elsewhere in this issue.

John J. Burleigh, Public Service Corporation, Newark, N. J., said that he felt that the convention was greatly indebted to Mr. Wherry for his address. On the motion of Mr. Burleigh, appreciation of the address was shown by a vote of thanks.

C. M. Rosecrantz, general counsel The Milwaukee Electric Railway & Light Company, read a paper on "Valuation: Other Elements of Value". An abstract of this paper will be published in a later issue of the ELECTRIC RAILWAY JOURNAL.

Announcement was made by the chair of the following committee on the president's address: Frank Hedley, Percy Warner and R. E. Danforth.

The meeting was then adjourned.

TUESDAY SESSIONS OF CLAIMS ASSOCIATION

The Tuesday session of the Claims Association was called to order at 10 a.m. The proceedings followed the program very closely. The first order of business was papers on "The Prevention of Accidents," by H. V. Drown, general claim agent Public Service Railway, and J. H. Handlon, claim agent United Railroads of San Francisco. On these written discussions were contributed by P. C. Nickel, claim agent New York Railways, and E. H. Odell, secretary Pacific Coast Claim Agents' Association. This subject was also discussed at considerable length by other members present. H. K. Bennett, chairman, then read the report of the committee on uniform forms and records. Following this business a paper on "The Value of Safety Committees" was presented by George Carson, claim agent Puget Sound Traction, Light & Power Company. This was followed by written discussions which were presented by R. E. MacDougall, claim agent New York State Railways, and H. K. Bennett, claim agent Fitchburg & Leominster Street Railway. The meeting concluded with a felicitous address by President Harries of the American Electric Railway Association, who expressed his gratification at the large attendance and the great interest shown by the claim agents in their work. He also discussed the ways and means whereby claim agents could assist their brethren in the other associations to make the "safety first" movement most effective.

TUESDAY'S MEETING OF THE ACCOUNTANTS' ASSOCIATION

In the unavoidable absence of President Neal of the American Electric Railway Accountants' Association, the annual meeting was called to order at 10 o'clock yesterday morning by the first vice-president, M. W. Glover, Mobile Light & Railroad Company. Mr. Glover stated in opening the meeting that all who knew Mr. Neal realized that his absence was a great loss to the association.

The annual address of the president, which had been forwarded by Mr. Neal, was then read by the secretary, M. R. Boylan, Public Service Railway, Newark, N. J.

Mr. Boylan read the report of the executive committee and afterward his report as secretary and treasurer.

F. J. Pryor, Jr., American Railways Company, presented the report of the committee on education, of which he was the chairman. An abstract of this report is published elsewhere in this issue. Supplementing his written report, Mr. Pryor said he thought some action should be taken by the convention looking to the establishment of a course of study. The committee had received letters from fifty or sixty companies asking when the course would be started. Mr. Pryor thought that the association should ask the parent association for an appropriation sufficient to begin the work. He believed that about $200 would be adequate for a beginning.

Chairman Glover said he thought that the association ought to take definite action.

The matter was discussed by T. P. Kilfoyle, Cleveland Railway; C. N. Duffy, Milwaukee Electric Railway & Light Company, and W. F. Ham, Washington Railway & Electric Company.

The association voted to recommend to the executive committee that a request be presented to the parent association for an appropriation in order that the work of education outlined may be started.

On motion of Mr. Duffy the association sent to President Neal a telegram of greeting and expressions of regret at his enforced absence. A telegram was also sent to W. H. Forse, Jr., Union Traction Company of Indiana, expressing the sympathy of the association in the death of his mother.

No report was presented by the committee on the destruction of records. A report was received that the report of the previous year be discussed, but on account of the number of other matters on the program this was not done.

H. L. Wilson, Boston Elevated Railway, chairman of the committee on the standard classification of accounts, was not able to be present and the report of that committee was read by Mr. Ham. An abstract of this report is published elsewhere.

F. W. Sweney, chief examiner of accounts Interstate Commerce Commission, was introduced by Chairman Glover and was asked to speak to the members. He said that this was the fifth convention, which he had attended. While he had appreciated the co-operation given by the committee on the standard classification of accounts in the past, he appreciated it more fully this year than ever before on account of the work on the pending new classifications. It was important that these classifications should embody the best electric railway practice. He hoped that when they were revised and definitely issued by the commission they would stand for twenty or twenty-five years. The commission would send copies of the tentative classification to the companies, and when the criticisms and suggestions had been returned the committee had promised to meet representatives of the commission again for the purpose of going over the accounts.

George Geekie, examiner Interstate Commerce Commission, was introduced to the members and referred briefly to the work of the new classification. He said that a number of changes had been introduced, which he thought would meet the approval of the accountants and also of the managers.

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It was hoped to have the classification in tentative shape before the close of the year.

H. S. Lyon, Board of Public Utility Commissioners of New Jersey, was then introduced and said that that commission would be very glad to adopt any system of accounts that was prescribed by the Interstate Commerce Commission.

James Adkins, United Railways of St. Louis, made the suggestion that the new classification be sent to all member companies of the association.

Mr. Sweney said he thought it was very important to get criticisms from the companies that did not do an interstate business as well as from those that were under the jurisdiction of the commission. If a list of the companies in the association was given to him, he would be glad to send the tentative classification to them.

Mr. Ham, chairman of the committee appointed to represent the association at the 1912 meeting of the National Association of Railway Commissioners, presented the report of that committee. An abstract of this report is published elsewhere in this issue.

In compliance with the recommendation of the committee the association passed a resolution directing the incoming president to appoint a committee to attend the 1913 convention of Railway Commissioners, which is soon to take place in Washington, D. C.

INCOME TAX LAW

Chairman Glover said that it had been suggested that the income tax law would require attention on the part of the companies and that if anyone was sufficiently familiar with the terms of the law to give information concerning it the association would be benefited.

C. L. S. Tingley, American Railways Company, said he did not want to be quoted as speaking authoritatively because the subject was a large and difficult one. He had given it some study, however, and had discussed it to some extent with counsel. He was advised that where a mortgage provided that the income should be paid without deduction for any present or future tax the company would be required to pay the tax. As far as dividends were concerned the only difference between the income tax and the present excise tax was that the $5,000 exemption on net earnings had been taken away. The corporation was taxed 1 per cent on net income. In the definition of net income, taxes were deducted but not the taxes fixed under this law. The law was not specific as to the deduction for depreciation, and the language provided for a due allowance for depreciation. An expert in the Internal Revenue Department had issued a pamphlet saying that companies would be allowed to deduct only the depreciation actually shown on the books. According to this expert, the company would not be taxed on any increment in value unless it was reflected in the books. If such increment was reflected in the books that would be taxed as income, and by analogy the expert applied the same reasoning to depreciation.

Mr. Adkins said that while the new income tax commenced from March 1 corporations would have to pay the old excise tax from Jan. 1 to March 1.

S. C. Stivers, American Cities Company, asked whether the amount retained at the source should be considered as a tax or as a deduction from net income.

Mr. Ham said he thought it ought to be considered as a tax.

Mr. Tingley said that he would be inclined to think that so far as bonds already issued, which had been put out free of tax, were concerned, it might almost be possible to charge up the tax to interest or discount on the securities because such a provision in the mortgage had been reflected in the price of the bonds. In Pennsylvania tax-free bonds sold from two to five points higher than bonds which were taxable.

Mr. Tingley added that the tax on salaries was certainly not a tax on the corporation.

A UNIT COST WORK ORDER SYSTEM

As announced in yesterday's issue of the Daily Electric Railway Journal a change in the program was made necessary by the inability of W. H. Forse, Jr., Union Traction Company of Indiana, to be present at the first session. For this reason the paper of G. W. Kalweit, auditor Milwaukee Electric Railway & Light Company, on "A Unit Cost Work Order System" was advanced from the place fixed for it in the program of Friday and was presented yesterday.

Mr. Kalweit in presenting the paper illustrated it with lantern slides, showing the forms comprising the records of the system and the use thereof. An abstract of the paper is published elsewhere in this issue.

T. B. MacRae, auditor of the Chicago elevated railway companies, said that the paper was very interesting and he would like to supplement the knowledge of the system, which he had obtained from it by personal investigation. He was especially interested in the final analysis down to unit costs. He could see that work of that character would afford comparative figures that would be invaluable. In the Chicago elevated lines the system used was known as the "a. f. e." system or authority for expenditure system. When authority was issued under this system the engineers could not exceed it without special authority.

Mr. Kalweit said that under the Milwaukee system if it was found that the amount authorized was being exceeded, authority was asked for more.

N. E. Stubbs, United Railways & Electric Company of Baltimore, said that his system followed in the main the principles of the Milwaukee system.

H. A. Gidney, Charles H. Tenney & Company of Boston, asked if uncompleted orders would be held on file against jobs as in the case of direct purchases.

Mr. Kalweit said that the work was always covered by orders.

R. J. Clark, Metropolitan Street Railway of Kansas City, said that he followed a similar system. He was sorry that the paper had not been presented before the joint meeting with the Engineering Association, as it was a matter that concerned so largely the members of both parties. He was trying in his department to establish more co-operation between his organization and the engineers. He liked the arrangement governing timekeepers in Milwaukee and thought that he would try to put something like that in force, although Kansas City was so large that they would not find it practicable to get over the ground four times a day.

In answer to a question, Mr. Kalweit said that the engineers made the separation between the different accounts. After the completion of the work order necessary adjusting entries could be made.

Mr. Glover asked if this would not mean that sometimes large amounts would be added to operating expenses in certain months.

Mr. Kalweit said that the charge was made to the depreciation reserve account and not to operating expenses.

Mr. MacRae, describing his practice, said that in case large amounts were to be charged to operating expenses in connection with work of this character, accruals were charged as the work progressed.

Mr. Pryor said that the system his companies used was based somewhat on that described by Mr. Kalweit but that they did not go as closely into the unit cost system.

C. N. Huggins, Portland (Ore.) Railway, Light & Power Company, said that except in one respect his system did not differ materially from that of the Milwaukee lines.

Mr. Ham said that no company, however small, could afford to continue keeping accounts without maintaining a detailed record of capital expenditures. It was not necessary to go into details or unit costs as the Milwaukee company had done. It would be a tremendous asset for the electric railway companies to-day if they had a record of their

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expenditures from the beginning based on a system like that of the Milwaukee company. Another great advantage of such a system was that its development frequently showed where inefficiency existed. In his company savings had been made in one line of work as a result of analysis of this character. Errors had also been discovered.

Mr. Tingley said that the knowledge that the details were checked had a salutary effect on foremen and superintendents. With such a system a company could be in possession of essential facts which could not be controverted.

P. S. Young, Public Service Corporation, Newark, N. J., said in discussing overhead charges that it seemed to be desirable to have some estimate in connection with this factor. If an estimate was to be made the time to do it was when the work was done. He thought that so far as it was possible to do so it was desirable to divide the charges in work orders each month.

Mr. Glover said that in his system work orders were used for all important jobs but were carried as separate accounts. The cost of jobs was charged to the regular accounts and in addition work orders were shown against the charges. A work-order ledger was kept separate from the other books.

Mr. Duffy said that Mr. Kalweit had stated that a controlling account was used. It was known as work orders on the general ledger and bore the same relation to each work order, of which there were 350 or 400 on the books now, as the operating expenses as a controlling account on the general ledger bore to each of the individual operating expense accounts.

Estimates rarely worked out and usually there was a good reason for this. Sometimes a job was undertaken and for good and sufficient reasons the extent of it was increased or decreased. Sometimes there was something wrong with the charges. Sometimes the estimate had not been correct. If there was a proportion of 5 per cent over or under the estimate, taking into account all of the unpaid contracts, freight bills and various other charges that the construction departments knew nothing about, an investigation was started immediately. In Milwaukee the company was able to have the benefit of the knowledge that it obtained from its work orders. This was a great advantage now and would be a greater advantage in the future. Under the system that was in use, if the Milwaukee company was under consideration in any way ten or fifteen years from now, the work orders would show the exact facts.

Chairman Glover appointed as the committee on nominations: C. L. S. Tingley, H. B. Cavanaugh, H. J. Jumonville, L. T. Hixson and C. B. McCourt.

The following committee on resolutions was appointed: E. D. Gault, G. B. Cade and H. L. Sanders.

The association then adjourned to meet this morning in joint session with the Transportation & Traffic Association.

ACTION OF TRANSPORTATION & TRAFFIC ASSOCIATION ON PROPOSED REVISION OF RULES

At the adjourned session of the Transportation & Traffic Association held yesterday morning the discussion of the proposed changes in the standard codes of rules was taken up at the point where it was dropped on Monday evening. Summed up, the final action of the association was that the proposed changes in the present standard bell signals were not to be made and that the suggested modifications of the present codes for city and interurban lines in order to make them similar were not desirable. The revision of the city code, which included changes in diction and provided for the interpolation of those rules which applied to special types of cars in the general code, was, however, approved by the association. The major objection to the proposed bell signals was the use of three bells for backing as well as for the emergency stop signal, thus affording an opportunity for confusion when starting backward.

JOINT SESSION OF ENGINEERING AND TRANSPORTATION & TRAFFIC ASSOCIATIONS YESTERDAY

There was a joint session of the Engineering and Transportation & Traffic Associations, yesterday morning at the Greek Temple. President Schreiber, of the Engineering Association, called for the report of the joint committee on block signals. It was presented by the Mr. Waldron, who, at its conclusion, moved the adoption of the recommendation of the committee for the use of continuous track circuits for the control of automatic signals for high-speed interurban service.

C. P. Nachod, Philadelphia, objected to the adoption of this recommendation as he feared it would restrict the development of the art of signaling. He said that at the present time the assumption that any particular system is the only one adaptable to certain conditions did not seem warranted. He mentioned particularly the intermittent control signals, which he believed would be so developed as to be adaptable for high-speed operation in the near future.

Charles L. Henry, Indianapolis & Cincinnati Traction Company, moved to amend the recommendation of the committee to read as follows: "For high-speed interurban service, where automatic signals are controlled by continuous track circulits, that expenditure be concentrated on the form of indication in preference to a more expensive form of signal and less reliable control."

J. W. Brown, Public Service Railway, cited an example to show the value of the continuous track circuit system. It prevented an accident, which would have occurred without it.

Upon request Mr. Henry explained the reasons for requesting the amendment to the recommendation of the committee. He stated that his motion should not be construed as a thrust or an argument against the continuous track circuit control but was meant to put the association in a position of advocating the development of something better if possible. He stated further that it was only within the past year and a half that anything had been done along the line of a signal with continuous track circuits other than the semaphore type. At the present time the light signal alone without the semaphore is being tried. Mr. Henry believed that the committee had misconstrued one of the assigned subjects in that the association had not asked the committee to report what was the best signal for high-speed interurban roads. To substantiate his position he cited the instruction, which read: "To continue the study of signaling constructions and methods and make recommendations." This did not mean that the committee was to report recommendations that continuous track circuits be adopted as against all other signals, but that it should report on instructions and methods for the use of continuous track circuits. In closing Mr. Henry cautioned the association members that the signal business was in its infancy and it would appear ill advised to recommend or adopt any particular standard at this time.

Mr. Waldron replied to Mr. Henry that he would never think of recommending anything where automatic appliances are used for the protection of human lives unless it was the best the art had developed up to that time. In view of the recommendations and reports recently handed down by the Interstate Commerce Commission regarding certain accidents and wrecks, it was not advisable to recommend any automatic device which was not considered by those versed in the art of automatic signaling as being the safest.

Mr. Emmons also replied to Mr. Henry and stated that he believed that 90 per cent of the actual signaling that is being done at the present time for high-speed service is the continuous track circuit signal. He also stated that the Interstate Block Signal Train and Control Board had gone into this matter thoroughly, and its report is exceedingly favorable to control of the continuous track circuit type.

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C. N. Wilcoxon, Chicago, Lake Shore & South Bend Railway, expressed himself as being heartily in favor of certain recommendations of the committee. He believed it would be unwise to make a positive commitment to any particular signaling system as recommended in the report. In explanation of his position he said that he was a strong advocate of the continuous track circuit signals, as he was at the present time installing 60 miles, but he did not believe that the amendment offered by Mr. Henry would harm anyone. It permitted those who desire track-circuit signaling to use it and it did not handicap those who were trying to develop something that is all that could be desired in the future.

Mr. Waldron again replied that the committee's recommendation did not interfere with anyone developing a new device but simply offered what was now considered by signal engineers to be the best protection known.

Mr. Henry stated that the Indiana law regarding automatic signals had been changed to meet all types. It included a provision that any kind of signal which may be approved by the Railroad Commission of Indiana that would reasonably protect the public might be installed in place of the automatic signal.

H. H. Adams suggested that this entire recommendation be referred back to the committee for further consideration. Before putting the amendment to vote President Schreiber put the whole proposition as follows: First, whether the continuous track circuit is the best means of protection to be used or not? Second, if it is the best at this time, does the association want to recommend it, especially if there is any possibility of hardship on any of the member companies?

Mr. Henry's amendment was then put to vote and adopted.

Mr. Waldron then explained that the committee had tried to answer subjects No. 2 to 6 inclusive as well as it could, but every railroad manager knew that the questions were in a sense local to his particular property. This being the case, the committee simply presented different schemes for handling traffic under the conditions asked for by the executive committee. He did not attempt to read all the sections but quoted the essentials, conclusions and recommendations.

Following a brief discussion President Schreiber put the motion that the report of the committee be accepted and approved as amended. Before the vote was taken, Mr. Nachod inquired whether the report would take care of the aspect as recommended, and upon advice that it would he stated that the recommended indication "proceed by contactor to operate signal" was given as a green light, which was an unrestricted clear signal. This aspect was for intermittent control signals and required a check indication. President Schreiber explained that the matter of indications would always be under the supervision of a standing committee which would look after it each year and make such revisions as were necessary as the art progressed. At this point the motion that the report of the committee as amended be accepted and approved was put and adopted.

COMMITTEES ON TRAIN OPERATION

President Stevens took the chair as H. H. Adams and W. H. Sawyer, co-chairmen, presented the report of the joint committee on train operation for city service.

The discussion was opened by E. T. Munger, who said that he considered the two-car trains of the Public Service Railway a great improvement for rush hours. The fact that the loading of passengers could be done on the train as quickly as on a car, and for twice the number loaded, was a strong point in favor of two-car trains. He favored the near-side stop as a help toward reducing accidents and believed the coasting register was valuable not only in reducing energy consumption but also in reducing the cost of car maintenance.

C. H. Hile discussed conditions which affected train and single-car operation in Boston. No conclusion had been reached, but so far as his personal studies extended the final decision tended rather to the two-motor car service. In reply to H. H. Adams, Mr. Hile said that his company was now operating some six or eight trains of articulated cars made up of two 20-ft. closed cars but without the stepless features. It would soon have thirty in operation. A number of modifications might be made to advantage in future equipment. They were now changing from the folding step to the stepless car as the middle unit is only 15 in. from the street. The company has not yet gone far enough to feel that it would use this type of car for its 25-ft. closed cars.

L. P. Crecelius, Cleveland, called attention to the importance of voltage studies in connection with train operation. In reply to his query on this point, J. W. Brown, Public Service Railway, said that on account of their bulk voltage records had not been included in the report but they were available for the investigation of anyone interested.

Upon motion the committee's report was adopted and a vote of thanks was tendered to it for its work.

The next order of business was the report of the joint commitee on train operation for interurban service. In the absence of E. C. Faber, chairman, the report was submitted by C. N. Wilcoxon. Mr. Wilcoxon said that at a meeting of the committee on Monday night it had been decided to create a new committee to handle train operation as applied to interurban railroads as it was believed that a division of the work as between city and interurban lines would bring the matter to the attention of the railroad fraternity in a more advantageous way.

Mr. Wilcoxon then abstracted the report of the joint committee on train operation for interurban service.

E. F. Gould summarized the report of the committee but noted that it had made no investigation as to difference in maintenance between single car and train operation. In the instruction originally given to the committee it was asked to look into the effect of car design on the duration of stops. While variations in car design undoubtedly have great effect on the duration of stops when single car units are concerned or in the case of train operation in cities, it did not seem that this subject furnished a very fruitful source of investigation for interurban service. Outside of ample width of entrance doors and easy steps there seemed to be little in car design which would have any bearing on the duration of stops.

Upon motion of Mr. Boutelle, the report of the committee was adopted.

The meeting then adjourned.

SAFETY ALWAYS

An international exposition of safety and health is to be held in New York at the Grand Central Palace, Dec. 11 to 20 inclusive, under the auspices of the American Museum of Safety. Dr. Tolman, director of the Museum, is in attendance at this convention to interest representatives and manufacturers to exhibit what they are doing to safeguard the lives of the public and their employees. A jury of award will decree five grades of distinction, viz.: Grand prize, gold, silver, bronze and honorable mention. Acceptances on the jury thus far include Hon. Elbert H. Gary; John H. Patterson; J. B. McCall, president National Electric Light Association; Hon. Joseph H. Johnson, fire commissioner of New York, and Hon. John H. Finley, New York State Commissioner of Education. At this convention Dr. Tolman is accompanied by F. W. Payne.

The Department of City Transit of Philadelphia has established the geographical center of Philadelphia at Sixth Street and Erie Avenue and the center of population at Seventeenth Street and Girard Avenue.

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A UNIT COST WORK ORDER SYSTEM

BY GEORGE W. KALWEIT, AUDITOR THE MILWAUKEE ELECTRIC RAILWAY & LIGHT COMPANY

In order to account correctly for all expenditures made in connection with new construction and equipment, reconstruction or re-equipment, so that the total cost of a specific piece of work as well as the unit costs of same may be accurately determined, a unit cost work order system is necessary, comprehensive in its scope and practicable in its workings. Such a system should embody the following:

(1) Classification of Accounts.—The classification of accounts should be in sufficient detail to keep in touch with the work while it is in progress and insure correct charges being made to the proper accounts. Every employee of the company having anything to do with the charges or credits and their distribution should thoroughly understand the classification of accounts and its application.

(2) Timekeeping System.—The timekeeping system should be simple enough to be fully understood and readily applied by the average timekeeper, this being absolutly necessary for the accurate reporting of labor charges and their distribution, as well as the "man hour cost."

(3) System for Recording Material and Supplies Used and Distribution of Charges.—The system for recording material and supplies used, the unit quantities thereof, as well as the distribution of charges and credits, is of the greatest importance, as it is in this part of the work that the liability of errors is most likely to occur and most difficult to detect and adjust. The system should comprehensively cover the ordering, delivery and receipt of material and supplies, also the record of material and supplies rejected, returned or transferred from one work order job to another.

(4) Unit Quantities.—The unit quantities used to ascertain unit costs should be the actual unit quantities determined by measurement of the completed work. The actual unit quantities are not necessarily the estimated unit quantities or the unit quantities built up from the distribution of labor charges and the distribution of material charges. The use of the actual unit quantities determined after the work is completed in compiling the analysis of the charges and their unit costs is an invaluable check against the cost of the work as well as the unit quantities shown on the books.

(5) Analysis of Charges and Unit Costs.—An analysis of the charges and their unit costs should be prepared and finished immediately after the work is completed and the work order is closed, or the analysis loses its value and the work order system fails to accomplish the purpose for which it was devised. It is therefore important that the accounting system be so planned and the record of the work performed as it progresses be so kept that the preparation of the analysis upon the completion of the work will not involve anything more than the assembling of the data as recorded on the books.

The "unit cost work order system" of The Milwaukee Electric Railway & Light Company has proved practicable in its application and satisfactory in attaining the desired results. The company has made it a practice to issue "specific work orders" for each piece of work undertaken, covering charges to capital expenditure accounts or reserve fund expenditure accounts, or special charges in operating expense accounts (work order charges), unless such charges would be covered by "general work orders."

INSTRUCTIONS COVERING WORK ORDER CHARGES TO CAPITAL, RESERVE OR OPERATING ACCOUNTS

The company's classification of accounts prescribes:

(A) Capital expenditure accounts (work order charges) should include charges constituting expenditures for construction and equipment, additions and betterments, including intangible capital expenditures properly chargeable to "property and plant."

These charges are to be carried on work orders either through a "specific work order" or a "general work order," issued to cover charges properly chargeable to capital expenditure accounts.

Charges and credits to capital expenditure accounts must be in accordance with the classification of capital expenditure accounts (work order charges) as follows:

(B) Reserve fund expenditure accounts (work order charges) should include charges constituting expenditures for reconstruction, re-equipment, betterments, or uncurrent and extraordinary expenditures, properly chargeable against "maintenance and depreciation reserve fund," as distinct from construction and equipment, additions and betterments, or intangible capital expenditures, properly chargeable to "capital expenditure accounts," or current ordinary maintenance charges, properly chargeable to "operating expense accounts".

These charges are to be carried on work orders either through a "specific work order" or a "general work order" issued to cover charges properly chargeable against "maintenance and depreciation reserve funds."

Charges and credits to reserve fund expenditure accounts must be in accordance with the classification of reserve fund expenditure accounts (work order charges).

(C) Operating expense accounts (work order charges) should include work order charges properly chargeable to operating expenses, separated from regular charges to operating expenses for the purpose of ascertaining the cost of a specific job, the cost of the job to be transferred monthly to the appropriate operating expense accounts.

CLASSIFICATION OF WORK ORDERS

Work orders are divided into two classes: (A) specific work orders; (B) general work orders.

A "specific work order" should carry the charges for a specific job, for example:

(1) Construction of 1 mile of double track in Twenty-seventh Street from North Avenue to Burleigh Street, 7-in. 95-lb. T-rail; 350 cast-welded joints; 205 splice joints; necessary special work; brick and granite paving; necessary electric line construction work.

(2) Remodeling of 300 standard city cars into P—A—Y—E cars.

A "general work order" should carry the charges for certain general work during a current year, for example:

(1) Purchase or construction and installation of new and additional shop equipment—year 1913.

(2) Cast welding joints on various Milwaukee city lines—year 1913.

WORK ORDER REQUISITIONS

For the guidance of department heads, the accounting department issues the following instructions regarding work order requisitions covering capital expenditures or reserve fund expenditures:

(A) All work properly classified as a "capital expenditure," or a "reserve fund expenditure," as distinct from a "maintenance charge" (properly chargeable in "operating expense accounts") must be authorized through "work order requisitions."

(B) "Work order requisitions" should describe the work to be done, the reason for doing it, the estimated cost of same in detail. "Work order requisitions" should be sent to the accounting department for the proper distribution and charge, to be in turn passed to the properly authorized official for approval, and then returned to the accounting department for the issuing of the "work order notification."

(C) "Distribution of estimated cost" must be drawn up to conform with the distribution prescribed by the classification of accounts. This distribution is carried by the accounting

*Abstract of paper read before the American Electric Railway Accountants' Association, Atlantic City, N. J., Oct. 13-17, 1913.

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department for all "capital expenditure work orders," but not for other work orders, unless a request is embodied in the "work order requisition" to do so.

(D) "Details of estimated cost" must be drawn up in accordance with classification of capital expenditure accounts (work order charges), or reserve fund expenditure accounts (work order charges).

WORK ORDER NOTIFICATION

When the approved "work order requisition" reaches the accounting department, it is carefully scrutinized and the calculations of "details of estimated cost" checked. If found to be properly drawn, the serial number is assigned, the "work order notification" issued, and a copy of same sent to all the departmental heads.

The "work order notification," with proper identification number assigned, shows the department from which the "work order requisition" originated, the title of the work order, the description of the work, the estimated cost, as well as the distribution and charge.

WORK ORDER INDEX

The accounting department's copy of the "work order notification" is entered on the work order index which shows the date issued, work order number, description, distribution and charge, sub-index page and date completed. The work order index thus combines a ready reference and record.

WORK ORDER DISTRIBUTION SHEET SHOWING COST OF EACH JOB

The accounting department's copy of the "work order notification" is entered on a loose leaf distribution sheet, to which charges are posted from day to day as the work is in progress, the charges being carried according to the distribution and charge prescribed, separated as between "labor" and "sundries."

"Labor," according to the classification of accounts, is defined as:—"Pay roll charges," covering manual labor, clerical work, engineering and superintendence.

"Sundries," according to the classification of accounts, is defined as: "Sundry charges," other than "pay roll charges," covering material and supplies, tools and expenses.

The charges segregated as between vouchers or journal entries, the latter including charges for material and supplies, disbursed from stores, charges from special account reports, such as horse and vehicle service, cast welding, gravel pits, etc., are carried in a controlling account on the general ledger called "work orders."

RECAPITULATION OF WORK ORDER CHARGES FOR GENERAL JOURNAL ENTRY

A recapitulation is made at the end of the month summarizing the total charges to each work order; from this recapitulation the total work order charges are transferred to the proper general ledger accounts by general journal entry. All charges to the controlling account "work orders" on the general ledger, are closed out monthly.

CLASSIFICATION OF WORK ORDER CHARGES

The charges to each work order are recapitulated in accordance with the classification of "capital expenditure accounts", "reserve fund expenditure accounts", or "other accounts", as previously described. The total of these charges to the respective accounts affected, are then transcribed on the "monthly financial and operating report."

MONTHLY WORK ORDER REPORT

All work orders are scheduled monthly, showing the work order number, date issued, description, charges current month, year to date, total to date, separated as between "labor" and "sundries", estimate, company and account as between "capital expenditure accounts", "reserve fund expenditure accounts," etc. The monthly work order report is forwarded to all departmental heads, thereby giving them an opportunity to follow the work as to charges and costs.

The foregoing outlines the system followed in obtaining the total costs of various pieces of work or jobs properly classified in accordance with the classification of accounts.

WORK ORDER UNIT COSTS

In order to ascertain the costs of the various items entering into a work order or job, to determine unit costs, an amplification of the classification of capital expenditure and reserve fund expenditure accounts previously referred to is necessary.

WORK ORDER UNIT COST RECORD (SUB-DISTRIBUTION)

A loose-leaf sub-distribution sheet is used for recording the distribution and unit cost data for each work order. The charges appearing in total on the work order distribution sheet are posted in detail on the sub-distribution sheet giving the date, reference, unit, description of the item, unit rate, separated as between labor and sundries, and the total, agreeing with the amount shown on the work order distribution sheet. This, of course, entails a great deal of detail work, listing the items under the various distributions, but after the data are assembled, it is comparatively easy to draw off accurate unit costs. The sub-distribution sheet further provides facilities for working out "specific unit" costs and "common unit" costs, as shown by the following:

Group I. Grading. This is subdivided as follows: Excavation (labor).—The specific units applicable to excavation labor would be "man hours" and "cubic yards," whereas the common unit would be "lineal foot of track."

Group II. Ballast. This is subdivided as follows: Crushed stone (material).—The specific unit applicable to crushed stone would be "cubic yards," whereas the common unit would be "lineal foot of track."

TIME BOOK

A very important factor in order to be able to assemble the labor items accurately so as to ascertain the "specific" and "common" unit costs, is the manner in which the timekeepers report the distribution of the labor. All timekeepers are supplied with a copy of the classification of accounts, showing only the labor accounts. The timekeeper on the job checks his gang four times a day, twice in the morning and twice in the afternoon, indicating the account number in the little square opposite each man's name, to record and show the work that he is doing. Each timekeeper recapitulates daily the total hours worked by his gang, showing the hours under the various rates and the various charge accounts. This information is reported on a daily labor distribution sheet.

CLOSING OF WORK ORDERS

(A) When the work covered by a given work order is completed the coupon attached to the "work order notification" is sent to the accounting department by the department in which the "work order requisition" originated, as a notification to close said work order.

(B) Upon receipt of the notification described in (A) the accounting department makes an investigation of the work order charges on the books, compares same with the estimates, and if found to be in order the work order is closed. Differences between actual cost and estimated cost are sometimes accounted for by reason of balances to be paid on contracts or certain credits to be applied which have not been taken on the books and which the other departments may not know of. If the cost does not vary from the estimate more than 5 per cent, the work order is closed, otherwise the accounting department holds the work order open, notifying the department drawing the work order to investigate the charges and furnish an explanation. The accounting department sends out a notice in the form of a letter to all departments, listing the work orders that have been closed. Work orders are always closed as of the end of the month.

UNIT COST ANALYSIS AFTER COMPLETION OF WORK ORDERS

After the completion of a work order a unit cost analysis is prepared for each work order, showing the group number, item number, item, unit, quantity, specific unit cost, common unit cost, item cost, group total, remarks. Remarks

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cover the following: Date work was begun, date completed, weather conditions, soil conditions, labor conditions and reconciliation of estimated cost with actual cost.

SUMMARY

It may be argued, especially by the smaller electric railway companies, that, from a financial standpoint, the cost of a work order system, particularly the keeping of unit costs, would be too great to warrant the expense involved. In answer to this, it should be understood that while it might be desirable to have the unit costs of every piece of work, it is not necessary, provided unit costs are determined for each class of work.

Unit costs are extremely valuable, in fact absolutely necessary, in making or checking valuations of properties. For this purpose, unit costs have an asset value, worth all, and many times more than, the expense incurred in ascertaining them.

The importance and necessity of a unit cost work order system is of special significance at this particular time, in view of the fact that there is to be a valuation made of all the interstate electric railway companies of the United States by the Interstate Commerce Commission, and also because of the increasing number of state commissions, exercising supervision over electric railways within their respective states and of the increasing number of valuations of electric railway properties being made by such commissions.

The usual experience of an electric railway company when a valuation of its property is made is that data are not available with which to substantiate the various charges made to "capital" or "maintenance and depreciation." This results in estimated valuations, usually far below actual costs, due principally to extraordinary and unforeseen conditions encountered during construction, greatly increasing the normal or estimated costs, which costs engineers' estimates do not cover.

In my opinion, there is no work performed in the accounting department of an electric railway company of greater importance or value than the work covered by a unit cost work order system.

REPORT OF DELEGATES TO THE CONVENTION OF THE NATIONAL ASSOCIATION OF RAILWAY COMMISSIONERS*

BY C. N. DUFFY AND W. F. HAM

The twenty-fourth annual convention of the National Association of Railway Commissioners, held in Washington, D. C., from Nov. 19 to Nov. 22, 1912, was most successful and dealt with some very important topics, such as taxes and plans for ascertaining fair valuation of railroad property; rates and rate making; railway capitalization; telephone and telegraph rates and service.

The report of the committee on accounts and statistics of electric railways, in the absence of the chairman of the committee, was presented by Mr. Duffy at the request of the president of the association.

Certain features of the above report were discussed by Mr. Duffy, particularly its importance with respect to the other topics under discussion.

Emphasis was laid upon the importance of the electric railway industry and the policy of the American Electric Railway Association as the representative of the industry.

A new constitution and by-laws were adopted, incorporating certain revisions and changes, but not in any way affecting the affiliation of the American Electric Railway Association with the National Association of Railway Commissioners, except possibly to make it stronger and of more importance. This was brought about by a conference between your delegates and the executive committee of the National Association of Railway Commissioners, and the importance of maintaining the affiliation previously existing between the two associations was emphasized by your delegates and approved by their executive committee.

It is of great importance that a representative standing committee of his association should be appointed to attend the annual conventions of the National Association of Railway Commissioners and we earnestly request that such action be taken.

The next convention will be held in Washington, D. C., Oct. 28, 1913, which will not conflict with the date of our convention as was the case in 1911.

*Abstract of a report read before the American Electric Railway Accountants' Association, Atlantic City, N. J., Oct. 13-17, 1913.

MEETING OF MANGANESE OPEN-PRICE SOCIETIES

The Manganese Steel Founders' Society and the Manganese Track Society are two recent "open-price" associations formed on the basis of a new theory of price agreement and co-operation among competing manufacturers. Each of these associations has a standardization committee, and the two committees are substantially one in that they are working jointly toward the development of standards for track work in which manganese steel castings and manganese special work are used. This joint committee had a meeting yesterday in one of the parlors of the Marlborough-Blenheim for the discussion of certain proposed standards. The two societies will hold a luncheon and meeting to-day. These open-price societies, of which several are in existence, are the outgrowth of ideas promulgated by Arthur J. Eddy, the author of a work on industrial and economy problems, entitled "The New Competition." Mr. Eddy is in attendance at the convention, and he delivered a brief address at yesterday's meeting of the standards committees.

The plan under which the societies operate is substantially as follows: Instead of having a secret compact controlling prices, there is no attempt at control of prices and no attempt at secrecy. The members file with the secretary of the society such bids or information about prices as they see fit, and each receives from the secretary of the society like information filed by other members. The more information a member files the more he gets. If, after receiving advice as to the prices made in a given case by others, a member desires to reduce his price he is at entire liberty to do so, even to the extent of making a reduction, which gives him the order before the necessary time has elapsed for his latest price to be filed. The limits of space preclude a full explanation of this very interesting development in trade agreements, but in future issues of the ELECTRIC RAILWAY JOURNAL the subject will receive more extended attention.

The following members were present at yesterday's meeting of the standardization committees: L. G. Parker, Cleveland Frog & Crossing Company; W. S. McKee, Edgar Allen American Manganese Steel Company; C. A. Alden and B. L. Weaver, of the Pennsylvania Steel Company; J. H. Stedman, St. Louis Steel Foundry Company; A. G. Smith, Morden Frog & Crossing Company; Victor Angerer, William Wharton, Jr., & Company; W. L. Jones, Taylor-Wharton Iron & Steel Company. The following were present as guests: John C. Jay, Jr., G. S. Vickery, R. W. Gillispie, and R. L. Gillispie, Pennsylvania Steel Company; W. H. Hunt, W. G. Nichols and Walter Brinton, Edgar Allen American Manganese Steel Company. B. M. Fosgate, secretary of the societies, was also present.

The Compania del Tranvia de San Sebastian, San Sebastian, Spain, asks for a concession to extend its electric tramway. The Sociedad La Maritima, petitioner for a steam tramway from Motril to the port of the same name, will only be granted this concession after an open letting.

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REPORT OF THE COMMITTEE ON A STANDARD CLASSIFICATION OF ACCOUNTS

BY H. L. WILSON, CHAIRMAN; W. H. FORSE, JR., W. F. HAM AND F. E. SMITH

During the past year your committee has held three meetings—one in New York in January, lasting three days; one in Atlantic City in April, lasting four days, and one in Boston in June, lasting five days. At no time have there been less than four members of this committee present, and at the New York and Atlantic City meetings there were three representatives of the division of carriers' accounts of the Interstate Commerce Commission in attendance, and at the Boston meeting there were two representatives.

The matters taken up have been a revision of the classification of expenditures for road and equipment, and this new classification will also include instructions covering charges for improvements and betterments, a revision of the entire classification of operating expense accounts, a revision of certain of the text of operating revenue accounts, a tentative classification for income and profit and loss accounts, and a proposed classification for balance sheet accounts.

You can readily understand that these subjects have required a great deal of thought, and outside of the twelve days that the members of this committee have devoted to them at the meetings named, they have spent much time and thought on these matters.

It is the intent of the Interstate Commerce Commission to submit to electric carriers a tentative text of all of these classifications with the request that they shall be carefully examined and that all those who have any interest in these subjects shall offer any criticism or suggestions that they may have to the schedules as submitted, and it is hoped that when these schedules are received they will receive prompt consideration from all, and if anyone has any suggestions to offer he will at once submit them to the Interstate Commerce Commission, which will take them up with the members of this committee. Careful consideration will be given to all suggestions submitted.

It is the hope of the Interstate Commerce Commission that all of these classifications may be completed and promulgated for the use of interstate carriers commencing with July 1, 1914.

It is, therefore, imperative that prompt consideration be given to the subject matter that this may be accomplished as planned.

The importance of having these classifications as perfect as possible must be evident to all, as they will completely round out the entire system of accounts, and it is hoped to make them so perfect that they will not require any revision for many years to come.

The committee has had the usual number of questions submitted through the bureau of statistics and accounts of the Interstate Commerce Commission or direct to the committee, and these questions have received prompt attention, but as the members of the committee are so widely separated and the bureau of the Interstate Commerce Commission which considers these matters is so extremely busy, there has necessarily been some delay in giving prompt answers, but every endeavor has been made and will continue to be made to reply to questions as promptly as possible.

Our very cordial relations with the Interstate Commerce Commission have continued. Mr. Fred. W. Sweney, who represented the commission when the present classifications were prepared, is in charge of the division of carriers' accounts, he having succeeded, since our last annual meeting, Charles A. Lutz in that position.

*Abstract of report read before the American Electric Railway Accountants' Association, Atlantic City, N. J., Oct. 13 to 17, 1913.

"HERE'S WHERE WE HELP OPEN SOMETHIN'"

Judd Mortimer Lewis contributed the following in a recent issue of the Houston *Post*: "To-morrow I am going to help my good friend David Daly open the Central Park street car line and some other things. The Central Park street car line will be opened at Central Park, and the other things will be opened at the Country Club. The more I go away and get yanked onto and pushed off the street cars of other cities the more I admire Houston's street car service. I might have acquired wealth at the expense of the Houston Electric Company, but my love for it was too great. One morning when the streets were coated with slickery mud I swung gracefully from a car platform in front of the *Post* building, rolled over twice, then getting my bearings slid gracefully to the gutter on my stomach and came up alongside the curb like an ocean liner warping into her slip at the Turning Basin. Just as I said: 'Toot! Toot!' and stopped, George P. Brown, who was on the car, yelled out loud enough to be heard across the city: 'Oh, there goes the Texas Mocking Bird!' Of course, such is my shy and retiring nature, I wanted nothing so much as an opportunity to crawl off and hide, but the conductor remained right beside me all the way and insisted upon holding me until he had my name and address and the addresses of witnesses. He was certainly onto his job! I went to my sanctum and scraped the mud off myself with George Bailey's hat, the little green one with the bow behind, in which he used to take such pride, and wrote the Houston Electric Company a letter explaining that I left the car while it was in motion, that the conductor warned me against so doing and tried to restrain me, that I was entirely to blame, was not hurt, and that it would have served me right if I had been hurt. The claim agent of the company wrote me that he was going to frame my letter and hang it above his desk. He ought to. There is no doubt in my mind that I could have gone into court with my weeping children and two or three borrowed ones and convinced any jury that the conductor pushed me off the car and followed me to the curb and kicked me in the face. There's no telling how much damages the jury might have allowed me, and my lawyers might have let me have some of what the jury awarded: you never can tell. And the Poet Carleton died the other day worth $75 less than nothing. The Electric Company *ought* to open something!"

SHOWING OF PUBLIC UTILITIES FOR THE YEAR

Public utility corporations of the country for the year ended June 30, 1913, made an excellent showing of increases in gross, net and surplus earnings, according to a statement compiled by the *Wall Street Journal*. Not including any of the public utility corporations in the large cities of the country, or the holding companies, reports have been received for the fiscal year ended June 30, 1913, from seventy-five operating electric railway, electric light and power, gas and hydroelectric corporations, operating in various sections of the country. These companies may be considered as typical of the hundreds of such corporations in the smaller cities and towns of the United States. The utility companies in the important cities have been reporting large increases for the fiscal year and these reports from the smaller companies show that this gain was general in the last year. Almost without exception these seventy-five companies report gains, although in several instances there were decreases due to some local conditions. For the fiscal year there was an average increase in gross earnings of 17.21 per cent over the gross of the preceding year, with a gain of 16.70 per cent in net and of 20.30 per cent in surplus after charges.

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THE ENGINEERING MANUAL

An important feature this year of the work of the committee on standards of the Engineering Association is the Engineering Manual, mentioned in the report of the committee on standards. The convenience of a book of this kind is evident because at present anyone who wishes to find the existing standards and recommended practices of the association can do so only by going through the printed proceedings of the association for a number of years back. For this reason the committee on standards appointed a sub-committee, consisting of Paul Winsor, H .H. Adams, J. H. Hanna and H. C. Donecker, to prepare such a manual. As important matters connected with standardization are to be settled at this convention the committee on standards decided not to publish the Manual for general distribution until after the convention, but some ten copies of the existing standards have been bound up and can be seen at the secretary's office to the right of the entrance. The leaflets describing each standard or recommended practice are printed separately, and the collection is contained in a flexible binder with space for the addition of further standards as they may be adopted.

The collection is arranged so as to make the subject matter easy of reference. In the first place, two different colors of paper are used. Blue indicates a standard or recommended practice, and white indicates recommendations. The page is the same size as the pages of the Transactions. The illustrations, where possible, are full size and are printed on thin paper so as to permit of blueprinting. All sheets are systematically numbered, and the Manual is divided into six general classifications; namely, buildings and structures, power distribution, equipment, power generation, miscellaneous and way. Each of these divisions is further subdivided, and a distinguishing letter or series of letters has been assigned to each division and subdivision. Manual contains a comprehensive index.

It is the purpose of the association immediately after this convention to hasten the compilation of the complete Manual embodying the 1913 recommendations and to have copies ready for distribution not later than Jan. 1, 1914. At that time a binder, complete with all printed matter, will be furnished to each member company. Arrangements will also be made to sell the Manual to others who wish it, and the price will be fixed as near the cost price of the association as possible. The association will also furnish flexible binders for holding the sheets, when desired.

REPORT OF THE COMMITTEE ON EDUCATION OF THE ACCOUNTANTS' ASSOCIATION*

BY F. J. PRYOR, JR., CHAIRMAN; F. B. LASHER, J. H. NEAL, W. H. FORSE, JR., AND N. E. STUBBS

The first effort of the committee on education was directed toward the investigation of the field to determine whether there was a demand for a correspondence course in electric railway accounting, and to this end a circular letter was mailed to each of the member companies. The replies were in such number as to encourage and warrant a further step toward securing the services of a practical director employed in the industry, who would give his personal attention to the preparation and the supervision of the course. It was concluded, however, that a competent person could command greater compensation for his services than would accrue from this source; furthermore, it was impressed upon us that we could not look for the desired co-operation from a committee of supervisors within the association, since their duties were at the sole disposal of their companies.

It had been expected that a course could be established at a minimum fee of $5, which sum was fixed in conjunction with the knowledge that many of the prospective subscribers were already members of company sections and this might add a burden upon their income. This figure can readily be recognized as inadequate, however, so much so that it does not permit of a reasonable profit after the deduction of the cost of the printing, the necessary stationery and the postage on mailing of the lectures and the return of the corrected papers, rent, and an investment in a small plant.

We therefore took up the question with the recognized professional schools, with the thought that railway accounting could be made an adjunct to their curricula. An objection was offered that this would be out of harmony with the real policy of such organizations and might tend to conflict with their general policy. We succeeded, however, in interesting the officials as individuals. After much correspondence and a number of personal interviews, we were informed that a course such as we demanded could not be sold for less than $10 per term of ten months, extending over a period of two years; in addition, we were expected to guarantee a fixed income. It was felt that the committee was not empowered to enter into a contract, especially when the proposition to the vender was one of prospective profit.

Negotiations were taken up from another viewpoint, and a tentative agreement reached whereby the association was to bear the preliminary expenses in the announcement of the course and its publicity. The course was operative upon the enrolment of 400 subscribers for the first year. Unfortunately, we were not in possession of funds to carry on the initial campaign, and the matter is now in abeyance. It is sincerely hoped that some ways and means can be devised to secure financial aid and furnish an avenue for the education of our fellow-workers. The group of studies as submitted was to cover a period of two years, extending from October to May in each year. The first year was outlined "to embrace the theory of accounting with special reference to electric railway work, interspersed with applied theory tests and simple problems, and accompanied by the law of contracts and agencies and the principles of finance. The work of the second year was to comprise a series of corporation problems built upon electric railway organizations and also the principles of corporation law."

The complete outline follows:

FIRST YEAR

THEORY OF ACCOUNTING, LAW AND FINANCE

1. The purpose and scope of accounting.
2. The relation of accounting to allied subjects, such as economics, law, finance and organization.
3. The methods of keeping books and the media for recording financial transactions.
4. Accounts; their philosophy, construction and classification.
5. Discussion of the balance sheet accounts.
6. Discussion of the revenue and expense accounts.
7. Preparation, interpretation and use of balance sheets, income statements, etc.
8. Graphs, charts and statistics as aids to operation and management.

SECOND YEAR

ADVANCED CORPORATION PROBLEMS BUILT AROUND STREET RAILWAY ORGANIZATION AND CORPORATION LAW

1. Organization and development.
2. Operation.
3. Merger.
4. Consolidation.
5. Holding company.
6. Receivership.
7. Reorganization.
8. Dissolution.

The general trend of public utility corporations is to establish a course of instruction and to train the employee to apply the knowledge thus gained, which reacts as an advantage to the employee as well as to the company. The times do not admit of any dispute as to the necessity of a business education. The association can, by the inauguration of a course of instruction in financial and commercial subjects, add to its present usefulness.

Beaumont (Tex.) Traction Company has entered upon a "safety first" campaign. The movement is under the direction of Alves Dixon of the Stone and Webster organization.

*Abstract of a report read before the American Electric Railway Accountants' Association, Atlantic City, N. J., Oct. 13 to 17, 1913.

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ECONOMICS OF THE CLEVELAND RAILWAY SITUATION AS DEVELOPED IN THE 1913 ARBITRATION DECISION *

BY C. NESBIT DUFFY, VICE-PRESIDENT THE MILWAUKEE ELECTRIC RAILWAY & LIGHT COMPANY AND ARBITRATOR FOR THE CLEVELAND RAILWAY

The questions involved in the controversy and their disposition were and are still of the greatest importance, not only to the Cleveland Railway, but to every electric railway company in the United States.

THE CLEVELAND RAILWAY ORDINANCE

Otherwise stated, the ordinance expressly declares its fundamental principles to be:

1. Maintenance of the company's property, unimpaired.
2. The certainty of a fixed return thereon.
3. Transportation at cost "consistent with the security of the property and the certainty of a fixed return thereon."

The "securing to the public the largest powers of regulation in the interest of public service, and the best street railroad transportation at cost, consistent with the security of the property and the certainty of a fixed return thereon, and no more," were presumed to be accomplished by the appointment of a "city street railroad commissioner" to "act as the technical adviser of the council of the city of Cleveland in all matters affecting the interpretation, meaning or application of any of the provisions of the ordinance and of action thereunder affecting the quantity or quality of service, or the cost thereof, or the rate of fare."

To carry out these provisions of the ordinance, it is the duty of the city street railroad commissioner to prescribe the service, keep informed as to the cost or quality or quantity of service furnished, the receipts and disbursements of the company, the rate of fare, the vouchering of expenditures of the company, with the right to take up with the company the vouchering of expenditures, the manner of keeping accounts, or other matters affecting the bookkeeping of the company, if he disapproves of same.

This creates and maintains a dual control over the operation of the property, the company being obliged to furnish the service prescribed by the city.

The "capital value" which was to represent "to the owners of the property invested in street railroads, security as to their property", fixed as $24,091,600, made up of $8,128,000 of bonded indebtedness, $1,288,000 of floating indebtedness, and $14,675,000 of stock, wiped out approximately 45 per cent of the capital stock of the Cleveland Railway, therefore the "fair and fixed rate of return" on the "capital value," fixed at 6 per cent per annum and no more, yielded only approximately 3.30 per cent per annum on the capital stock of the Cleveland Railway after "a complete readjustment of the street railroad situation" was made.

Under the provisions of Section 35 of the ordinance, at the expiration of the grant, the city has the right to purchase the property of the company, within the city limits, at its capital value, as determined by the ordinance, and the property of the company outside of the city limits at a value to be determined by agreement or arbitration.

There is no assurance, however, to the company, that the city will purchase the property of the company, nor is there any obligation on the part of the city to do so; under the terms of the ordinance, therefore, the capital value of the property, as this has been determined by the ordinance, is not safeguarded.

In the event that the city should not make a new grant to the Cleveland Railway, the property of the company, at the expiration of the grant, would have only a "scrap value" as compared with the "capital value," as determined by the ordinance. Furthermore, the probabilities are that the company would be declared a trespasser in the streets and be obliged to expend large sums of money in removing its property from the streets, or it would be obliged to sell its property to the city, or some other purchaser, under a forced sale, at a great sacrifice.

This brings up the question of the necessity for provision for the amortization of the capital value of the property, as determined by the ordinance, and the requirement, either of the city being compelled to purchase the property of the company at the capital value determined by the ordinance, or that the cost of the amortization of said capital value be included in the cost of the service.

This is absolutely necessary if there is to be secured to the Cleveland Railway unimpaired the capital value of the property, as determined by the ordinance, and the rates of return thereon, as provided for by the ordinance, and to the city of Cleveland, adequate and efficient service at the cost thereof, the fundamental principles upon which the ordinance is based and as set forth in Section 47 thereof.

The only protection the company has for the safeguarding of its capital value, under the terms of the ordinance, is the right, whenever the unexpired term of the grant or any renewal thereof shall be less than fifteen years, to charge the maximum rate of fare provided for in the ordinance, 4 cents cash fare, seven tickets for 25 cents, 1 cent transfer, no rebate, and the right to control the schedules for the operation of cars.

It would be a safe prediction to make that even with a 5-cent cash fare and no commutation ticket fares, as compared with the maximum rate of fare provided for in the Cleveland ordinance, neither the Cleveland Railway nor any other street railway could maintain its property up to proper standards of physical efficiency, furnish adequate and efficient service, earn even as little as 6 per cent return on its capital value, and properly safeguard the same by providing an adequate reserve for the amortization of the loss in capital value, a situation any company would be forced to meet, at the end of a fifteen-year franchise period, judging the future by the present, with respect to the cost of furnishing street railway transportation, and the past, with respect to the loss in capital value, by the experience of the Cleveland Railway itself.

The low rate of fare in Cleveland has probably increased the "riding habit," or number of rides per capita of population, over that obtaining prior to the enactment of the Cleveland ordinance.

LIFE OF THE GRANT

The recognition of the necessity for provision for the amortization of loss in capital value, bound to be sustained by a public utility company operating under a franchise for a definite and limited term of years, is responsible for the "intermediate permit" feature of the public utility law of Wisconsin, the intent and purpose of said law being that the "intermediate permit" should grant to public utility companies the privilege to operate their properties until acquisition by the municipality or termination according to law.

The interpretation and effect of various sections of the ordinance relating to the duration of the grant would appear to be as follows:

"(1) Under Section 1, the maximum duration of the grant would be twenty-five years, unless the entire street railway system would be purchased and taken over by the city, as provided for in Section 32, in which event the duration of the grant would be indefinite, but if the property was not purchased by the city, the duration of the grant would be twenty-five years.

"(2) Under Section 33, if the city's licensee exercises the right to purchase the property, the duration of the grant to the Cleveland Railway Company would be limited to practically only eight years, from Dec. 18, 1909, to Jan. 1, 1918.

"(3) Under Sections 40 and 41, it would seem that the intent and purpose thereof was, if the city or the city's li-

*Abstract of a paper read before the American Electric Railway Association, Atlantic City, N. J., Oct. 13-17, 1913.

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censee did not purchase the property of the company, as provided for in Sections 32 and 33, or if the city did not desire to have the company exercise its right to charge the maximum rate of fare provided for in the ordinance during the last fifteen-year period of the duration of the grant, that, at the end of a ten-year period, the city would pass an ordinance in renewal of the rights granted by the ordinance passed Dec. 18, 1909, for a period of twenty-five years to May 1, 1934, for another twenty-five year period, from the date of renewal, subject to like terms and conditions.

"This would make the maximum duration of the grant, after the renewal of the original grant, twenty-five years, subject to such limitations as would result from the application of the various provisions of the sections of the ordinance, previously referred to in (1) and (2)."

The service furnished by the company, as prescribed by the city officials, is inadequate and unsatisfactory, if measured by the standards prevailing in many other cities where the rate of fare is higher, the effort apparently being to resort to every means possible to prevent an increase in the rate of fare existing as of April 1, 1913, (3 cents cash fare, 1 cent transfer, 1 cent rebate).

This was accomplished in part, with respect to the service prescribed, by re-routing cars on various lines, increasing the speed schedules, cutting out stops, and by other means, the controlling consideration of the city officials in prescribing the service evidently being to keep down the cost thereof, rather than to prescribe adequate service, measured by the usual standards.

The service measured in car miles, making allowance for increase in the size of cars, has not kept pace with the increase in fares or the growth of the city and its suburbs. In 1912, there was an increase of 3.64 per cent in car miles over the year 1911, while the number of fares increased 7.45 per cent and the number of rides 9.56 per cent. The average number of passengers carried per car mile in 1912 was approximately 10, the exact figures being 9.946.

In the operation of the property during the first three ordinance years, March 1, 1910, to March 1, 1913, there has been no substantial addition to the track mileage or increase in the car equipment, there being approximately only 2¼ miles of single track added and a net increase in the number of cars of only thirty-nine.

With respect to the exercise of the control which the city has over the vouchering of expenditures, the manner of keeping accounts, or the other matters affecting the bookkeeping of the company, as prescribed by the ordinance, the city further prevented an increase in the rate of fare by holding in abeyance the necessary approval for making needed renewals or replacements of property, or the authority to wipe off the books' in "capital account," the value of abandoned property consisting of track, cars, and power equipment, aggregating, at the time of the arbitration proceedings, approximately $1,000,000, as these charges would further increase the over-expenditure in "maintenance, depreciation and renewal account," and correspondingly increase the cost of the service.

The reason for this, from the standpoint of public policy on the part of the city, or rather political expediency on the part of the city administration in power, is plain, as the result of making needed renewals or replacements of property, or wiping off the value of abandoned property from the books of the company, would of necessity cause an increase in the existing rate of fare.

The policy and methods of the city officials in their exercise of control over the operation of the property of the company are of special significance and importance, in view of the fact of the charge being frequently made that electric railways furnish inadequate service, charge excessive rates of fare, fail to maintain their property in accordance with proper standards of maintenance, make no provision for depreciation, carry the value of their property in "capital account" at a figure greatly in excess of the real value thereof, and distribute the so-called profits from operation in excessive dividends on over-capitalization of the real value of the property.

RESULTS UNDER DIFFERENT FARES

For a period of fifteen months, from March 1, 1910, to June 1, 1911, the rate of fare defined in the ordinances as "(e) 3 cents cash fare, 1 cent transfer, no rebate" was in force.

For a period of twenty-two months, from June 1, 1911, to April 1, 1913, the rate of fare defined in the ordinance as "(f) 3 cents cash fare, 1 cent transfer, 1 cent rebate" was in force.

The financial results of the operation of the property for the period of thirty-seven months, March 1, 1910, to April 1, 1913, showed that it was an impossibility for the company to furnish the service prescribed by the city (inadequate and unsatisfactory as the service was), and meet the cost of same at the rates of fare in force, and secure to the company the capital value and the rates of return thereon provided for in the ordinance.

On April 1, 1913, there was an over-expenditure in the "operating fund" (including approximately $60,000 for insurance reserve and approximately $144,000 for accident reserve) of over $286,000, based on an allowance of 11½ cents per revenue car mile for all operating expenses, exclusive of maintenance, depreciation and renewal, and taxes, notwithstanding the city increased the allowance for operating expenses from 11½ cents to 12½ cents per revenue car mile from May 1, 1911, to Jan. 1, 1912, said increase amounting to approximately $193,000.

Taking this $193,000 into consideration, the over-expenditure in the "operating fund" for the period of thirty-seven months was approximately $479,000, including reserve for fire insurance to take care of the company's co-insurance liability and the reserve for accidents to take care of the company's liability for unliquidated and unpresented damage claims, said reserves aggregating approximately $204,000, and approximately $275,000, disregarding the $204,000 of reserves.

On April 1, 1913, there was an over-expenditure in the "maintenance, depreciation and renewal fund," without adequate provision for depreciation of property used in the service or for properly abandoned, of over $359,000, based on an allowance of approximately 5 cents per revenue car mile.

From this it will be seen that the financial results of the operation of the property for the period of thirty-seven months, March 1, 1910, to April 1, 1913, showed a combined over-expenditure in the "operating fund," and the "maintenance, depreciation and renewal fund," without any provision for liability for co-insurance on account of fire losses, unliquidated and unpresented damage claims, depreciation of property used in the service or property abandoned, of over $624,000.

Provision for co-insurance liability, accident liability, and abandoned property, as computed by the company without adequate provision for depreciation of property used in the service, would increase the over-expenditure of $624,000 previously referred to, by $1,204,000, making the total over-expenditure on this basis, $1,828,000.

Adequate provision for depreciation of property used in the service, as determined by the company, on the basis of the rates of depreciation used by Judge Tayler, Mayor Johnson and Mr. Goff, in making their valuations of the Cleveland Railway's property, less the value of renewals and replacements to make good said depreciation, would increase the over-expenditure by over $1,300,000.

This would make the total over-expenditure in "operating fund" and "maintenance, depreciation and renewal fund," or the true cost of the service furnished, based on proper accounting by a public utility company, or a public utility commission, prescribing a proper system of accounting to determine the true cost of street railroad transportation, during the period of thirty-seven months, March 1, 1910, to April 1, 1913, $3,128,000 in excess of the car mile allowances prescribed by the ordinance of 11½ cents per revenue car

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mile for "operating expenses" and approximately 5 cents per revenue car mile for "maintenance, depreciation and renewal," or $3,068,000 if the insurance reserve of approximately $60,000 be disregarded, and $2,924,000 if both the insurance reserve of approximately $60,000 and the accident reserve of approximately $144,000 be disregarded.

RESERVES

Assuming that the company's co-insurance liability for losses that might be sustained by reason of fire would be taken care of by an expenditure for fire insurance premiums, in the purchase of 100 per cent indemnity fire insurance policies, and that the company would not sustain any loss in the event of a fire, which is not borne out by experience, then the cost of the service should stand only the expenditure for such indemnifying insurance and not the amount of the insurance reserve, which amounts to approximately $60,000.

With respect to the accident reserve of approximately $144,000, it is impossible to purchase indemnity to provide for the payment of unliquidated and unpresented damage claims growing out of accidents. Taking into consideration that as at the close of Dec. 31, 1912, the amounts claimed in suits pending aggregated $600,000 for claims for injuries and damages sustained, growing out of accidents which happened prior to Jan. 1, 1913, the cost of the service should stand the amount in accident reserve, approximately $144,000, especially in view of the fact that the ordinance prescribes in Section 15, among other things, that "the company shall keep in its office full, true and accurate accounts of all moneys expended and liabilities incurred."

The amount in accident reserve, approximately $144,000, would not be sufficient to measure the "true and accurate liabilities incurred" for unliquidated and unpresented damage claims, especially with suits pending aggregating $600,000 in amounts sued for.

An unexpended balance in "accident reserve" or any other "reserve account" belongs not to the stockholders, not to the city, but is a part of the property of the company.

Without an adequate reserve to provide for the payment of unliquidated and unpresented damage claims, growing out of accidents, and adequate reserves for maintenance, depreciation and renewal, the capital value of the property unimpaired cannot be secured nor the true cost of the service determined.

The company has no incentive to charge more for the service than it costs, as it has no other return than the prescribed interest on its bonds and stock and the assurance of the unimpairment of its capital.

The interest and the responsibility of both the company and the city would appear to be identical and in the nature of a trusteeship, both being charged with the duty of furnishing street railroad transportation to the public at cost, under the terms and conditions and within the limitations prescribed by the ordinance, and both should be accountable to the public for the proper performance of this obligation.

If the company should charge more for the service than it costs, under Section 31, a board of arbitration could reduce its rate of return on its stock from 6 per cent to 5 per cent per annum. This amply protects the car riders.

The figures herein presented show that during the thirty-seven months' period, March 1, 1910, to April 1, 1913, the street railroad transportation prescribed by the city and furnished by the company, not "the best street railroad transportation," as prescribed by the ordinance, cost at least $3,068,000 more than the revenue derived therefrom at the rates of fare prescribed, even with a "fair and fixed rate of return" limited to 6 per cent per annum on the "capital value" as fixed by the ordinance.

COSTS OF OPERATION

The cost of carrying a revenue passenger by the Cleveland Railway during the three ordinance years ending Feb. 28, 1911, 1912 and 1913, respectively, was as shown in the accompanying table.

Cost in Cents of Carrying a Revenue Passenger by the Cleveland Railway.

		Year Ending Feb. 28, 1911	Year Ending Feb. 29, 1912	Year Ending Feb. 28, 1913	Average for Three Years
(A)	Cost as per company's books.	3.63	3.50	3.29	3.47
(B)	Cost as per company's books adjusted to conform with the arbitration decision of June 19, 1913	3.58	3.45	3.27	3.43
(C)	Cost after providing for insurance reserve, accident reserve, ordinary maintenance and depreciation, 6 per cent return on capital value	3.87	3.79	3.64	3.76
(D)	Cost after providing for insurance reserve, accident reserve, ordinary maintenance and depreciation, 8 per cent return on capital value	4.15	4.06	3.89	4.03
(E)	Cost after providing for insurance reserve, accident reserve, ordinary maintenance and depreciation, 6 per cent return on capital value, amortization for 50 per cent loss in capital value, figured on a 4 per cent sinking fund basis	4.15	4.05	3.88	4.02
(F)	Cost after providing for insurance reserve, accident reserve, ordinary maintenance and depreciation, 8 per cent return on capital value, amortization for 50 per cent loss in capital value, figured on a 4 per cent sinking fund basis	4.43	4.32	4.13	4.29

These costs do not include any provision for contingencies-extraordinary (casualties).

	Year Ending Feb. 28, 1911	Year Ending Feb. 29, 1912	Year Ending Feb. 28, 1913	Average for Three Years
Investment	$25,000,000	$25,500,000	$26,500,000	$25,666,667
Car miles	26,282,977	28,140,251	28,927,359	83,350,587 (Total)
*Revenue passengers	176,208,347	191,680,322	206,026,691	573,915,360 (Total)
Population served	600,000	625,000	660,000	628,000
Revenue rides per annum per capita of population served	294	307	312	305

*Actual number of revenue passengers carried by the Cleveland Railway during the three ordinance years ending Feb. 28, 1911, 1912 and 1913, respectively, on a 3-cent fare, plus 1 cent for a transfer, from March 1, 1910, to June 1, 1911, and on a 3-cent fare, no charge for a transfer, from June 1, 1911, to March 1, 1913.

An increase in the rate of fare would probably decrease the number of revenue passengers carried.

The costs of carrying a revenue passenger, as shown in the table, do not properly represent the cost of service, when the conditions under which the service was furnished are considered.

The costs shown are lower than the normal costs of service because the "riding habit" under higher rates of fare would probably decrease. This would, in turn, cause an increase in the cost of service per passenger, since a large part of the total cost of service is fixed and does not vary directly with the number of passengers carried.

"Amortization," to provide for a possible loss in capital value of 50 per cent, which may be sustained at the expiration of the franchise, has been figured on a 4 per cent sinking fund basis, although the customary or usual basis is 3 per cent, not 4 per cent. The 4 per cent basis was taken because the prevailing rate of interest at the present time, allowed by the savings banks and trust companies of Cleveland, on savings deposits, seems to be 4 per cent, rather than 3 per cent. The 4 per cent rate, of course, may not be maintained during the period within which the amortization sinking fund would be required to be built up.

The company, finding that the cost of the service furnished, was more than the receipts from the rates of fare prescribed and that the security to the company of the unimpairment of its capital value, and the rates of return there-

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on, as provided for in the ordinance, was threatened, asked for arbitration, as provided for by the ordinance, on the questions as to whether the allowance for "operating expenses," and the allowance for "maintenance, renewal and depreciation," as defined in the ordinance, should be increased, and, if so, what amount.

The unanimous decision of the arbitration board, with respect to "operating expenses," was, that there should be an increase of six-tenths of 1 cent per car mile, making the allowance 12.1 cents per car mile, effective on March 1, 1913.

The unanimous decision of the arbitration board, with respect to "maintenance, renewal and depreciation," was that the allowance of approximately 5 cents per car mile was possibly too small. A majority of the board (the company's arbitrator dissenting) was of the opinion that there should be no increase in the allowance for "maintenance, renewal and depreciation," as prescribed by the ordinance, but that a new start should be made, on the theory that the allowance of 5 cents per car mile would provide an adequate "maintenance, renewal and depreciation reserve" for the future.

The board unanimously decided, with respect to the over-expenditure of $323,597, as of March 1, 1913, for "maintenance, renewal and depreciation," that before the close of the ordinance year on Feb. 28, 1914, the company should be reimbursed for this amount by transfer of sums from the "interest fund," from time to time, or that the car mile allowance, as prescribed by the ordinance, be increased to such amount as would balance said over-expenditure.

THE PLAN DOES NOT MEET THE SITUATION

From the foregoing, it would appear that the Cleveland franchise plan did not meet the Cleveland situation, nor would it meet the situation in any other city for the following reasons:

(1) Because the service is inadequate and unsatisfactory, measured by the usual standards obtaining, far from being "the best street railroad transportation," as prescribed by the ordinance, not only with respect to the number of cars, but also with respect to the limited trackage operated, from the standpoint of population and territory served.

(2) Because the cost of the service, inadequate and unsatisfactory as it is, is greater that the receipts from the rates of fare prescribed by the ordinance, if proper allowance and provision was made for "insurance reserve," "accident reserve," and "maintenance, depreciation and renewal reserve," to say nothing of an "amortization reserve."

(3) Because the capital value as determined by the ordinance does not represent what the investment in the Cleveland system was, or what the investment in any other similar street railway system would be, operating the same amount of trackage as the Cleveland Railway operates, without regard to what the trackage should be, based on population and territory served.

(4) Because the rate of return—on bonds 5 per cent, on bills payable 6 per cent, on capital stock 6 per cent—and adequate margin of safety, are not sufficient to compensate capital properly for the risks incident to the hazards of the street railway business.

(5) Because there is no assurance that the capital value as determined by the ordinance, or experience in its interpretation after more than three years of operation, will be unimpaired at the expiration of the franchise, there being no requirement that the city or any other purchaser be compelled to purchase the property of the company at the capital value determined by the ordinance, or provision for the amortization of the loss in said capital value, bound to be sustained at the expiration of the franchise.

(6) Because of the rather general recognition that street railway transportation in Cleveland is being furnished at less than cost and that any disturbance of present conditions would result in a book deficit.

(7) Because the machinery apparently provided in the ordinance for insuring against and financing depreciation is similar to the "assessment insurance" of fraternal societies, now pretty effectively discredited as a safe means of providing against the contingencies of sickness and death.

(8) Because the difficulties so far encountered in carrying out the intent of the ordinance, as set forth in Section 47 thereof, and the political hazard which any city administration would assume in attempting to recognize this intent in a practical way, will sooner or later be fully appreciated by the junior security holders and their capital will be withheld for investment in enterprises where the dividends and preservation of principal are more certain.

A PECULIAR CONTEST

A daily newspaper editor, casting about for something on which to hang a prize contest, hit upon the scheme of offering prizes for the best answers to the question "Which, in your opinion, is the worst trolley line in ——— and why?" The letters were to be limited to 500 words, and peculiar as it may seem the following prizes were offered: for the best letter, 200 trolley tickets; for the next best, 100 trolley tickets; and for each of the next two best, fifty tickets. One would think that the very offer would have defeated the purpose of the contest. That it did not is merely another instance of the vagaries of human nature.

We do not know that the writer of the letter which follows in fact was a prize winner, but it would be interesting to know what he did with the tickets if he obtained a prize. The letter:

"Which is the worst trolley line in the State? They're all the worst. But the very worstest worst is the ——— Avenue line. Why? Well, to set down all the reasons it would be necessary to go over the 500-word limit about eight volumes, so I will mention just a few. In the first place, the cars are too small. You couldn't get 20 people in one of those cars with a shoehorn. In addition to the sardine packing system (without the oil) the conductor pushes through us every little while, holding up people and incidentally twisting our clothes about till we look like a bunch of scarecrows at a poverty ball. I put my coat on back side front nowadays, so that by the time I reach the getting-off place it is pulled around almost straight. The ventilation on this line is unique. The air inside is changed every time the cars are painted; namely, once in eleven years. Some class, trying to read about Somebody's Soups and Somebody Else's Chewing Gum, with the car smelling like a hunk of Limburger cheese in distress. Then the time. Oh, my! But the whole trouble is that the cars are not properly trained before leaving the factory. As a result they go just as they please. And should one of them suddenly take a notion to get a gait on it does so when there is another car immediately ahead; it draws people's attention to the sudden spurt of business-like attitude by means of a crash. But a strictly original habit on this line is slipping the pole off the trolley wire on the railroad crossing. Of course it is possible for a pole to jump anywhere, but the ——— Avenue cars prefer to do this trick at this particular point because they are so ashamed of themselves that they want to commit suicide."

James Brooks, superintendent of the Sioux Falls (S. D.) Traction Company, was in Omaha at the time of the cyclone last spring. He did what he could toward the work of rehabilitation. No matter how grave the situation the ridiculous seems always to be present. Following is an account of one of Mr. Brooks' recent experiences. "Mr. Brooks was present when the body of a negro was removed from beneath a pile of wreckage. in one hand of the corpse was a one-dollar bill and three aces were found up the sleeve of the other arm. It was presumed he was in a poker game when the storm struck."

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REPORT OF THE JOINT COMMITTEE ON BLOCK SIGNALS FOR ELECTRIC RAILWAYS*

J. M. WALDRON, CHAIRMAN; C. D. EMMONS, C. H. MORRISON, G. K. JEFFRIES, B. E. MERWIN, GAYLORD THOMPSON, JOHN LEISENRING, J. J. DOYLE

During the past year the majority of the new installations of block signals on high-speed interurban lines have been controlled through continuous track circuits. In view of this fact, the committee desires to repeat its recommendation of last year—that for high-speed interurban service automatic signals be controlled by the use of continuous track circuits, and that expenditures be concentrated on continuous track circuit control with a cheaper form of indication in preference to a more expensive form of signal and a less reliable control.

For signaling single-track suburban railways with headways between five minutes and thirty minutes and speed not exceeding 20 m.p.h., several schemes for trolley contact signals are submitted together with drawings of diagrammatic arrangements, according to different arrangements of passing sidings. It has been generally conceded that trolley contact signaling is well adapted for this type of line. Track circuit control for this general scheme of signaling has been installed, however, and may be used, possibly with certain imitations.

For signaling double-track suburban railways with headways between one minute and ten minutes and speeds not exceeding 30 m.p.h., several schemes for trolley contact and track circuit signaling are submitted, the latter including both three-position and two-position signals. All provide, either by overlays or distant signals, means for protecting the rear of a train which may be stopped a short distance beyond any home signal so that it will not be hit by a following train which overruns the signal in making a stop.

For signaling single-track interurban railway with hourly headway and with speeds from 40 m.p.h. to 60 m.p.h., two schemes are submitted. In one of these no track circuit preliminaries are used, intermediate signals replacing the preliminaries. In the other the track circuit preliminary is used with a light indicator, if desired, at the beginning of the preliminary so as to indicate, to a car approaching the siding from side on which the preliminary is located, the position of the home signal at the siding before it is reached.

In both schemes absolute blocking from siding to siding is employed, either semaphores or light signals or a combination of them being used. [These schemes were described in the ELECTRIC RAILWAY JOURNAL for October 4, 1913, pages 619 and 617.—Eds.]

For signaling single-track interurban railways with fifteen-minute headways, trains in several sections and speeds from 40 m.p.h. to 60 m.p.h., three schemes are submitted. One provides intermediate signals in place of preliminaries and uses two-position signals, giving absolute blocking for following cars at one-half the distance between sidings. The second provides signals to be of the three-position type, following cars being blocked practically one-half the distance between sidings for following movements and from siding to siding for opposing movements. With this arrangement both the stop and caution indication are given. With the third arrangement cars are allowed to follow one another in to an occupied block under a permissive indication, the blocking of opposing cars being absolute. Signals in one direction are normally clear, in the other normally danger. A light indicator is used at the beginning of the preliminary section, also a secondary light is used on the signal to provide the permissive feature. Light signals may be used if desired. [These three schemes were described in the ELECTRIC RAILWAY JOURNAL for Oct. 4, 1913, pages 619, 620 and 618 respectively.—Eds.]

For signaling high-speed double-track interurban railway with five-minute headway only one scheme is suggested. With this arrangement semaphore signals operating in three positions are used, the distance between signals being governed by the headway and speed. The operation is the same in either direction. Light signals may be used if desired. Stop and caution signals are displayed behind each car and cars are able to follow each other as close as the distance between two adjoining signals, the second car in this case running under the caution indication continuously. Continuous track circuits are used with this scheme.

DIGEST OF BLOCK SIGNAL LAWS AND RULINGS.

There is no federal law requiring the use of block signals on railroads of the United States and the Interstate Commerce Commission has no rules and regulations relating to signal systems. There is, however, a federal law requiring the use of air brakes and automatic couplers by common carriers engaged in interstate commerce. However, a number of states have laws or rulings by the Railroad Commissions governing safety devices on railroads. [The report gives these in condensed form for each of the states in question.—Eds.]

RECOMMENDATIONS OF THE COMMITTEE

The committee recommends for adoption as standard the following aspects for trolley contact signals:

For a non-car-counting signal for single track a single red light indicates "Stop: Do not pass contactor." A single green light indicates "Proceed by contactor to operate signal." If green aspect changes to red over yellow on passing contactor it indicates "Proceed: If red and yellow are displayed on approaching signal, do not pass contactor until this aspect changes to green."

For a car-counting signal for single track a single red light indicates "Stop: Do not pass contactor." A single green light indicates "Proceed by contactor to operate signal." If green aspect changes to red with a yellow light diagonally below on passing contactor it indicates "Proceed, but if yellow light changes to opposite side of red proceed under control into block as block is occupied by car running in same direction as car about to pass under contactor."

It is to be understood that red with staggered yellow on either side indicates "Block occupied with same direction of traffic," and this permits proceeding past contact device only unless staggered yellow changes from one side to the other, which indicates recording of car. Changing from one yellow to the other permits proceeding under control.

For light aspects for car-spacing signals operated by trolley contactors or other form of end set device used for double track a single red light with a white telltale light indicates "Stop." A single green light with no telltale light indicates "Proceed." A single yellow light with no telltale light indicates "Proceed—Next signal at stop." For two-position signaling the latter indication is omitted. The aspect called the telltale indicates that the contactor has operated the signals, and in practice it should be located on the next pole beyond the signal.

With regard to these recommendations of the signal committee the committee on standards decided that action be deferred until the matter had been discussed and acted upon by the convention.

APPENDICES

The report was accompanied by four appendices, of which Appendix A covered a summary of installations of signals by various manufacturers during the past year including brief descriptions of the apparatus. Appendix B covered the subject of automatic stops for both steam and electric railways and in another section, also entitled Appendix B, were submitted the data sheet sent out by the committee and the tabulated replies received from the various member com-

*Abstract of report read before the American Electric Railway Engineering and Transportation & Traffic Associations at Atlantic City, N. J., Oct. 13-17, 1913.

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panies. In Appendix C was presented a bibliography on block signals for electric railways. An abstract of that part of Appendix B dealing with automatic stops for electric railways is published herewith.

AUTOMATIC STOPS

Any historical data concerning the automatic train stop and its development should, logically, refer in the beginning to that system which has been in successful operation on the lines of the Boston Elevated Railway for more than twelve years. This was a modification of an overhead contact type of automatic stop, providing for the signal operating a rocker shaft lying transversely to the track and equipped with a tripper arm, which moved into and out of the path of an arm suspended from the forward end of the car. To this arm on the car was attached a valve which vented the train pipe when operated by the track tripper arm in the event of a train overrunning the signal in the stop position.

In 1903 a modification of this system was introduced on the Interborough Rapid Transit Company of New York City, and later on the Philadelphia Rapid Transit Company. This modification was of minor importance, however, consisting merely in the operation of the rocker shaft by a pneumatic cylinder separate from the one which operated the signal. The valves of the two cylinders were jointly controlled by the track circuit relays of the block system.

A few years ago the same system was introduced on the lines of the Hudson & Manhattan Railroad, which were then all in tunnels, and on those of the tunnel and terminal division of the Pennsylvania Railroad across New York City and under the North and East Rivers. In its application to the Pennsylvania tunnels, it was found necessary to meet a condition not heretofore encountered. Trains ran beyond the tunnels into open country and through towns and across highways where high speeds were permissible. Under these conditions the brakes might be set by contact of the lever of the automatic train stop valve with loose objects or with snow and ice, and a modified form of tripper arm was developed to overcome this difficulty. The valve is of the plunger type and is mounted between two guards, one in front and one in the rear of the plunger, so that it is protected against operation not acting vertically upward against it.

CONCRETE WORK IN COLD WEATHER

An article in the last issue of the *Engineering Record* says that it is none too soon to start preaching against the dangers of careless work in winter concreting. Despite the emphasis placed on the subject there has been a harvest of disasters each winter, serious always in the financial loss, and sometimes in life.

The precautions necessary are so simple that there is no excuse for not applying them. To discourage concreting altogether in cold weather is not only unnecessary but would result in tying up to no good purpose the capital invested in construction plant and in losses owing to postponement of the use of the structures. There are construction difficulties in other lines, but they are not allowed to interfere with the execution of the work. The heating of the material and the protection of the fresh concrete from freezing are sufficient measures to permit work to proceed in all but the very coldest weather. With intelligent supervision and close attention to the heating equipment there is no reason why even in zero weather pouring should not be continued.

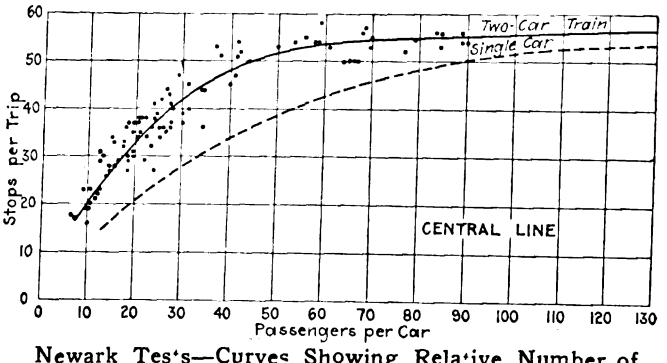
Persistent efforts, beginning at once, may help in lowering materially the disaster record made last winter. Cement manufacturers and their salesmen, cement jobbers, building department officials, engineers, architects and contractors experienced in cold-weather work can all bear a part in the educational campaign. The reward will come in greater confidence in concrete as a construction material and in the saving in life and property.

REPORT OF THE JOINT COMMITTEE ON TRAIN OPERATION FOR CITY SERVICE*

H. H. ADAMS AND W. H. SAWYER, CO-CHAIRMEN; H. A. BENEDICT, W. G. GOVE, P. N. JONES, GEORGE KEEGAN

The joint committee held its first meeting on Jan. 30, 1913, at the headquarters of the American Electric Railway Association. The following memorandum from the minutes of this meeting is quoted:

"The committee decided to give particular attention to the question of transportation matters as applying to the operation of two-car trains in city service, and to the effect of train operation upon schedule speeds with various types of trains in service, comparing this with single-car operation;



Newark Tests—Curves Showing Relative Number of Stops Made by Train and by Single Car

also as to the effect of the length of stop on train operation. Data are to be obtained relative to the results of train operation from companies now operating train service. In addition, a study is to be made of the operation of the articulated car now operating on the Boston Elevated Railway system. From the data which the committee proposes to accumulate deductions will be made which will form the basis for the report to be presented at the next convention."

After the meeting on Jan. 30 the committee sent out circular letters to several of the member companies asking for data, results of tests and conclusions regarding train operation. From the replies received it developed that practically none of the companies had as yet any comparative data. A few of them were operating trains, but these were mostly for trailer operation. Many of them were considering train operation and were keeping in mind, when buying new equipment, that they might ultimately operate trains.

The tests on train operation made by the Public Service Railway Company of New Jersey were most complete and exhaustive, and those interested in this question should read the report of these tests, copy of which is attached herewith by courtesy and permission of the Public Service Railway Company. Some of the more pertinent facts and conclusions which might be drawn from these tests are separately attached herewith, but briefly the tests appear in general to bear out the conclusions of report made by the committee last year, with the exception that for their local conditions the trailer proposition does not look as favorable as was reported by your committee. They particularly point out that, on account of trailer operation slowing down the schedule, it is inadvisable to operate trailers in the same service as single-motor cars or two-motor car trains. On the other hand, Cleveland, Denver, Pittsburgh, Birmingham and many other cities are using trailers to good advantage, and the committee still is of the opinion, as expressed in its report of last year, that "there are many cities where trailer service could be used at least to a limited extent with considerable saving over single-car operation," and that "the more flexible multiple-unit train would warrant its installation in the more extreme congested conditions."

*Abstract of report read before the American Electric Railway Engineering and Transportation & Traffic Associations at Atlantic City, N. J., Oct. 13 to 17, 1913.

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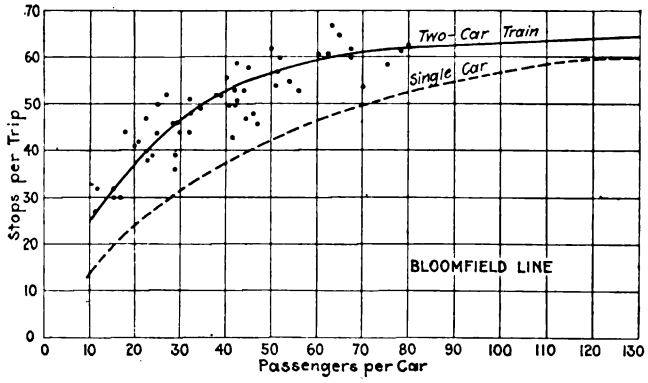
The Public Service Railway Company tests show the six-motor two-car trains to have a definite advantage over all other cars or trains tested, and while the committee concurs in the published conclusions drawn from these tests and considers that these tests, which involved a considerable expense, furnish most definite, practicable information to all railway companies interested in this subject, it begs to point out that the much-abused phrase "local conditions" should always be considered, as, for instance, in cities where four motors per car are not necessary at any time of the



Newark Tests—Curves Showing Relative Number of Stops Made by Train and by Single Car.

year, the two two-motor cars are more economical than the six-motor train.

The Pittsburgh Railways Company, through its general manager, P. N. Jones, has written the committee regarding its experience. The company apparently takes the position that for certain classes of train service there is no question or argument but that train operation is more economical and satisfactory than single-car operation—the letter being devoted, in the main, to a comparison of a train composed of two motor cars and one composed of motor and trailer. Below are quoted a few of the points brought out:

"We have maintained consistently from the first and still maintain that there is no appreciable difference in operating results between a train equipped with maximum traction trucks and four motors (two on each car) and a train consisting of a four-motor motor car and a trail car, provided the weights of the two complete trains are the same. We operate trains of the latter type over some very hilly routes in Pittsburgh and find that the schedule is not slowed down to any extent. Even a single motor car, if it becomes overloaded, will often lose more time in getting to the end of the line than a train with the normal load.

"We do not consider that any tests that can be made on any property will be accurate unless the crews have been operating the cars for a long time, since this question of slowing down of schedule depends more on the crews than on the equipment, provided the equipment is fairly suited to its service.

"It seems to require no argument to prove that any company having motor cars that weigh from 48,000 lb. to 50,000 lb., equipped with four 50-60 hp motors, should increase its evening rush-period service by the addition of light-weight trail cars. If new equipment is to be purchased with motor cars of modern design as light in weight as they can be built, there would not be sufficient weight on the front car to keep the wheels from slipping during the accelerating period, if such cars are to pull trail cars. For such service it is self-evident that two or four motors should be placed on the trail car.

"We further believe that multiple-unit control for trains has been greatly improved in the last four or five years and that the maintenance cost is very much less than it used to be.

"Our belief, therefore, is that until every big car has a trailer behind it additions to the peak service should be by means of center-entrance, light-weight trail cars, and after every large car is pulling a light-weight trailer, then every addition should be by means of light-weight motor and light-weight trailer, with motors on both cars."

M. C. Brush, vice-president Boston Elevated Railway, has kindly furnished the committee with data regarding the articulated type of car in use on that line, but as "to all intents and purposes this is a single car rather than a train and operates in all respects similar to a single car," the data are not included in this report, although, as will be noted from minutes of the committee meeting on Jan. 30, it was the intention at that time to make a study of the operation of this car, as it was recognized that this type of car gives the longest over-all length of single unit that can be ordinarily operated with one conductor.

After carefully reviewing the situation the committee finds that new data or tests available since the last year's report do not warrant at this time the further study contemplated at the ime of the committee meeting on Jan. 30; further, such data and tests as are available tend to strengthen the conclusions of last year's report, and therefore this committee concurs in general in the conclusion of last year's report and quotes from that report as follows:

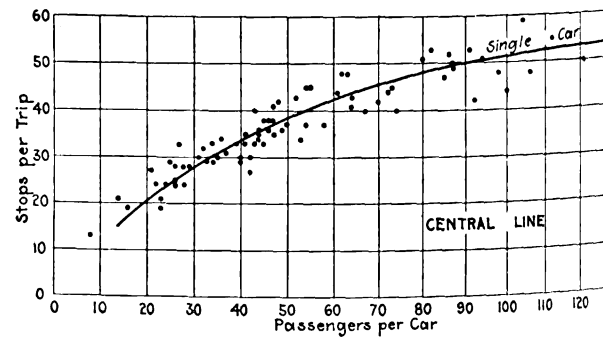
"The committee especially desires to recommend, in regard to this city service problem, that the operating officials of city properties give the subject of two-car train operation serious study and attention, as it is the belief of this committee that a distinct saving is to be made by train operation during certain periods of the day over portions of the system."

APPENDIX A

CONCLUSIONS FROM TESTS MADE BY PUBLIC SERVICE RAILWAY

The use of trains was found to be entirely practicable for congested city service, such as that of Newark. The multiple-unit combination of one four-motor car and one two-motor car seemed to be without question the most desirable, and trailer operation the least desirable, for such conditions, of all trains tested. On the general average, schedule speeds of single car and multiple-unit trains were approximately the same.

The number of passenger stops per trip tends to become constant or independent of the number of passengers provided the total number carried is sufficiently great—but on none of the lines tested was this point reached for the entire length of line, although on portions of the line the number of stops was the same, whether with single cars or train operation. The number of stops and length of stops will tend to make the train a little slower than single car



Newark Tests—Curve Showing Increased Number of Stops Caused by Increased Load on Single Car.

when carrying heavy loads, but the difference will be small.

Front and rear end collisions should be reduced, but while train operation is new there are certain accidents which may occur because of train operation. While train operation may be used to double the headway with same seating capacity or to furnish 33⅓ per cent more seating capacity, it is probable the best results would be obtained by some intermediate course. Reducing the number of units operating on a line aids in securing safety and regularity of operation. In very congested sections the track capacity is increased by elimina-

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tion of the gap between cars. There is saving in time at intersections with trains.

Track layouts must, in places, be modified to permit train operation. If trains are made up on the road, a definite allowance for coupling should be made in the timetable. Power consumption figures varied too widely, owing to methods of testing, to draw conclusions. In trailer operation the reduction in capital charges and maintenance is largely offset by increased running time. Even though trailer operation should show a saving in direct operating expense, there are many indirect objections and the operation of trailers is in general more costly than first appears.

Familiarity with equipment by train crew and other employees is absolutely essential to produce satisfactory results, and many of the criticisms will be minimized or eradicated after train operation is an established routine.

The report of the committee also included, as Appendix B, the report of the Public Service Railway of New Jersey on train operation in city services, together with several diagrams and curves. This was published in the ELECTRIC RAILWAY JOURNAL for July 5, 1913, the account containing passenger count curves for all the lines tested and condensed tables of the operating results which were obtained. Three of the curves which showed the relation between the number of passengers carried and the number of stops were not shown in this previous article and these are published herewith.

COLON ELECTRIC TRAMWAY

The contract for the construction of a street railway in Colon was executed between the Municipal Council of that city and Dr. Antonio Papi Aizpuru on Nov. 21, 1910. This contract was approved by the president of the Council on Jan. 18, 1911, and by the Alcalde on Feb. 4, 1911. Work on the system was begun on May 23, 1913, and the track has been laid for practically its entire length on D Street.

Dr. Aizpuru has turned over his interest in the franchise to a company, known as the Colon Electric Tramway, organized with a capital stock of $50,000, of which Ruben S. Arcia is president; Elias Aizpuru, secretary, and H. Hellinger, manager. The track will be 3 ft. 6 in. gage, and will be constructed of 56-lb. T-rail, laid on wooden ties 6 ft. long and 6 in. square. Some of the principal items in the construction of the system will be: One hundred and seventy-one tons of steel rail; 4,000 ties; four cars, equipped with storage batteries, estimated to cost $12,400; carhouse to cost $2,500; electric plant to cost $3,250, and the breaking up and replacing of 8,550 sq. ft. of macadam, $4,788. The erection of an electric plant to furnish power for operating the line has not yet been fully decided upon, and current for a time may be obtained from a local company.

The contract under which the company will operate is in force for fifty years. The work of construction must be completed within one year after it is begun, and the company has been required to deposit $2,000 in the municipal treasury as an act of good faith. The company is exempt from the payment of municipal taxes, but it is required to pay into the municipal treasury 3 per cent of its gross receipts for the first three years of operation and 4 per cent of its gross receipts after the first five years. Cars will be required to operate from 6 a.m. to 11 p.m., and a penalty of $12.50 is provided for each day's suspension of service. The fare is limited to 5 cents, United States currency, over the whole or any part of the system, and includes the carriage of parcels and baggage that do not exceed a measurement of more than 27 cm. Certain public officials and members of the police and fire departments are to be carried free upon proper authorization. Freight cars may be operated at the option of the company. All differences with the city are to be submitted to a tribunal for arbitration.

THE LONDON COUNTY COUNCIL TRAMWAYS

The report of the highways committee of the London County Council tramways, which was presented in June last, is a peculiarly interesting document. It appears from the report that the total capital invested in the undertaking is £12,927,925, of which, fortunately, some £3,000,000 has now been extinguished by the sinking fund. The receipts during the financial year ended March 31 last amounted to £2,251,729, and the working expenses to £1,512,675, leaving a surplus on working of £739,053. The debt charges, interest, and sinking fund amounted to £730,687, leaving a balance of only £497, to be carried to the renewal fund, and nothing whatever to the "general reserve fund." On a basis of ⅔d. per mile run, the sum which should this year have geen added to the renewals account was no less than £150,309, so that the year's accounts show actually a deficiency of nearly £150,000. It is apparent, of course, that this entire amount must ultimately be made good.

The total number of passengers carried amounted to 512,652,653, and the car-mileage to 53,943.104. Since 1907 there has been a steady diminution in the receipts per car-mile. In that year they amounted to 11.95d., and this figure fell steadily to 10.98d. in 1912. During the year which ended March 31 last, however, this fall has been accentuated, the return having fallen to 9.73d. per car-mile. Among the causes contributing to this result, the committee confess that many of the lines added during recent years have not been of a highly remunerative character, and it will be remembered that the traffic department of the Board of Trade has pointed out that any further extension of the system must be effected under such unfavorable conditions as to make financial success highly problematical, all the best routes being now adequately equipped. It is probable, too, that the electrification of portions of the London, Brighton, & South Coast line may also have affected the receipts, though no allusion to this is made in the report of the highways committee, which apparently attributes practically the whole of the deficit to the greater efficiency of the recently developed motor-bus services, which offer the public advantages which it is impossible for tramways to afford.

In order to try and meet the motor-bus competition it is proposed to speed up the services, to make new junction lines, and to reduce fares. As regards speeding up, it would seem doubtful whether this can be done without scrapping most of the existing rolling stock and replacing it by lighter vehicles, accommodating about half the number of passengers now carried. Time is lost mainly in stops, and every additional passenger carried increases both the likelihood of stops and their average duration.

As regards the question of injury to the road surfaces, no impartial observer will contend that an omnibus is more injurious than the fast motor delivery vans, or does as much damage to the roads as the heavy steel-tired steam-tractors. Nevertheless, no suggestion is made that the proprietors of these should make a special contribution to the rates. The fact is the London County Council has made a bad speculation, and quite naturally wishes the public to apportion the blame to anything but to the mistaken judgment and lack of foresight of the representatives in whom, as it has thus proved, they made such an unfortunate and unlucky section.

Ignorant of technical matters as were the politicians that induced London to saddle itself with a system of transport which is being rapidly rendered obsolescent by the march of progress, they did so with their eyes open to the fact that certain charges for rates, maintenance and widenings would be incurred, and in this knowledge they promised London enormous subventions from the profits of the tramways. It is now too late to turn round and whine at a burden that was undertaken with full knowledge and complete volition.—*London Engineering.*

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THE VALUE OF SAFETY COMMITTEES*

BY GEORGE CARSON, CLAIM AGENT PUGET SOUND TRACTION, LIGHT & POWER COMPANY, SEATTLE, WASH.

The safety committee idea orignated with Ralph R. Richards, general claim agent of the Chicago & Northwestern Railroad. Mr. Richards' plan was outlined in an exceedingly interesting paper read by him at the meeting of the American Association of Railway Claim Agents in Montreal, May 24-26, 1911. After reading Mr. Richards' paper, I became satisfied that a safety committee would prove equally valuable in accident prevention on electric railways. In many respects our organization is patterned on the same lines as Mr. Richards' organization.

A general safety committee was first organized composed as follows: superintendent of railway, superintendent of transportation, superintendent of rolling stock and shops, superintendent of ways and structures, operating superintendent of light and power, superintendent of lines and division superintendents, with myself as chairman. Later we added our chief engineer to this committee. It was then decided that we would first organize a division safety committee at one carhouse as an experiment, selecting for the purpose our North Seattle carhouse, where we had at that time 450 men.

The division committee, so organized, was composed of the station master as chairman, one man from the trolley line department, one man from the mechanical department, one man from the substation and eight trainmen, making a total of twelve men.

The men to serve on this committee were selected by the division superintendent and heads of departments. At the same time we prepared a circular letter to all employees of the company, notifying them of the organization of the safety committee, with instructions for the division safety committeemen in the duties they would be expected to perform. These instructions were to keep continual watch for anything that would cause, or tend to cause, accidents, as well as for other matters of interest to the service, and having made discoveries to report promptly, on blanks furnished, to the chairman of the division safety committee, it being his duty to forward the reports promptly to the chairman of the central safety committee, by whom they were to be forwarded promptly to the head of the department concerned, for action. When the matter reported had been acted upon, notice of the action taken was to be sent to the chairman of the division safety committee, who would advise the member who made the original report of the action taken. This circular letter contained suggestions concerning proper matters to be reported by members, such as defective cars, defective track, defective tools and machinery, defective platforms and landings, defective bridges and trestles, defective buildings, overhead defects, obstructions near the track where a passenger was liable to be hit, and all other matters that might tend to cause accidents. Of course, emergency matters and defects requiring immediate attention would continue to be reported as theretofore.

Members of the committees were instructed that one of the most important duties they would be called upon to perform would be to watch the work of new men entering the service, and others as well, and when such men were disposed to be negligent in operation, either through ignorance of the rules, carelessness or other cause, to go to them in a friendly way and tell them about matters in connection with operation in which they might not be proficient and matters about which they might be careless; that if the men spoken to did not respond to the advice given to them, it would be necessary to report to the proper authority, and if the men should continue to be careless after sufficient warning had been given, it would become necessary to remove them from the service.

We decided at the beginning that the service of the division committees should be for six months, and we are continuing this plan, changing the personnel of these committees every six months, thus giving an opportunity to a large number of men to serve within a comparatively short time. When the term of service of the division committees expires, we encourage its retiring members to continue this safety work as when they were official members of the committees.

It was intended that the division committees should meet formally at least once each month and discuss matters of accident prevention of interest to the service, the company paying members for the time lost through attendance at the meetings. It was also decided that meetings should be held between the division and central committees, at times to be decided upon, for the purpose of discussing matters of interest in the prevention of accidents and any other matters of general interest to the service that might arise. We are now holding such meetings once each three months. The claim department prepares and submits to the meeting a report of the accident situation, going back three months, bringing out the class of accidents that appear to be most frequent. Means are considered for the reduction of such accidents, and we discuss thoroughly the general accident situation.

It was believed when our organization was first started that it would result in bringing the officers of the company and the employees together in a manner that would bring about more friendly and closer relations between them and thus prove beneficial in bettering conditions generally and reducing accidents. Our expectations have been fully realized after a year's trial. The atmosphere is clearer, general improvements have taken place in our entire organization, and accidents have been greatly reduced.

After trying out the first division organization referred to above for about six weeks, we decided that it had proved a success far greater than had been anticipated. It was then decided to organize our whole system on the same lines, which we did as rapidly as possible, completing the organization about March 1, 1912. Our whole safety committee organization consists now of about seventy men.

Soon after the organization was completed, the claim department gave a dinner to all members of the central and division committees and a number of invited guests which included all the officials of the company. We continue to give these dinners semi-annually. At these dinners subjects appropriate to the topic of safety are assigned to some of the officers of the company to speak upon.

These dinners have certainly resulted in great benefit to the company. Apart from the educational feature in connection with the subjects dealt with by the speakers, such gatherings arouse, in a high degree, an interest among the men in the prevention of accidents and the welfare of the company's business in general.

We hold meetings of the central safety committee whenever occasion arises. These meetings are held very frequently. I appoint sub-committees of the central safety committee to take up and act upon matters that arise in accident prevention. Some of these appointments are permanent, other committees are appointed to act on certain matters, and when these are disposed of the committee is discharged.

We have a permanent sub-committee on carhouse competitive charts known as "bogies." These are the result of an idea brought out at one of the meetings of the central committee by one of the members. We think these charts prove very beneficial in that they create a friendly rivalry

*Abstract of paper read at annual meeting of American Electric Railway Claims Association, Atlantic City, N. J., Oct. 13-17, 1913.

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between the trainmen of the various carhouses, arouse great interest, and undoubtedly tend to increased exertion on the part of all trainmen to avoid accidents.

We also have a permanent sub-committee on carhouse meetings whose duties are to make arrangements for subjects and meetings of trainmen and the members of transportation and claim departments.

Recently our central safety committee decided to present to all members of the safety committees, past, present and future, a handsome watch-fob suitably inscribed. To make the safety committee organization of the most value, the interest of the men should be continually kept up in the safety work by the claim agent, or whoever is chairman of the safety committee. This official should call regular and frequent meetings to discuss the accident situation and inspire the men with enthusiasm so that the committees do not become merely perfunctory and useless organizations, but rather develop into live, active and vigilant bodies of men, bent on improving and bettering the service and avoiding accidents.

DETAIL OF EXPERIENCE WHERE SAFETY COMMITTEES HAVE BEEN IN EXISTENCE

We now have a live organization and our accidents are certainly decreasing. This is shown conclusively by the comparison between the years 1911 and 1912. The figures follow: Number of accidents, 1911, 5305; 1912, 4193; per 100,000 miles, 1911, 43.15; 1912, 33.24; per 1,000,000 passengers, 1911, 70.18; 1912, 55.07. I do not mean to say that the decrease shown was entirely brought about by the safety committee organization, because we have been using many other accident preventive methods. I feel certain, however, that the safety committee organization was a prime factor in the reduction.

HAVE SAFETY COMMITTEE SERVED TO DIMINISH THE NUMBER OF UNREPORTED ACCIDENTS?

Unreported accidents may be divided into three classes: (1) Those which in reality never occur and are predicated upon the fraud and frame-up of claimants; (2) those which do occur and are of such a nature as not to come within the observation of the trainmen; (3) those which trainmen wilfully fail to report.

To deal with the first class is a problem for the claim agents' associations and index bureaus throughout the country and calls for alertness on the part of claim agents and their assistants, and while the organization and the work of safety committees may not materially affect this class of unreported cases, the vigilance of the trainmen developed by safety committee organization will make fake cases more dangerous for fakers in their attempt to perpetrate frauds on our companies.

As to the second class, safety committees can aid materially by the reporting of defective conditions in and about cars, equipment, landings, etc., and in that way considerably reduce the number of these cases. In fact, it has been our experience that there has been an appreciable decrease in this class of unreported accidents since the inauguration of the safety committees.

As to the third class, a trainman who wilfully fails to report an accident in which he is concerned is, of course, a most dangerous employee, much more to be dreaded and much more undesirable than the man who steals the fares of his company. Trainmen generally recognize that wilful failure to report an accident is an inexcusable offense. The good influence exerted by the safety committee organization so clears the atmosphere that a trainman who would wilfully fail to report an accident would be regarded with scorn by his fellow employees, and would be forced to do right or leave the service. In this way the latter class of unreported accidents are diminished by safety committee organization.

WRITTEN DISCUSSION ON VALUE OF SAFETY COMMITTEES

BY R. E. MACDOUGALL, CLAIM AGENT NEW YORK STATE RAILWAYS, ROCHESTER, N. Y.

My attention was first attracted to the value of safety committees by Mr. Carson at the 1912 mid-winter meeting. I became interested and, about the first of October, 1912, following Mr. Carson's plan, perfected an organization somewhat similar to his on the Rochester Lines of the New York State Railways. The organization is composed of a permanent central committee and five division committees—three city and two interurban. The city committees consist of twelve and the interurban of eight members, and the personnel of the division committees is changed every six months. Up to April 1, 1913, the sub-committees turned in a total of 160 suggestions to the central safety committee Of these the company adopted eighty-one. Seventy-three were deemed inadvisable and six held in abeyance. No foolish or absurd suggestions and no suggestions involving the expenditure of a large amount of money were made. In addition, about sixty suggestions were sent in by others who were not members of the committees and were acted on in the same manner.

With us safety committees have not yet succeeded in reducing the number of accidents, as our accidents show an increase in number over prior years; yet the class of accidents has not been so serious. However, there can be no doubt as to the value of these committees. The cost of maintaining them is almost nil—the payment for their time to members of the division committees and the expense of putting suggestions into operation where adopted.

WRITTEN DISCUSSION ON VALUE OF SAFETY COMMITTEES

BY H. K. BENNETT, CLAIM AGENT FITCHBURG & LEOMINSTER STREET RAILWAY

My experience with a committee of this kind is limited to observation of those now in operation and of the results of my own endeavor as a committee of one. Any sensible plan along the line of accident prevention should be given a free and fair trial. It may be that it is not an idea to be universally adopted from the viewpoint of local conditions and that it is not as necessary for the smaller roads to have a large working committee, especially where the claim department can handle the situation itself. If the men come to the claim department for instruction, and this instruction is wide in its scope, and embraces the ideas of a "safety committee," and the claim department is allowed to follow up the instruction to see that it is carried out, then we have such a committee on a small but efficient scale. We are all, or should be, "doctors of prevention," and this is but one of the ways in which we should work if allowed to by the management of our respective companies.

In this connection, it is my personal opinion that our association should maintain a permanent "safety committee" for the purpose of assisting member companies along the line of prevention. This committee could well study the causes for the various kinds of accidents, and be competent to offer suggestions, should they be desired, looking toward their elimination.

The instilling of the idea of co-operation should be made one of the features of the education of employees before they go to work. Special effort should be made to gain the goodwill of the motorman or conductor in advance, making the matter a personal one with him by stating plainly that the reporting by him of defects or conditions that should be

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remedied is as much for his benefit as for that of any one else and that a failure in this direction may cause him personal injury; that a man who does report these matters, as well as fellow employees who are taking chances and not conforming to the rules of the company, is not by any manner of means a spy, but rather one who, in the interest of self-preservation, has the welfare of the public and the company in mind.

THE PREVENTION OF ACCIDENTS*

BY H. V. BROWN, GENERAL CLAIM AGENT PUBLIC SERVICE RAILWAY OF NEW JERSEY

I do not believe the full importance of keeping men in the service has been generally realized. Last year we prepared a set of figures and graphics, based on the records of the Public Service Railway for the entire year of 1911, and I was surprised to find that our conductors and motormen in the service less than one year, and who made up 34.50 per cent of the entire force, were responsible for 60.90 per cent of all the accidents occurring during the year. It therefore follows that the men in the service over one year made up 65.50 per cent of the entire force, and that the per cent of accidents attributable to them was but 39.10 per cent of the whole number. An analysis of the expenditures showed that the cost of accidents for the year attributable to men less than one year in the service averaged $202.05 per man, while those attributable to men in the service one year or over averaged but $67.31 per man; in other words, the new men were costing almost exactly three times as much as the old men.

Undoubtedly the fine accident record made by the men who had been in the service over one year indicates that their conservation of the company's resources extended to other departments and gives weight to the argument that it pays well from all standpoints to maintain as nearly as is possible a permanent force. The question of comfort and entertainment for the men and the setting up of safeguards to prevent injustice in the administration of discipline are the most important factors to be considered. The Public Service Railway has, through its welfare department and through the various officials who come in contact with the men, made a special effort to retain men in the service. We find that of the men in the service at the end of the year 1912 but 24.9 per cent have been in the service less than a year, as against 34.5 per cent at the close of 1911. This change in the make-up of our force toward permanency has been reflected all along the line, especially in the accident record.

Many companies issue bulletins to the men at frequent intervals containing instructions and comparative statements—the comparative statements for the purpose of stimulating interest and rivalry between the carhouses and divisions. The statements should at least cover the number of passengers carried per accident and the average number of witnesses obtained. The unreported accidents should be shown separately and the men impressed with the fact that to fail to report an accident is a very serious offense. It is an advantage to post the comparative statements, in the form of bulletins, in conspicuous places at the carhouses.

The "bogy" charts, which I understand were first introduced in street railway work by Mr. Carson, of Seattle, are excellent. These show the daily accident record by graphics and figures as against that of the previous year. The idea is so simple that it is understood at a glance. Our men show great interest in these charts and are constantly striving to keep below the "bogy" line.

Educating the public in the prevention of accidents is a field in which there is great opportunity for new and original ideas to be developed. On all sides we hear of vague general plans. Public safety committees and safety bureaus in long and interesting articles in the daily press tell of their good intentions. Usually statistics are quoted as to the appalling number of railway, auto and other casualties occurring daily, and it is declared that this horrible carnage must be stopped, and, what is more, the particular movement described is about to stop it. When we come to look the situation over, we find that no very substantial results have been accomplished by these general movements, but I do believe that at some future time there will be a larger appreciation of the necessity of conserving human life and health and a practical way to accomplish it. In the meantime the street railway and steam railway companies and some of the large industrial concerns are doing very effective work.

Perhaps the branch of this work that has been best developed is that among the school children. Our campaign in New Jersey was conducted by Frederick S. Hughes. It took him, with an assistant furnished by us, about ten months to cover our territory, and about 100,000 children were reached. The result was quite a substantial falling off in accidents to children of school age. One result of the campaign that I consider remarkable is that not a single child has been killed or injured as the result of touching a live wire since the campaign closed in March, 1913, although there had been frequent accidents of this sort before, especially with the wires of the Public Service Electric Company that furnish light and power to practically the entire State.

*Abstract of a paper read before the American Electric Railway Claims Association, at Atlantic City, N. J., Oct. 13-17, 1913.

REPORT OF THE COMMITTEE ON EDUCATION*

H. H. NORRIS, CHAIRMAN; R. S. GOFF, J. F. CALDERWOOD, D. C. JACKSON, A. S. RICHEY, WILLIAM ROBERTS, F. J. FRYOR.

Last year it was hoped that the correspondence course, with which the committee had excellent success in a preliminary experiment, could be inaugurated on a large scale, but this was found to be impracticable largely because it was impossible to reach the officials of the companies with clear explanations of the plan. At the midyear meeting an appropriation of $250 was made to cover expected expense for the remainder of the year. The educational committee planned to publish in the *Aera* from time to time papers bearing on practical educational topics, but as the members of the committee were too busy to prepare this a railway man was to be paid for the work upon the papers. The association was to reprint the papers for distribution among the employees of the member companies. The expectation was that the foremen or others interested would assist in disseminating information among the men. In furtherance of the plan several communications have been printed in the *Aera*. The plan for the employment of an instructor could not be carried out. An excellent man was engaged, but he was unable to get the work done in the time available. The committee has, therefore, expended no money.

The association was represented at the founding of the National Association of Corporation Schools by Secretary Donecker, who also attended the midyear meeting of the American Institute of Electrical Engineers educational committee in order to keep in touch with its work.

An important feature of this year's work of the American Electric Railway Association educational committee has been the fine spirit of co-operation manifested by the educational committee of the affiliated associations, and it would seem wise for the American Association to continue to have a committee to keep posted on educational matters, to carry out such plans as seem needed and practicable and to maintain the present spirit of helpful co-operation with the affiliated societies.

*Abstract of report read before the American Electric Railway Association, at Atlantic City, N. J., Oct. 13-17, 1913.

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FRANCHISE VALUES*

BY WILLIAM M. WHERRY, JR., NEW YORK

Cost is often confused with value, and the fact that the purpose for which the property is used is one of the elementary considerations which have to be taken into account in fixing value is often ignored. Even in so recent a case as the Minnesota rate decision, we find one of the ablest judges advancing the opinion that property which can only be used for a railroad right-of-way is not to be valued as a railroad right-of-way. The result of this is that a great deal of confusion and vagueness pervades the whole subject.

It is generally conceded that special franchises have value, but what such value is and how to arrive at it is a subject of endless dispute. Without the protection of law there can be no value, for, as Bentham said, "Property and law are born and must die together. Before the laws there was no property; take away the laws, all property ceases." Value must be distinguished from cost. They are two separate conceptions. In economics, value is always considered in the sense of price, but the essence of value is the advantage which the owner derives from possession.

The advantages which the owner can derive from any property fall into three classes. First, those of mere enjoyment. We may use the thing owned. It may be of no use to us except as a possession. In the second place, we may regard it as something which we can dispose of in exchange for other advantages, and in the third place, we may, by using it, derive a profit or income from it. A franchise, in the broadest sense of the term, has all these elements of value, but the element of special value in any special franchise is the power to produce an income or profit out of the exercise of that franchise.

It was early established that a franchise which had in it no element of value except the power of enjoyment derived from its possession had a value; that such value could not be taken except by due process of law, and that if taken, compensation must be awarded. The same thing is true of a franchise whose chief value lies in the second element, namely, its marketability. In considering the marketable or exchange value, it will be noted that in order to be marketable the property must be alienable.

In most cases the enjoyment and the marketability depend on the profit which the owner or expectant owner can derive from the user of the franchise, and it must follow that the third element of value, namely, the power to earn profits, must be protected, or the value will be impaired. And the courts have so held in many cases.

Let us now consider how the question of franchise value may arise and how it is to be determined. In discussing value, the word is frequently used with reference to marketability, and this is what gives rise to the confusion of value with cost. It is plain that the value of a thing, due to its marketability, is often synonymous with cost. The price which we pay for a thing, that is, the cost, is evidence that at that time the value we set on it was at least equal to the amount paid.

A franchise is not a commodity, the value of which can be arrived at by collating and comparing market prices. Furthermore, franchises are often given away, and in the great majority of cases cost nothing, the reason being that the use of them alone can give them value. The confusion of value with cost gives rise to the fallacy that because a thing cost nothing it has no value. A thing may cost nothing and yet have a great value due to its marketability or the profits which can be derived from its use. In the case of tangible property, this is universally recognized. In the case of intangibles, it is now established, but the notion persists in some quarters that because franchises cost nothing they have no value which the law is bound to respect.

The confusion of cost and value has given rise to another fallacy, namely, that the owner is not entitled to the unearned increment which has accrued. In fixing a value from the point of view of marketability of a franchise, the question arises whether the court should protect unearned increment. In most cases the unearned increment establishes the value of property as a marketable commodity. Whenever property is bought with the expectation of reaping a profit, the unearned increment is discounted. The store which the owner sets on his property is fixed largely by his estimate of its unearned increment. To deprive the owner of his unearned increment is to deprive him of his property. This is peculiarly true of a franchise, the value of which lies almost entirely in its unearned increment.

Of course, the value of any property as an article of commerce is largely dependent upon the use to which it can be put, and also the profits which can be derived from it. Nevertheless, a franchise may have a value to its owner solely because of the fact that he can sell it. For example, the owner may not be able to use the franchise as efficiently as someone else, in which case it would be more to his advantage to sell it and it would have a greater value to him as an article of commerce than as an income producer. Again, the owner may be a corporation whose corporate charter has expired but whose special franchises survive, as in the New York Street Railroad case. In such a case the owner cannot use the franchise, but someone else can, and the franchise is valuable to the owner by reason of his right to sell. It is seldom, however, that the value of a franchise is determined solely by its marketability. Usually its chief value lies in the fact that profits can be derived from the use of it. The existence of this value is sometimes disputed, but is recognized by economists.

It is always, of course, difficult to ascertain what is the value of any property by capitalizing its expected income. We have to ascertain the probable income and the rate of interest. The facts on which the probable income depends are the population served, its wealth and the like. The rate of interest depends upon the risk involved. Instead of a single rate of interest representing the rate of exchange between this year and next year, we find a great variety of rates. The rate in every case is adjusted on the basis of the security. It is the uncertainty which makes changes in value. The happenings of almost every day—new inventions, floods, disasters, regulations under the police power, tariff revisions—all these things affect the interest rate and affect the value. What the courts do is to approximate the value as nearly as possible and hold that the value which the law protects is the value which is set upon the property to-day; that is to say, it is to-day's estimate of the probability of any of these chance happenings occurring, and not to-morrow's certainty.

In many cases franchises must be valued, and the value must be based on the power to derive profits. The earnings must be taken as of the time when the value is fixed. In the Consolidated Gas case, a rate-making case, the Supreme Court of the United States valued the franchises in that way. In that case the court said it took this value because the State had already fixed it for purposes of taxation. In other words, the court held that the same method of arriving at value which was proper in a taxation case was also proper in rate making.

The question then comes, how far does the Constitution protect this value? The Constitution prohibits the taking of property except by due process of law. The property may be taken in a condemnation suit, but compensation must be made. It may be possible to lower a service charge without taking the property because the charge as lowered may so increase the net earnings that the value of the property

*Abstract of a paper read before the American Electric Railway Association, at Atlantic City, N. J., Oct. 13-17, 1913.

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as an earning proposition will not be impaired, or there may be some compensating advantage which would lower the rate of interest by increasing the safety of the investment. There is no case where the court has admitted that a reduction of service charge would decrease the value of the property and yet has sustained such reduction.

Certainly the State has the right to prevent extortion, for example fixing a rate of interest to prevent usury, or requiring blacksmiths and innkeepers to serve travelers at the same rates which prevail generally throughout the country for similar services. The whole rate-making power of the State is based upon this principle and is limited by it. The State can only fix a service charge for the purpose of preventing an extortion.

In the early cases the only question was what could a public servant recover on a *quantum meruit* for a service which he had rendered, and whether the charge which he had made was reasonable or not. The question of what profits he derived from his business did not enter into the matter at all.

In modern practice, the commissions and the courts have departed from this ancient principle. They have inquired into the profits which the public service companies have made and reduced service charges not because the charges were exorbitant but because the profits seemed unreasonable. Perhaps they have not put it expressly on that ground, but that is the effect of their holdings. The only bearing which the amount of profits should have is as being an evidence that the charge is unreasonable. In order to ascertain this, it would be necessary to compare the profits derived in the case before the court with profits derived on all similar businesses conducted under similar conditions during the same time and at the same place. In other words, you must ascertain as a fact the actual past rate of interest.

If the State should ascertain as a matter of fact that the charges made in the case before it were exorbitant, taking into consideration, among other things, the profits derived on the investment, it has, perhaps under the police power, the right to take away the value by reducing those charges, even though by so doing it reduces the earnings for the future. This would be taking the property by due process of law. The State runs the risk, however, whenever it inquires into the past, of committing the gravest sort of an injustice, since its own acquiescence in the charges then made has served as the basis upon which the value has accrued, and under the doctrine of estoppel, it would be unreasonable for the State to take away that value, when its own acquiescence has created it.

If the court fix different values on a franchise in a rate-making case and in a condemnation case or a taxation case, they run the risk of permitting an extortion on the part of the State, for, of course, the State could destroy the value by denying that any value existed, irrespective of whether the charges made for the services were reasonable or not. This would certainly be taking property without due process of law.

The value of the franchise as based on its earnings cannot be omitted in ascertaining the property which the law must protect and which can only be taken by due process; such value can only be taken away when the charge is clearly extortionate or unreasonable as compared with the service rendered, otherwise the State becomes the extortioner and not the protector against extortion.

In arriving at the question of what is a proper charge for the services rendered, the significance of the unearned increment should not be lost sight of. There are cases where the unearned increment is not a return for any service. For instance, in England there has been a land-holding class where titles have changed comparatively little for centuries. These land owners have performed no service to the community. Each unearned increment value contributed by the community at large bears no relation to any service rendered by the land holders. This is very different from the case where the person who benefits by the unearned increment actually performs a service which is measured by this increment. For instance, a franchise unused is of no value. The man who develops and uses it is performing services and the value which accrues from such use and development is the measure of those services. The consideration for the development of the franchise is this value, and it cannot be taken away without depriving those who have created it of the reward for their services.

REPORT OF JOINT COMMITTEE ON TRAIN OPERATION FOR INTERURBAN SERVICE*

EDWIN C. FABER, CHAIRMAN; C. N. WILCOXON, F. A. BUNDY, J. B. STEWART, E. F. GOULD, G. T. SEELY

A data sheet was sent to all member companies in order to get certain information to be made the basis of this report, and replies were received from over sixty companies, of which twenty-six are already using train operation to a greater or less extent in their regular passenger service. The use of train operation for handling freight business is a comparatively small problem compared with passenger operation on interurban roads, and so has been disregarded this year by the committee. In this year's report it has been the aim of the committee first to find out what is the practice of the various operating companies in regard to interurban train operation, including not only the advantages accruing from such operation but also the handicaps and problems arising therefrom.

Of the roads operating passenger trains there is a great diversity in the proportion of total service requiring trains of two or more cars, the proportion varying from 5 to 75 per cent, but on all roads such train service seems to require an average of about two cars per train, with the maximum length of train usually four or five cars. Of the member companies replying to the inquiry, fourteen are already using trains in regular daily service, as differentiated from a number which maks up trains usually consisting of one or more trail cars added to a motor car, using the arrangement only on comparatively few days during the summer to handle some especially heavy traffic. This is indicative of the gradual tendency of electric interurban service to follow steam road practice, particularly as the density of traffic and length of haul increase. Only two roads replying to the data sheets are using sleeping, dining or buffet cars. Such special accommodations, it is evident, will not come into general use on electric interurbans until through service of a long-haul nature over connecting systems, or connecting divisions of a consolidated system, becomes more common.

Most of the roads which are operating trains in regular service have cars equipped with multiple-unit control. The use of a motor car dragging a trailer is perhaps the best arrangement for those roads whose traffic conditions are exceptionally heavy for only a few days in summer, but for regular daily operation of trains there is no question that the multiple-unit system is very much more flexible and a time saver when schedules are at all severe. Not only is it very convenient to have all cars movable on their own power for switching and making-up purposes, but the facility with which trains can be made up at junction points from single-car units on the different branches is a great point in favor of the multiple-unit system.

Another physical feature of car construction which has received the attention of several of the roads operating trains is that of center-end doors to allow the passage of a person from car to car. That such construction is not more generally used would seem to indicate that train operation

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is a rather recent development in the case of most roads, or that present excessive curvature of tracks would not make such construction desirable. That long cars and short radius curves in cities are no real hindrance to the operation of the trains is shown by no less than eight roads, which operate cars in trains around curves of from 34-ft. to 60-ft. radius, lengths of cars varying from 52 ft. to 67 ft. 6 in. One road operates 62-ft. cars around 34-ft. radius curves, and another cars 67 ft. 6 in. long around 35-ft. radius curves, and the results indicate that no difficulties are being experienced in either case.

Practically every road has a certain proportion of its track laid on city streets or public highways, though in only one or two cases were municipal regulations noted against train operation. It is possible that the lack of municipal regulation may be due to the comparatively small proportions which train service has reached in the case of many roads, or that the roads now employing train service have made special provision in laying out their entrances to cities. As trains increase in length, however, municipalities might raise objections to the operation of heavy trains through principal and crowded streets, or might so limit the speed as seriously to affect the schedule. The importance, therefore, of having the best possible entrance to all large cities is apparent, and has already been recognized by a number of companies that have provided special rights-of-way into cities or else have relocated their terminal stations so as not to make it necessary that trains be run on the main thoroughfares.

The schedule speeds maintained are from 20 m.p.h. to 30 m.p.h. in local service and 30 m.p.h. to 45 m.p.h. in limited service, and compare very well with steam railroad service for similar lengths of haul. The average headway reported between trains is thirty minutes to sixty minutes, most of the roads employing sixty minutes, though a few report fifteen minutes or less, the latter instances being in the case of double-track roads. It can readily be seen that handling the same service in single-car units by increasing the number of separate trains would greatly decrease the headway, largely augment the difficulties of dispatching and occasion a considerable extra loss of time in waiting at sidings, not to mention the resulting increased danger of collisions.

As to the saving effected in power consumption by the operation of trains, there were various answers. About 25 per cent of the roads consider that there is a saving, estimating this at from 2 per cent to 25 per cent over what it would be with single cars, though the majority evidently have neither investigated nor considered this phase of the situation. A few seem to doubt that there is any saving, and one states that instead of a saving there is an increase in power consumption due to the increased number of stops where trains are used. This latter point is one which well may be taken into consideration, as it is a well-recognized fact that the larger the number of passengers in a train, the greater is the probability of making any particular stop. This has been noticed before in investigations of rail-car operation in city service and applies with equal force to interurban service having a considerable number of signal stops. With any given number of stops there should be, and is, a saving in power per car mile from the operation of trains.

No data are available to show the effect on maintenance cost of train operation, but it is logical to expect a certain saving per car mile if a certain amount of the service is handled by trail cars or two motor cars instead of four motor cars.

The largest item of saving is, of course, that of platform expense, and the amount of this depends altogether on the size of the trains and the crew required by local conditions. From the replies received, the actual saving over single car operation is all the way from 20 to 50 per cent. There is considerable diversity in practice as to the number of conductors and brakemen required on the various lengths of trains, many of the roads being able to operate three and four trains with three men, including the motorman, while others require four to five men, including the motorman. It is evident, of course, that unless end vestibule doors for passage between cars are provided, there will be required one trainman for each car, in addition to one motorman for the train.

An effort was made to ascertain what effect train operation had had on the accident question, but nothing tangible could be obtained. Several roads stated positively that train operation had had no effect either in increasing or decreasing accidents, while ten companies, though having no figures to present, feel that the use of trains reduces accidents, especially collisions, due to a lesser number of trains on the road.

The following are factors which have made it unnecessary for other roads to consider train operation and in many cases are, of course, simply the reverse of the arguments for it: (a) Insufficient density of travel. Most of such roads find that one car per hour will take care of all regular service, and use trail-car operation in very rare cases only. (b) Municipal ordinances forbid train operation. (c) Sharp curves or other physical barriers in cities. (d) Expense of changing control and air equipment.

The report was accompanied by an appendix containing curves to show the results of a number of tests to determine the energy consumption of one, two and three-car trains in regular service on the Aurora, Elgin & Chicago Railroad.

COMMENTS ON CLEVELAND FARES.

The following humorous letter appeared in a New York daily recently:

"In Cleveland they have pay-leave cars, which you enter at the front door and leave at the rear. That is, going uptown. Going down town, there are pay-enter cars and you get on at the back and off at the front. As the front doors are labeled "Entrance" in huge letters and the rear doors "Exit" the downtown journey finds many unfortunate persons who do not live in Cleveland engaged in quarrels with the motorman, while the conductor bawls at them from the rear to know why they don't hurry back there and get on. The reason for this is that these cars run beyond the city limits, where the fare is 5 cents, and they have to collect from the nickel guys when they get on going into town, and when they get off going home. All right when once you know about it.

"Then there's one more kind of car. It has no end doors, only a side door, and the seats run all around the car. So did I. I got on and sat down in the rear half of the car. Observing the conductor standing at his fare box, I got up and politely put my nickel in. Then I sat down again where I had been sitting. The conductor motioned me to take a seat in the other end of the car. I obediently did so, and ventured to ask why.

" 'The front end of the car is pay-enter,' quoth he, 'the back end is pay-leave.'

"Gosh!

"When you want a transfer you buy one of the conductor, paying 1 cent cash, and when you turn in your transfer on the subsequent line the coductor digs down and hands you out a cent for it.

"A man got off a pay-leave car one day without giving the conductor anything, and the conductor chased him two blocks into a cigar store. After he had lighted his cigar the man dug up a transfer and collected his cent from the conductor.

"I can't swear to this last story. A man told it to me. If it isn't true, it ought to be. All the rest I can swear to or about, as the case may be."

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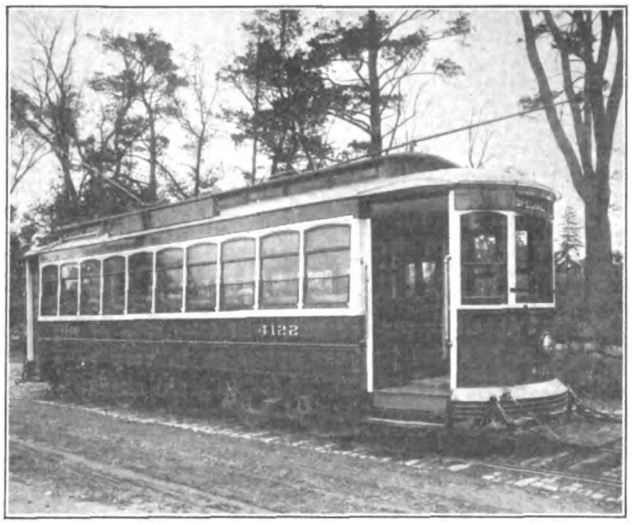
SPECIAL CONVENTION CAR OF THE BAY STATE STREET RAILWAY

An account was published in yesterday's issue of the special trip taken by trolley by a large number of New England delegates from Boston to New London on their way to the convention. Through the courtesy of E. W. Holst, superintendent of equipment Bay State Street Railway, some views are published herewith of a Bay State car which formed one of the six passenger cars that were used on that trip.



Bay State Special Car Used on Convention Trip from Boston to New London

The car was one of the standard passenger cars of the company, with a 28-ft. body and 40 ft. over all, but it was converted for the purpose of this trip into a chair car at the shops of the company. As shown in the interior view of the car, all the cross-seats were removed, and their places were taken by standard wicker armchairs. A handsome carpet was laid on the floor. At one end of the car were placed serving tables which were used for the luncheon which was served "en route." On one platform the company installed an electric stove for refreshments which had to be warm, and on the other platform there was carried a commodious ice box for the refreshments which were served cold. The deck signs were painted, "New England Street Railway Club."

A novel feature was also introduced in the advertising racks of these cars. The advertising cards were removed, and large maps of the route, drawn in the drafting room of the Bay State Street Railway Company, were inserted. These maps were to the scale of 25 ft. to 100 miles. A map showing the route by way of Worcester occupied one side of the car, and a map showing the route by way of Brockton occupied the other side of the car.

An especially interesting feature of all of these convention cars was their equipment with a special wheel, necessary because in operating over the city streets the cars in most of the cities in New England use a wheel with 2½-in. tread. On the other hand, a part of the schedules run by these convention cars were over some electrified steam tracks of the New York, New Haven & Hartford Railroad, where the standard M.C.B. wheel is used. By a compromise with the railroad company a wheel with a 3-in. tread was used by the electric cars. The problem of designing and furnishing a special wheel was put up to the Griffin Wheel Company, which designed and cast enough special wheels to supply the six passenger cars and the express car used on the trip. This wheel was equipped with the standard flange and tread employed on the New England city cars but also had an extension on the tread of ½ in., with a coning in this distance of ¼ in. The result was that the coning was sufficient to let the wheel clear the paving on the city streets, but the wheel had really an effective tread for the steam tracks of 3 in.

INDUSTRIAL WELFARE AND EFFICIENCY CONVENTION IN PENNSYLVANIA

The Pennsylvania Industrial Welfare and Efficiency Convention will be held in the Capitol at Harrisburg on Oct. 28, 29 and 30. The convention has been called by John Price Jackson, commissioner of Labor and Industry of Pennsylvania, and will consist of representatives of industrial establishments, engineers, contractors and other employers of labor doing business in Pennsylvania and representatives of labor and heads of the various State Departments coming in contact with engineering and industrial affairs of the State.

The convention will be held under the auspices of the Engineers' Society of Pennsylvania, which will also have charge of the exhibit to be held in connection therewith. The exhibits will be of a general engineering nature to appeal to the type of delegates attending the convention. The Engineers' Society of Pennsylvania had charge of similar exhibits in 1909 and 1910. The convention this year will be of greater importance than the preceding conventions, and the exhibits will doubtless be of additional value to the firms exhibiting.

The exhibit will be held in the large concrete building of the Harrisburg Railways at Cameron and Forster Streets, Harrisburg. There will be approximately 26,000 sq. ft. of concrete floor space within the building. The details of the exhibition will be in charge of Paul Gendell, director of exhibits. His address is in care of the Engineers' Society of Pennsylvania, Harrisburg, Pa.

Interior of Bay State Convention Car Converted from Standard Car

A traffic ordinance has been adopted by the City Council of La Salle, Ill., providing that street and interurban railway cars must make far-side stops and that vehicles must not approach cars which are loading or unloading.

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CARNEGIE HEAT-TREATED AXLES AND GEAR BLANKS

A careful study of the exhibit of the Carnegie Steel Company on heat treatment of axles should be one of the first duties of every master mechanic at the convention. A number of sample axles were made and tested for this exhibit intended to demonstrate that first-class results can be secured with 0.05 per cent or more of sulphur and phosphorus. Sample axles were subjected to drop, bending and tensile tests. Various photographs were taken of all axles and can be seen at spaces 546 to 553. Special attention is being called to the Carnegie high-test axle which is being tried out now on a number of roads. In this the attempt has been made to approach the ideal conditions of treatment so as to bring out the inherent properties of the material. While axles are of prime importance, visitors should not overlook the exhibit of gear blanks, which are rolled in three different grades—soft, for case-hardening or armorizing, with 0.10 to 0.25 per cent of combined carbon; medium carbon, 0.30 to 0.50 per cent, and high carbon, 0.50 to 0.60. They are arranged for heat treatment after cutting, the gears being usually quenched in oil. Blanks are rolled by the Slick process, being forced into a rotating die by a second die mounted on an arbor incline at an angle of 30 deg. to the axis of the blank. The blank is rolled therefor by a pressing or ironing process which is very effective. A still more recent development is the successful forging of annular piston heads. These processes will do away with the use of casting, with the danger of blowing holes and irregularities.

Automobile flywheels are also being worked, an interesting example of the process being that used in producing flywheels for self-starting Pierce-Arrow cars.

THE LATEST TAYLOR STOKERS

Power plant men will be pleased to learn that the American Engineering Company has succeeded in perfecting the promised continuous-dump stoker, fourteen of which are now going into the Interborough Rapid Transit plant. This stoker has also been successful under the large boilers of the Detroit Edison Company. The continuous feature has been introduced by means of a very simple but effective device. Under the opening at the rear of the stoker is a reciprocating stepped ash plate which makes a tight joint with the bridge wall. By the operation of this the amount of ashes is broken up and fed continuously downward from the bottom. In other words, it may be said to be "chewed up" from below. The ashes are thus removed without admitting excess air to the combustion chamber. This invention overcomes what has been heretofore considered the one objectionable feature of this type of stoker. It will now be possible to operate boilers continuously at tremendous overloads without any interruption for cleaning the fire.

PROGRESS IN BALL-BEARING APPLICATION

The exhibit of the Hess-Bright Manufacturing Company will interest most mechanics who are following the development of anti-friction bearings for motors and cars. An axle and wheels weighing about 2000 lb. mounted on ball-bearings and exhibited at spaces 143 and 145 show graphically the small friction coefficient of this type of bearing. This axle, when brought up to 300 r.p.m., the highest speed which the floor of the booth will permit, will run for thirty minutes. It is then stopped by windage probably more than by bearing friction. The Hess-Bright Company is catering to the railway field by improving its bearings and reducing the price as demand increases. The New York Railways are using ball-bearings on their center-entrance storage-battery cars as are the Gould companies on the battery cars recently furnished for Cienfuegos, Cuba. Right here in Atlantic City is car No. 107 of the Atlantic City & Shore Railway, which has been in satisfactory operation for five years. The latest development is the adoption of ball-bearings by the Illinois Tunnel Company of Chicago for twenty new electric locomotives. Up to the minute is the adoption by one of the leading trunk lines of the country of ball-bearings for experimental use on a 120,000-lb. steel passenger car. While running friction is not a consideration in this case, starting friction is, as it is at least four times as easy to start a car with ball-bearings as with the ordinary type. Another very general use of ball-bearings is on axle-driven train lighting equipments.

SCIENTIFIC WORK ON CARBON BRUSHES

Attendants at the convention who are interested in the scientific side of carbon brush manufacture will enjoy a study of the brush curves which can be seen at the exhibit of the Speer Carbon Company, spaces 382 and 384. In the testing laboratory, which has been recently developed by J. C. Lion, a long series of tests has been conducted and is still under way. Curves have been plotted between current density and positive drop, negative drop, friction coefficient and temperature. The original apparatus devised for this purpose was described at the 1913 mid-winter meeting of the American Institute of Electrical Engineers. The high conductivity brush for low-voltage machines consists mainly of copper and graphite. Its specific resistance is 2.6 michroms per inch cube, and at the normal current density of 450 amp per square inch the potential drop is 0.26 volt. The normal spring pressure is 3 lb. per square inch and the coefficient friction 15 per cent. The hardness is ten divisions on the sclerescope scale. This brush would normally be used up to 6 volts. At the other extreme of conductivity is the H-8 railway brush with a specific resistance of 0.00135 ohm per inch cube, producing 0.9 volt drop at 50 amp yer square inch, having a friction coefficient of 0.19 and 55 deg. of hardness. Between these two brushes is a long series having varied characteristics. The scientific way in which this company is studying the brush question and its willingness to make public the results of the investigations are greatly to be commended.

NOVEL BALDWIN TRUCKS

The Baldwin Locomotive Works, spaces 540, 542 and 600, show two of the latest creations in city and interurban trucks. A single-motor truck constructed for the Topeka property of the Illinois Traction System has 34-in. drivers and 22-in. idler wheels, all steel-tired. This type of wheel rather than the solid steel wheel usual in this country is preferred abroad. The features kept in view by the designers were lightness and simplicity, and special attention was given to the elimination of chattering in the brake rigging. A continuous forged side-frame, a centrally located bolster and Symington bearings are among the salient structural features. A nickel-plated model, as well as a finely finished example of this type M truck, is on view. The M.C.B. two-motor truck, known as the K type and designed for the Washington Railway & Electric Company, is also represented by a full-sized truck. This design is for city and interurban service. The exhibit is rounded out by literature on the company's products and many interesting photographs.

The Trolley Supply Company, spaces 360-61, is exhibiting the new Hollis fender. Of the projecting type, it is a combination of fender and life guard, with a guard rail slightly in advance of the lower apron. When the guard strikes an object it trips the apron. In addition, the company has on exhibit the Knutson trolley retriever, the Ideal catcher, headlights and trolley bases.

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A VARIETY OF NEAR-SIDE CARS

The representatives of the Near-Side Car Company, New York City, in space 385, are distributing cards and information showing the plan of operation under the "near-side" principle and the reduction of platform accidents. The actual models of near-side cars are found across the Boardwalk, almost opposite the Convention Pier. The canary-yellow car is one of twenty-six cars built for the Pennsylvania Railroad, which owns the operating company, the Atlantic City & Shore Railroad. The cars were delivered and placed in service on Oct. 1, and are now running on Atlantic Avenue, Atlantic City. The orange-colored car is one of an initial order of five cars to be built for the Charlottesville & Albemarle Railway, Charlottesville, Va., on the order of John L. Livers, general manager. An interesting feature in regard to this car is that it bears the colors of the local college. Two more cars of the same model have been ordered by Mr. Livers for his North Carolina properties. The near-side auto bus, also exhibited on the Boardwalk, is a model designed to hold forty people, but as yet not in actual use.

DEVELOPMENTS IN SIGNALING

The United States Electric Signal Company, in space 401, has working exhibits of type K and K-3 counting signals, the new four-light counting signal, the two and three-position, high-speed block light signals, the type G signal, the standard crossing bell and the American automatic switch, which is now manufactured by this company. A feature of greatest novelty in the exhibit is the new CL signal, which has been designed to meet the recommendations of the signal committee of the American Electric Railway Association. This is purely a light signal with long hoods over the lamps to prevent reflection of sunlight. As ordinarily arranged, the green light is placed at the top with the red light directly below and two yellow lights on a horizontal line at the bottom. A car entering a block lights a red and one yellow lamp, providing that the stop signal has been established at the opposite end of the block. A second car extinguishes one yellow lamp and lights another and so on alternately as successive cars enter the block. The yellow lamps are in the recording circuit and the lighting of one of them shows that the recorder has operated. Provision has also been made for a change in aspects to bring the green and yellow lamps together instead of the red and yellow, by the throwing over of a switch, for the convenience of those who prefer this combination.

The signal box and counter previously used in connection with the K-2 signal has been modified slightly and bears the number K-3. The improvement consists in having the red disk mounted on a semaphore arm and work with a vertical motion instead of a rotating one. This brings the disk closer to the glass and prevents the reflection from the glass from obscuring the view of the disk. Otherwise the box is the same as the K-2 type.

The signals are operated by the standard overhead contactor or by the use of insulated track sections. In the latter case a track relay has been developed by which it is necessary to have a sequence of three-track contacts before the signal can be operated. This prevents any evil effect from the accidental crossing of the insulated and grounded rails. The track relay coils are wound of low resistance so that any leakage from the insulated rails not amounting to a dead cross will not hamper its operation.

Mention should be made of the new spacing signal, of which two types, the three-light and the two-light, are shown. The chief feature of this is the telltale signal, located beyond the main signal, which lights up immediately the signal is set to danger behind the car and is a positive indication that the signal has been set to danger behind it. The main signal and telltale have large lenses, 8 in. in diameter with 48-cp lamps.

MAZDA LAMPS FOR CARS, AND NITROGEN LAMPS FOR YARDS

The National Lamp Works of the General Electric Company are exhibiting in spaces 606-608. The advantage of National Mazda lamps over the old-style carbon lamps are brought out by carefully designed apparatus. A rotating wheel studded with lighted lamps shows very clearly that Mazda lamps burn in any position. The superior candle-power regulation with fluctuating voltage is demonstrated by one 94-watt Mazda lamp, a cluster of five 60-watt carbon lamps and a rheostat, inclosed in a light-tight cabinet. The excessive dimming of the carbon cluster with a drop in voltage is clearly seen. The 94-watt Mazda lamp, fitted with a Holophane X-traficiency reflector gives approximately the same illumination as the five 60-watt carbon lamps. A sign on the cabinet invites anyone interested to manipulate the rheostat and observe the effect for himself.

The different styles and sizes of Holophane reflectors suitable for street railway use are shown with the corresponding lamps. The use of a reflector not only provides greater comfort for passengers, but also tends to economy in operation. The economy in energy consumption brought about by the use of Mazda lamps is shown by a meter, which registers the current consumed by Mazda and carbon lamps of equal candle-power.

The new high-efficiency nitrogen-filled Mazda lamp is being exhibited for the first time. The lamp exhibited consumes but 750 watts and gives approximately 1400 cp. Its application to street railway systems lies in the lighting of yards, barns and other places where a high candle-power unit can be employed to advantage. C. W. Bender, R. W. Tavey, J. A. Hamilton and J. R. Colville are in attendance.

NUTTALL SPLIT-GEAR EXHIBIT

R. D. Nuttall Company, Pittsburgh, Pa., is exhibiting this year a new line of gears both forged and cast steel, also various grades of pinions, standard trolley bases, including its latest design. No. 15, and also two designs of its flexible coupling. The company shows its usual line of harps, wheels, trolley poles, etc. The star feature of the exhibit is a cast-steel split gear and pinion which have made 583,000 miles during twelve years of active life and are still good for 100,000 miles or more. The lubricant used was the well-known Galena "4-cent grease." As the ordinary life of a gear is, say, 200,000 miles, then a well-made cast-steel gear can compete favorably with higher-grade, higher-priced gears. This gear was used in hilly service in Western Pennsylvania, received ordinary but careful attention and is a sample out of a lot of one hundred.

The Naugle Pole & Tie Company, in space 330, has made a most interesting exhibit out of a cut and dried proposition by showing some of its ties that have been in hard service from fifteen to twenty-nine years on steam roads. The large photograph showing the stock carried in the yards is a very convincing proof of the ability of the company to make prompt delivery from stock. To learn the fine points of the evolution of the tree to the pole and tie the visitor should just give either J. W. Benham or L. E. Morier five minutes of his time.

Heywood Brothers & Wakefield Company, Wakefield, Mass., space 636, has on exhibit its standard types of Heywood-Wakefield pressed-steel cars seats in rattan, plush and leather, and sample rolls of car seat webbing. It also shows some interesting photographs portraying natives in Singapore cleaning, washing, drying and sorting rattan ready for shipping to the factory in Wakefield. This is done under the supervision of the company's representative from this country. C. W. H. Frederick, Bertram Berry and Scot Wade are representing the company at the convention.

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Among the Exhibits

The American Car & Foundry Company is maintaining a reception booth for the entertainment of visitors at space 619. The company is represented by Scott H. Blewett and others.

* * *

The Lorain Steel Company, Johnstown, Pa., is in space 418, exhibiting girder and high T-rails and girder guard rails—frogs, crossings—Tadpole type switches and mates—electrically welded and composite joints.

* * *

Following the custom of some years past, Charles E. Smith, Standard Paint Company, New York, has an attractively decorated booth at space 504. The well known P. & B. trade mark in large gold letters is conspicuous in the background.

* * *

The Speer Carbon Company, St. Mary's, Pa., has an exhibit at spaces 382 and 384 of a new line of brushes for low-voltage machines and high-speed turbines. It also has all data to show the curves of the different grades which will be explained by John S. Speer and his colleagues.

* * *

The Globe Ticket Company, Philadelphia, Pa., at space 314 is showing a complete and attractive assortment of city and interurban railway transfers, books, cash fare receipts and tickets in strips and sheets for commutation, complimentary and other purposes. It has a special exhibit to explain the advantages of the Pope P. M. coupon transfer.

* * *

The Standard car wheels used by the Public Service Railway, the Cincinnati Traction Company and others are shown in space 528, by the National Car Wheel Company, Pittsburgh. The result of special study of street railway requirements has resulted in the production of the Star special wheels, two samples of which are on exhibition.

* * *

The Railway Track-Work Company, Philadelphia, Pa., is displaying its reciprocating track grinder in operation. It shows a sample of corrugated rail ground with this machine, as well as samples of grinding on compromise joint and cupped joint built up by a welding process and surfaced with its machine. The company is also exhibiting its flexible shaft grinder at spaces 161 and 163.

* * *

Following the custom of past years the American Brake Shoe & Foundry Company, New York, has an attractively decorated booth and reception room in space 416. A few samples of association standard brakeshoe heads are displayed. A simplified proposed standard brakeshoe head is also shown. This head is of remarkably simple design, the forked ends of the old brakeshoe head being eliminated, so that the shoe fits squarely on the end of the head.

* * *

For eighteen years Col. Ludlow, of Cleveland, has attended these conventions, and every time he comes he brings a piece of news with him. Now he announces that manufacturing and selling arrangements for his track-drilling machines have been undertaken by the Johnson & Jennings Company, Cleveland. This is an old-fashioned concern with large manufacturing resources. The colonel is enthusiastic about his improved models, which are on display in the exhibit of the Electric Service Supplies Company.

* * *

The Philadelphia Holding Company, Philadelphia, Pa., is exhibiting one of its radial trucks carrying car No. 560 of the Public Service Railway of New Jersey. The car has been taken out of service for the purpose of this display. It is to be returned to the railway company immediately after the convention. The location of this exhibit is, with that of other cars, at the passenger station of the Philadelphia & Reading Railway. The headquarters of the Philadelphia Holding Company at the convention are on this car. Its representatives are W. H. Stevenson and John R. Dickey.

* * *

The Galena-Signal Oil Company, Franklin, Pa., is occupying its usual space, Nos. 28 to 31 inclusive. As in the past, its booth is a reception room. The experience of the company has shown that the best convention lubricants are good-fellowship supplemented by tea, cakes, candy, cigars, etc., which are served to their friends, and special courtesy is being extended to the ladies while their husbands are attending meetings or busy at other places. The company is utilizing the regular "movies" of the pier to good advantage. The company's representatives are well primed with the latest practical experience in lubrication problems and have some interesting things to talk about.

* * *

Effective fire fighting is illustrated by the device of the Pyrene Manufacturing Company, New York. Several interesting demonstrations of the characteristics of Pyrene as a fire extinguisher are daily being made at this company's exhibit. One demonstration is to extinguish an arc of 550 volts and 100 amp. To show the non-conductivity of Pyrene, the bulb of an incandescent lamp has been filled with this fluid and when the current is turned on the carbon filament burns or emits light almost as brightly as in a vacuum. Further to illustrate non-conductivity, an incandescent lamp and socket to which the bare copper wires are attached is immersed in Pyrene and burns without interference. Sample boards of Pyrene guns and gun hangers in various colors to match the interior decorations of cars are displayed.

* * *

The Railway & Industrial Engineering Company, Pittsburgh, Pa., is exhibiting in space 609 one of its switches with a typical pole mounting for 22,000 volts, and units showing construction of switches, fuses and lightning arresters for various voltages. It has erected at the end of the pier a typical out-door substation completely equipped. The transmission tower complete was sent from Pittsburgh and erected in forty-eight hours. An earlier tower was shipped by freight from Pittsburgh, but part of it became lost on the way. The company discovered this on Thursday afternoon and had another tower and equipment sent on by express, which was in position by Saturday afternoon. It also has a miniature out-door substation in its booth which attracts much attention. In the Westinghouse booth it is showing a model railway portable substation marked "Westinghouse portable substation, designed and equipped by the Railway & Industrial Engineering Company."

* * *

An oval miniature of a standard track layout fitted with Abbott rail joints and new double shoulder tie plates forms a conspicuous feature of the display of the Lackawanna Steel Company, Buffalo, N. Y., at spaces 407, 409. The tie plate has a hook shoulder on one side which grips the base of the rail, with just enough play between the base of the rail and the plate to give the necessary resiliency to the track when trains are passing over it. With this tie plate it is not necessary to have the spikes come in contact with the edge of the base of the rail. The spike holes in the tie plate are placed about ⅛ in. to ¼ in. from the edge of the base of the rail. This construction gives the proper elasticity to the track so that the spikes do not work loose. Twenty-three samples of T-rails from 12 lb. to 100 lb. are also displayed, as well as structural-steel beams and channels, block signal insulated rail joints and steel sheet piling. The water-tight characteristics of steel sheet piling are shown in a tank filled with water, in the center of which is a circular formation of piling with the water pumped out. This piling was used in the raising of the battleship *Maine* in Havana Harbor. Some fine illuminated views of this remarkable achievement are presented.

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The DuPont Fabrikoid Company, Wilmington, Del., has on view at space 323 a new line of car window curtain material, vestibule curtains and Fabrikoid leather for upholstering car seats.

* * *

Among the new exhibitors are William L. Munk and S. A. Musser, who are demonstrating the Keystone tool grinder at spaces 331 and 333. This grinder has now been on the market for two years.

* * *

The Standard Steel Works Company, Philadelphia, Pa., is at space 635. While it has no exhibit, its quarters are fitted up as a reception room, where its many friends will meet with a hearty welcome.

* * *

The Sterling Varnish Company, Pittsburgh, Pa., space 574, is showing coils, and sample plates of iron-enamel structural steel and bridge paint, and giving out interesting literature on its insulating varnishes and iron enamel.

* * *

The Cambria Steel Company, Johnstown, Pa., has no exhibit, but has arranged at space 518 an attractive spot for the entertainment of visitors, where they will always be made most welcome by Messrs. Replogle, McElhany, Baker, Morris, Ottinger and Bankard.

* * *

The Corliss Carbon Company, Bradford, Pa., is showing a friction testing machine in operation to demonstrate the low coefficient of friction of its brushes without oil or lubrication. It is also showing samples of its different grades of motor and generator brushes.

* * *

The Western Electric Company is showing at its booth sample poles reinforced with the Orr reinforcement. The use of the Orr reinforcing material is increasing rapidly among electric railway companies, especially since its adoption by the Pennsylvania Railroad.

* * *

Newman Clock Company, New York, N. Y., has on exhibit at space 516 various types of its portable watchmen's clocks, such as used in carhouses, shops and offices. These clocks are used exclusively by the Pennsylvania Railroad in track walker service, 1500 being in use on its lines between New York and Pittsburgh. The Newman system is also in use as a permanent service on the Convention Pier.

* * *

At the headquarters of the Peter Smith Heater Company, spaces 366-367, much interest is centered in the electric forced ventilation hot-air car heater with thermostatic control. This combination of heating and ventilating equipment furnishes fresh, warm air from an outside supply. The manual control switch is interlocked with the heater switch to remove all arcing from the heater switch to the automatic switch. This company is also showing its standard forced ventilation, coal-burning heater with an auxiliary electric heater installed in the main heater casing. This auxiliary heater is advantageous during cold mornings and evenings when continuous operation of the forced-air coal heater is not required for the comfort of passengers. The well-known magazine type, hot-air heater for interurban railway service is also included in this exhibit.

* * *

A fine lathe showing is made by J. J. McCabe at spaces 124 to 130 with his latest style "2-in-1" double-spindle lathe (26 /48-in. swing) in operation turning worn-down steel car wheels. The truing up of these wheels is very interesting as the lathe this year embodies many new features, among which are the heavy deep bed to make the lathe more rigid and powerful, revised wheel-holding attachment and a wheel-turning rest. The range of this lathe covers every repair job in the present day street railway repair shop, large or small, light or heavy, on either the 48-in or 26-in. swing. It affords all the facilities of two lathes standing on the floor space of one. The manufacturer claims that he has at last arrived at the "perfect" 2-in-1 combination as a result of vast experience in furnishing lathes of this character to a large number of electric railway shops.

* * *

General Vehicle Company, Inc., Long Island City, N. Y., has on exhibit in space 100-A a 2-ton emergency wagon, one of six furnished to the New York Railways. This truck bears a body specially designed by the New York Railways engineers, the other equipment being of the standard design of the company. The motive equipment includes Philadelphia storage batteries, and the truck is rated at 15 m. p. h. A special feature of the truck is a draft hook, which may be used for towing disabled surface cars to sidings or carhouses. The New York Railways Company has ordered twenty-nine trucks of various types from the company after exhaustive trials of one similar to the one which is now being exhibited. An industrial motor truck for depot and warehouse use is also on exhibit, the type being same as in use by the Erie Railroad, Delaware, Lackawana and Western Railroad, and Fall River Line. E. W. Curtis, sales manager of the New York division, and F. H. Wright, of the service department, are handling the exhibit.

* * *

The Pantasote Company, New York, N. Y., has its usual interesting display at space 400. In addition to a full line of Pantasote seating material in sample sheets and on standard car seats, some of the uses for Agasote are shown. A practical test of the water-resisting quality of Agasote is made on an end section of a combination roof and headlining built of that material. A spray pipe directly over this roof, which is elevated to about regular car height, provides a continuous flow of water over the entire surface. The underside of the roof forms the headlining, which is neatly finished in colors, illustrating the finishing possibilities of this material. Some partitions on exhibit are grained and finished to represent mahogany. The test piece of Agasote flooring shown was taken from the Twenty-ninth Street station of the Hudson & Manhattan Railroad, New York City, after 760,000 passengers had walked on it. Agasote as used for a controller box cover is also shown. A panel of Agasote which was submerged in water and mud at the plant of the Barney & Smith Car Company during the recent Dayton flood is exhibited to prove the wonderful non-warping quality of the Agasote composition board.

* * *

In space 141 the Shepherd Automatic Switch Company, Montgomery, Ala., is showing models and demonstrating the use of an automatic relocking safety switch for street railways, and an automatic self-closing switch for interurban railways and steam roads. In the street railways switch all electrical wiring and protective devices have been eliminated and the action is purely mechanical. If a motorman wishes to take a branch line, the pressing of a pedal causes an engagement with mechanism in a slot between the tracks that automatically unlocks the switch, throws it and locks it in place. The switch remains in this position until the foot plunger is again pressed, causing a reverse action. Arrangement is made, however, to permit a main line car coming in the opposite direction to ride through the locked switch. The self-closing switch for interurban and steam lines consists of a lever, which must be raised by hand to throw the switch to the branch line. The lever then automatically disengages and the remainder of the action is not controlled by human agency. When the train is past the switch it automatically closes, and it remains so unless the train returns down the branch line past a guard rail, which automatically opens the switch to the main line again. These switches are being manufactured by the Pittsburgh Steel Foundries and have been installed on trial on several important roads. L. Shepherd, vice-president and general manager of the company, and the inventor of these devices, is in personal charge of the demonstrations.

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The Stewart Hartshorn Company, East Newark, N. J., is exhibiting, at space 515, its car rollers, sash balances and shade guide, specially adapted for street cars, particularly open cars.

* * *

The Pittsburgh Steel Company, Pittsburgh, Pa., is represented by E. Sidney Lewis. It is exhibiting "Pittsburgh Perfect" electrically welded right-of-way fence, galvanized plain fence wire, galvanized barbed wire, wire nails, galvanized staples and galvanized telegraph and telephone wire.

* * *

Phillips Manufacturing Company, New York, N. Y., has spaces 156-158 fitted up with several types of the Phillips automatic commutator truing device, which are in operation. With this device it is possible to true commutators without intercepting their service, as can be seen at the exhibit. T. E. Chappell is in charge.

* * *

The Okonite Company, New York, N. Y., in space 332-334, is showing samples of its new steel-braided and steel-taped cables for parkway and other ground service. These cables can be laid as they are without the use of conduits. Okonite forms the primary insulation on the conductor of these cables. The regular line of Okonite submarine and railway signal cables is on display also. The company is represented by W. M. Candee, W. G. Hovey and R. Mace.

* * *

A feature of the Rooke Automatic Register Company's exhibit in space 312 is a new form of register which takes care of tickets as well as cash fares. These are being introduced on some systems which heretofore have been using the old method of fare collection. In addition to this departure, the company is showing its standard 5-cent and 10-cent automatic fare collectors. Careful explanation of the principles and methods of the Rooke system will be given to delegates attending the convention.

* * *

Valentine & Co., New York, N. Y., have an interesting exhibit in spaces 580-581. A running-water test board of several panels finished one with Valspar, the others with finishings of other makers, shows a comparison of the moisture-resisting qualities of these several finishes. Three small car models, each varnished the front half with Valspar, the other end with other outside car finishings, demonstrate the necessity for a waterproof varnish. The results are brought out by submerging the models in water. Several stands bearing semaphore blades finished with Valspar are also shown.

* * *

The exhibit of the Railway Roller Bearing Company in space 140 contains an excellent model of solid roller-bearing, free-running wheels on a stationary axis, as well as models of roller-bearing end shields for railway and industrial motors, roller-bearing center plates with cone-disked rollers, and roller-bearing journal boxes that are interchangeable with regular journal boxes. A more general refinement of parts is indicated in all models, but the newest single development is the elimination of the fixed adjustment of the end thrust, formerly taken care of by carhouse men, and the use of a non-adjustable device, through which all danger of improper adjustment is obviated.

* * *

J. M. Johns Manufacturing Company, New York, N. Y., in space 371, is displaying the Flower brush holder provided with an adjustable tension stud. A method of reclaiming worn-out controller and air-brake handles is shown; the worn holes are broached and fitted with steel bushings. Old controller stems are shown as fitted with a steel sheathing. A pivot journal bearing that provides self-alignment, a check plate of manganese bronze and a trolley wheel having a special metal replaceable center with malleable iron sides are also on display. F. W. Roth and D. B. Flower are representing the company.

L. S. Brach Supply Company, New York, N. Y., in space 150, has set up two types of its Brach automatic flagmen for crossing protection. The signal comprises an arc-shaped compartment with two faces, each containing eight red lenses, between which eight stationary lamps are placed so that the lights are shown on both approaches. Visible warning is given by the lighting of this succession of lamps alternately backward and forward, producing an effect similar to the swinging of a red lantern. Above the lamp compartment is the sign "Railroad Crossing" surmounted by a locomotive type of bell, the hammer of which operates when the lamp circuit is closed. The Brach line of lightning arresters, time elements, rail contacts, hydro-grounds and other signal accessories is also shown.

* * *

The G. Drouvé Company has on exhibition in space 607 an Anti-Pluvius puttyless skylight, such as has been bought by the Public Service Railway of New Jersey for installation in the carhouse and shops in Roseville, and also by the Rhode Island Suburban Railway for use in its power house additions. There is also shown a model of the Straight Push sash operator, used by the Oakwood Street Railway, Dayton, Ohio, the Havana Railway, Light & Power Company and other lines. The last company is being furnished with an improved design of the Lovell window operator, designed to give extraordinary openings as compared to those given by the ordinary operating device. This operates lines for 100-200 ft. and has an easy hand control. All working joints are phosphor-bronzed to prevent rusting.

* * *

In order to demonstrate the accuracy of the "Utility" thermometer control equipment manufactured by the Railway Utility Company, Chicago, Ill., under most severe operating conditions, it is being subjected to three extraordinary tests in space 617. One test is to show how severe vibration fails to effect its operation. Another test, where the thermometer control is submerged in a jar of water, clearly demonstrates that its operation is not affected by water. The low voltage necessary to operate this control apparatus is featured by installing a simple connector in the main 15-volt circuit which may be opened and closed with the operator's hands in direct contact with the bare ends of the connector. This company is also showing its three types of "Utility" ventilators, which include the "Honeycomb" ventilator, applied to the side-deck and to the arched roof types of cars, and the "Utility' vestibule ventilators in two sizes.

* * *

The only reason that every electric car is not equipped with meters recording the amount of energy consumed is that the delicate commutation and jeweled bearings which form a part of ordinary meters will not stand up under the vibration to which such instruments are subjected in car service. The perfection of a mercury type meter has made it possible to do away with these disadvantages so that the application of an integrating meter is as practicable on a car as on a stationary board. The Sangamo watt-hour and ampere-hour meters, which embody the mercury principle, are now being used by important electric railways of this country. They provide a record of the total energy or current consumption for each car, thereby giving a check on the motorman and on the equipment. Thus by proper analysis the management can educate its motormen to operate with greater economy and can also determine what equipment is too wasteful to maintain in service. Results from regular installations of the Sangamo meters show savings ranging from 15 per cent to 25 per cent. These meters are being displayed by the Sangamo Electric Company, Springfield, Ill., at space 610 to the right as one leaves the main convention hall. R. C. Lamphier, general manager of the company, and M. B. Chase, manager of the New York office, are in attendance.

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The Midvale Steel Company, Philadelphia, Pa., offers at space 640 a steel-tired wheel and several rolled-steel wheels.

* * *

The Eureka Company, North East, Pa., is represented at the convention by George E. Austin and Fred LaChance, of the New York office.

* * *

Fred F. Stockwell, W. W. Field and F. H. Ellis are present at the convention in the interest of the Barbour-Stockwell Company, Cambridge, Mass.

* * *

E. R. Mason, formerly New York manager of the Electric Service Supplies, is at the convention representing his own company, E. R. Mason & Company, New York. Mr. Mason has recently started in business in his own interest as manufacturer's agent with offices in the Grand Central Terminal, New York.

* * *

Champion Recording Machine Company, in space 331, is exhibiting its transfer issuing machine, which automatically times, dates, and issues transfers. It saves the time of the conductor, and by doing its own printing saves the waste in printing and paper stock incurred by present methods of advance printing.

* * *

The R. D. Nuttall Company shows, in spaces 142 and 144, a novelty in gear making. It is a "herringbone" gear for compressors, etc., made from a solid blank with continuous crescent-shaped teeth. The advantages of this type are: first, it is in one piece, hence is simple; second, there are pockets for the accumulation grit.

* * *

The Chicago Varnish Company, in space 584, is showing its quick-drying C. E. V. method of car painting, familiar to most railway men. It has a new member of the family in its railway rubbed finish varnish for interior woodwork. It is applied the same as any other varnish, but dries with the rubbed finish heretofore obtained only by hand work.

* * *

Wilson Remover Company, Newark, N. J., is prepared at space 213 to demonstrate the removal of paints and varnishes from wood and steel surfaces by means of its liquid and emulsion removers and pneumatic appliances. The Imperial Car Cleaner Company is also represented in the Wilson booth. J. MacNaull Wilson and J. Whitney Wilson are in attendance.

* * *

The Dalton Adding Machine Company, in space 573, is giving demonstrations of the touch method of operation by two ladies, one from the Roebling Company and the other from the census bureau in Washington, D. C. The machine adds, lists and calculates a wide variety of problems, and can be used in both the auditing and engineering departments of electric railways.

* * *

The Electric Railway Improvement Company, in spaces 566-568, is showing its electric weld rail bonding car in operation, of which more than 200 are now used by the electric roads of the United States and Canada. It is also showing all of its types of electric weld rail bonds. Foreign railway men are taking to this machine, one being shipped now to Spain and another to Brazil.

* * *

The Automatic Signal & Appliance Company, Cleveland, Ohio, is showing its standard automatic block signal mechanism for signaling on single and double track electric railways at space 153. The mechanism is mounted on a tubular steel mast and is in actual operation. This company is also featuring samples of its high-speed troll y contactors which have been tested under service conditions with cars operating at 70 m. p. h. without failure to give accurate indications.

Among the improvements shown by the Cheatham Electric Switching Device Company, in space 159, is the new track box lever which now operates integral with the fulcrum. The arrangement of this element in the mechanism prevents sagging of the lever under wear. All parts of the switch are now manufactured of cast steel, except the links in the track box mechanism, which now are made of forged steel instead of cast steel as used in the older types. An improved tripping mechanism has also been included in the circuit changer apparatus in conjunction with a locking device to prevent splitting switches when trains consist of more than one car.

* * *

Ackley Brake & Supply Company, New York, holding forth at spaces 117-119, is showing a working model of the Auger improved automatic brake slack adjuster, which is in extensive use in England and on the Continent and which is now being introduced into the United States. The adjuster comprises simply a pair of ratchets, a fulcrum bracket, an upper connecting rod and a lower connecting rod. All parts of the adjuster are entirely inclosed in a casing, which is wind-proof, dirt-proof and waterproof. The threaded nut in the adjuster is made of phosphor bronze with 3 in. of thread, so that it cannot rust, trip, break or jam on the rods on which it operates. Its application to any type of truck does not necessitate any alterations in the braking arrangements.

* * *

The exhibit of the Northey-Simmen Signal Company, Ltd., Indianapolis, Ind., and Toronto, Ont., is again attracting an unusual number of visitors to spaces 160-162. The signal apparatus shown this year includes a dispatcher's table with recording sheet and mechanism operating in conjunction with an interlocked switchboard. The cab signals are arranged on a miniature car, with contact rails and connections. The type of signals employed in paved streets where third-rail installations are impracticable are also shown. Signaling apparatus shown for the first time includes the control of signals with directional indications. By means of this addition to the "Simmen" system of railway signaling clear signals are given to cars running in one direction and danger signals to cars running in the opposite direction.

* * *

"Is Your Road on the Map?" is the heading on a postal card in space 173 of the Indianapolis Switch & Frog Company, covering the entire southeast corner of Machinery Hall. This shows the great progress made in the adoption of the Indianapolis portable electric welder since the last convention in 1912 at Chicago. While the company is showing solid manganese crossings, frogs and switches, it makes a specialty of track reclamation work by use of its portable electric welder and portable electric grinder. It is operating the welder to build up armature shafts, worn and broken frogs, switches, gear cases, building up low points and cups, and applying the welded joints and bonding plates. The company builds three types of track grinders, demonstrating its work in welding onto low places and grinding off to original surface. The steel applied to the surface of track by the welder is a hard wearing manganese which resists all abrasion and wear except that of the emery grinder. The 3 in. by 4 in. spindle type grinder is used especially for removing corrugations in rail. The special feature of all these grinders is that they are equipped with a cup wheel, which guarantees a perfect job without cups or dips, even with an inexperienced man. While the welder is operated primarily with a steel electrode, for cutting off rails or burning holes in manganese it is used with a carbon electrode. One road found that one man and the welder did as much work in taking up old rails as formerly required eighteen men. Demonstrations of both welding and grinding will be given on request.

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Walter S. McKee vice-president of the Edgar Allen American Manganese Steel Company, Chicago, Ill., is attending the convention.

* * *

The interests of the Universal Trolley Wheel Company, Northampton, Mass., at the convention, are looked after by Daniel D. Mahoney.

* * *

The Union Electric Company, Pittsburgh, Pa., is represented by George W. Provost, president, T. M. Cluley, purchasing agent, and R. M. Kerschner.

* * *

The "personalities" Thomas W. Casey, David Murdoch and Willard Cockley are ably representing the interests of the Prepayment Car Sales Company at the convention.

* * *

The Universal Lubricating Company is showing six different grades of Tulc, which is used for all purposes from armature and motor axle bearings, journal lubrication, engineers' valves, air compressors, trolley wheels, etc. This product is furnished in quantities from 5 lb. up.

* * *

The Western Electric Company announces that the following is a revised list of its attendants at this convention: M. A. Oberlander, R. H. Harper, F. D. Killion, C. H. Starkweather, Jr., G. K. Heyer, A. G. Kingman, J. C. Enders, J. C. Maxon, A. L. Hallstrom, L. C. Coller, S. Greenfield, J. F. Davis and G. T. Marchmont.

* * *

In space 624 Templeton, Kenly & Company, Ltd., the exhibit of Simplex car and track jacks holds food for thought for the railway men looking for a large percentage of safety first in jack construction. The mechanism is so designed that the jack cannot fall, and the parts so few in number that maintenance is reduced to the minimum.

* * *

The Joliet Railway Supply Company, Chicago, Ill., is featuring its roller and self-centering center plates in spaces 570 and 571. These are set between heavy built up car and truck bolsters to demonstrate their operation. Both are designed to conserve applied power, reduce wear on track, especially at curves, prevent derailments and have numerous other characteristics making for safe operation.

* * *

In the Western Electric Company's exhibit, spaces 341-335, the Benjamin Electric Manufacturing Company calls attention to special car receptacles and sockets with the lamp grip feature, protecting the lamps after they are screwed in from working loose from vibration. B. G. Kodjibanoff is representing the Benjamin Electric Company at the convention.

* * *

The Star Brass Works, Kalamazoo, Mich., are exhibiting many types of the trolley wheels which are standard on many of the important electric railways of the country. This firm has recently moved into a new factory at Kalamazoo which is equipped with modern machinery throughout and by means of which the work of making and shipping trolley wheels is greatly facilitated.

* * *

International Steel Tie Company, in spaces 168-170, is exhibiting its steel ties for paved street construction, ties for open track work, and ties for substructures for crossings. It is also showing a method of bonding rails on International steel ties. The crossing shown in the exhibit was built for the Indiana Union Traction for its Mounds Park crossing over the Big Four Railroad, and will be installed directly after the convention closes.

* * *

The Wheeling Truing Brake Shoe Company in space 523 is showing a part of its complete line of abrasive brake shoes, of which it makes more than 500 different styles, used by more than 800 steam and electric roads. While Mr. Griffin of the company does not claim that his shoe is a panacea for car wheel ills, he says that it does cure all but hopeless cases of cup, flat, and flange disease without going to the expense of removing the wheels and the labor cost of truing them by machinery.

* * *

F. D. Spottswood, accident preventer, located in space 138, is exhibiting a number of devices for the prevention of accidents to the traveling public, including hanging signs containing "safety first" warnings, also metal signs for use between the windows. One of the specialties of this company is to furnish all signs, blotters, etc., for conducting a "safety first" campaign for the benefit of the general public.

* * *

Demonstrations of the ease of operation and the working efficiency of the new Root spring wheel guard are being given continuously in the booth of the Root Spring Scraper Company, space 506. This wheel guard is built of curved steel springs and when dropped into working position permits the basket to conform to the curvature of the pavement. The Root spring scraper set up in operating position is also being demonstrated. Fred N. Root, manager of the company is in charge of the exhibit.

* * *

A large cordial welcome is extended to all railway men at spaces 590-591 by the representatives of the St. Louis Car Company. One of the interesting features of its exhibit is an album containing photographs of the process of construction of the latest types of steel cars, which is well worth careful examination by any company contemplating the purchase of this character of equipment. The company also shows car seats, vertical brake handles and the Peerless ventilator.

* * *

A gear and pinion that was installed on the lines of the Philadelphia Rapid Transit Company March 4, 1907, is exhibited at the booth of the Whitmore Manufacturing Company, spaces 121, 123 and 125. Since these were installed and packed with Whitmore's gear protective compound they have been in service six years, six months and twelve days, during which time the gear has traveled 269,615 miles and the pinion 239,265 miles. The gear and pinion shown are grade D, ordinary steel. This extraordinary service record surely indicates the value of this gear protective compound.

* * *

Universal Safety Tread Company, Boston, Mass., shows in space 601 samples of its Universal Anti-Slip metal safety treads such as are used on all steps of the 1300 new cars ordered during the past year by the Philadelphia Rapid Transit Company. Universal Anti-Slip safety treads can be seen in actual car step use on the two near-side cars on exhibit at Arkansas Avenue and the Boardwalk opposite the Convention Pier. A flight of steps fitted with types of lead-filled treads of brass and steel base, the standard Universal safety tread type, is also shown. F. W. Langford, R. R. Hammond and R. R. Dougherty are in charge.

* * *

The Golden Glow headlight for interurban cars is one of the new devices shown in space 104 of the Esterline Company. In tests recently made with this headlight, it was demonstrated that its beam has a penetrating power equivalent to 22,500 cp. Several of these headlights were recently purchased by the Italian Navy for use at Venice after a representative of the department had seen the headlights in service in this country and had subjected them to most severe tests for penetration and all-around efficiency. This company is also showing its most recent development in Golden Glow headlights for electric railway service, including pressed steel housings for all sizes, thereby reducing the weight to 75 per cent of the former types. They also have an arrangement for ready attachment to the dash.

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H. B. Logan is at the convention in the interest of Dossert & Company, and is at the Marlborough-Blenheim.

* * *

The Ramapo Iron Works, Hillburn, N. Y., are represented at the convention by James B. Strong and W. B. Lee.

* * *

The interests of the New York Pole Company and G. M. Gest, conduit engineer and contractor, are looked after at the convention by H. H. Stannard.

* * *

Henry Carlisle, a member of the firm of Marsh & McLennan, general fire insurance, New York, is making his first visit to an electric railway convention.

* * *

The National Carbon Company is showing its improved line of Laclede carbon brushes in space 315. It reports a very gratifying attendance of railway men at its booth on Monday.

* * *

All-manganese construction, switches, mates, frogs and cross signs, steam-over-electric crossings and a 400-ft. steam railroad switch for Consolidation locomotives are the features of the St. Louis Steel Foundry, in space 14.

* * *

The McQuay-Norris Manufacturing Company is showing in space 321 an extensive line of leak-proof piston rings. The rings exhibited range in size from 1 in. to 34 in. in diameter. The president, W. K. Norris, and the recently appointed secretary-treasurer of the company are in attendance.

* * *

This year the Buda Company, Chicago, Ill., is exhibiting models of manganese center switches, mates and frogs. It is calling particular attention to its new crank form of adjustment at the head of the switch as well as its method of positively fastening the inserts in special trackwork pieces.

* * *

The Griffin Wheel Company, maker of F. C. S. wheels, with factories in Chicago, Detroit, Boston, St. Paul, Kansas City, Denver and Vancouver, is showing thirteen types of wheels for city and interurban use, including its "Ferro-Chromium Special." The capacity of the combined plants is 1,500,000 wheels a year. The company also makes axles for every service.

* * *

The Cleveland Frog & Crossing Company, in spaces 562-565, is showing, in addition to its manganese inserts and special work, a new hand press for splices, used largely in connection with rail-grinding jobs. It does the work accurately and more economically than can be done by hand at the blacksmith forge, the general practice. It also has the Porter derailer, an automatic device for protection on steam road crossings.

* * *

Carbolineum Wood Preserving Company, New York, N. Y., has an interesting display of valuable data pertaining to treatment of structural woods used in the railway industry. A cabinet containing samples of seventy varieties of structural timbers made up by the United States government will enable a railroad man to gain a valuable lot of information. Another educational feature of the exhibit consists of a collection of some twenty specimens showing the common defects in structural timbers. Interesting photographs illustrating the carbolineum method of surface treatment for wood are on display. The carbolineum "Black Cats" are much in evidence also.

* * *

The Ohmer coin counter and fare box is one of the latest fare collection devices shown in the booth of the Ohmer Fare Recorder Company. This is strictly a coin-counting device which counts pennies, nickels and dimes either by electric or hand power. The company is also showing its totalizing register for city railway cars. This register indicates, records, prints and totalizes the fares collected. It is built to meet all requirements in city service. Several of the other fare collection and recording devices made by this company are exhibited.

* * *

The Jamison Rail Bond & Electrical Supply Company has on exhibition a bond of the bushing type, samples of which have been in use for five years in Homestead, Pa. This bushing is slipped into a bolt hole carefully reamed through angle plates and rail web, and forced into contact with the steel by means of a mandrel. At the booth a joint has been rigged up with connections for attaching a millivoltmeter across the joint to show its high conductivity. The same principle is applied to bonding structural steel work, the bonding bushing being swedged into place before the rivet is applied.

* * *

The Weston Electrical Instrument Company is showing many types of electrical instruments in spaces 17 to 19 inclusive. Among the new things exhibited for the first time is a special instrument for automobile service. Other features attracting attention include a demonstrating switchboard group in operation. The instruments on this board include all A. C. apparatus, namely, wattmeters, power factor meter, ammeter, voltmeter, synchroscope, frequency meter and a polyphase wattmeter. This demonstrating board is installed in connection with a flashing mechanism which interrupts and varies the load. Another demonstrating board, simultaneously operated by a second flasher set, contains 107 instruments of various types and in various positions on the switchboard.

ADDITION TO LIST OF EXHIBITORS

Automatic Ventilator Company, New York, space 317. Automatic car ventilators; Royal Worcester renewable metal track broom. Represented by George H. Ford, general manager, W. J. Fleming, Jr., H. E. Lavelle.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., space 21. Light-weight HL control rack, HL control line switch, HL control details, type PK control rack, Nos. 306, 307, C-4, 323-A, 328 and 333-B-2 railway motors, No. 306 motor rack, No. 307-C-4 field control motor rack, railway motor commutator, pressed steel gear case, field coils, railway motor bearings, armature coils, brush holders, model portable substation, model outdoor transformer substation spare parts for railway motors, insulating material, railway line material. Represented by E. M. Herr, president; H. P. Davis, vice-president; S. L. Nicholson, C. S. Cook, G. B. Griffin, J. Brett, M. B. Lambert, J. W. Busch, J. P. Alexander, G. C. Ewing, F. H. Shepard, G. M. Eaton, E. P. Dillon, N. W. Storer, C. Renshaw, A. W. Lomis, J. G. Miles, H. L. Garbutt, J. McA. Duncan, A. A. Brown, T. A. McDowell, P. H. Smith, W. A. Swift, D. E. Drake, O. T. Smith, H. C. De Camp, H. C. Stier, H. A. Coles, T. R. Langan, J. C. McQuiston, H. W. Beaumont, D. H. Ackerson, A. H. McIntire.

Westinghouse Machine Company, East Pittsburgh, Pa., space 21. Turbine rotor set to show sections of the machine with intake and exhaust connections, etc. Represented by E. H. Sniffen, sales manager, L. L. Brinsmade, H. A. Rapelye.

Westinghouse Traction Brake Company, Wilmerding, Pa., space 21. Air-brake devices, motor-driven air compressors, automatic car and air couplers, motorman's brake valves, electric compressor governors, air reservoirs, complete car equipments. Represented by A. L. Humphrey, vice-president; W. V. Turner, C. J. Olmstead, H. F. Worrnley, J. R. Ellicott, E. A. Craig, C. C. Farmer, C. R. Ellicott, C. P. Cass, R. P. Noble, W. H. Beattys, F. M. Nellis, E. H. Denson, A. Cameron, W. G. Kaylor, G. H. Martin, H. S. Clark, C. H. Beck, F. H. Parke, C. P. Billings, S. D. Hutchins, R. W. Williams, T. W. Newburn, W. M. Bisel, W. H. Goble, P. H. Donovan, S. W. Dudley, J. B. Wright.

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THURSDAY, OCTOBER 16, 1913

PROGRAM FOR TO-DAY

CONVENTION MEETINGS

9:30 a.m. Joint Session of Accountants' and Engineering Associations, Engineers' Hall, Convention Pier.
9:30 a.m. Closing Session of Transportation & Traffic Association, Greek Temple, Convention Pier.
12:30 a.m. Session of Engineering Association, Engineers' Hall, Convention Pier.
2:00 p.m. Closing Session of American Association, Greek Temple, Convention Pier.

ENTERTAINMENT

Golf, Blind Handicap-Medal Play, Country Club, Northfield, N. J.
11:00 a.m. Concert by William Fenrich and Orchestra, Lobby, Convention Pier.
3:00 p.m. Afternoon Concert by William Fenrich and Orchestra, Lobby, Convention Pier.
9:00 p.m. Promenade Concert and Ball, Ballroom, Convention Pier.

The Savings of Welfare Work

Those railway companies that are accustomed to look at welfare work from the point of what it costs rather than from what it saves will find some food for reflection in the figures presented by J. J. Burleigh, chairman of the committee on welfare of employees. Mr. Burleigh, who is one of the vice-presidents of the Public Service Corporation of New Jersey, states that its expenditure of $104,818 in the year of 1912 for health, accident, old age and life insurance for 13,421 employees has actually been more than compensated by its saving in expenses due to the platform employees alone, although the latter number but 3654 men in all. The one great cause for this splendid showing is the fact that the inauguration of the several forms of insurance cut down the resignations of trainmen by 31 per cent as compared with the preceding year. Furthermore, those who are personally acquainted with the conditions on this property know that immediately after the company announced its welfare scheme hundreds of former trainmen who had left the service with excellent records applied for reinstatement. Consequently, the company has not only saved the cost of breaking in more than a thousand men but must also have a much larger proportion of experienced operators than is usually the case on large properties. The saving in the cost of training new men is estimated by Mr. Burleigh at the exceedingly low figure of $20 per man, but a far greater saving is that which follows from the reduction in accidents. It is a rare recruit indeed who does not get into one or more costly scrapes during his first year. Such figures as the Public Service Corporation has been able to disclose prove conclusively that the average workman is wise enough to remain in continuous, loyal service with the employer who shows some regard for his future as well as his present interests and also that the employer himself will actually save money in a tangible way by following such an enlightened policy.

Importance of Express and Freight Traffic

The experience on most interurban lines has been that passenger business develops rapidly for the first few years but that later on it increases only as fast as the population of the territory served. This failure to show a permanent rate of increase is especially evident where the electric interurban lines traverse a widely diversified territory, and to meet the growing cost of operation as the property ages and renewals are necessary it generally becomes obligatory to look to other fields than passenger traffic for increasing the gross income. Freight and express traffic offers the most fertile ground for additional revenue, for though there is keen competition for this business there also is so much of it that both steam and electric lines have equal opportunities. The electric lines, however, are in a position to offer a class of freight service with which the steam roads cannot compete and after having established reliability of service the freight and express traffic may be had for the asking. However, the matter of rates at which it may be profitably handled is a serious problem. After a local freight business has once been developed and it is found that rates must be increased, an unorganized attempt to do so will meet with immediate rebuff. On the other hand, organized action as suggested by the committee on express and freight traffic yesterday could undoubtedly force the establishment of a separate classification for electric lines, and there is no doubt that the higher rates would make unnecessary a large number of exceptions such as exist with the present classification, thus eliminating much of the unprofitable part of the business. An organized movement for uniform rates also would prepare electric lines for interline freight traffic, which is certain to increase as extensions are built and connections are made to the lines of other electric interurban companies. In addition, it might remove some existing false impressions regarding the motor truck, which cannot compete on long hauls and which is a competitor for short-haul business only in a few isolated cases where a house-to-house delivery is necessary to meet competition in handling certain commodities.

Rules for Fire Prevention

Rules for protection against fire, or rather for the prevention of fires, are so widely known in their general form as to be, from the standpoint of their detailed construction, almost superfluous. The difficulty with them is that their existence is not continually brought before those who should not only know them but should be governed by them. For this reason the recommendation of the committee on buildings, presented at yesterday's meeting of the Engineering Association, to the effect that rules should be posted in all conspicuous locations in all risks is one that ought to be implicitly followed.

The proposed code is complete and simple. It is probably the equivalent of those in use in the majority of shops and carhouses to-day, and its introduction ought to be easy. Its enforcement, however, is quite another matter, and for

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this reason the form for a fire inspector's report which was submitted with the code of rules may be used to exceptionally good advantage. A special inspector is quite likely to take himself seriously enough to make a really careful survey of the premises, and if his reports are conscientiously followed up one of the prolific causes of fires may be absolutely eliminated.

It is perhaps unfortunate that the most important clause in the form for inspectors' reports, that relating to cleanliness of the premises, is left until the last. This, it would seem, is really of more value in determining the manner in which rules were carried out by employees than the knowledge offered by the remainder of the report, which deals solely with the condition of apparatus. As a matter of fact the very best kind of inspection for apparatus is the use which it gets in fire drills. In these no chance exists for careless or hurried examination. If a valve is stuck shut, the fire brigade finds it out very quickly, and it has to be remedied before the drill goes on. If a hose nozzle is once missing, the nozzle-men are made morally, if not actually, responsible, and it is safe to say that they will see to it that the same trouble does not occur again.

Fire drills are admittedly a foolish-looking procedure, and they unvariably produce a certain amount of ridicule, yet, in the end, their occasional occurrence affords a pleasant change from the daily routine, and in the majority of cases employees really enjoy them. Certainly there is no other organized performance in which more enthusiasm can be worked up by the exercise of a reasonable amount of patience and persistence.

Mr. Sergeant's Paper

Mr. Sergeant discussed yesterday a matter which is of vital interest to all large surface railway companies. He used the Boston Elevated Railway system as an example, but the same situation, although in a less acute way, confronts most of the large electric railway systems in this country. The situation is accentuated in Boston because of its narrow streets and topographical conditions, but every city which suffers from congestion is bound to have the same problem presented to it for solution.

Mr. Sergeant's position is that the evil is not one which the railway company should be made to remove unaided. It is, it is true, one beneficiary of the relief from congestion but by no means the only beneficiary or, indeed, the principal one, and it ought not to be expected to defray all of the cost. If, for example, an underground or elevated terminal for a route or for several routes will cut down the running time on those routes 10 per cent or 15 per cent, the railroad company will make a saving in its platform charges and in some other expenses, but each patron will also be directly benefited, and the community served will reap great advantages from greater valuations in taxable property in the outskirts of the city. When the good to all of these different interests is considered, the improvement may be worth while, although the benefit to be derived by any one of them would be insufficient to warrant it in alone making the improvement.

The figures submitted in the paper in regard to the cost of subway construction in Boston will be a surprise, we believe, to many even among those familiar with the cost of great works of this kind. Undoubtedly the hilly nature of the city and the tortuous character of its down-town streets were considerable elements in the cost of subway construction in Boston, but there is no doubt that under even the most favorable conditions subway construction is enormously expensive, and it should not be employed except as a last resort. At the same time, we infer from Mr. Sergeant's remarks that the experience in Boston has indicated that elevated construction is not very much less expensive owing to the damages for noise and interference with light which can be obtained by abutting property owners.

In regard to the solution of the problem, there is but one answer, and that is that the city itself should undertake this work on some sort of a partnership basis in which the railway company would be a preferred partner. Such a plan up to a recent period would have been considered revolutionary from both a railway and a civic standpoint, although it does not differ in principle from the plan of bonuses or subsidies under which many of the early transportation lines were built. The contract for subway construction in New York, however, made recently between the city and its two principal transportation systems constitutes an excellent modern instance of this kind of arrangement. Without such a plan the extensive transportation system now under construction in New York City would have been impossible. The city and the companies are partners in the enterprise, and the companies have first claim on the net receipts until a certain return is obtained on their existing investment. After that both share in the profits. Some such plan must be followed in most other cities before any plan for the removal of congestion by expensive subway or elevated structures can be adopted.

Proper Capacities for Modern Boilers

One of the features of the exceptionably able report presented by the committee on power generation is the manifest desire of the committee to awaken interest in the advantages offered by forcing steam boilers. This appears in two of the four papers included in the report, and the reasons submitted in its support are indisputable. The point has, of course, been brought out before, but, as in all other matters pertaining to steam engineering, conservatism has apparently prevented it from being generally accepted and put into practice.

There are, perhaps, contributory reasons besides conservatism for this lack of action. It is common belief that tubes are more likely to fail in a boiler which is being forced than in one operated at the commercially inadequate manufacturers' rating of 10 sq. ft. of heating surface to the boiler-horsepower, although recent examples have shown this to be incorrect, and it is obvious that one boiler which evaporates two or three times as much water as another in a bad-water district will require a proportionately greater amount of washing. Yet neither reason would seem to account for the present practice of cluttering a boiler room with a lot of costly boilers when half as many would make ample steam for the plant.

In the matter of existing furnace design, it is true, much room for improvement exists, for it is practically a physical impossibility to incorporate in most boiler settings a grate or stoker of sufficient size to get the desired capacity out of a boiler without a very strong draft, an abnormally high furnace temperature and the consequent difficulties of operation. In many cases, as pointed out in one of the papers, the chain grate is handicapped by this condition, which causes a fusion between the brickwork in the furnace walls and clinkers in the fuel bed so that the fire at the sides is pushed off the grates. The re-design of existing standard boilers and settings appears in consequence to be necessary. This may be voluntarily inaugurated by the manufacturers, although it is hardly likely.

On the other hand, there should exist a persistent demand for boilers with ample steam-disengaging space and for settings with room for sufficient grate area to evaporate 7 lb or 8 lb of water per square foot of heating surface without necessitating a rate of combustion in excess of, say, 20 lb of coal per square foot of grate. If such a demand could only be developed and maintained for a short time, it is certain that the manufacturers would for self-protection be obliged to meet it. Unfortunately, the demand does not exist to-day, but the committee on power generation is doing a most excellent work in pressing the point.

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Conventionalities

G. E. Watts—some name, eh!

Whad'ye mean, Ich gebibbil?

Gaelic for "I should worry," of course.

A word to the unwise,—P. Edward Wisch is snooping around here.

The Brill lighting puzzle was unraveled before a ravished multitude on Wednesday night.

S'funny how the report of the committee on heavy electric traction is always so light.

General Joseph Busch (dont forget the c) called yesterday to say that he was here. All right, Joe; we gotcha.

The mixture of ocean air and illuminating gas from a leak near our booth brings regretful recollections of last year at Chicago.

The Cornell lunch will be held to-day at the Shelburne. Cornellians should register with H. C. Hallaway, spaces 350-5, before noon.

R. C. Cram, who was banished from Connecticut to Brooklyn some time ago, still feels his disgrace, if his anxiety to drown his woes in tangoing is any criterion.

B. M. Lathrop, of the Colorado Springs & Interurban Railway, says that Pike's Peak had nothing on his peak during the tourist season at the Springs.

Guy E. Tripp, chairman of the board, and E. M. Herr, president of the Westinghouse Electric & Manufacturing Company, arrived last night at the convention.

It's easy to understand why Tom McDonald doesn't have those Cooper heaters in operation. When Tom gets talking everybody in the immediate vicinity shucks his coat.

One of George C. Killeen's many friends tried to put over a wheeze about the way in which he killed the evenings: Thus, "Kill e'en." Do you get it? Neither did we.

Edgar S. (Mary Ann Oho) Fassett, free nowadays from thoughts of single-truck and double-truck cars, is startling his friends with one of those nobby hip-length top coats, y' know.

Allen F. Edwards, who has just been appointed vice-president in charge of purchases on the Detroit United Railway, is in town, but all we can say about him as we dash madly to press is that he's a right good-looking guy.

An excellent reason, weighing 12 lb. and of the male persuasion, has prevented Joe Downs, of the transportation department Public Service Railway, from attending the convention. They say the baby will be named Aera.

There are four halls on the pier—engineering hall, claims hall, accountants' hall and the net haul. The first three are convention places of assembly, and the last is a fishing expedition peculiar to Young's Million Dollar Pier.

P. N. Jones, the well-known automobilist, who has just purchased five new cars, 1914 (double-deck) model, went back to Pittsburgh yesterday to start a new M. U. F. campaign. What! Don't you know that? Move up front, of course.

Harry le Beau Ransom has been restless to enter the Perpetual Chairmanship Sweepstakes ever since he read that item about "Nate" Garland and "Pa" Wilkinson. No one can beat Harry when it comes to keeping the ladies happy.

It is being noised around that W. M. Archibald, of the Houston (Tex.) Electric Company, fell off the water wagon and as a result is carrying a cane and a slight limp. He wants to explain that it was a regular tank wagon and not the other kind.

His corpulence T. E. Fischer, formerly vice-president and general manager of the Illinois Traction System but now a consulting engineer who can advise us why we should or should not build electric interurban railways, is among the late arrivals.

H. L. Garbut complains that we misspelled his name in a recent issue, and as this was by no means intended as a slight to Mr. Garbot, we hasten to apologize, and we wish to assure Mr. Gerbutt that henceforth his name will be spelled correctly as follows: H. M. Gurbott.

One of the wags of the convention after reading the item in yesterday's DAILY about the order for near-side cars placed by General Manager Livers, of the Charlottesville & Albemarle Railway, said: "It strikes me that the color of those cars that Livers bought is slightly bilious."

Charles H. Bigelow is showing Mrs. Bigelow her first convention. Mr. Bigelow is chief mechanical engineer of the Millville Traction Company, which operates a line between Millville and Vineland, the famous grapejuice town of New Jersey and the home of the Wilson-Bryan cocktail.

A fine testimonial (portrait included) was recently given to E. F. Schneider, general manager of the Cleveland, Southwestern and Columbus, when his notable accident prevention work was described and commended in a recent issue of the *American Magazine*.

Some brute beat it to our hat after lunch on Wednesday at the Traymore. If he will call at our booth, he will be rewarded by seeing us in a nice, new cap. This covers our bald spot very nicely, thank you. Indeed, we hope that our hat is as satisfactory as a cover for its present solid ivory support.

The sad news of the sudden death of William C. Wood, president of the New York Switch & Crossing Company, is being commented on at the convention by many of his warm personal friends. Mr. Wood was connected with the electric railway industry for over twenty-five years and he was unusually admired and respected.

In answer to numerous inquiries as to the location of Cornell Hawley's exhibit of a center-entrance car we wish to announce that Mr. Hawley has a tackless blueprint which he shows with tireless energy to timeless people who want truckless cars on trackless roads for stepless operation. He claims with the utmost sobriety that he has a real American patent on the car.

Alphonse Chopin Terwilliger recently sold a music box similar to the one which is successfully keeping the sea lions in the Pier Aquarium subdued, little Johnnie Livers, the Charlottesville (Va.) managerial wonder, being the purchaser. Notwithstanding, the two are still fast friends according to a Burns Agency report dated Boardwalk, Oct. 14, 3 a. m.

E. W. Olds, one of the organizers of the Engineering Association and its second president, is being welcomed to the convention by his many friends. Mr. Olds is now living in Pomona, Cal., where he has a large orange plantation, but one of his sons, who has come with him to Atlantic City, seems to be a chip of the old block as he is engineer of maintenance of way of the Havana Electric Railway Company.

A number of the men in charge of the registration booth in the headquarters of the association are representatives from the accounting department of the Public Service Railway of New Jersey. Their services are generously put at the disposal of the association by President McCarter and Messrs. Young and Boylan, and their efficient work has been of great help to the secretary. It is a good thing all around because it gives them incidentally a good opportunity to attend the convention.

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Albert Thode, or, as he is known to all Europe, "Elektrothode," is one of the most interested inspectors of the exhibits. Mr. Thode is the head of Albert Thode & Company, Hamburg, which is one of the greatest electric railway supply houses in Europe. He was so pleased with his first view of an electric railway convention exhibit in 1912 that he has come again to pick up specialties for European electric railway use. There is no truth in the rumor that he will buy the trained seals, for his ocean trips have made him quite familiar with raucous retchings. Mr. Thode is planning to remain in the United States for about one month. During convention week he is stopping at the Chalfonte, but for the rest of his stay he will be found at the Vanderbilt Hotel, New York.

Although it was unscheduled, the most important social event on Wednesday afternoon was the presentation of a magnificent memento of the convention to Al "Steeplechase" Green. This took place in the Galena parlors before a large delegation headed by W. O. Wood, who said in a few well-chosen remarks that the price of the gift had been raised by general subscription as a deserved recognition of the invaluable services of Mr. Green on the entertainment committee. Al expressed his thanks in a speech replete with feeling, and upon opening the beautiful plush case, he found a splendidly gilded brass watch from the 5 and 10 cent store.

W. W. Cole, formerly of Elmira and now with Day & Zimmerman, of Philadelphia, has brought nine of his construction engineers to the convention, and they are putting in most of their time in examining exhibits which are of especial value to construction engineers. Mr. Cole personally is particularly interested just at present in fare boxes and says that it would take many weeks to visit all the factories where fare boxes are being built and acquire as much information as may be obtained in a few hours on the pier. The same condition applies to other branches of the work. Last year his firm placed a number of orders as a result of the inspection made of the exhibits at the 1912 convention.

The last time that E. G. Connette, of Buffalo, was in attendance at any annual convention of the American Electric Railway Association he was present in the capacity of transportation engineer of the Public Service Commission of New York, First District. He is present at this convention as a mere electric railway president. From this it will be seen that Mr. Connette has experienced all the vicissitudes of life. He knows how it feels to regulate and how it feels to be regulated, how to be elevated and how to be abased. It is said that Mr. Connette is planning soon to publish a book on his experiences with the Public Service Commission. According to the same rumor the only reason which has prevented the appearance of the volume up to this time is that Mr. Conette is uncertain whether to select as a title "Gates Ajar" or "In Darkest Africa."

As we do the Jumbo-slide to press, the idea drifts over our lumen of consciousness that our columns have not as yet been graced with any reference to those softly rolling, delightfully comfortable and eternally omnipresent chairs on the Boardwalk. Well, the height of superfluity may be the completely bald-headed man with a dozen combs, but this doesn't apply in the case of the rolling chairs. And although the happy occupants must soon lose that delicious feeling of "nothing to do till to-morrow" that fills their souls as they meander along the Boardwalk, still the pleasure while it lasts is undeniable. And say—we wonder if any of the chair committee has ever surprised a big 300-pounder being softly urged along on wheels, as it were, by a little black midget. The expression overflowing his face as if he were caught in something awfully devilish is enough to pay the committee for its labors in offering such satisfactory transportation facilities.

FINALS IN THE LADIES' BRIDGE TOURNAMENT

The bridge tournament for ladies which was held yesterday afternoon was not completed until 7 o'clock, the play being exceedingly close. At the close of the third round early in the afternoon the winners at the four tables were as follows: At table No. 1, Mrs. F. D. Lyman, of Montreal, Canada, with 1163 points; at table No. 2, Mrs. Warren L. Boyer, of Kingston, N. Y., with 631 points; at table No. 3, Mrs. W. F. Ham, of Washington, D. C., with 1358 points, and at table No. 4, Mrs. Frank J. Newbury, of Trenton, N. J., with 730 points.

The final round was played by these four ladies and in this Mrs. Frank J. Newbury won the championship prize, which consisted of an elaborate silver dressing table set. Mrs. Lyman won the second prize, a silver vanity box, and Mrs. Boyer was third and won a silver puff box, Mrs. Ham taking fourth place and a prize consisting of another vanity box.

The prizes are to be formally presented to the winners at the promenade concert and ball which will be held tonight in the ballroom, Convention Pier.

STEEPLECHASE NIGHT

There have been many joyous evenings at A. E. R. A. conventions, present and past. Sunshine has been seen in plenty. The radiations of mirth which have always been described as radiating from the merry throng have often radiated. Yet never before in the long history of A. E. R. A. entertainments has anything equaled the new stunt of our ingenious entertainment committee, Steeplechase Night. It was, indeed, some party.

It would be impossible, as the regular newspapers used to say about Mrs. John Jacob Astor's dinner-dances, to describe the magnificent scene in detail. It was as a matter of fact quite impossible because we lost our notebook going through the "philandipringstotum, "together with 68 cents in change, so that any catalog of the events would have to be made from a memory obscured by slides, whirls, dips, loops and bumps—especially bumps.

A striking spectacle was afforded when many long streamers of colored tissue were thrown across the roof-beams over the dancing floor and hung down from them in a swaying grill-work of color through which were thrown brilliant shafts of calcium light. The evolutions of the dancers seen through this screen made a shadow-dance effect that was really remarkable.

Possibly the chief center of interest was the Mississippi ball game, at which prizes were given to successful contestants. These were awarded to every man who succeeded in throwing baseballs with sufficient accuracy to break clay pipes held between the teeth of manikins in the six windows of a screen about 25 ft. away from the throwers. Ladies were given prizes for throwing baseballs through the windows, and they developed a surprising degree of accuracy. No rules prevailed, and everyone took as many shots as he or she desired. We know of no one, in fact, who failed to get at least one prize except Walter Jackson, who—poor prune!—had to go over to Phillie to get this issue to press, and W. G. Kaylor, the chairman of the sub-committee in charge of the Steeplechase entertainment, who got stuck in the soup bowl late in the evening and couldn't get out.

One of the best features of the evening was the elimination of the usual confetti nuisance and the fact that the "ticklers" were devoid of wire ends was very much appreciated. The official announcer was in rare voice. Some of his jokes were actually devoid of moss, but owing to the previously mentioned loss of our notebook, they cannot be published in full.

However, the crowd seemed to enjoy best the various

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stunts pulled off by themselves. A few of the people noted on the different pieces of apparatus were E. T. Munger and H. G. Pearce, who had a clinch on the human roulette wheel but went through the "down and out" chute to the cellar at that. Frank Hedley got safely through the "tube" as might be expected. He said it was very rough going and weakened once but made the trip. C. A. Cadle went over the "turkey-trotters" in grand shape and B. F. Wood made the "soup-bowl slide" in perfect style. H. Gulick went down the "Jumbo slide" mostly on his ear. He survived.

ALWAYS IN GOOD HUMOR

MORE MATUTINAL MEDITATIONS AND MIRTHFUL MEANDERINGS FROM OUR MARTIAL MARVEL OF MISANTHROPY

Some of the boastings of sales down our aisle recall this incident: Several colored converts were being baptized in the river in very cold weather and as one emerged from the water a buck on shore yelled: "Is de water cold, Sam?" "Bress de Lord, no; warm as de sunshine," replied Sam. "Dip him again, min'ster," shouted the buck "Dat nigger lies yet."

When B-y W-d apologized to the eaddy yesterday for not being in good form, the boy said: "Oh! you've played golf before, have ye?"

Had three unique experiences this trip—for the first time in my long and eventful life I had the berth in the stateroom (not the sofa), rode in the end seat in the bus and made a newspaper man laugh.

Have you seen the sign in the corset shop in M-B corridor: "All sorts of ladies' stays here?" Makes you think of the man at the ball who said to his pal: "I can see your wife's back from Chicago."

Those who used to laugh at "Bime bye, she blow some more" will enjoy this:

"MONTREAL, Sept. 3, 1900.

"DEAR MISTER: I Have the honor to tole you that the Reverend Messieurs of the Grande Seminary have ordained me with instruction to poursuivre you for the scandalous nuisance that was caused to that vicinity by the parroquet which you have on you residence which make such abominable fracas. The Reverend Messieurs are interfered with when they make their devotions and when the band of the Grande Seminary of pupils begin for play and your dam parroquet was begin for screech it is dreadful. Also one of the neighbors on the same street with yourself was very mad. He can't sleep on the afternoon and when he go for play the piano your bird yell and spoil his improvision. Altogether you must put away that bird. Please give me that understanding without delay, otherwise I must institute the procedures. Receive the assurance of my consideration. Your obedient servant,

"J. DE LATROUMANILLE.

"To Henry Russel, Esq."

This cool request recalls the squib in "North Shore Ballads":

"Miss Lucee had a parrot,
And she kept it in the garret,
And she fed it on a carrot,
And she called it J. Iscariot—
Tidy yum, Tidy yum!
And the parrot had a feather
That turned blue in stormy weather,
Or turned red—I don't know whether
It was one or it was t'ether—
Tidy yum, Tidy yum."

J. H. STEDMAN.

TOTAL REGISTRATION MANUFACTURERS' AND RAILWAY ASSOCIATIONS

At the time of closing the registration booths of the Manufacturers and Railway Associations Wednesday, the total number registered was 2840. This number is 440 more than the total second-day registration at the 1911 Atlantic City convention and 490 under the second-day registration at the 1912 Chicago convention. A comparison of the detailed figures with those of 1911 shows that each of the associations made a substantial increase in attendance except the Claims Association, which is the same as two years ago. There also is a marked loss in the number of guests registered, as compared with former years.

QUALIFYING ROUNDS AT GOLF

The committee on golf met yesterday evening to allot handicaps for to-day's medal play on the Country Club links at Northfield, N. J. Mr. N. M. Garland, chairman, stated that there seemed to be a healthy interest in the play thus far during the week, although the high winds which have prevailed since Monday have not afforded the most ideal conditons on the links.

The golf finals will be held to-morrow, the qualifying rounds having been completed to-day.

Forty entrants have qualified for the final round and it is expected that about ten post entries will be received in addition, thus making a good field for to-day's sport.

Thus far no exceptionally low scores have been made owing to the high winds and indifferent putting greens. However C. H. Bankard, Jr., a son of C. H. Bankard, purchasing agent Baltimore & Ohio Railroad, turned in a score of 78 notwithstanding the very unfavorable conditions. Mr. Bankard, it may be remembered, played well toward the finals of the National Championships some years ago, and it is likely that he will be scratch man in to-day's tournament.

The Country Club course has this year been placed in excellent condition, except for the putting greens, and a number of new hazards have been provided in addition. For the benefit of those who have not yet played over it, it may be said that the eighteen holes give a total length of 6016 yds., par for the course being 72 and bogey 82. There are several natural hazards including a brook, and there is an "island" green about 100 ft. across, which is fully as difficult as the famous heart-breaker at Baltusrol.

COMPARATIVE LITERATURE

(From Collier's)

A sort of street car which has gained steadily in use during recent years is that in which one pays the conductor a fare immediately upon getting on board. Such cars have an inscription upon the front to make clear the scheme. In New York this reads:

"PAY AS YOU ENTER."

In Philadelphia it runs:

"FARE READY, PLEASE."

In Boston the corner waiter is greeted by the announcement that the approaching conveyance is a

"PREPAYMENT CAR."

Ornamental elevated stations will be constructed at Fort Hamilton Avenue and at Eighthy-sixth Street and Bay Parkway on the proposed rapid transit line through New Utrecht Avenue, Brooklyn. The Public Service Commission for the First District of New York has sent to the Art Commission designs for these two new stations. The stations will be built of steel in accordance with the approved plans of the commission and will be finished with concrete.

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WEDNESDAY JOINT MEETING OF THE ACCOUNTANTS' AND TRANSPORTATION & TRAFFIC ASSOCIATIONS

President Dana Stevens of the Transportation & Traffic Association called the joint meeting of the Accountants and the Transportation & Traffic Associations to order in the Greek Temple at 10 o'clock yesterday morning. First Vice-president M. W. Glover of the Accountants' Association also presided as co-chairman.

The first order of business was the report of the committee on fares and transfers. As F. T. Wood, New York, the chairman, was unable to be present, the report was read by J. V. Sullivan, Chicago Railways Company. An abstract of the report is published elsewhere in this issue.

President Stevens said that while he realized that a universal system was impracticable if not impossible, he felt that a very full discussion would be of great benefit to the members present.

F. A. Boutelle, Canton, Ohio, said he would like to hear from someone who did not register transfers.

E. E. Strong, New York State Railways, Rochester Lines, said that this system had followed the practice of registering transfers, using double registers. The conductors were also required to turn in transfers in separate envelopes sealed each half trip. He had been on roads where single registers were used and he favored the practice of double registers.

C. N. Huggins, Portland (Ore.) Railway, Light & Power Company, said that his company registered transfers on a multiple register and also required conductors to inclose transfers in sealed envelopes.

H. A. Nicholl, Union Traction Company of Indiana, said that about 95 per cent of the fares on their lines were cash, the other 5 per cent being transfers. Transfers were registered and checked periodically. The conductors dropped the transfers in a box each trip.

James E. Gibson, Metropolitan Street Railway of Kansas City, said that that company did not register transfers. Conductors placed the numbers of transfers on their trip sheets. The results were checked up carefully at irregular periods. Conductors placed the collected transfers in envelopes at the end of each half trip but deposited them only at the end of the day's work.

J. V. Sullivan, Chicago Railways Company, said that transfers were not registered in Chicago, but that he believed in the adoption of this practice in almost every other city, where the systems and traffic would be smaller.

James Adkins, United Railways of St. Louis, said that his practice was to compile lists and to examine the transfers as carefully as possible periodically. Any action that was to be taken as a result followed through the superintendents. Conductors sealed up transfers at the end of each half trip. He was strongly in favor of a non-registering system for transfers.

Thomas P. Kilfoyle, Cleveland Railway, said that his company was not in favor of registering transfers.

M. R. Boylan, Public Service Railway of Newark, N. J., said he would like to hear a discussion on the use of fare boxes. He had been making inquiries recently and found that about 7500 registering fare boxes of various types were in use by approximately thirty-five to forty companies.

J. E. Duffy, New York State Railways, Utica-Syracuse Lines, said that he was like a good many representatives of other companies. He was using about all the types of fare boxes on the market and had not yet arrived at a conclusion as to which was the best. These included both non-registering and some of the different types of registering boxes.

W. F. Ham, Washington Railway & Electric Company, said that his company was probably one of the few that had not experimented extensively in the use of fare boxes. That, however, should not be taken as a condemnation of the use of fare boxes, but simply as a statement that as regards the local situation in the city of Washington the fare box did not seem to work. That seemed to be due to the fact that about 80 or 85 per cent of the business was done on tickets, leaving only about 15 per cent to be done on a cash basis. So far as his experience had gone, they felt that they could do better without the use of the fare box. To show, however, how different people reached different conclusions, Mr. Ham said that about the same time that his company did away with the fare box the Capital Traction Company, operating in the same city, adopted it, and this company had practically the same conditions to contend with that his company had, so there was no unanimity of opinion in Washington as to whether fare boxes were good or bad. From his experience he did not get good results, and while he thought that they did not have the best kind of a fare box still there was nothing in it that looked particularly attractive and it was decided to give up the use of the device.

In answer to a question from J. E. Duffy, Mr. Ham said that his company used both registering and non-registering boxes.

S. C. Stivers, American Cities Company, said that none of their companies used fare boxes. For a while the non-registering type of box was used but this was abandoned.

Mr. Huggins said that in Portland about 800 cars were operated, of which 250 were pay-as-you-enter cars. The non-registering lock fare boxes had been used on the pay-as-you-enter cars for about two years.

At the end of that time the company had reached the positive conclusion that it was bad practice, because the increased cost of handling and counting the money more than offset the benefits. In a very small way the company experimented with a coin-registering box, but inasmuch as it did not take care of the tickets it was abandoned. The company was now operating the pay-as-you-enter cars without fare boxes, and this had proved very satisfactory. The company concluded that it would be best to wait for the Public Service Railway and other Eastern companies to make reports on their experiments.

Mr. Adkins said that his company first used the registering type of fare box and found it unsatisfactory. Then it used a closed non-registering box, but it was trying now to get back to some other system, which would be less expensive. As far as the use of the fare box was concerned, taking it all in all, it was found to be advantageous.

E. G. Connette, International Railway of Buffalo, thought that it would be enlightening to give one instance of his experience in the operation of a small line in the system. Only six cars were operated on this line, and early this year a recording fare box was installed with the one-man car system and the fare collected as the passenger passed into the car. He thought that the resulting benefits were great and attributed them to the efficiency of the fare boxes.

Howard F. Eaton, Brockton & Plymouth Street Railway, said that that company was now using a type of registering fare box with lock. Of course the lock fare box entailed more expense. He believed that the registering fare box was desirable, provided it was used in connection with a register inside of the car.

D. A. Byrne, New York State Railways, Rochester Lines, said that this company was still experimenting and trying a type of closed box different from the one it had used previously. No decision had been made as to whether it would be more economical to use the box or to do away with it entirely.

Mr. Boylan said that when the Public Service Railway placed prepayment cars in operation it used a lock box. It had over 1000 boxes in use and found that it was very expensive to handle the money from them. He therefore got in touch with the manufacturers and suggested that they

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devise some kind of a box that would eliminate this expense. The company had tried and had in use to-day four different kinds of registering fare boxes. He had eliminated the expense of handling and counting the returns from the lock boxes. The expense of handling the registering fare box was very small. He thought that the registering fare box was the proper receptacle to use for the collection of fares on prepayment cars. The company was still experimenting, however, and while it had now 1400 registering fare boxes in use, it was not in a position at this time to recommend any particular box, although it thought that eventually it would get a registering fare box that would take care of all of its requirements. The company has no ticket fares, although it has one school ticket, and this was increased to the size of the smallest transfer in use on the system. Such tickets are handed to the conductor in the same way as transfers, leaving the fare box clear for coins.

J. H. Wilson, Mobile Light & Railroad Company, said he found that two classes of fare boxes were needed, one for the railroad that had from 30 to 35 per cent of tickets, and another for the road that had a very large percentage of tickets.

Frank H. Brown, Rhode Island Company, said he had been using the Rooke system for the last six years and had found it very satisfactory. The company did not register transfers and had no tickets and had never had any trouble with the Rooke system.

Mr. Boylan asked if the company used the Rooke system on its prepayment cars and Mr. Brown replied that it did do so.

President Stevens said that his company in Cincinnati had experimented with probably every class of fare box on the market, including the Rooke system. Before attempting the use of the Rooke box he took the subject up with Mr. Potter, Rhode Island Company, where he understood they were using it very successfully. The Cincinnati company, however, tried it on one line and a good many objections developed, so that the experiment was discontinued after about sixty to ninety days. There was no question in his mind that with the prepayment type of car a fare box was essential, or at least very advisable. The question arose of getting a fare box that met local conditions. As one member had said, it was largely a question of whether it was a system of cash fares or ticket fares. That would largely determine the type of fare box to be used. In Cincinnati practically 97 per cent of the business was cash. He had used both the recording and non-recording types and was satisfied that sooner or later the company would get something that would meet its requirements in every respect.

J. E. Duffy, New York State Railways, Utica-Syracuse Lines, said that this company had experimented with a transfer-issuing machine, using the first commercial machine made by the Champion Recording Machine Company. It experimented with that for only a week or ten days and found that it worked out very satisfactorily. It did not go into the question of cost, but was experimenting simply to see whether such a machine for use on prepayment cars would be practicable. The machine issued a transfer, which printed the time of issue and the time to which the transfer was good, therefore determining without doubt, except in case of the failure of the clock, the time of expiration of the transfer.

Another speaker said that the experimental use of a similar machine adapted by Mr. Champion for one of the Rochester lines proved to be perfectly practicable. It could be operated rapidly even at the start. He believed that the practicability of the machine had already been demonstrated and that its success was purely a question of whether or not it would stand up in service and could be put on the cars at a cost that would make its adoption possible. This machine was used in connection with a closed fare box, but he could not see where that would make any difference as to its success. It could be placed beside the fare box in such a way that a passenger paid his fare and on stepping forward received his transfer. The conductors and motormen seemed to be pleased with the machine.

Henry J. Davies, Cleveland Railway, said that during the period when the railway company property was leased to the Municipal Traction Company metal tickets were used. When the railway company resumed possession of the operation of the property it abandoned the use of metal tickets and substituted paper tickets. A careful examinaton convinced the company that the cost of dealing with metal tickets was very much in excess of that with paper tickets, particularly that part of the cost which came from putting up tickets after collection. A great many tickets were used now, but they were not sold at a discount. They were merely for the convenience of the public and conductors.

Mr. Boylan said that conductors on the Public Service Railway placed their transfers in trip envelopes at the end of each half trip. The conductors also noted on their day sheets the numbers of transfers issued and the transfers were deposited in a locked box at the carhouse and later turned in and forwarded to the auditor's office. There they were checked as to time and also compared with the particular trip on which they were reported to have been issued.

Charles H. Smith, United Traction Company of Albany, said that the system in use there was exactly like that in Newark, N. J.

J. C. Collins, New York State Railways, Rochester Lines, said that on that system transfers were collected and put into envelopes showing the number contained, the trip and the time. They were retained by the conductor until he turned in his money at the end of the run. A transfer band was placed around the number of envelopes and the number of transfers marked on the band. The receiver simply had to count the number of envelopes contained in the band and they were then forwarded to the auditing office, where they were counted.

H. J. Davies, Cleveland Railway, said that a method of checking transfers was followed in that city which he believed existed nowhere else. By reason of the mutuality of interest of the city and the company, 1 cent was charged for each transfer when it was issued and this was returned to the passenger upon presentation of the transfer for use. That practice ought to be in use on every railway of the country. It could be put into effect as a regulation of transfer issue and collection.

Mr. Boylan said that he thought the subject of the transfer issuing device was a very important one for investigation. Two machines had been made for the Public Service Railway and were to be put on cars this week. If the machines could be made practicable they would be very important.

D. A. Hegarty, New Orleans Railway & Light Company, said that he had used a transfer box, not for issuing, but for checking transfers. This box had a time stamp on it which registered automatically when the conductor put his transfers in the envelope and the envelope in the box at the end of every half trip. The envelope could not be withdrawn after it had been stamped. In answer to a question of Mr. Boylan, Mr. Hegarty said that these boxes were not in use at the present time.

President Stevens then announced the appointment of the nominating committee of the Transportation & Traffic Association as follows: J. N. Shannahan, W. N. Casey, J. E. Duffy, J. V. Sullivan and W. E. Boileau.

DISCUSSION ON EXPRESS AND FREIGHT TRAFFIC

The next order of business was the report of the committee on express and freight traffic. The chairman announced that the discussion on this subject would also cover in a general way the subject of express and freight accounting. The report was presented by the chairman,

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F. D. Norviel, Union Traction Company of Indiana. An abstract is published elsewhere in this issue.

H. A. Nicholl, Union Traction Company of Indiana, said that that company was doing a general freight business, but that it did not find it very profitable on account of the high cost of operation. The package express business was easier to handle and the rates were higher. As pick-up and delivery service were not given and the business could be handled on regular cars schedules were not affected.

President Stevens said that the interurban lines ought to develop revenues in addition to those of the passenger service.

E. H. Hyman, Electric Package Agency of Cleveland, said he wanted to emphasize the point made by the committee in reference to low rates. He had always been of the opinion that a great many electric lines did business at rates that were too low.

C. D. Emmons, Chicago, South Bend & Northern Indiana Railway, said that the recognition of interurban lines by the steam roads and the establishment of through routes and joint rates would be an advantage in the future to interurban lines. He had been a constant believer in the development of the freight business and had said often that the future of the interurban roads depended on their care of it.

The report of the committee on a statistical unit for car operation was read by the secretary.

J. A. Emery, with Ford, Bacon & Davis, New York, then read a paper on "Statistical Units Used in Analysis of Electric Railway Accounts." An abstract of this paper is published elsewhere.

On the motion of Mr. Kilfoyle, a vote of thanks was tendered to Mr. Emery for his complete paper.

J. E. Duffy said that he had never heard so skillful an attempt to cover the subject.

T. B. McRae, Chicago Elevated Railways, said he thought some arrangement should be made whereby each operating man in each department would be able to get exactly the information that he wanted.

W. F. Ham, Washington Railway & Electric Company, said that the standard classification of accounts was a scheme of putting into a given account certain expenditures which would make that class of items comparable in all instances. It was possible to elaborate the system of accounts so as to give a great deal more information than was contained in the classification itself, but even that would not be all that accountants would want to know. One of the matters that entered into the discussion of the classification was the assignment of overhead charges. He did not know how many times it had been argued that the classification should provide that the company should add to the cost of track or whatever it might be a certain amount to cover the cost of power used for that purpose. The classification did not purport to be a system of cost accounts.

Mr. MacRae said he thought that too much emphasis had been laid upon the needs for which the accounting department existed. He thought that all of the accounting men should co-operate with the operating departments and give the information these departments wanted.

Mr. Ham said that no classification would meet all the needs of all of the companies, but that the association had adopted a classification on broad general lines that would apply to every company in the United States, large as well as small. It met differences in size, different conditions and wide differences in classes and types of construction. It was one of the greatest achievements accomplished by any association that the Accountants' Association, without governmental authority back of it, was able to devise a system of accounts which was generally acceptable to all of the companies.

Mr. MacRae said his idea was that the accountant should take any classification he might use and through the addition of sub-accounts give the operating officials the information they wanted.

C. N. Duffy, Milwaukee Electric Railway & Light Company, said he thought that if a general manager of a company did not know what accounting information he ought to have it was the duty of the accountant to tell him. As he understood the paper, Mr. Emery did not criticise the classification of accounts, but rather the uses to which it was put.

Mr. Emery said that that was right.

Mr. Kilfoyle said that he used the classification and got very satisfactory results from it. By the use of a subdivision of accounts it was possible to give operating officials any information they wanted.

Chairman Glover said that in the system used by his company there were 188 accounts, and that made it possible to give the management such information as it wanted on various items.

Mr. Ham said that on behalf of the people who had prepared the classification he would say that they should examine the form submitted by Mr. Emery.

The committee on the statistical unit for car operation, in accordance with its recommendation, was discharged.

Chairman Glover said that, owing to the late hour, the report of the committee on "best methods of collecting and accounting for variable rates of fare" and the address of Edwin Gruhl on "Factors Affecting the Cost of Passenger Service" would be postponed until the Friday morning session of the Accountants' Association. All members of the Transportation & Traffic Association were invited to be present at that time and to participate in the discussion.

On account of the absence of L. T. Hixson, Terre Haute, Indianapolis & Eastern Traction Company, who was unable to be here, Chairman Glover appointed W. H. Forse, Jr., Union Traction Company of Indiana, to take the place of Mr. Hixson on the nominating committee.

The meeting was then adjourned.

YESTERDAY'S SESSION OF THE ENGINEERING ASSOCIATION

Yesterday's session of the Engineering Association opened yesterday morning with President Schreiber in the chair. The first subject on the program was the presentation of the report on electrolysis by Prof. A. S. Richey, Worcester, chairman of the committee on that subject. This report is published in abstract elsewhere in this issue. It was received with thanks and ordered to be placed on file.

BUILDINGS AND STRUCTURES

The next subject was the report of the committee on buildings and structures, which was abstracted by R. H. Pinckley after he had made the following preliminary statement:

"The committee on buildings and structures has been asked to investigate and report on the following subjects: (a) review of modern carhouse construction; (b) fire protection rules; (c) general specifications and form of contract for railway structures.

"The first subject, review of modern carhouse construction, has been thoroughly analyzed by the sub-committee, and its report gives a clear outline of the trend of modern practice in carhouse design and construction. As stated in the report, there are many considerations that affect the type of construction other than the promptings of strictly engineering analysis and judgment. The much debated question of outdoor versus indoor storage is often an important factor in determining the design, and a decision as to the number of cars to be stored under cover may be as strongly influenced by financial limitations as by the results of an efficiency study.

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"The relation of the type of construction to the insurance rate is an interesting feature of the report. An appreciable annual saving can often be effected on existing carhouse buildings and the rolling stock stored therein by making changes and improvements that decrease the fire hazard. Insurance improvements for existing properties is a timely subject and one that might be assigned to a future committee for investigation. Another suggested subject is 'What Constitutes a Standard Building from an Insurance Standpoint.'

"The sub-committee on the second subject has formulated a complete set of general fire rules for posting in various properties. This sub-committee has also submitted a skeleton outline of organization and operating rules for local fire brigades and an admirable form for inspector's report. The report on general fire rules, which was submitted to the committee on standards, has been referred back to this committee to be taken up with the National Fire Protection Association and have further consideration.

"A preliminary report on the third subject, general specifications and form of contract for railway structures, was made by the committee of 1912. The report submitted at that time was not recommended for the consideration of the committee on standards, and it was referred back by the executive committee for further consideration. The sub-committee did not complete its report this year in time for presentation. After a review of the work of the 1912 committee in our general committee meeting, it was the consensus of opinion that this year's sub-committee be instructed to give preference to the general clauses in specifications and complete form for contract and bond, rather than to the parts of the specifications referring to specific classes of work. The grades of material and accepted standards of practice for the different items of construction vary so much in different localities that only broad general clauses for these details would serve as standard practice for all conditions.

"Another difficulty that confronts the authors of a general form for specifications and contract is the variation in the laws of the different states and municipalities. Laws relating to liability, liens, etc., may be made by the States, while laws governing design, materials and methods of construction may be made by the municipalities. Comparisons of both classes of laws for different localities reveal many inconsistencies. Confronted with such conditions, it is not surprising that the sub-committee finds itself somewhat cautious about making definite recommendations.

"It appears entirely feasible, however, to devise a general form for specification and contract, which would make provision for all of the essentials, if necessary leaving blank spaces to be filled in to suit the local laws and regulations where there is a possibility of such variation. Many of the larger companies and engineering firms have already adopted standard forms for specifications and contracts. These forms are usually drawn up in a broad way so as to include not only structures but all classes of construction work. While the sub-committee has made admirable progress, I believe that this subject could well be referred back for further study and that a future committee should endeavor to work out a form that can be recommended as a standard.

"In addition to the subjects mentioned above, it might be of interest for the committee on buildings to undertake subjects involving a study of structures other than buildings, such as 'concrete structures for interurban lines, including culverts, bridges and retaining walls; standard practice in the design of steel bridges for interurban lines, and wood trestles for electric lines.'"

Mr. Pinckley also read a letter from the secretary of the electrical committee of the National Fire Protection Association approving the recommendations.

Chairman Schreiber called attention to the fact that the only real question before the association was whether to recommend the standard general fire rules proposed.

Mr. Adams read an extract from the report of the committee on standards stating that rules of this character do not admit of adoption either as standard or recommended practice but are of a nature to warrant their inclusion in the Engineering Manual. He suggested that before final approval was given to the code of rules it be referred back to the committee to be put before the National Fire Protection Association, of which the American Electric Railway Association is a member, with a view to bringing about the elimination of inconsistencies or provisions which may conflict with other adopted codes. Mr. Adams commended the point in the report referring to the matter of housekeeping, which is one of the most important things that men responsible for the care of buildings have to handle. He emphasized the fact that the more orderly the buildings the less risk there is from fire.

Mr. Schreiber replied that the rules would be taken up in consultation with the National Fire Protection Association.

Charles R. Harte, constructing engineer of the Conecticut Company, called attention to the fact that the topography of a site will occasionally permit a two-story carhouse with a grade entrance at both ends. While this is an unusual case, it is not impossible and should be considered in the report. He suggested amplifying the reference of the committee to special work, inferring that the committee did not intend to include the special work in the carhouse. The special work should be outside the carhouse structure, provided it does no take up too much storage room. He referred humorously to catenary construction, stating that catenary construction will transfer loads from one point to another, but these loads must eventually be taken care of. For every ounce of dead weight taken up by the catenary the corresponding number of pounds of anchorage must be put in somewhere.

R. C. Cram, Brooklyn Rapid Transit, said that often engineers have considerable latitude in the selection of the location of a carhouse and should choose a site which admits of proper and safe design, as judged from the special work and fire hazard standpoints. He instanced a carhouse recently constructed where the property was utilized in such a way that, after making the entrance from the street in the form of a "Y" into a single track at the end of which was a spur, six or eight branch tracks were taken off leading into the carhouse proper. The main spur track itself was roofed over, and the roofing was continued between the spur tracks and the carhouse proper without any provision for fire doors. The special work leading out of this gauntlet track was of such construction that several sets of switches were close to each other. With this construction it would be impossible, in case of a fire, to clear the carhouse of cars because they could not be put through the "neck of the bottle." The site of the carhouse should be so selected that there will be at least two or three free car lengths of track, so that cars may be run out beyond the building before they get into the congested special work layout. The industry was getting to the point of a general standardization of carhouse design, and this standardization should include the design of special work. Mr. Cram called attention to the apparent intent of the rules that these should be mandatory upon employees, and he recommended that the language should make this clear.

W. V. Burnell, of Houston, Tex., stated that his company was considering the construction of additions to its shops, and the question of whether a transfer table or special work should be used must be decided. The general "lay" of the land available seems to make the transfer table more suitable, but there was some question as to the wisdom of using it.

Mr. Adams on this point stated that from his experience in several shops he felt that the transfer table was a desirable adjunct, particularly where a group of buildings had to be

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served. The transfer table undoubtedly reduced the cost of special work and met all of the requirements of a repair shop where the number of movements during a day was not great enough to produce congestion on the transfer table. In other words, the transfer table is satisfactory under ordinary conditions.

Mr. Burnell inquired about the matter of fire hazard and called attention to the fact that under certain circumstances it was impossible to get the cars out in case of a fire, and it was absolutely necessary to protect the cars in place by means of a sprinkler system. In one case which he recalled the sprinkler system was effective in confining a fire to individual cars.

Norman Litchfield testified as to the ability of a transfer table to handle cars, as fast as the main tracks could take them away, even from a three-story building. Cars could be handled well by means of transfer tables when the organization was sufficient to handle them. There was no use in posting rules unless there was an effective plan to force the men to imbibe them. In New York a regular system was in force by which one of the clerks or sub-foremen was detailed to read the rules aloud to certain groups of men on definite days, the roll being called to insure the presence of the men. Records were kept to show that each rule has been read to all of the men. This practice applied not only to fire rules but to all bulletins containing information which it was important to get to the men, and in cases where a record of the fact that the men have received the information was desirable. This was a quick method of bringing home the rules to the men, and foreigners could not be expected to understand the niceties of some of the language used in the rules, which they really cannot understand.

J. H. Hanna, Washington Railway & Electric Company, corroborated Mr. Adams' statements regarding spur tracks. In his work the transfer table had been a necessity, but his experience showed that the added cost of special work was not justified from the standpoint of fire hazard. Cars could be brought down from even a third floor amply fast enough with an elevator to take care of any operating schedule. With a carhouse of fireproof construction and a good sprinkler system there was not the vital necessity for geting cars out in a hurry. He expressed regret that the committee had not taken up the construction of carhouses having more than one story. He also stated that the door question is one of great importance.

Mr. Litchfield corroborated Mr. Hanna's statement regarding doors but said that he had tried one door built on the jack-knife principle which looked promising. It was divided in the middle half way up and was operated by a winch, so that when the door was open the door stood horizontally in two halves. The trouble with a rolling door was that it was difficult to get it high enough to clear the cars.

Mr. Adams stated that the car station with more than one floor was coming but that many companies did not realize how easily a second floor can be operated by means of an elevator and transfer table.

Mr. Cram referred to the lack of necessity for protecting special work from the weather. Very seldom is there a situation in which the expense of roofing it over was justified.

H. H. George stated that an additional reason for keeping special work off the street is that it is necessary to get a special franchise in many cases for every piece of special work that goes on streets.

In closing the discussion Mr. Pinckley stated that the purpose of the committee was to draft a set of rules that could be adopted as standard by all of the companies. In general he did not believe that it was necessary to locate carhouses on property expensive enough to warrant the use of two-story construction. It was not the intention of the committee to recommend the placing special work under roof, but only on private property. A reason for this was not mentioned in the discussion. It was often desirable to fence in property and it was possible, by placing the ladder tracks and leads inside the fence, to reduce the number of gates necessary. There would be also less interference with the work of employees by outsiders. In regard to the discussion of special work versus transfer table there was a difference in insurance rates in favor of direct special work, which would be removed if the insurance companies understood the situation. In the matter of doors it was important to eliminate dead space at the front of buildings which was caused by doors of the folding type.

The last point mentioned by Mr. Pinckley called out a statement from Mr. Litchfield to the effect that some space was necessary between the ends of the cars and the doors, say 10 ft. or 12 ft. In reply Mr. Pinckley stated that he followed the insurance regulation requiring 3 ft. of space.

Chairman Schreiber then put the motion that the general fire rules be referred back as recommended by the committee on standards so they may be taken up by the National Fire Protection Association.

E. W. Olds, former president of the Engineering Association, made a short speech referring to his pleasure in attendance at the convention. Mr. Olds is back after an absence from the work of somewhat over a year.

HEAVY ELECTRIC TRACTION

The report of the committee on heavy electric traction was presented by E. R. Hill. It was received, and on motion referred back to the committee for further consideration.

POWER GENERATION

The report of the committee on power generation was then presented by B. F. Wood and W. H. Sawyer.

W. N. Smith said that apparently the smaller companies do not always realize the importance of getting all they can out of their coal. Even the managers of small plants where the kilowatt capacity does not exceed 5000 kw or 10,000 kw should use all the economies which the large plants do. As to the cost of reactance, in one large plant that item alone had cost $1 per kw, and the cost of installation would be anywhere from 50 per cent to 100 per cent additional because the reactances were so large. It might be that small plants could install reactances for less money, but at present the cost appeared too high.

H. G. Stott asked whether it was not time to abandon the term "boiler horse-power" in regard to rating. Why not use the old practice of giving the number of square feet of heating surface? Everyone knew that the rating varied from normal 3½ lb. of water per square foot of heating surface to 20 lb. or even 30 lb. on some torpedo boats. The statement that forcing the boiler is dangerous to the tubes had been demonstrated to be a fallacy. He had carried out tests of boilers for long periods up to 400 per cent rating and had found that boilers which average more than 200 per cent rating are better than those which operate below rating and which are shut down frequently. When a boiler is shut down the sediment settles in the tube and forms scale, but when running at high range the rapid circulation cleans out the scale-forming matter and carries it over into the mud-drum. The curves due to losses of efficiency in extreme forcing of boilers should be plotted, but this inefficiency obtained only for two hours or at most four hours a day. Forcing boilers performed two functions—first, it reduced the investment in a large degree and, second, it reduced the operating expenses by cutting out a great many banked-boiler hours. The whole tendency was to get high capacity by forced draft and possibly by induced draft.

Mr. Stott, speaking of reactances, said that he had concluded that if they were used they should be used as now. Instead of employing the bare copper wire for the coils with insulators, he would insulate the coils with practically solid mica. In this way the reactance could be cut down almost 50 per cent. In regard to selective relays his company had come to the conclusion that the generator should

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be designed to take care of itself under any conditions except those of internal short circuit. To take care of that condition he proposed to put a current transformer inside of each neutral leg, which would be synchronized with the other one. No matter what short-circuit occurs outside of the machine there will be a balanced condition in the relay. He referred to this as a modification of the Merz-Price system. Naturally, if one obtained a short-circuit the current could be killed on two legs, but it would cut the switch off the line the moment there was any trouble in the machine. So far as devices were concerned, he had found that the simplest solution at present was the use of a grounded neutral through resistance. The feeder relays are set instantaneously so that they cut out in the time required to get the oil switches out, namely, eight cycles or three-fifths of a second. In about 95 per cent of these feeder troubles the oil switches cut out at both the power house and substation ends, without any notification. The first indication is that the pilot light goes out on both ends and shows a green light. He used no protection for short-circuits between phases. In most troubles of that kind one phase went to ground, whereupon the ground feeder took care of it very satisfactorily without any drop of voltage or disturbance of the system.

J. W. Welsh said that reactances had been generally considered somewhat of a makeshift and were put in to give the oil switches and relays an opportunity to perform their functions. The loss from reactances was small, usually one-tenth of 1 per cent. The reactances for a 20,000-kw plant as used on 11,000 volt, three-phase No. 0000 feeder circuits cost only about $1,000 for each reactance of 200 amp continuous capacity. This would be about 25 cents per kw. Each of the three reactors was about 3 ft. in diameter and 6 ft. high.

L. P. Crecelius said that his experience with sixty-cycle apparatus had shown that it causes less concern from reactance than 25 cycles. Mr. Welsh, however, differed from Mr. Crecelius as he believed that the question of damage on a short-circuit depended on the short-circuit that flowed and that in turn depended on the reactance in the circuit. In old apparatus the reactance was in many cases only one-quarter or one-fifth as much as in modern apparatus.

The discussion was concluded by B. F. Wood, who expressed the hope that the users and makers of boilers would endeavor to raise the efficiency curves of high-rating boilers.

Upon motion of W. N. Smith the report of the committee was accepted with thanks. The meeting was then adjourned.

YESTERDAY'S SESSION OF THE AMERICAN ASSOCIATION

The American Association held its second session yesterday afternoon at the Greek Temple. General Harries called the meeting to order at 2.30 o'clock and appointed the following committees:

Nominating committee: A. W. Brady, C. S. Sargeant, Simon Bamberger.

Committee on resolutions: John G. Smith, T. H. Tutwiler, W. O. Hay and Patrick Dubee.

The report of the insurance committee was then presented with the report of the insurance expert. This report is published in abstract elsewhere in this issue.

The reports of the committee on public relations and the *Aera* advisory committee were then presented. A. D. T. Van Zandt, publicity agent Detroit United Railway, then read his paper on "Progress in Publicity." J. J. Burleigh, second vice-president Public Service Railway, then read the report of the committee on welfare of employees. The papers on "Profit Sharing with Employees," prepared by W. F. Ham, Washington Railway & Electric Company, and H. A. Bullock, Brooklyn Rapid Transit Company, were then read. These papers and reports are published elsewhere in this issue.

The next report in order was that from the committee on electrolysis, of which Calvert Townley was chairman. The president then read the following letter from Mr. Townley:

"In view of the invitation extended to our association by the American Institute of Electrical Engineers to participate in the organization of a national committee to consider the questions of electrolysis and in the absence of the receipt of instructions to the contrary from our executive committee, this committee has deferred the development and plans for any comprehensive consideration of the question until the organization of the national committee above referred to, which is not yet complete. Meanwhile, we are informally advised that the committee on electrolysis of the American Electric Railway Engineering Association has been giving attention to the technical side of the question and will submit a report of its proceedings."

Professor Richey's report on electrolysis, to which Mr. Townley refered, is printed on another page.

C. S. Sergeant, vice-president Boston Elevated Railway, then read his paper on "Some Financial Aspects of the Relief of City Congestion by the Construction of Subways and Viaducts," the report of the committee on company sections being deferred until Thursday morning.

There was no discussion on Mr. Sergeant's paper. The meeting then adjourned.

REPORT OF COMMITTEE ON INSURANCE*

BY H. J. DAVIES, CHAIRMAN; F. A. HEALY, A. H. FORD, E. J. COOK

Only 216 members responded to the data sheet for 1912. Their reports show: Amount of fire insurance carried, $179,881,945; amount of premiums paid, $1,198,564; amount of fire losses, $224,895; amount recovered, $180,691; ratio of recoveries to losses, 80.34 per cent; premiums per $100 of insurance, $0.66⅔; losses per $100 of insurance, $0.12½; recoveries per $100 of insurance, $0.10; ratio of losses to premiums, 18.76 per cent; ratio of recoveries to premiums, 15.08 per cent.

A comparison of the ratios of losses to premiums in the last three years with the ratios of earlier years, as shown by the committee's annual reports, indicates a betterment of the risks. Construction is better; old buildings and the cars in them have been protected by automatic sprinklers and in other ways; improved facilities have been installed for extinguishing fires in rolling stock in open yards, and there has been considerable improvement in the cleanliness of carhouses and other buildings—in what the insurance people call "housekeeping." Lower rates have followed, of course. Improvements by other companies will further reduce the losses by fire and the average cost of insurance.

Several hundred gentlemen are meeting in Philadelphia this week to discuss the subject of fire prevention. This association was invited to attend the convention. Your insurance expert and the chairman of your committee on insurance had the pleasure of attending Tuesday's sessions as your representatives. The chairman of the committee had the honor also of being a representative there of the National Chamber of Commerce. In the call of that convention it is stated that of all the countries in the world the United States has the distinction of having the largest fire loss per capita of population. Let us continue to help to lessen the disgrace of that unenviable distinction.

In the discussion of the general subject of fire prevention it has been said that nearly every fire that has ever occurred could have been prevented. There are unavoidable accidents, perhaps, but there is no such thing as unavoidable carelessness. As common carriers we are required to exercise the highest degree of care toward our passengers. It is to our interest to exercise a very high degree of care also in regard

*Abstract of report presented before the American Electric Railway Association, Atlantic City, N. J., Oct. 13 to 17, 1913.

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to our property. If we permit a fire to occur, we lose in several ways: First, probably, by inability to collect the entire value of the physical property destroyed, as indicated by the ratio of recoveries to losses last year; secondly, by loss of business; thirdly, by increased expense until the plant can be put in condition to operate again at full capacity; fourthly, by having to pay a higher rate for insurance than would be charged if, by reason of good construction and good defence against fire, we were entitled to a lower rate. We can obtain a lower average rate if we deserve it.

Send in your data sheets that we may make full and accurate statements to the association and to the insurance companies of values and losses. Your committee hopes to obtain for electric railway property a still better reputation than it now has among insurance men. The truth can be more accurately shown by reports from all than from half of the members.

The steam railroad companies have recently organized a fire-prevention bureau. We hope to receive an invitation to co-operate with them. If we do not, we shall ask them to unite with us.

We believe that, as your committee has from the beginning urged, it is more important to prevent fires than to collect insurance, and its name should be changed to "the fire prevention committee."

S. L. Tone, of the Pittsburgh Railways, who has been an efficient member of this committee for several years, has resigned from the street railway business and from the committee to serve his State as a member of its Public Service Commission for a term of nine years.

In our next annual report we expect to present, after careful study, an analysis of the causes of fires, as disclosed by all data sheets received since the organization of the committee, and possibly some practical suggestions for the prevention of similar fires.

Your insurance expert has had a busy year and has made to us a report of his work which we have asked him to read to you.

REPORT OF HENRY N. STAATS, INSURANCE EXPERT AMERICAN ELECTRIC RAILWAY ASSOCIATION

My position as insurance expert of the association and as a member of the National Fire Protection Association has enabled me to deal directly with the Central Traction & Lighting Bureau and with various committees of other insurance associations in behalf of our member companies. The good results accomplished during the past two years are apparent.

We have secured a better understanding with the old-line insurance companies, and we now have the co-operation of the factory mutual insurance companies, which are insuring at actual cost the major part of the properties of a number of large electric railway and light companies.

Your insurance expert enjoys the respect of and friendly relations with leading insurance representatives of both stock and mutual insurance companies. The insurance bureaus are striving earnestly to agree upon conditions and rates of insurance that will prove satisfactory to the member companies of our association. I am confident that the results already secured can be maintained; and that even greater benefits will follow through the co-operation of our own Bureau of Insurance with other insurance organizations.

You now have a successful insurance department doing effective work and it should be maintained. There is no sufficient reason for not making your Bureau of Insurance a negotiating office for all the insurance of all the member companies of the association.

For the good of the service and for the purpose of making more effective the work of its Bureau of Insurance, I recommend that each member company submit to this bureau copies of the schedules used in writing its insurance. Comparison of these schedules with the schedules of the present members of this bureau will give your insurance expert information that will prove very effective in his negotiations with the Central Traction & Lighting Bureau, local insurance agents and other insurance organizations to obtain the most favorable conditions and lowest rates of insurance. The co-operation of our association along these lines will prove a powerful factor in obtaining the results most desired.

As a further protection and for the convenience of our member companies, I recommend for their use specific schedules of insurance on all items except rolling stock. This should be written under a blanket item. This form of schedule has already been adopted by some of the large traction companies. The item, the rate, the amount and the premium should be printed in the schedule for each item.

Your insurance expert and his assistants are the only members of the association who give their entire time to a study of these insurance subjects and to working out detailed plans and carrying out suggestions of your committees for the benefit of our member companies and in aiding them to adopt the well-established principles of protection and inspection that go far toward reducing the hazards of fire and reductions in their rates of insurance.

During the past two years I have traveled more than 50,000 miles in the interest of some of our member companies. A part of this work has been accomplished with personal financial loss. Much credit is due the committee on insurance, the building committee of the Engineering Association, the executive committee and the secretary of our association for assistance rendered your insurance expert.

There is no field of electric railway work where more valuable results may be produced by co-operation than in that of insurance and protection against fire.

LANTERN SLIDES WITH "SAFETY FIRST" MESSAGE

Recognizing the value of the motion picture houses as an advertising medium, the subsidiary companies of the Federal Light & Traction Company, New York, N. Y., have arranged to run "safety first" lantern slides in the moving picture houses in the various cities where they operate electric railways.

The slides, which are made in colors, have painted on them the dial of a clock with movable hands affixed thereto. The picture operator in his little booth, ascertaining the correct time, sets the hands of the clock on the lantern slides accordingly and the slide is then flashed on the screen.

Many persons attending a theater find it difficult to read the time from their watches in the darkness. As women make up a large part of the audiences they find the slides of great value in keeping track of the time of day. Most of the picture show proprietors are glad to run the slides for the clock feature alone.

Attracted by the novelty time-telling slides, the readers are sure to read the "safety first" notices thereon. The Federal companies have supplied the picture shows with twenty-five different slides.

The managers of the companies under the control of the Federal Light & Traction Company report that the public has evidenced considerable interest in the novelty.

The most important electric street railway system in Peru is the Associated Railway, Light & Power Company, Lima, commonly called the Electric Trust (Empresas Electricas Asociadas), which has the monopoly of the three industries for Lima, Callao, and their suburban towns. Its water-power stations are located near Chosica and at Santa Rosa, on the Rimac River, with auxiliary steam plants for cases of emergency.

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REPORT OF THE COMMITTEE ON BUILDINGS AND STRUCTURES*

R. H. PINKLEY, CHAIRMAN; GEORGE WESTON, C. L. CRABBS, L. C. DATZ, W. T. BOUGAN, H. A. FISKE, W. B. INGHAM, D. G. KNIGHT, H. G. SALISBURY

This report consisted of three parts, namely;

Part A—Review of modern carhouse construction, prepared by Messrs. Knight, Salisbury and Datz;

Part B—Fire protection rules, prepared by Messrs. Crabbs, Fiske and Dougan;

Part C—General specifications and form of contract for railway structures. Of these the first two are published in abstract. The sub-committee assigned to the third subject was unable to complete its report in time for inclusion with the others.

REVIEW OF MODERN CARHOUSE CONSTRUCTION

The proper general arrangement of the modern terminal is now pretty well defined. It is generally conceded that the double-end plan is desirable, as a layout that will provide continuous operation without backing of cars or turning of trolley poles. It is very important to keep this point in mind, particularly where any single-end cars are used.

Although the all-fireproof carhouse, particularly with brick walls and concrete roof, has gained strong favor in the last few years, there are still advocates for the carhouse with brick walls and mill construction roof. The latter in a way is due to the requirements of the insurance interests, as it must be remembered that it is just as important to protect from fire the contents of the building as the building itself. The importance of this consideration is illustrated when it is explained that a carhouse for thirty cars may have a value of $45,000 and the equipment a value of $200,000. If a company wants a low blanket insurance rate covering cars as well as building, the building should be equipped with an automatic sprinkler system, whether it is of fireproof construction or mill construction and the rate will be practically the same for either type.

A building holding 100 cars would probably cost for the mill construction $150,000. The same carhouse built with a reinforced concrete roof would cost $180,000, or $30,000 more. The example quoted is simply by way of illustration, as the exact values change for each special case. The smaller the difference of first cost, the more desirable is the fireproof building. In either case it can generally be shown that a sprinkler system will save its cost through reduction of insurance rates. The cost of maintenance of the fireproof building is, however, less than that of the one with the mill construction roof.

One of the most important considerations in the shop portion of carhouse terminals is the provision for pit tracks. The tendency with some companies is to increase the percentage of pits under the operating tracks. A few years ago pits that took up 50 per cent of the operating tracks in a carhouse were rare. Some of the latest terminals to-day are being constructed with more than 50 per cent of the operating tracks over pits. For example, the new Luzerne carhouse of the Philadelphia Rapid Transit Company has 60 per cent of operating tracks with pits, and the new Hilton carhouse of the Public Service Railway 75 per cent.

It is still the general opinion that it pays only to heat the shop portion and offices. Generally, it is best to install the low-pressure gravity return system, but where the runs are long it is better to install the vacuum return system. In one of the latest carhouses of the Philadelphia Rapid Transit Company, the washing of cars is done with warm water, and the carhouse proper is not heated and is also open at both ends. For lighting the carhouse, on account of the low ceiling type design that is now so popular, the use of incandescent lights to conduits is the general practice. Sometimes arc lights are installed on poles at the front of the building and in the open storage yards, to give a general illumination.

For natural ventilation windows are not relied on, but louver skylights and ventilators are installed in the roofs of each bay; in some cases the skylights are continuous. The natural light effect may be improved by finishing the inside of the carhouse in white, using a dark-colored paint only around the walls on the inside to a height of 6 ft.

It is now considered good practice to install the very best of track work at carhouses. Indeed, this is necessary if it is expected to maintain the floors in good condition. If it is possible, only a small amount of special work should be in the street, merely the necessary lead tracks, and the principal entrance special work should preferably be on private property. In the carhouse both girder and T-rails are used. The girder or high T-rail has the advantage for very long spans on the pits, and the girder rail is better for floors and paving. Grooved rail is objectionable in a carhouse on account of its groove becoming filled with dirt and other obstructions.

FIRE PROTECTION RULES

Fire rules should be printed on substantial carboard of any stock or standard size not less than approximately 12 in. by 18 in., framed under glass and posted in all conspicuous locations in all risks. Printing should be in two colors, red and black (main heading, paragraph headings and final clauses in red), and all type should be prominent so as to be easily read.

General fire rules have value largely in their constant impression upon employees of the general principles of fire prevention, and continued instruction in detail is necessary, and the organization of fire brigades is one of the most ready and thorough means to the latter end. Attention in this direction is called to the publication of the National Board of Fire Underwriters, entitled "Suggestions for the Organization and Drilling of Private Fire Brigades as Recommended by National Fire Protective Association." These pamphlets are easily obtainable.

A form for organization and distribution of employees selected for fire duty should be prepared. This should preferably be printed of size and style uniform with the general fire rules and similarly framed and posted. The names of employees selected for various duties should be written in the blanks under the respective classifications of service and, in case of changes in the personnel, the roster should be kept to date. This form may, of course, be amended or elaborated providing for the organization of hose companies, hook and ladder companies, chemical companies, etc., and contain reference to the points at which the various members of companies should report for duty at alarm of fire.

Frequent inspections by a competent and thorough inspector are necessary and some definite system of inspection should be carried on by those in charge of properties outside of regular watchman service and of inspection by underwriters and their representatives. Such supervision, to be complete, should follow some preconceived routine descending to the most minute detail, and for the purpose the use of inspection reports is recommended in such forms as will provide for attention to every feature of the subject.

Accompanying this sub-committee's report were three sections which covered, respectively, general fire rules, organization form for fire brigade and inspector's form of report.

RECOMMENDATIONS OF THE COMMITTEE ON BUILDINGS AND STRUCTURES

It was the recommendation of the committee on buildings and structures that the general fire rules as given in Section 1 of Appendix B of this report be adopted as recommended practice. It was the sense of the committee on standards that rules of this character did not admit of adoption either as standard or recommended practice, but were

*Abstract of report read before the American Electric Railway Engineering Association, at Atlantic City, N. J., Oct. 13-17, 1913.

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of a nature that would warrant their inclusion in the "Engineering Manual." It was recommended, however, that before final approval be given to the suggested code of rules, the same be referred back to the committee in order that they may be put before the National Fire Protection Association, of which the American Electric Railway Association is a member, with a view to bringing about the elimination of inconsistencies or provisions which may conflict with other adopted codes.

PROGRESS IN PUBLICITY*

BY A. D. B. VAN ZANDT, PUBLICITY AGENT DETROIT UNITED RAILWAY

Some years ago the Detroit United Railway published a small four-page leaflet weekly. Its chief function was to assist in the development of the passenger business of the company, particularly the interurban travel. Its issue was some 25,000. As time went on the company felt the publication was not broad enough in its sphere. Our next important step was the publication, in the fall of 1912, of a series of newspaper advertisements—a campaign of street railway education. This series lasted somewhat over a year. The advertisements were then grouped in series of threes under a standing front page entitled "Some Problems in Street Railway Service," and published in pamphlet form. Of these pamphlets we issued 30,000 every three weeks, the advertisements of every three weeks forming a new issue. The series of advertisements consisted of fifty-six articles in popular language treating of such topics as:

"Why the Street Cars Sometimes Pass You By."
"Why the Rush Hour Jams the Cars."
"The Story of the Freight Car."
"Fighting the Snow So All May Ride."
"D. U. R. Not All in Detroit."
"Building a Mile of Street Railway."

It was not long before we became pretty well convinced that we were missing a portion of the good results we believed we were entitled to by reason of our advertisements being buried in the mass of other advertisements in the newspapers. Coincident with the publication of these advertisements and their reproduction every three weeks in pamphlet form we began a series of front window posters. These met with instant success because they drew the immediate attention of the riding public. These were posters 12 in. by 19 in.—as large a size as our variety of cars could accommodate. These posters frequently drew editorial attention and many times were paraphrased in the press.

It did not by this time mean a leap in the dark to start our own publication. Finally we cast the die and with it we cut loose from other forms of advertising in Detroit, except our own issues of timetables and folder maps. Every test made by us has demonstrated that a railway can make a wider and more thorough distribution of its information to the public through the medium of its own cars than it can in any other form. It is a better distribution not alone because it is more thorough but because it is less expensive.

Speaking more directly of *Electric Railway Service*, our purpose is to produce an intelligent, readable newspaper discussing railway facts. We are, of course, mainly interested in the problems of our own city and interurban system, to which most of the space is devoted. We do not, however, confine our discussions to our own properties and problems. *Electric Railway Service* is distributed almost entirely through the interurban and city cars, the only exception being the placing of a few in waiting rooms.

Fifty thousand copies of the first issue were placed in the cars, but the weekly average is now 100,000. An allotment is made for each carhouse in both city and interurban property based upon the number of cars, the class of riders and, of course, the proved demand. The demand shifts from week to week in different localities, in no small measure depending upon the chief topics discussed. Carhouse foremen make reports and the men specially engaged in distributing the weekly in the city carhouses check the distribution so that there shall be at all times an absolute knowledge of the circulation conditions on the various divisions. Finally the distribution is checked by myself and my assistant.

The folders are placed in specially constructed boxes in the cars. These boxes hold from fifty to seventy-five and are kept filled by the distributers as long as the supply lasts. We have found that, on pay-as-you-enter cars especially, the front boxes have a much greater demand than those in the rear, so it is the policy to keep the folders constantly moving from the rear to the front in order that the larger circulation may be had.

Our original expectations were that no small portion of the circulation would be among passengers more or less casually reading what we had to say and thus whiling away the time spent in the car. But such has not proved to be the case. The big percentage of distribution we find is to men and women who take the folders from the front boxes as they leave the cars and place them in their pockets for reading and studying at their leisure.

A special poster is used every week in the cars to advertise special features of the forthcoming week's edition. Every Wednesday night the old folders are removed from the box, and on the same night the new posters are put up on the front windows of the cars with the reading matter facing the passengers. It is thus arranged to have the boxes empty all Thursday so that no confusion as to issue will result. On Thursday night the Friday folders are placed in the cars ready for the demand of the morrow. The poster remains from Wednesday to Wednesday, being in sight all the time that the papers are in the boxes in addition to the one day when there are no papers in the car.

So much for the progress of publicity with us. I do not claim that we have arrived at the ideal, but I do claim that we are accomplishing excellent results, though years of misrepresentation are not to be overcome in a day. But you must print the truth. And it is a mighty uncomfortable street railway in these days that is afraid to print the truth. Political demagogues have charged public utilities with committing many crimes, but the greatest crime the public utilities have committed has been against themselves—the crime of non-publicity.

*Abstract of a paper read before the American Electric Railway Association, at Atlantic City, N. J., Oct. 13-17, 1913.

REPORT OF THE COMMITTEE ON HEAVY ELECTRIC TRACTION*

E. R. HILL, CHAIRMAN; E. B. KATTÉ, J. H. DAVIS, HUGH HAZELTON, W. S. MURRAY, J. M. BOSENBURY

The committee on heavy electric traction reported that it had co-operated with committees of the American Railway Association and the American Railway Engineering Association in the matter of clearances for automatic stops but that no decision had been reached. It recommended that the ensuing committee, in co-operation with the committees of other associations, investigate the question of these clearances and report further on the matter.

OVERHEAD WORKING CONDUCTORS

On the question of clearances and locations for overhead working conductors the committee submitted the information that was recently presented to the American Railway Association by its committee, for the information and consideration of the members of the American Electric Railway Engineering Association. This was published in full in the ELECTRIC RAILWAY JOURNAL for May 24, 1913, page 935.

*Abstract of report read before the American Electric Railway Engineering Association, at Atlantic City, N. J., Oct. 13-17, 1913.

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REPORT OF THE COMMITTEE ON EXPRESS AND FREIGHT TRAFFIC*

F. D. NORVIEL, CHAIRMAN; A. R. PIPER, G. W. QUACKENBUSH, F. W. COEN, C. V. WOOD, J. M'MILLAN

That the electric lines are irrevocably committed to the handling of freight and express at some rate and in some manner seems to be beyond argument from the number of lines, as compared with the whole, which are now handling this traffic, and for this reason the committee feels that it is its duty to bring forward the question of a classification suitable for the electric lines, the division, number of classes and the rates to be made on some uniform basis, either a mileage or zone system being used and an exception sheet being made, which may be uniform for the exchange of traffic as between all electric lines.

In order to show briefly and in an abridged form the answers which are made to the questions on a data sheet by the various roads a tabulation of the replies has been made. In the divisions of the states as arranged, local conditions are approximately the same on all lines in each division.

	Local and Interline	Local Freight	Only Express	Do Not Handle	Total
Eastern States	24	12	..	3	39
Western States	17	5	1	2	25
Southern States	..	2	..	1	3
Middle States	28	9	1	..	38
Totals	69	28	2	6	105

The answers to the inquiry "Do you maintain a pick-up and delivery service?" may be summed up as follows:

	Pick-up and Delivery	No Pick-up and Delivery	Do Not Answer Question	Total
Eastern States	9	27	3	39
Western States	2	21	2	25
Southern States	1	1	1	3
Middle States	4	34	..	38
Totals	16	83	6	105

The above would indicate that of the total number of lines represented eighty-three did not believe in a pick-up and delivery proposition, while sixteen lines have this service. In all but one instance it is usually limited to one or two of the larger stations and on only one line are the automobiles and drays owned by the company using them. As to the use of the auto-truck, of the 105 roads represented only four lines have placed them in service.

The question requesting expressions of opinion as to a uniform scale of class rates on a mileage basis, the committee believes, was not wholly understood in all cases by the lines answering. However, a careful perusal of the answers given would indicate that as a whole a uniform class rate on an agreed mileage basis in small zones, somewhat on the plan of the parcel post, might be worked out satisfactorily and to the interest of the electric lines. Further, the character of franchise rights (this refers particularly to the use of streets through cities and towns), as indicated by the answers to this question, is such as to deny the broadening of the freight traffic to a point where its volume would be sufficient to warrant a large expenditure for equipment and station facilities without practically rebuilding nearly all of the traction lines.

One section of the data sheet contained inquiries as to the advisability of adopting the "official classification" or the classification applicable to the territory in which a road is located, also as to the advantages to be derived from following steam railroad practice in the matter of using per diem charges for cars used on foreign lines. Inquiries were also made as to whether or not the companies recommended representation by electric railways on classification committees, also as to whether the members favored the adoption of the national car demurrage rules, the current storage rules and rates of steam railroads and rules for the settlement of freight claims now being used by steam railroads.

The replies to the questions outlined above indicate that a very large majority of the companies replying are in favor of the adoption of the rules and practices referred to.

Regarding the system of way bills (i. e., the unit way bill as against the blanket way bill), it is not believed that uniformity in this particular is essential. Many roads find that it is wise to use both systems, the "unit" way bill for various reasons being especially adapted to the needs of electric lines covering local shipments for small country towns where much of the freight is delivered directly to the consignee at his store door. The answers to this question taken as a whole would indicate a leaning toward the standard steam railroad blanket way bills for interchange of freight either with electric or with steam roads and the committee would recommend that member companies make this standard a uniform one.

As to the matter of uniform exceptions to the classification, the committee realizes that every line has certain local conditions to contend with which would make it almost impossible to follow out any general rule for a large territory, especially for local business on its own line. A close scrutiny of the answers to this question would indicate that many of the lines which have voted "no" would have voted "yes," provided it had been understood that these exceptions would only apply on interline business as with other roads, and that they were at liberty to make such local exception as might be necessary for the operation of their own lines.

The Central Electric Traffic Association has recently issued, through its chairman, a joint exception sheet covering C.E. T.A. territory for the use of all lines in the interchange of freight business. Many of the lines thought that it was impossible to adopt some of the restrictions in this exception sheet on their own lines for local business, but many of these same lines have subsequently adopted this joint exchange sheet for use in this way.

In the matter of the establishment of a weight and inspection bureau, a respectable majority of the lines voted "yes." Several conditions for handling freight as regards correct weights and inspection are deplorable, and yet the expense necessary for an organization of this kind cannot be borne by the electric lines on the volume of freight business now being handled. However, at certain large centers a weight and inspection officer can be advantageously placed and be the means of saving a large sum to the line or lines so employing a man. This plan was tried out at the Indianapolis terminal with the remarkable showing of about 15 per cent gain in revenue on the same volume of business, resulting in a gain of five times the expense incurred.

The question of industrial switches seems to the committee to be one of very great importance and should receive further attention. There seems to be no general plan for the placing of this aid to industries, hardly any two roads following the same plan; in fact, the answers would indicate that very few roads put in two switches under the same conditions.

As to the kind of freight handled, many lines stated that they handle all kinds of freight while a general analysis of their report would indicate that this was not entirely the case, as in most answers there was usually the word "except," which would indicate that there was some break in the chain of possibilities as to the general freight business.

The question of public demands and the profitableness of the freight business are other points which should be carried forward for further and closer investigation. Very few of the lines would give an unconditional answer that it was profitable to handle freight, most of them commenting that

*Abstract of report read before the American Electric Railway Transportation & Traffic Association, at Atlantic City, N. J., Oct. 13-17, 1913.

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it would be so if "proper facilities," "belts around cities and towns," "freight houses," "side tracks," "steam road connections," etc., were provided. In other words, that the business was not now profitable, but it might be made so.

The committee is hardly in sympathy with this pessimistic view. The electric lines have a field entirely their own and are capable of giving a service to the public far superior to that now rendered by any steam road. This need not be confined wholly to short distances, but may be extended to 100 or 150 miles and even further, and the service rendered would be so much quicker than that of steam roads that special recognition would be given by the shipping public commensurate with such service.

There are only a very few electric lines represented in this report which are equipped to handle sufficient cars in one train to justify the tonnage at the rate received, and it is possible for the electric lines to handle any of this business without a visible loss only because of the fact that much of the freight handled by traction lines is of such a character as to take a high-class rate and is delivered in quantities so small that minimums apply.

The usual compensation for electric lines on the class of freight now being handled will approximate closely 3 cents per ton per mile hauled. The committee has been unable to secure any general figures from the Indiana lines, but, quoting from the report made by the Public Service Commission of Ohio, the freight tonnage and freight revenue of steam lines show a gross earning of 0.5 cent per ton per mile haul. This is a figure which interurban lines are gradually approaching, under the system of accepting all classes of freight on the same basis of revenue as that received by the steam roads. It is hard to conceive how any traffic man can figure a net earning on this basis with the expensive and limited methods which electric railways employ in handling freight and express, such additional expense being caused largely by franchise conditions.

Recently the Interstate Commerce Commission conducted an extended investigation as to the relative merits of the wooden boxes versus the corrugated fiber container for package purposes. This showed that for packages handled in fiber containers the risk is five times greater than for those packed in wood, even on steam roads, where the custom is not to pile freight as high and in as promiscuous order as is the case with the electric lines, for the reason that the electric lines must handle practically all classes of freight in one car. Yet one road, member of the C.E.T.A., issued exceptions on many articles shipped in fiber containers, especially bottled goods, glassware, or heavy single articles, and was finally forced to withdraw these exceptions as being "unjust and discriminating." The foregoing proves the justification of the stand taken by this company, and demonstrates further the real need of representation by the traction lines on classification committees.

Under certain conditions traffic arrangements with the steam roads might be advisable. Just recently under the Indiana Public Service Commission law, passed by the last Legislature, an interchange between a steam road and a traction line was ordered by the commission. In this case, however, a certain state institution situated on the traction line having a traction line switch (but no steam road connection) ordered the steam road to deliver certain commodities in car loads to the traction line for delivery. This the steam road finally consented to with the reservation that it was not to be considered as a precedent to which reference might be made when other like requests should come before the commission. Isolated cases of this kind might be wisely put into effect, provided as in this particular case the delivery were made by a belt connection and operated over a section of the interurban tracks, where it had a private right-of-way, and not through any city or town. This is only a forerunner of what may be expected in the future from commissions and electric railways should be prepared to decide knowingly whether indiscriminate connections of this kind would be desirable or not.

There are some roads, as indicated in the answers to the questions in the data sheet, prepared to handle all classes of freight (and possibly at a profit) on the steam railroad basis. These lines are few and far between, however, and as in every case it would be necessary to develop a special tariff to cover such interline business, a general proposition of tightening up on the character of freight accepted and the rate at which same can be handled profitably would seem advisable for the traction lines as a whole. That this view is partially taken by members of the Interstate Commerce Commission is evidenced by their decision on the matter of through rates and through traffic between Louisville and Indianapolis over a traction line making this link, where their orders only cover first, second, third and fourth class, not compelling or even asking that the traction lines should consider the proposition of handling freight taking a class rate lower than the ones mentioned.

A brief summary of the whole situation would be in order preliminary to the recommendation of the committee as to what should be further continued in the investigation for the succeeding year.

The preponderance of answers in the affirmative would indicate that it is the intention of a large majority of the traction lines communicated with to handle freight and express.

Replies indicate that the lines as a whole are opposed to pick-up and delivery, and that if it was maintained it would only be in order to take care of a special situation.

The use of auto-trucks has not been general enough to permit any suggestion as to augmenting freight service with this auxiliary. All lines, with one exception, were against the owning of drays or auto-trucks, for any service.

It would seem that a majority of the lines represented would be in favor of a uniform scale of class rates on some basis, to be agreed upon later.

On the question of franchises, as these are largely controlled by legislative conditions varying widely as between different states, it would seem that this subject should receive further attention from our legal departments.

All questions referring to the adoption of certain rules and regulations now in use by the steam roads have been voted on in the affirmative by a very large majority of all lines represented; in fact it would appear that a majority of lines were using these rules at the present time.

The answers to the query concerning the desirability of the unit way bill as against the blanket way bill would indicate general approval of a double standard, the unit way bill for local use and the blanket way bill for interline traffic.

There are about the same number of lines in favor of a uniform exception to the official classification, as against it. Our recommendations would be that for interline business some form of uniform exception sheet should be agreed upon in order to facilitate traffic as between the different electric lines.

There is undoubtedly a crying need of some form of checking weights of outbound and inbound shipments and inspections relative to classification and the committee would recommend that further consideration be given this subject.

A wide variation of conditions makes it impracticable for the traction lines as a whole to have one set form of agreement for the placing of such private sidings, and from the nature of the work, each individual case must be handled on its own merits.

APPENDICES

Appendix A submitted with the report consisted of a reproduction of the data sheet sent out by the committee to the member companies. Appendix B consisted of a compilation of the answers received from different roads on the questions submitted in the data sheet.

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REPORT OF THE COMMITTEE ON POWER GENERATION*

B. F. WOOD, CHAIRMAN; G. H. KELSAY, G. W. KNOX, W. H. SAWYER, J. W. WELSH, NORMAN READ, WILLIAM ROBERTS, L. P. CRECELIUS, G. C. HALL

The committee states that on account of the low first cost and high economy of steam turbine generating stations the possible economy of gas engines and gas producers is so small that there is little general interest in this subject for the member companies. From information in the hands of the committee it is the belief that with gas engine plants costing $90 per kw, or more, as compared with steam turbine plants at $50 per kw, the saving in the higher economy of the gas engine would not be sufficient to offset the additional fixed charges, except in cases where the cost of coal was from $6 to $8 per ton.

The report was accompanied by three appendices, A, B and C, covering the subjects of peak loads, boiler settings and furnace design, automatic relays and distant control of valves. Of these two are published in abstract. That on peak loads was prepared by B. F. Wood, that on automatic relays by W. H. Sawyer, J. W. Welsh and G. C. Hall, and that on the distant control of valves by William Roberts.

PEAK LOADS

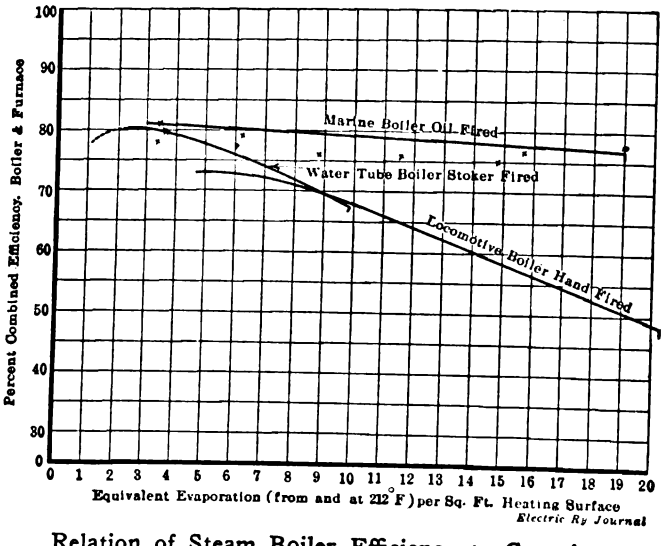
In the reports of this committee for the years 1910, 1911 and 1912 the important bearing of fixed charges to the total cost of plant output for various load factors was clearly brought out, as operating costs do not materially change for the various load factors. Except in a few cases where there is an excessive and unnecessary amount of standby apparatus installed, the only portion of the power station in which a reduction in first cost and the related fixed charges can be made is in the boiler room. Here the reduction in cost must be made by securing an increase in the steaming capacity of the boiler plant.

Curves showing the combined efficiency of boiler and furnace when operating at various rates of evaporation per square foot of heating surface are shown in the accompanying illustration. All of these curves are continued to the present known maximum rate of operation. The curve showing the performance of the marine boiler represents work recently done under the direction of the Navy Department at the League Island Navy Yard, and, so far as known, represents the highest performance, both as to rate of evaporation and efficiency, yet obtained with this type of boiler. The performances of the locomotive and marine boilers are included to show the great possibilities for improvement in power plant operation, both in the direction of securing greater output from the installed boiler plant and better economy in its operation.

By reference to the curve, it will be noticed that the combined boiler and furnace efficiency at the usual rating for stationary boilers, 3.45 lb. per sq. ft. of heating surface per hour, is 80 per cent; if the boiler and furnace are worked at double rating the efficiency is 74 per cent. This performance, of course, represents conditions obtaining at a constant rate of working, and in the every-day operation of power stations the combined efficiency rarely exceeds 70 per cent, which is due to the losses that occur during the period of light loads when boilers are banked or held in reserve. By operating at higher rates during peak-load periods the number of boilers that must be banked at the time of light loads will be less, and consequently the losses that occur at such times will be reduced.

To show that the total cost of plant output is not increased, but on the contrary is decreased, with the higher rates of the working of the boiler plant, it may be said that the boiler room portion of the ordinary power plant costs about $30 per kw when boilers are installed on the basis of operation at rated capacity. The cost can be reduced to about half this amount if the boilers are installed to operate at double rating during the peak-load periods, thus reducing the first cost of the plant by, say, $12 per kw. The saving in fixed charges on this amount, at 12 per cent per annum, would therefore amount to $1.44 per year on each kw of installed capacity.

Estimating the yearly load factor at 27.5 per cent, which corresponds to an annual output of about 2,500 kw-hr. per kw of installed capacity, the saving in fixed charges becomes 0.58 mill per kw-hr. The coal consumption per kw-hr. of the plant will be increased in an inverse proportion to the boiler efficiency at the two rates of working, and there will be required, if the plant is worked at double rating during peak loads, 80/74 of the coal at normal rating. Such a plant would operate at 2 lb. of coal per kw-hr. under normal operation, requiring therefore 5000 lb. of coal per year per kw of installed capacity, which at $2.50 per net ton amounts to



Relation of Steam Boiler Efficiency to Capacity

$6.25 per year. The annual cost for fuel at the higher rate of operation would therefore be 80/74 of $6.25, an increase of 50 cents per year for fuel. The net gain at the higher rate of working would therefore be nearly $1 per year per kw of plant capacity.

SUGGESTED ARRANGEMENT OF AUTOMATIC RELAYS AND APPARATUS TO PROTECT POWER PLANTS FROM SHUTDOWN

The success of any method of protecting a power system from shutdown is dependent upon the selective elimination of the faulty section of the maintenance of service in the remainder of the system with the least possible disturbance in voltage and frequency. The problem of cutting out an overloaded section under normal conditions of load and power factor is simple. The real test of a protective system is its ability to isolate a damaged section when a short-circuit or other trouble occurs with attendant circumstances of heavy power surges, low power factor and reduced voltage.

To limit the heavy rushes of current which occur at times of short-circuit and to prevent shutdowns, a form of self-inductant reactance should be employed in conjunction with a suitable form of automatic relay. This reactance, unless inherent in the apparatus, would preferably take the form of an open coil without iron in the magnetic circuit and have a cross-section designed to secure the maximum self-induction, such as can be easily secured and installed at comparatively low cost; these coils to be placed directly in series in those parts of the system in which it is desired to limit the short-circuit current.

Where modern turbo-generators are installed, with at least 6 per cent internal resistance, additional internal reactance may not be required. In most of the earlier machines, both

*Abstract of report read before the American Electric Railway Engineering Association, at Atlantic City, N. J., Oct. 13-17, 1913.

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turbines and transformers, the internal reactance was made as low as possible for the purpose of improving the regulation, but with the result that the short-circuit current was in some cases as high as forty or fifty times full load current. This, of course, is the maximum instantaneous current at the moment of short-circuit and dies down, decreasing quickly as the armature reaction builds up, counteracting the field flux and reducing the generator voltage. Reactance in the generator leads, besides protecting the generator from external short-circuits, has the additional advantage in case of trouble in the generator itself that it interposes an impedance between the bus and the fault, thereby reducing the shock on the system.

In the case of short-circuits occurring in the feeders or transmission circuits beyond the generator buses, a reaction located in the feeder itself is the most economical point of installation from the standpoint of minimum voltage drop under normal operating conditions, for the generator reactances are all in parallel between the source of electromotive force and a short-circuit on any feeder, while a feeder reactance is in series between the generator and a short-circuit on the feeder. Another advantage of having part of the reactance in the feeder circuit is that the busbar voltage is subjected to less disturbance when a short-circuit does occur, owing to the interposition of the reactance between the bus and the short-circuit, and the stability of the system is hereby increased. An additional advantage results when a feeder is used as a tie line to other generating stations or when it feeds synchronous apparatus, as a reactance in this line limits the amount of reverse power fed back from the other stations when a short-circuit occurs on one station feeder.

In stations of large capacity having sectionalized busbars and tie lines to other stations, a reactance between the bus sections or in the tie between stations or groups of machines permits a much greater total generating capacity to be operated in parallel with the same factor of safety in switching equipment and limits the area of the system over which any disturbances extend.

To overcome the objection of poor regulation and power factor caused by reactance there is sometimes installed an additional short-circuiting switch so connected as to shunt the reactance and provided with an automatic instantaneous device to open the switch and cut in the reactance in case of short-circuit. The objection to this, however, is that the reactance is out of the circuit when trouble occurs and therefore does not necessarily reduce the shock to the system.

GROUNDED NEUTRAL

Where the generators are Y-connected on large underground systems, a further protection from shutdowns due to surges may be secured by grounding the neutral. This limits, even when solidly grounded, the normal voltage between any conductor and ground to approximately 58 per cent of that between conductors—thus protecting the insulation of apparatus. A resistance inserted in the ground connection limits the flow of current and shock to the system and, for the underground systems, grounding the neutral through resistance is in general advisable, but, to take the other extreme, grounding the neutral on long-distance overhead systems is, in general, not advisable—the primary difference in the two extremes being the fact that one is an underground cable on which a fault to ground generally rapidly develops into a short, whereas the other is an overhead circuit of three separate wires and fault to ground can often be located and remedied without interruption of service; also on underground cable systems there are generally more spare cables.

RELAYS IN MAIN GENERATOR LEADS

To isolate the affected portion of the system and protect the station from shutdown, reverse current or reverse energy relays operated from transformers in the generator leads, for the automatic operation of generator oil switches, should be installed. These relays should have the following operating characteristics: (a) Should permit of limited reversal without relay tripping in order to allow leeway for motoring when the generator is first put on bus before picking up load. (b) Operation at predetermined reverse load setting should be instantaneous. (c) Must not operate on overloads. (d) Must operate on reversal even with low voltage and low power factor. (e) Must not operate on over-voltage.

In general, overload relays should not be installed to operate generator switches, and where they are installed, they should be equipped with a definite time-limit feature, arranged so as not to operate under any condition of short-circuit, except at a given time setting.

In order to cut off from the bus a generator having an internal short-circuit, an adaptation of the Merz-Price system of balance current has been proposed consisting of two transformers on each leg of the generator winding, one of the two being outside of the generator and the other being inside the star connection. Normally these two transformers are in opposition and no current flows through a relay placed in the circuit, but in case of internal short-circuit there is more current flowing in one transformer than in the other and the relay will operate, cutting the generator off from the bus and opening the field circuit.

RELAYS IN FEEDER CIRCUITS

At the power house end of feeders, relays of the overload type, with adjustment for the time limit, should be used. When feeders are operated in parallel at the substation end relays of the reverse energy type should be installed at the substation. On systems having substations fed directly (substations not in tandem or on ring system) and where the service is not such as to demand that the power supply be maintained at all hazards, inverse time element relays should certainly be employed at the generating station rather than the use of definite time relays. In cases of larger and more important but relatively short tie lines between generating stations, reverse current or energy relays should be installed in each station, interconnected so as to operate immediately upon reversal of energy or current at one end of the line. In general, for transmission and long tie lines, inverse time element relays should preferably be furnished of such characteristics that under all conditions of overload or short-circuit the successive relays maintain their selective sequence.

DISTANT CONTROL OF VALVES

Some remarkable developments have been made within the last few years in the distant control of valves either by electricity, air or steam. The perfecting of these different systems of control after an initial attempt has been exceedingly rapid and the electrically operated system has perhaps been the more pronounced in its advancement and adoption.

Several very interesting installations have been successfully completed with special reference to the operation of valves between boilers and headers and sections of the header, thus permitting any break in the pipe to be isolated by closing the necessary switches, which may be placed at any remote point for convenient operation. In one installation, a plant of fifteen boilers, the cut-off valves from the boilers to the main header are controlled from the engine room with the switches conveniently placed, numbered distinctly and in plain view. In case of the loss of a tube, some one formerly had to mount the boiler and endeavor to locate the valve, frequently among clouds of steam, and by the time the valve was located and the boiler cut out the steam would be down on account of other boilers discharging more or less into the boiler with the damaged tubes. Employees have been scalded through this method or want of method of operation.

In another plant, operation of the turbines is carried on from the switchboard and steam is admitted and controlled electrically on all units. The governors of all the turbines are also controlled electrically, while in another part of the plant air is used for remote control of valves for shop purposes.

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REPORT OF THE COMMITTEE ON FARES AND TRANSFERS*

F. T. WOOD, CHAIRMAN; J. V. SULLIVAN, E. C. DEAL F. L. HUBBARD, G. K. JEFFRIES, W. B. THOMAS.

The committee on fares and transfers presented in its report the results of an investigation of the matter of fare boxes, in which replies to data sheet inquiries were received from sixty-three companies. Of these, thirty-one reported gross receipts annually of less than $1,000,000, the remainder being properties of larger size. Sixty per cent of the smaller companies and 80 per cent of the larger ones reported the use of prepayment cars, a total of forty-five, or 71 per cent of the whole number. The practice of the forty-five companies operating prepayment cars was shown by the replies to be about equally divided as to the use or non-use of fare boxes. A further equal division was found between the locked and non-locked box, the former being the type which renders fares inaccessible to the conductor, and the same result was found in regard to the use of fare box registers. Four companies using a non-registering locked box used a fare register on the car and six companies did not use such a register under such conditions. Nine companies used fare registers besides registering fare boxes, and two did not.

The reasons given for use of fare boxes of the various types are as follows. Eight companies favor the registering non-locked fare box because the change is available for the conductor and four others give other reasons. Two companies are using both types of boxes, but each prefers the registering fare box because it delivers money to conductors and gives them available change. Seven companies favor the locked fare box mainly on account of its cheapness and simplicity.

One company is experimenting with both types, and one is experimenting with a registering non-locked box. Two companies using the locked box give no reason for preference. Most of the locked non-registering fare boxes will receive any coin, three take pennies, nickels and dimes, and one nickels, dimes and quarters. Twelve of the registering non-locked boxes take pennies, nickels and dimes; two take nickels and dimes only.

TRANSFERS

In the matter of transfers it was found that the majority of the smaller companies, such as issued less than 60,000 transfers daily, did not issue transfers on transfers, but the larger companies did do so, though in the majority of cases the re-transfer privilege was limited. The majority of the smaller companies registered transfers, although the reverse was the case with the larger ones, a separate or double register being used in most cases for this purpose.

Most of the companies which follow the practice of registering transfers reported more or less effort to verify collections with register readings, and discipline for failure to register transfers in the same manner as in the case of failure to register fares. The general consensus of opinion seems to be that it is impracticable to do more than check the matter of transfers issued, destroyed or given away in a general way, particularly when a large number of transfers is involved.

There is a somewhat surprising difference of policy observed in checking transfers to determine if they had been properly honored by the conductor. Certain of the roads receiving but a few thousand transfers daily check them out with care as to date, time, direction, etc., while some roads receiving less than a thousand transfers a day either make no check at all or at infrequent intervals only.

About half of the companies reported that a conductor who has improperly honored transfers is called before the superintendent or his representative. Two companies give demerits in such cases. Several report that men are cautioned and subsequently disciplined for repetition of offense, while twelve companies charge conductor on short list for each such irregularity.

The percentage of transfers given to conductors and not issued varies between the approximate limits of 15 per cent and 50 per cent, although in some cases this difference is reported to be actually nothing. The proportion of issued transfers which are finally collected varies between the approximate limits of 75 per cent and 95 per cent, decreasing on the larger roads.

From the replies received the committee was of the opinion that the transfer which provides for the cancellation of the month and day by punch and notch marks is well adapted for use on those lines where the number of transfers honored daily is relatively small. The transfers which are stamped or printed with a figure to indicate the day of the month are somewhat more subject to waste. The transfers which are perforated by a machine before being given to a conductor are not quite as economical as either of the other two types of transfers, but obviously involve less waste than those which bear the printed day, date and month and are only good for one particular day. The dated transfer which may be used only on one day involves more waste than any of the preceding types of transfers mentioned, and as it involves the use of more than one standard form of transfer, it opens the way to additional abuse; but there may be certain local conditions which offset these undesirable features. The coupon transfer is expensive, but it appears to possess marked advantages in those cases where a person is permitted to transfer more than once.

Where a relatively small number of transfers are collected each day a reasonably thorough check of the date of the tickets, the time of presentation and the point at which they were honored will be productive of good results in the maintenance of discipline and in minimizing fraud. Where the number is large the opportunity for imposition and pecuniary loss is correspondingly greater, and in those cases where transfers are not registered a systematic audit with a comparison of transfers issued by each conductor is desirable, men going over the whole system once in ten days. Where the number of transfers amounts to several hundred thousand or more daily and transfers are not registered, periodical checks at somewhat less frequent intervals should be made, and such checks should be supplemented by special tests through the co-operation of the secret service department.

This report had as Appendix A the conclusions of a sub-committee regarding methods by which overlap zone fares may be simplified and the prevailing methods of registration and accounting of fares on both city and interurban lines. The sub-committee believed that overlap zones should be avoided if possible, and if they already exist some steps should be taken to eliminate them, a neutral zone between a 5-cent and a 10-cent district being likely to give rise to many disputes.

Of twenty-eight companies answering the questions as to the basis for computing published fare rates ten reply "Two cents per mile"; five others say, "City limits 5 cents"; four others, "Five-cent fare zone basis," while several others are indefinite. The minimum interurban fare of the great majority of companies answering is 5 cents, a few charging 10 cents and one on a basis of 1¼ cents per mile. Nearly all the companies collect fares through to destination, but there are seven which collect in zones.

There is also submitted in the report a communication from the representative of a large interurban system stating that plans were under way for the abolition of payment of cash fares on the trains of that line. This appears in the report as Appendix B.

*Abstract of report read before the American Electric Railway Transportation & Traffic Association and Accountants' Association, at Atlantic City, N. J., Oct. 13-17, 1913.

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REPORT OF THE COMMITTEE ON WELFARE OF EMPLOYEES*

J. J. BURLEIGH, CHAIRMAN; D. F. SHERMAN, J. D. CALLERY, DANA STEVENS, H. T. EDGAR, C. S. KRICK

It must be recognized that if men are to be kept for long periods in a given service their employment must be made attractive and inducements must be offered beyond the prevailing day's wage. In addition, if a man gives the best years of his life to an industry, he has some right to expect that industry to provide for his sustenance when his days as a producer have passed. The committee is convinced that the activities embraced within the general term "welfare work" are productive of satisfying and even profitable results, and it desires to submit for the consideration of the managements of member companies some of the forms which these activities may assume.

The sick benefit is a form of helpfulness which reaches a large number of individuals and yields a return in faithfulness, good will and loyalty on the part of the employee. The committee recommends the adoption of such a plan where it does not now exist and suggests that it include the following provisions: That a short period of service, about a month, be required before eligibility to benefits is attained; that no benefits be paid for an illness of less than one week; that benefits amount to not more than half wages when half wages exceed $7 per week, nor less than $1 per day; the period of payments may be limited or not as desired; medical service may or may not be provided; only permanent employees should attain eligibility to benefits.

A sick benefit fund may be created, maintained and administered entirely by the company or jointly by assessments upon employees and contributions from the company, preferably in the former manner. Where the fund is financed by the latter method, a mutual association should be formed having a governing board composed of both company officers and employees, with the company management in control.

Death benefits and insurance are effective features of welfare work. With a prospect of a life insurance payment to their dependents, men will be prone to remain in the service and give to the employer their best efforts. Benefits should be paid for death from injury as well as from illness, unless the death is the result of industrial accident or occupational disease otherwise compensated for.

The committee recommends that "service annuities" or pensions be paid entirely by the company under well-defined conditions, among which are the following: voluntary applications should be granted at from sixty to sixty-five years of age, and compulsory retirement may be provided for at the age of seventy; a longer period of service should be required to permit voluntary retirement than in the case of compulsory retirement. From twenty to twenty-five years is suggested for the former cases and from fifteen to twenty years for the latter. The suggested basis of service annuities or pensions is from 1 to 2 per cent of the employee's average yearly wages for the ten years preceding retirement, multiplied by the number of years of continuous service. This should constitute the yearly payment and may be subject to a minimum of not less than $240.

Accident benefits are payments for industrial injuries and occupational diseases. In a number of states such payments are provided for by workmen's compensation acts, and where such are in force, and an automatically fixed compensation feature is elective, its adoption is recommended. Such legislation is based upon the theory that the industry should bear the burden of its mishaps and we are convinced that it will operate for the best interests of all concerned. Where, however, under the company's sick benefit plan, for a like disability, the employee is entitled to an amount in excess of that provided by a compensation act, the company might elect to pay an additional amount sufficient to make the total payment equal to that to which the employee would be entitled under the company's plan.

The committee believes that where the employee's interest in the welfare of the company is that of a shareholder or quasi-partner, such conditions make for the greatest efficiency of the individual and as a corollary the greatest success of the enterprise. Where these conditions obtain the employees are entitled in some degree to a partner's return.

Any compensation paid to employees in the form of profit sharing should be considered an addition to the ordinary wage schedule. Ordinarily, profit sharing should not be paid in cash but should reach the employee in the form of securities of the company or, in the case of a subsidiary company, in securities of the parent company. Where good reasons exist, exceptions may be made in the application of the foregoing rule. Employees receiving securities under this plan should be required to retain same for a definite period, and ownership interest is not secured. Dividends accruing from profit-sharing securities should be paid in cash in the manner of other dividends, the money being available to the recipient for any desired purpose. The opportunity for participating in profit sharing should be open to all employees under given conditions.

The committee realizes that much good may be accomplished by encouraging thrift among employees and believes that by the establishment of savings funds such an effect can be brought about.

The making of loans is an effective way of establishing closer relations between employer and employee since it prevents the employee from falling into the hands of loan sharks when for legitimate reasons he is in needy circumstances, because of which his efficiency might be affected by worry over his pecuniary difficulties. In this connection the committee suggests: That the sums loaned be small, say $25, $50, or $100, that no interest be charged upon the loan, that the return of the money in regular instalments be rigidly required, and that the employee be allowed to make his payments voluntarily rather than to have a deduction from his wages, unless at his own request.

The committee also recommends that well-appointed quarters be provided containing reading and recreation rooms, suitable games, lunch rooms, baths, sleeping accommodations and assembly rooms for social affairs and entertainments, and that these club rooms be located preferably at each carhouse where the carhouses are large. Clubs should be established and maintained either solely by the company or in connection with a mutual benefit association, but always under the direct control of the company. Various forms of entertainments, lectures and meetings should be held at intervals, and on these occasions the company's officers should take the opportunity to speak to the men and to manifest a personal interest in their well-being. All forms of athletic sports should be encouraged among the employees and friendly rivalry between the various divisions or carhouse crews encouraged.

The committee desires to place a stamp of disapproval upon systems of discipline which do not aim for concurrent effort. The old system of suspension and consequent loss of wages should be abolished since it cripples the service, frequently fails to improve the employee, causes his family to suffer and often embitters the employee and imbues him with the spirit of revenge.

The various phases of welfare work which have been suggested call for a considerable outlay on the part of the employer. The committee does not expect the adoption of all of the plans but strongly urges that as many as practicable be undertaken, because the entire outlay, in many instances, will be more than compensated for by returns which

*Abstract of report read before the American Electric Railway Association, at Atlantic City, N. J., Oct. 13-17, 1913.

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can be directly calculated in dollars and cents. In addition, benefits will accrue to which a money value cannot be assigned but which, nevertheless, will increase income effectually.

It has been estimated that, assisted by the employing company, mutual associations can pay approximately 50 per cent of wages of the employee during illness at a cost approximating 1 per cent of his wages, and that death benefits ranging from $300 to $500 can be paid with a weekly contribution of from 10 cents to 15 cents.

One member company, the Public Service Corporation of New Jersey, which assumes the entire cost of what it regards as four types of insurance, namely, health, accident, old age and life, finds that last year it expended $104,818.12. This company has 13,421 employees, of which 3,654 are trainmen, and since its welfare plan has been in operation the resignations among the latter have decreased each year, thereby indicating that the company is retaining experienced men in the service. During the year 1912 the decrease in the number of trainmen leaving the service as compared with the year 1911 was 31 per cent. The company's statistics show a saving of about $20 per man in training expenses and an enormous saving in accident costs by the retention of men for one year or more, the combined saving on trainmen alone having been practically the entire cost of the welfare work. It is evident, therefore, that with economies effected by other employees, the figure reached will more than compensate for all the company's welfare work, including payments made to injured employees under the compensation act.

FINANCIAL ASPECTS OF THE RELIEF OF CONGESTION BY THE CONSTRUCTION OF SUBWAYS AND VIADUCTS*

BY CHARLES S. SERGEANT, VICE PRESIDENT BOSTON ELEVATED RAILWAY COMPANY, BOSTON, MASS.

The provision of suitable and adequate urban and suburban transportation for our rapidly growing cities presents many problems to street railway managers, but none more difficult of solution than that commonly called "congestion." Unfortunately the street railway company is too often looked to as solely responsible for the inadequacy of the streets, and elevated or subway lines are demanded at its expense. The average citizen has no conception of financial problems and no especial interest in their working out. Good service is what he deems a reasonable demand upon the traction company without consideration of practical difficulties. Undoubtedly many are inspired in making these demands by their knowledge of the New York subways with their marvelously competent operation and great financial success. Civic pride makes the home city to them as important as the metropolis, and they are not sufficiently well informed to perceive the difference in conditions, nor can they conceive why an underground railway is not possible in their city. The traction manager, seriously concerned about the increase of his labor account and the poor service resulting from slow movement, is eager to adopt relief measures, and perhaps is over-sanguine of their financial success, and thus may enter upon costly construction work without carefully analyzing its effect upon his net income.

Underground city railways have not as a rule been highly profitable, and often have not been self-sustaining. The noise and heat do not tend to popularize this mode of transit, which people make use of more from necessity than choice. Upon the other hand, elevated roads, while more agreeable to the passenger, are very objectionable to abutters upon the line, and the payment of damages to them, if required by the statute, greatly enhances their cost. Such cost figures as I may give in this paper will be drawn entirely from local conditions in Boston and vicinity, and should not be taken as a standard or criterion for other localities where different conditions prevail. Some of the costs which have been experienced in Boston are subjoined in a table as follows:

BOSTON ELEVATED RAILWAY, COST OF RAPID TRANSIT STRUCTURES INCLUDING REAL ESTATE AND DAMAGES.

	Opened to Public	Equivalent Length of Two-Track Main-Line Travel Structure*	Cost*	Cost per Mile of Two-Track Main-Line Structure
Tremont St. Subway	1897-8	2.357	$4,653,524	$1,974,000
East Boston Tunnel	1904	1.409	3,496,696	2,482,000
Washington St. Tunnel (including approaches)	1908	1.380	9,416,013	6,823,000
Elevated System, Dudley St. to Sullivan Sq.	1901			
Forest Hills Extension	1909	10.624	21,414,577	2,016,000
E. Cambridge Extension	1912			
Cambridge Subway Route (including Beacon Hill Tunnel, Cambridge Bridge)	1912	3.819	9,878,889	2,587,000
Totals		19.589	$48,859,974	$2,494,000

*Excluding cost of shops and yards and mileage of tracks therein.

Particular attention is directed to the comparison of cost between the Tremont Street subway and the Washington Street tunnel, so-called. The Tremont Street subway was the first built, and for a very considerable part of its length was built under the Common and Public Garden. But one station approach in addition to the northern terminus was constructed on private land. On the contrary, the Washington Street tunnel or subway, while built mainly under public streets, was for a portion of its route carried under private land, and no less than ten of the station entrances and exits were placed on private land on account of the narrowness of the streets. This resulted in a cost per mile of nearly three and one-half times that of the Tremont Street subway, and is a good illustration of the essential government of subway costs by local conditions.

Under exceptional circumstances where the geography of the system concentrates a very great traffic over a considerable length of route, subways may be financially possible for the traction companies. But for cities having a wide spreading radial system of track with perhaps only a congested center, the elevated or underground railway can only be carried through that center, or more probably cannot be afforded at all, if the expense is to be borne by the street railway, that is to say, by the fares paid by the users at prevailing rates.

METHODS OF USE OF SUBWAYS

Where the distance for which traffic is to be buried is short, one must reach the conclusion that surface cars should merely be diverted underground through the congested center, on account of the difficulties of transferring passengers at a point of maximum traffic to a different system or train service, yet this method of use is necessarily restrictive of speed on account of the number of train units, or of capacity if a high speed is required. Therefore neither the company nor the public can realize the fullest advantages from the heavy investment. If, on the other hand, a sufficient length of line is constructed, its operation by trains offers the desirable and economical solution, giving the maximum of speed and capacity with a minimum of expense for train service. Both of these methods are in use in Boston.

FINANCIAL RESULTS

The total investment in structures for rapid transit lines, so-called, as distinguished from the surface railways, in operation in the Boston system now amounts to $51,018,000, including terminal yards, shops, etc., of which nearly $17,000,000 has been provided by the city of Boston, which owns all of the underground facilities (subways and tunnels) in Boston, and is now engaged in the building of additional subways and tunnels which may reach a further outlay of over $15,000,000. All of this trackage is leased to the Boston Elevated Railway Company at rentals usually of 4½ per cent or 4¾

*Abstract of a paper read before the American Electric Railway Association, at Atlantic City, N. J., Oct. 13-17, 1913.

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per cent of the cost, rates which are calculated to provide sinking fund as well as interest. The railway company is therefore paying both principal and interest as a rental, although the subways remain the property of the city.

In addition to the fixed charges one must not overlook the heavy operating expenses. Station operation is a burden from which street railways have usually been exempt. It constitutes a new element of operating expense, and there is in addition the maintenance, lighting and ventilation of the subways. These expenses go far to offset the savings of train service.

But what shall be said of the revenues? In 1897-8, when the first subway was opened in Boston, the passenger revenues of the entire system were $8,967,000. In the last fiscal year they were $16,268,000, an increase in fifteen years of 81.42 per cent, which is only normal. Our experience has been that no addition to rapid transit facilities has accelerated the normal growth of business. It is true that without them the usual increase could hardly have been realized for lack of physical space in which to do the business, but from the point of view of net financial results the change has been for the worse. This is not only due to the heavy burden of fixed charges but also to the general extension of the length of rides made possible by the new facilities and to the universal fare maintained by through service and free transfers.

The public has benefited enormously at the cost of the investor. Nothing can well be of more consequence to a community than low-priced and convenient transportation facilities. Some one should provide them, but the burden should not all fall upon the stockholders of the street railway company or upon the users of the system; something should be paid by the city, which reaps an enormous benefit in increased taxable valuations and in freer movement of traffic upon the streets, and something should be left to future generations, for subways are built for the future.

WHO SHOULD PAY FOR SUBWAYS

Since it is the duty of the city or the state to provide adequate streets, why should we not conclude that, when it becomes necessary to segregate a particular class of traffic for its relief and the relief of the streets, it is the duty of the city or state to bear the burden? All should have a right to sufficient street accommodation for their needs. But some one will say a rental should be charged. Is it not true that any such rental is in the nature of a toll? Tolls have generally been abolished, toll bridges and turnpikes are now mostly free. Taxpayers rather than users maintain them. The cost of the recent great improvements in highways has not been levied in tolls upon automobile owners and other users. I think it must be conceded that any rent or tax laid upon the business of a street railway is in the nature of a charge or toll for the use of streets, and this use is for the great public, not for the stockholders of the traction company, unless they are entitled to such profits as they may reasonably make from their investment. When, as in Massachusetts, the profit of the stockholders in such enterprises is limited by one means or another to mere legal rates of interest and those are by no means guaranteed or assured, an element is introduced which logically requires the city or the state to provide at least the space or way needed for carrying the traffic, whether it be on the surface, overhead or underground.

The method pursued in Boston of leasing the city-owned subways to the operating street railway company results in the transfer to the street railway company of all the risks of the enterprise, and establishes the subway rental as a charge against net income prior to the dividends to which the stockholders are reasonably entitled upon their money already invested. It seems to me that this is fundamentally wrong; that, when these new means of transportation are desired by the community, the benefits to the community should be recognized, and the city at least made a partner in the undertaking and its risks, especially so because any possible profit can be obtained only in the future.

The American people are usually reasonable in the long run and it may be hoped will take into account all the elements of this great problem when important transit plans are being considered. The contracts for the new subways and elevated lines in New York show an encouraging recognition of the principle that the municipality is at least concerned as a partner in the enterprise of supplying these enormous new facilities.

My conclusions may be summed up as follows:

The general welfare in many cities may require large outlays for special rapid transit facilities by elevated or subway lines which are too costly to be remunerative to the investor unless too heavy a charge is laid upon the users.

Such provisions will increase the value of real estate for taxable purposes, and therefore should be paid for in whole or in part by the city.

If existing traction companies are called upon to operate them or to contribute to their cost, their existing investments should be a prior claim upon the income.

PROFIT-SHARING PLAN OF THE WASHINGTON RAILWAY & ELECTRIC COMPANY*

BY W. F. HAM, VICE-PRESIDENT AND COMPTROLLER WASHINGTON RAILWAY & ELECTRIC COMPANY

This company has been deeply interested for many years in welfare work among its employees and their families and may, perhaps, be considered a pioneer in such work.

Its Relief Association was organized in 1900, not only to furnish health, accident and death benefits to its members, but to provide a social organization in which its members and their families might take an active interest.

The association has since established a savings department where members are privileged to deposit savings which draw 5 per cent interest per annum; a loan department where members can borrow money at 6 per cent interest per annum; a bonding department in which fidelity bonds are furnished to members at prices considerably less than those charged by the regular bonding companies; a central club room equipped with bowling alleys, pool tables, music, game and reading rooms; and most recently a branch of the public library, whereby members are given all facilities of the main public library.

Also, since 1900 the company has maintained an efficient medical department whereby all employees receive free medical attention.

Rest, reading and recreation rooms have been established at carhouses; annual excursions and entertainments have been given for members and their families.

A pension system was inaugurated in 1907 for the benefit of employees grown old in service.

A graduated scale of wages for trainmen was put in effect early in 1912 in order to encourage longevity of service, and a little later, after a careful study of the merit and demerit system of discipline, the plan was adopted.

Early last year the management decided that the time was ripe for the adoption of some plan by which the uniformed employees of the company should share in its profits. Good service was being rendered the public and the stockholders, after years of waiting, were receiving a small return upon their investment. It was decided that the trainmen should share in whatever improvement could be made over the results of the year 1911. Naturally, the company desired to formulate and adopt the plan which would be most simple and most effective in stimulating the men to greater efficiency. As will be noted from the plan, as described, the

*Abstract of a paper read before the American Electric Railway Association, Atlantic City, N. J., Oct. 13-17, 1913.

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company has made its uniformed employees salesmen on a commission, with a guaranteed salary.

It was found that during the year 1911, of the gross passenger receipts, after deducting the 4 per cent tax paid the government, 22½ per cent was absorbed by trainmen's wages and 3½ per cent by settlement of damage claims. It was, therefore, decided to set aside 26 per cent of the gross passenger receipts, after deducting the above-mentioned 4 per cent tax, as a fund to cover trainmen's wages and settlement of damage claims. Whatever remains of this 26 per cent, after payment of wages of conductors and motormen and settlement of damage claims, goes into the profit-sharing fund for distribution.

Although the details of the plan were not decided upon until May 1 and announcement was not made until that time, the plan was made effective beginning Jan. 1, 1912.

Among the objects of the plan were:

First, to call to the attention of the men and the public the payment of the tax of 4 per cent of our gross receipts.

Second, to encourage the men to get their fares and to popularize the company, thereby increasing the passenger receipts per car mile, and

Third, to draw to the attention of the men and the public the high cost of damages and to encourage the men to do everything possible to reduce the liability of accidents.

One of the features of the plan which seem to have appealed most strongly to the men was the cash distribution made promptly at the end of the year. Although the plan was not announced until May 1, up to which time little, if any, improvement had been made over the corresponding period of the preceding year, at the close of the year $19,123 was accumulated in the fund and distributed to 801 men on Jan. 2, 1913, as shown in the accompanying table.

584 men in service one or more years	$28 72	$16,772 48
17 men in service 11 months	26 34	447 78
4 men in service 10 months	23 94	95 76
6 men in service 9 months	21 54	129 24
18 men in service 8 months	19 15	344 70
14 men in service 7 months	16 76	234 64
20 men in service 6 months	14 36	287 20
18 men in service 5 months	11 97	215 46
19 men in service 4 months	9 57	181 83
26 men in service 3 months	7 18	186 68
20 men in service 2 months	4 79	95 80
55 men in service 1 month	2 39	131 45
801		$19,123 02

The company feels that the plan is a success and that it tends to encourage the men to do their part and to feel that the company is glad to share with them in its increased prosperity.

It is gratifying to state that for the six months ending June 30, 1913, the profit-sharing fund is $5,655 greater than for the same period the previous year.

J. C. Fritts, master car builder of the Delaware, Lackawanna & Western Railroad, presented a paper, "Freight Car Troubles," at the regular meeting of the Central Railway Club, on Sept. 12, 1913. The object of the paper was to call attention to the cause and effect of freight car troubles and to suggest such changes as appeared to the author to be necessary for economical maintenance. The conclusions drawn by Mr. Fritts follow: First—Reinforcing the older types of cars that will not stand the expense of a steel underframe, with a long metal draft arm that extends through and over the body bolster. This in turn to be reinforced, or backed up with good, heavy compression timbers. Second—On such cars as will permit of the expenditure, the application of a carefully designed steel underframe. Third—In all cases apply the draft gear that will destroy the greatest amount of shock with the entire elimination of recoil. Fourth—The adoption of a standard specification for the testing of draft gear to determine its shock absorbing capacity, and amount of recoil, before purchasing. Fifth—Substitute for the present wooden roof an all-metal one as soon as it has been demonstrated what the proper construction should be.

STATISTICAL UNITS USED IN ANALYSIS OF ELECTRIC RAILWAY ACCOUNTS*

BY JAMES A. EMERY, WITH FORD, BACON & DAVIS

I wish to make a plea that operating men give more attention to the forms of accounts. The president and directors of a company are concerned with the summarized figures of the income account, but the details of revenue and expenses are prepared for the information of the manager. Here, from the manager's standpoint, lies a failure of our accounting system, that our classification is based on the character of the expenditure rather than on the object for which the expenditure is made.

It seems the height of absurdity, for example, in the electric light and power business, to draw careful distinctions between the elements of demand and output in making rates and then to pay absolutely no attention to this distinction in the records of cost of service. To determine or check the important figures upon which the charges to customers are based, it is necessary to go through a painful process of analyzing expense and construction accounts. There is no reason why central station expense accounts should not be kept in such a way that we may know every month the cost of maintaining a kilowatt capacity in readiness to serve, the additional cost of generating and distributing 1 kw-hr., and the cost per customer of those operating expenses which vary directly as the number of customers.

In street railway accounts likewise there is much opportunity for improvement. We spend millions of dollars per year for special work, yet few managers can tell how much it costs them, as the labor cost is not segregated. Our standard system of accounts does not provide means of ascertaining the costs of the important items of painting cars or of repairs to trucks or of repairs to air-brake equipment. In setting up depreciation or renewal reserve accounts we do not specify and allow for parts to be replaced under maintenance. We lump in one account all payments for damages and have no way of telling directly how much is paid to passengers and how much to the general public or employees; how much is paid in settlements and how much in judgments.

A street railway must provide:

1. During the rush hours, a number of passenger-space (seats and standing spaces) miles.

2. During the between-rush hours, a number of seat miles, or, on smaller properties, car miles.

3. During the night and early morning hours, a number of car miles to maintain reasonable headways, with little regard to the volume of traffic.

Therefore, a system would show high efficiency of design and operation when the cost per space mile during the rush hours is low and when the cost per seat mile during the night and early morning is low. It is manifestly out of the question to apportion costs on the above basis, and our problem is to determine the practicable basis which comes closest to it. We should like to find a unit which when divided into our costs will tell us, without substantial qualification, if the operation of a property is efficient and if the engineering design and construction are good.

The various units commonly considered, in the order of their relation to each other, are:

I. DOLLAR OF GROSS EARNINGS

It is very important that we should know in simplest terms what proportion of the money received goes to each item of expenditure. Percentage of gross earnings should therefore be used, whatever units of service are chosen. In comparing one property with another on this basis, however, care should be taken to see that the average rate of

*Abstract of a paper read before the American Electric Railway Transportation & Traffic Association and Accountants' Association, at Atlantic City, N. J., Oct. 13-17, 1913.

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fare, average haul, density of traffic per mile of track and load factor are not widely different.

II. REVENUE PASSENGER

The use of this unit would eliminate the variance due to difference in rates of fare, and the cost at which a company carries a passenger is in general a fair measure of the efficiency of design and operation, if values or factors for the principal fixed conditions of average haul, density and load factor are known.

III. PASSENGER MILE

Presentation of the cost of transporting one passenger one mile would eliminate discrepancies in average length of haul. It is not practicable, however, on a city system to calculate passenger mileage regularly, and it must be remembered that service cannot be proportioned exactly to the passenger mileage.

IV. SEAT MILE OR SPACE MILE

In stepping from the passenger mile to the seat mile or space mile, we introduce the first factor dependent upon operating efficiency. A manager, by lack of attention to schedules or traffic, may operate more seat miles than are necessary. His maintenance of track and line and general expenses which do not vary directly with the seat mileage will therefore figure lower per seat mile and his operation on the seat mileage basis would actually appear efficient when it may be poor. If, however, we can establish standards of proportions of seat miles to passenger miles for various traffic densities and load factors, a statement of such proportion, together with the cost of service per seat mile for a given system, would furnish a practically complete basis for judgment of its efficiency of design and operation.

The use of the space mile is hardly worth considering, for, while it ought to be understood that standing space must enter into rush-hour calculations, its general use would be popularly offensive. Space mileage is a measure of service for not over 25 per cent of the traffic of the day and the spaces per car vary in a considerable degree as the number of seats.

V. CAR MILE

Our friend of long standing, the car mile, is implanted in our imagination and habits of thought, and to give it up would involve something of the readjustment which would attend the adoption of the metric system in general business. Car mile figures are generally in convenient denominations and the unit is the most appropriate for many equipment records. Compared with other units under consideration, the car mile has the same merits as the seat mile, but at the present time it labors under the serious objection that there is such great variation in the capacity of cars. Although the average car is approaching a standard of from forty to fifty seats, there is always likely to be considerable variation. The car mile is a measure of about 25 per cent of the service provided by a street railway. Differences in size of cars and speed may not produce great variance in total operating expenses per car mile.

VI. TON MILE

The ton mile has some merit as a unit for judging efficiency of operation. A considerable portion of the operating expenses varies directly as the weight moved, but our unit should show efficiency of design as well as operation, and the ton mile side-tracks one of the most important features of design.

For example, if for a given railway property the operating expenses per ton mile be low, it would appear that the operation is efficient. This might not be the case, for if unnecessary weight were put into the cars through poor design, the ton mileage would be abnormally high and the operating expenses per ton mile abnormally low. Ton mileage is more difficult to calculate than seat mileage, on account of the live load.

VII. CAR HOUR

When used side by side with the car mile, the car hour indicates only the effect of speed. It has some advantage over the car mile in comparing revenue statistics, for it shows clearly the advantage in higher speeds and furnishes a more accurate, quick basis of comparison of the net earnings of various routes than does the car mile. For use in analyzing the details of operating cost, however, it is not so accurate a gage of efficiency as the car mile. As operating expenses per car hour are constant multiples of operating expenses per car mile, it seems wasteful to use them side by side for details. The car hour is not a direct measure of any part of the service.

The relation of the element of speed to revenue and expenses is intricate. It is certainly cheaper to haul a given number of passengers between two points at high speed than at low speed. It, therefore, would seem that at a less cost we can furnish what passengers prefer and would even pay more money for. Why, then, are our rates on suburban or high-speed lines at least as high as on city lines? The answer is found in the element of density of traffic. We can move 100,000 passengers over a given piece of track very much cheaper per passenger than we can move 10,000.

This balancing of factors explains the remarkable uniformity of operating expenses per car mile on systems widely different in size and character. It also brings to mind the fact that differences in size of cars may not make great differences in the cost of operation per car mile for handling the same volume of traffic; for, while most items of operating expenses are greater per car mile for larger cars, the item of platform wages, with some others totaling about 50 per cent of the operating expenses, is proportionately smaller. Speed is governed by all three elements which control the destiny of a street railway.

First—It is in part fixed by physical and legal conditions over which neither construction engineer nor operating manager has control.

Second—It is dependent on the design of track, rolling stock, power plant and distribution system. An effort to obtain higher speed in the design would have saved many properties from bankruptcy, and the neglect or failure to design for the highest speed practicable has crippled many others.

Third—The average number of car miles per car hour depends upon schedules, discipline and condition of equipment. Higher speed increases revenue per car hour and increases expenses per car hour. It has no effect on revenue per car mile, but it decreases expenses per car mile. It has no effect on total revenue but it reduces operating expenses. The car mile therefore brings out this important element of operating efficiency more clearly in the operating expenses, while the car hour has a similar advantage in relation to revenue.

VIII. NORMAL MAXIMUM CAR OPERATED

In electric lighting and power supply a large portion of the cost of production varies directly as the maximum demand. To a less extent this is true in the street railway business. Our loads fluctuate quite as much as do those of central stations, but it is not commercially, or indeed, in many cases physically, possible to provide corresponding service. We therefore furnish seats during the non-rush hours and passenger spaces during the rush hours. Even with this help our service factor or ratio of average cars to maximum is low, and a considerable part of the outgo of a street railway is proportioned to the number of cars that have to be put on the streets during the maximum hours of travel. The car is a convenient and common unit of equipment costs. It is therefore of interest and value to know how much money a car takes in per year and how much its operation costs. This unit, however, does not lend itself to useful analysis of the details of revenue or of many of the operating expenses.

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IX. CAR TRIP

The compilation of the number of trips is worth while as it leads up to the average length of trip and thus gives an indication of the average length of haul.

Train miles or train hours have very little utility for electric railway work, as few operating expenses vary with the number of trains operated. Where the motormen on lines operating multiple units are paid higher rates of wages than the other trainmen there is some difference, but, after all, we are trying to operate car hours and car miles cheaply and we do not have much control over the rate of wages, so that if wages of motormen per train hour are high it simply means that the rate of wages is high and gives no indication of efficiency of operation.

TRAILERS

In the writer's opinion, trailers should be treated exactly as motor cars if they provide the same passenger capacity. By so doing the economy or lack of economy in using them may be shown.

RÉSUMÉ

Reviewing the advantages and disadvantages of the various units, we see that percentage of gross earnings is always a useful basis for the analysis of operating expenses; that the unit revenue passenger would be satisfactory if proper values could be determined for varying length of haul, density of traffic and load factor; that the passenger mile is not practicable on account of the approximations necessary in calculating the passenger mileage; that the seat mile and car mile may be completely satisfactory as a basis of comparison if the efficiency of operating schedules can be determined; that the car hour is useful for comparing revenue; that the ton mile is not generally useful, and that the normal maximum car applies to a portion only of the operating expenses.

If operating schedules be held to a standard of efficiency with relation to the average length of haul per passenger and density of traffic, then these two factors are eliminated and cost per seat mile on one property becomes directly comparable with that of another. The seat mile is a somewhat inconvenient unit for analysis of both revenue and operating expenses, as the values are so small. To use it practically, therefore, we should have to use multiples of possibly 50 or 100. A reasonable method might be to establish a car standard of forty or fifty seats and modify the car mileage accordingly, producing a unit which might be called "forty-seat car mile." This unit would give a good basis of comparison between properties, not only in total cost per unit but in each of the details. There would propably be objection to such a unit on the score of cost of compilation. This extra cost, however, could be made slight by the use of tabulated equivalents.

COMBINATION OF UNITS APPROPRIATE TO GROUPS OF ACCOUNTS

There is no unit, however, which furnishes completely satisfactory bases for comparison of all items of operating expenses or even of all groups of items. That is to say, the "forty-seat car mile," as applied to track maintenance accounts, shows the maintenance necessary for the passage of one car over a mile of track. The density of traffic or number of car miles over each mile of track has a considerable effect on the cost per car mile. That is, if the car mileage per mile of track is low, certain fixed expenses will be higher per car mile. If, on the other hand, the car mileage per mile of track is high, there will be more wear and tear and certain of the maintenance costs will be higher per car mile.

It is so difficult to judge off-hand the opposite effect of these factors on the cost per car mile that many people who have to consider such matters go back to the fundamental basis of maintenance of trade per mile of track. Similarly maintenance of equipment is properly figured per car, power per kilowatt hour, platform wages per car hour and other operation of cars per car; and general expenses may be usefully treated in the same manner as overhead charges on construction work; that is, as a percentage of all other operating expenses. The important item of damages might better be classed by itself and figured per passenger.

If the operating expenses of all companies were regularly analyzed in this manner, it would be possible to establish standard values for each group of accounts, making allowance for the variation caused by lesser differences in conditions. For example, the cost of adequate maintenance of way, track and line per mile of track could be determined for various amounts of car miles per mile of track. Further refinements might then be made for percentage of special work, percentage of paving, average weight of rail and average age of rail.

This will eliminate the principal conditions which are fixed naturally or by engineering design and thus may be shown the limits within which the operating manager should work. In the same way, normal cost of maintenance of equipment per normal maximum car operated may be determined for cars of various capacities and for various amounts of car mileage per car. Reasonable limits for the remaining groups of operating expenses may also be determined for varying conditions. It is suggested that the determination of such standards is a useful field for this association. It goes without saying that a manager searches every nook and cranny of his expense account to learn where reductions of any kind are possible, but it will always help him if he knows definitely what other people are doing on the same basis and he is often harassed by having details of his property compared unfavorably with others where the conditions are distinctly different.

The reduction of operating expenses to the above units would permit of ready and comparatively accurate computation of the net earnings of various operated routes or lines where many lines of different length and character are operated under one system. This might be done with profit once, twice or four times per year.

Such unit computation would have little value when applied to monthly expenses, and if used every month should be applied to the operating expenses for the past twelve months.

Units appropriate to smaller groups of accounts, or even to individual accounts, might be used if desired, as for example, the number of feet of special work applied to the cost of maintenance of special work for the car mileage applied to the damages other than passenger.

The suggested "normal maximum cars operated" is defined as the average for the four weeks of a month of the maximum number of cars run in regular service on the heaviest day of each week.

The suggested "service factor" is the ratio of the average number of cars to the normal maximum and is derived by dividing the total car hours by the number of car hours that would have been made by the normal maximum number of cars operating a full day of twenty or twenty-four hours. This factor corresponds to the load factor of a power plant.

DETERMINATION OF PASSENGER MILEAGE

An approximate determination of the passenger mileage on any line or system is not difficult or expensive. It is a reasonable assumption that the character of traffic on normal days of each season of the year is about the same from day to day and that the character of travel on one car will average the same as that of another. In making such a determination, therefore, it is only necessary to place observers on one car in every six or seven on a given line for an entire day and count the passengers on and off at each stop. The calculation of passenger mileage is then simple, and if done graphically shows other valuable information, such as the point of maximum load, the ratio of number of passengers carried past the maximum-load point to the total carried and the points at which turn-backs should be permissible. This can all be done at a cost of not over $25 per route of average density of traffic.

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REPORT OF THE COMMITTEE ON ELECTROLYSIS*

ALBERT S. RICHEY, CHAIRMAN; G. W. PALMER, JR., E. B. KATTE, E. J. BLAIR

The electrolytic corrosion of earthed metallic conductors proceeds at a rate dependent upon the rate of flow of the current which leaves the metallic conductor for the earth. Theoretically, with an oxidizing anode the weight of anode corroded by one ampere in one second is equal to the electrochemical equivalent of the metal of the anode. This is 0.00029 gram for iron (ferrous) or 0.0010718 for lead. The amount of iron corroded by one ampere in one year is, therefore, approximately $0.00029 \times 60 \times 60 \times 24 \times 365 = 20$ lb. Similarly, the amount of lead corroded by 1 amp in one year is approximately 74 lb.

However, in a recent paper on electrolytic corrosion read before the American Institute of Electrical Engineers Messrs. McCollum and Logan show results of some very complete studies by the United States Bureau of Standards on the variations from the theoretical rate. Some of their conclusions are as follows, their term "efficiency of corrosion" being based on the above theoretical rate as 100 per cent. They state that the current density has a marked effect on the corrosion of iron in soils, the efficiency of corrosion being in general greater as the current density is lower. In saturated soil the corrosion may vary between 20 and 140 per cent for a range of current density varying from about 5 to 0.05 milliamp per sq. cm. Moisture content has also a marked effect on efficiency of corrosion, it being in general greater with increased moisture content up to saturation of soil. Temperature changes, within the limits commonly encountered in general practice, have no marked effect on corrosion efficiency, neither has the depth of burial of pipes, other conditions remaining constant. The amount of oxygen present has no appreciable effect on the efficiency of corrosion in the case of iron immersed in liquid electrolyte, but it has a marked effect on the end products of corrosion. If the corrosion is rapid and supply of oxygen small, there will be a preponderance of magnetic oxide, while if the rate of corrosion is low and the supply of oxygen abundant, the ferric oxide will predominate. Owing to the fact that the supply of oxygen around pipes buried in earth is always more or less limited, the character of the oxides formed gives some indication as to the rate of corrosion, and thus indirectly as to the cause of the corrosion if local conditions are properly considered. The efficiency of corrosion is not a function of the voltage, except in so far as the current density may be effected. Differences in potential as low as 0.1 volt to 0.6 volt show practically the same efficiency of corrosion as those of 5 volts to 10 volts or higher. Corrosion tests on a large number of different kinds of soils from widely different sources with average moisture content and current density indicated that corrosion efficiency between 50 and 110 per cent may usually be expected under most practical conditions.

RESISTANCE OF SOILS

With a given potential difference between two earthed metallic structures, the amount of current which will flow between them is dependent not only on the contact resistance but also upon the resistance of the soil. Relative to the latter, McCollum and Logan state that the resistance of soils varies throughout a very wide range, with variations in moisture content, the resistance of the comparatively dry soil being of the order of several hundred times the resistance of the same soil at about saturation. Above saturation, increase in moisture content has but little effect on the resistance of the soil. The resistance of the soil varies greatly with temperature within the ordinary range encountered in practice. In the case of the soils tested the resistance at —18 deg. C was over 200 times as great as at +18 deg. C. Even at about freezing temperature the resistance will be several times that at summer temperatures. This has an important bearing on the magnitude of the electrolysis trouble that may occur at different seasons and also indicates that, where practicable, voltage surveys should not be made when extremely low temperatures prevail. [A table of the specific resistances of soils in different localities is included in the report.—Eds.]

CONTACT RESISTANCE

As soon as an electromotive force is applied to a buried pipe the current flow drops off rapidly with time, especially during the first few minutes, due to the setting up of counter-electromotive forces and the formation of film resistances. McCollum and Logan show the effective resistance as a function of time after the application of about 6 volts between two short lengths of cast-iron pipe buried about 12 ft. apart. The initial resistance of about 18 ohms practically doubled within half an hour after the voltage was applied and after that the resistance remained practically constant. In this case the effect of polarization and film resistance was practically as great as the total soil resistance between the pipes. However, a well-drained rock or concrete roadbed may in general be expected to offer much higher resistance to the leakage of current than one in which the construction is such that a large amount of moisture is retained.

TESTS

As the polarity of the earthed conductor is indicative of the tendency of current to flow, and electrolytic corrosion takes place only where the current leaves a current conductor for earth, the first set of tests is generally a set of potential readings and is called potential survey. It is permissible and the usual practice to use hydrants or service connections for a contact to underground piping system. These readings are usually made with a low-reading voltmeter, preferably with the zero indication in the center of the scale, and are taken in a large number of places throughout the system between the rails and the buried conductors (pipes or cable sheaths). The voltmeter used should preferably have a high resistance to minimize the effect of accidental poor contact. A Weston high-resistance zero-center voltmeter with scale ranges of 1.5, 15 and 150 volts is a very satisfactory instrument. Readings should be taken at intervals of a few seconds for several minutes at each point and notation made of the location and of the maximum, minimum and average readings. It is desirable to plot these potential readings graphically on a map, where the differences of potential between city water mains and street railway tracks are shown graphically plotted with the latter as a base line. It is also desirable to show on this map the size and location of the various pipe systems.

It should be remembered, however, that the potential difference between pipes and rails, even if large, is not conclusive evidence of stray currents, but is only an indication of the points at which current may be flowing from rails to pipes or from pipes to rails or between other conductors. In fact, a high potential reading is generally an indication of high earth resistance and consequently a small current flow rather than of a large current flow.

Tests to determine the direction of current flow in underground conductors may be made by measuring potential differences between two points in the underground conductor. A zero-center Weston millivoltmeter with scales of 10 and 100 millivolts is a satisfactory instrument for this test and connections may be made to the cable sheath in two adjacent manholes or on the piping system between hydrants or service connections 100 ft. or 200 ft. apart. These readings, which are clearly indicative of the direction of current flow, may be used in the calculation of the amount of current flow in the case of cable sheaths where the resistance per foot is quite accurately known and is not seriously affected by joint resistance. In the case of pipes, however, such readings can be used only as an indication of the relative magnitude

*Abstract of a paper read before the American Electric Railway Engineering Association, at Atlantic City, N. J., Oct. 13-17, 1913.

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of currents because, especially in the case of the ball and spigot joint usually used in cast-iron pipes, the resistances vary so greatly that it is not possible to make any accurate assumption as to the resistance of a considerable length of pipe, including the joints.

CURRENT FLOW IN PIPES

In only one way can an accurate determination be made of the current flow in underground piping systems, this method with its modifications being a determination of the potential drop in a continuous length of pipe between joints, and the application of Ohm's law. Knowing the resistance of the pipe between the points of contact, knowing the weight of the pipe per foot, exclusive of hubs or joints, the resistance per foot may be calculated by dividing the resistance in ohms per pound foot by the weight per foot. The following is a table of resistances in ohms per pound foot of various pipe materials:

RESISTANCE OF VARIOUS KINDS OF PIPE.

Kind of Pipe	Ohms per Pound-ft.
Cast iron	0.001440
Wrought iron	0.000181
Steel	0.000210

[A table showing the resistance per foot of various sizes and weights of American Water Works Association cast-iron pipe, American Gas Institute standard cast-iron pipe, standard wrought-iron pipe and standard steel pipe is appended to the report in order to simplify these calculations.—Eds.]

In making current measurements, it is necessary, of course, to have a perfect metallic contact between the pipe and the millivoltmeter leads, and it is therefore necessary to expose the pipe where current measurements are to be made. The best contact is, of course, obtained by soldering the leads directly to the pipe, especially where readings are to be taken over a considerable period of time. It is sometimes convenient to carry these millivoltmeter leads as rubber-covered wires through a conduit to a box at the curb so that later readings may be taken conveniently. In such cases it is necessary to have a calibration of the millivoltmeter including such leads.

Where measurements are to be made in a pipe the weight or resistance of which is not definitely known, a determination of the resistance and current may be made by one of the methods described in 1912 by Dr. Carl Hering before the American Institute of Electrical Engineers, which include the use of a galvaometer on a shunt around a given section of pipe from which the unknown current has been diverted by a battery and variable resistance through an ammeter.

DETERMINATION OF AMOUNT AND DISTRIBUTION OF CURRENT LEAVING UNDERGROUND METALLIC CONDUCTORS

The amount of current leaving an underground piping system for the earth and thereby causing electrolytic damage can be determined only by determining the amount of current flow in two locations on the same line of underground pipe. The difference in the amount of current on the pipe between these two locations will then be the amount of current leaving or entering the pipe between the two locations.

As the difference of potential between two points on the rails of an electric railway system is in a way a measure of the tendency to cause stray earth currents, and as many municipal and other public requirements are based on this figure, this test is an important one. It is not difficult to make, the essential matter being that of running a potential wire between the two points on the rail and then measuring the drop with an ordinary voltmeter. Where the company has telephone or signal circuits which may be temporarily disconnected these are often used for this purpose. In some cases a trolley feeder is used, but a spare feeder is not often available during the time when such tests are to be made. Often it is possible to arrange with the local telephone company for its co-operation in furnishing spare wires from a terminal box in one location through proper connections at the telephone exchange to a terminal box in another location, and from these terminal boxes a continuation of the potential wire may be run to the voltmeter and rail. In using such circuits through a telephone exchange, it is important that all connections be removed on the terminal board which might serve to impress telephone battery current on the particular circuit in use. If the instrument used be of high resistance and if the telephone or signal wires used as potential wires be of copper, it is rarely necessary to allow for the resistance of the latter in correcting the voltmeter readings.

In many municipal or other public requirements a limit has been placed on the potential drop in rails, and in many cases this limit has been expressed in terms of a maximum permissible drop. That this is unfair and that the limit should be expressed as an average drop is brought out by Messrs. McCollum and Logan in their paper as follows: "It is evident that if the total amount of damages which results is proportional to the average current, the limitation of the average voltage is more logical than the limitation of the peak load voltage, since in the former case the cost of meeting the voltage limitation in any given case is proportionate to the danger involved irrespective of the station load facor; whereas if the voltage at peak load is the determining factor, the cost of complying with the requirement depends not only on the danger involved but on the load factor of the system, and the poorer the load factor the greater its cost will be. The rate of damage does not increase at fast as the voltage increases, because of the tendency toward lower corrosion efficiencies at higher current densities. This indicates that with a given average all-day current the actual amount of electrolysis that would occur would be less with a bad load factor than with a good load factor, and hence points to the undesirability of penalizing a high peak of short duration. It would appear very much more logical, therefore, in so far as the damage itself is concerned, to make the average all-day voltage the basis of the limitation rather than the voltage at time of peak load.

METHODS OF REDUCING EARTH POTENTIALS AND CURRENTS

The methods which have been most often used with success in this country to reduce earth potentials and currents have been three—the insulated negative return feeder system, the insulating joint system, and the drainage system.

In the first system the tracks are drained of current at radially disposed points about the power station by insulated negative return feeder cables. The negative busbar is not connected to the tracks nor to ground in the vicinity of the power station. Pressures as nearly equal as are required may be maintained at the track end of the return feeders by the use of rheostats on short feeders and boosters on long ones, or by greatly increasing the amount of copper in long feeders without the use of boosters or rheostats. The cost of the system increases very rapidly as the permissible maximum variation between the various portions of the track decreases. In a few American cities insulated negative return feeders have been installed in a portion of the city so as to secure an equi-potential condition of the track in an area where the amount of underground cables or pipes subject to damage is the greatest. This method is feasible and most often used where the railway company's power station or substation is located very close to the center of distribution of a system composed of several or many lines radially disposed about the center of distribution.

The insulating joint system requires cable sheaths or piping system to have insulating joints at frequent intervals. If the insulating joints be sufficiently numerous, this system may give good results, but there is some difficulty in applying them to an extensive system of underground cables, especially where the number of manholes is large and manholes crowded. Unless the number of insulating joints is sufficiently large to break up the potential around such joints to a very low value around each, there is also danger of current leaving the pipe or cable sheath on one side of the

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insulating joint and entering it on the other to such an extent that more or less serious corrosion is caused on the positive side of the joint. If every joint in the piping system were an insulating joint, this method would probably be an ideal one, as it would so increase the total resistance of the pipe line that the current flowing along it would be practically nil. This is illustrated in the case of some cast-iron gas mains where cement joints of high resistance are used and on which mains practically no current can be found.

In the drainage system the pipes or cable sheaths in the positive district are connected to the negative side of the railway return circuits through low resistance cables. This system, as its name implies, drains the stay currents from the pipes or cable sheaths through metallic conductors so that practically no current leaves the pipe via the earth path. The drainage cables should preferably be connected directly to the negative busbar at the power station or substation, and should be of very low resistance. In many cases a meter is installed in the connection to the negative bus, and in cases where the station shuts down for a portion of the day there should be a switch in the bus connections and the circuit should be opened when the station is not in operation. If the drainage system is properly installed, it will maintain the piping system and cable sheaths throughout their length at a potential lower than that of the rails. An objection which has been raised to the drainage system is that by reducing the total resistance to the flow of stray currents it thereby increases their volume and thus increases the damage which may be expected from "joint electrolysis," or the electrolytic action which may take place around a high resistance pipe joint due to the stray currents leaving the pipe on the positive side of the joint and returning on the negative side. Some evidence is on record of such damage, but the cases where such damage has occurred are extremely rare and where noted it has been caused either by isolated exceptionally high resistance joints or excessive current flow on the piping mains.

Some city authorities have compelled the installation of the drainage system, and in many cases they have allowed its use where the water system is owned by the city. The drainage system is very simple and much cheaper to install than the insulating joint method on a system of cables or pipes which are already in place in the ground, and is the system which is in most common use in American cities, either alone or in connection with the insulated negative return feeder system.

C. P. Steinmetz (*Trans. A.I.E.E.*, 1907) has said: "I believe a sensible specification would be not to limit the return drop at all, but to require that the underground metallic structures must be made negative and maintained negative against the rail and then let the railway company look out for its rails, which would be the only structure in which attack takes place. All the water and gas pipes should be connected to the negative terminal of the dynamo and maintained negative. That is a complete protection for them."

J. L. R. Hayden (*Trans. A.I.E.E.*, 1907) has stated with regard to alternating-current electrolysis that it is not a phenomenon like direct-current electrolysis, on which definite quantitative general laws can be formulated, but is of the character of a secondary effect; that is, the action of the positive half wave is not quite reversed by the action of the negative half wave, leaving a small difference, rarely exceeding one-half of 1 per cent of the electrolytic action of an equal direct current. Alternating-current electrolysis varies from practically nothing to somewhat less than 1 per cent of direct-current electrolysis, varying with the chemical nature of the electrolyte and practically independent of the current density. Protection ffrom alternating-current electrolysis may be absolutely obtained by the superimposing of a very small quantity of direct current upon the alternating, the amount of direct current being only 1.5 per cent of the alternating current.

REPORT OF COMMITTEE ON CHANGES IN CONSTITUTION AND BY-LAWS*

CHARLES L. HENRY, CHAIRMAN; C. N. DUFFY, H. C. DONECKER

Your committee submits the following recommendations:

Recommended, that Clause III of the constitution be amended to include the following sections:

"Clause III.

"Section (c). Associations of electric railway companies, or of individuals engaged in or affiliated with the electric railway business in the United States or other countries, organized for the purpose of the advancement and protection of the interests of the electric railway industry and for the purpose of dealing with specific local problems affecting their respective countries, sections or localities, may, upon application, become sectional associations of this association, and the relationship between such associations and this association shall be governed and controlled as follows:

"1. The membership of such sectional associations shall be composed of company members or individual members who are members of this association.

"2. A committee of this association shall be appointed to promote the welfare of such sectional associations and is to be known as the committee on sectional associations. This committee shall be composed of the presidents of such sectional associations and such other members as the executive committee of this association shall appoint. The chairman of such committee shall be designated by the executive committee of this association, and such chairman shall be a member of such executive committee.

"3. Sectional associations shall be entitled to all the benefits and privileges enjoyed by members of this association, except the right to vote, without the payment of any membership dues other than those paid by the company or individual members of such sectional associations as members of this association."

These amendments have been put before the member companies in accordance with the provisions of the by-laws and also bear the approval of the executive committee.

This matter was brought to a focus by the railways of the Pacific Coast which wished to form an association and expressed a desire to affiliate in some way with the parent association. An invitation was extended to this association to have representatives at the organization meeting in San Francisco. This meeting was held on March 31, and our association was represented by Charles N. Black, first vice-president; Albion E. Lang, past-president, and H. C. Donecker, secretary. The Manufacturers' Association was also represented by E. H. Baker, vice-president; James H. McGraw, vice-president, and H. G. McConnaughy, secretary.

The Pacific Coast Association, being duly formed, passed a resolution as follows:

"That all companies or corporations engaged in the electric railway business in the three Pacific Coast States (California, Washington and Oregon) shall be eligible for full membership in the Pacific Coast Electric Railway Association, and in case the Pacific Coast Electric Railway Association becomes a section of the American Electric Railway Association, that its members shall also become member companies (if they are not already members) of the American Electric Railway Association."

Subsequently your committee met and drafted the changes noted above and which it was hoped would bring about the closer affiliation desired. It may be that future developments will suggest a different form of alliance between the sectional and other associations and the American, but at this time, in the judgment of your committee, the recommendations above cover the situation.

*Abstract of report read before the American Electric Railway Association, Atlantic City, N. J., Oct. 13-17, 1913.

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RELATION OF CARRIERS TO THE DEVELOPMENT OF THE TERRITORY THEY SERVE*

BY PAUL SHOUP

The railways of this country have been both petted and abused, praised and reviled, rewarded and robbed, publicly aided and publicly regulated, but all the time used. On this use the fortunes, not of the few but of the millions, have depended. In so wide a field from which to illustrate the relation of the carriers to the development of the territory they serve, it is only possible to deal with the facts at hand with which familiarity makes for most certain knowledge.

The Pacific Electric Railway Company serves in Southern California four counties—Los Angeles, San Bernardino, Riverside and Orange. Heretofore the system has been separated into three sections, the major part centering in Los Angeles, with two isolated local systems, one in the San Bernardino Valley and one in the Riverside Valley. These two latter have been connected within the last few days. Within another six months this eastern section will be connected with the Los Angeles division. The system reaches 90 per cent of the towns and villages of the four counties named and serves more than 90 per cent of the population. It has 560 miles of roadway, of which 11.4 miles are four track, 274.5 miles single track and 115 miles spurs, sidings, etc., a total of 987.1 single-track miles. The scheduled trains aggregate about 2600 a day and more than 750,000,000 passengers are handled per annum in serving a permanent population of 750,000 people.

The speaker at a banquet which I attended recently, an attorney in no wise connected with railways, remarked that the one factor which had contributed most to the growth and prosperity of Southern California was its interurban railway system. The people of Southern California have recognized the value to development of interurban service not only by faith but by works. The Pacific Electric Railway is building a line between Upland and San Bernardino. For 90 per cent of the distance the right-of-way is through town lots, orange groves, vineyards and suburban property, and has been furnished by the communities, and, with the exception of perhaps 10 per cent, free of cost to the railway. A town that is interested in securing service has offered $10,000 per mile cash bonus and free right-of-way. The citizens of San Bernardino and Colton, through the supervisors, have deeded to the company 40 ft. of the connecting avenue as a private right-of-way.

These are a few examples of a common understanding of what this interurban service means to the community. A most significant fact in connection with all these enterprises is that within my experience there has been no complaint made following the construction of the line. This, of course, implies good service, and reasonable rates of fare.

The electric railway service has become a part of both the home and the business life of the inhabitants of Southern California. It means innumerable conveniences that cannot be measured in money. Notwithstanding this fact, however, there are important results that have been secured in a financial way. For instance, Los Angeles County increased in population in the ten years ending in 1910 from 170,000 people to 504,000, or 196 per cent. Long Beach, from which the lines of the Pacific Electric Railway now radiate, increased from 2252 people to 17,809, or 690 per cent. Pasadena grew from 9117 to 30,291, or 232 per cent. The population of Venice, the closest beach point to Los Angeles, grew from nothing to more than 3000. In every one of these instances and many others that might be mentioned the interurban railway service has been a very important factor.

During the same period the tax value of Los Angeles County increased from $85,000,000 to $525,000,000, Orange County from $9,165,000 to $28,397,000, Riverside County from $9,422,128 to $21,897,385, and San Bernardino from $12,285,325 to $35,585,056. The county showing the greatest increase in percentage had also the greatest increase in electric railway mileage both as to actual miles and as to percentage. Long Beach grew from $1,500,000 in 1902 to $21,000,000 in 1912, or 1350 per cent, and Pasadena from $7,837,675 to $42,264,860 in 1912. The large San Fernando Valley, lying northwest of Los Angeles, has been the last of the nearby valleys to be developed through the Pacific Electric service. The average assessment per acre ten years ago was about $30, compared to $300 last year. Perhaps the most remarkable rise in values has been in the beach cities. One case in Ocean Park has been cited where land sold seven years ago at $30 per front foot and last week brought $1600 per front foot.

In spite of the great general and financial benefits conferred by our service upon the rural and suburban population, we still have our troubles to overcome, such as the attack on interurban rates. These will cease when the people understand better that no matter how much co-operation they may extend in the matter of bonuses and free rights of way, capital cannot be invested in electric railway extensions unless its owners are assured that it will have fair business treatment from the community thereafter.

In summing up, I believe that this may be taken as a fundamental truth, that in undeveloped territories capable of intensive cultivation and adapted to dense population, the land owners and other business interests can well afford to give not only free rights of way but also cash bonuses to the extent of several thousand dollars per mile to secure the construction of interurban electric railways. Electric interurban railways create for other interests wealth out of proportion to the returns that the owners of the railways receive. This applies not only to increased land values but also to the creation of wealth in all forms that come with new city and territorial development.

Interurban railways should be built upon private rights of way and not on county highways, for if they are to be of service in developing territory it is essential that fairly high speed service be given. Except possibly between two centers of considerable population, unless the territory is to be benefited to the extent that the property owners can contribute free rights-of-way, then the prospective development is hardly such as to warrant interurban electric railway construction.

The landowners should help the development by subdividing within a reasonable time and placing on the market such tracts at reasonable prices.

The education of the people desiring the construction of a new line as to protection later on of the capital investment therein should begin before agreements are reached as to construction. The people should early be made to realize that the owner of capital has a right to expect in investing his money in electric railways that it shall be protected and that he shall have a reasonable chance for return thereon and a reasonable assurance of safety. With this point of view they should be then asked to agree as beneficiaries of the railway investment thereafter to protect the fares and freight rates agreed upon in order to secure good service; and this agreement should be made thoroughly known and become a written record.

The electric railways should remember, for their part, that good service is essential to their success and the only thing that will maintain for them the loyal co-operation of the public. The service should be frequent, should be certain and should take passengers to the business centers with such expedition that the suburban territory may, in a business and social way, be a part of the city's life. The greatest asset of any carrier is the good will of the public; and the development of this feeling in the public through good service is as important as the development of the material resources of the territory served.

*Abstract of address delivered before the American Electric Railway Association, at Atlantic City, N. J., Oct. 13-17, 1913.

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OTHER ELEMENTS OF VALUE THAN FRANCHISE VALUES*

BY CLARKE M. ROSECRANTZ, GENERAL COUNSEL THE MILWAUKEE ELECTRIC RAILWAY & LIGHT COMPANY

I do not understand that I am expected to suggest new or mysterious elements of value to be considered in determining the total value of a public utility company's property, but that I am to discuss certain elements going to make up the values of such utilities which do not naturally fall under the terms "physical value" and "franchise value," as they have been considered by the courts and public service commissions for the purpose of rate-making, taxation, municipal acquisition and private purchase or sale.

Upon the passage of the acts creating public service commissions, many petitions were filed for a reduction in rates. Some few petitions were filed by municipalities for the purpose of acquiring public utilities. These petitions made it necessary for the commissions to value the properties of the utilities and, being without any precedents, they were obliged to make their own construction of statutes under which they were proceeding. These satutes used language to the effect that in determinng rates and in fixing the price to be paid where a municipality acquired a utility nothing was to be considered except the value of the property actually used for serving the public. The public, whether in its proceeding for a reduction in rates or for municipal acquisition, insisted that such language excluded everything except the physical property in its then condition. This would in almost all instances have fixed a value upon which rates would be determined so low that the utility could not make any return to its stockholders, if indeed it would have been able to pay the interest on its bonded debt.

So, too, in the case of the municipal purchase, the value so fixed would in almost all instances have been less than the bonded debt. If the act under which the commission was proceeding did not in terms exclude any franchise value from being taken into consideration, such value was nevertheless excluded. All agreed that the value of the property used for serving the public was all that should be considered. But no agreement could be reached as to the elements which should be considered in determining that value.

It would seem comparatively easy to determine what was meant by "value," and those interested in the questions raised naturally turned to the books for definitions and decisions. The definition given by lexicographers was not helpful. The definition given by economists, while abstractly true, afforded but little help.

The decision of the United States Supreme Court in the case of Smyth vs. Ames was seized upon by both parties to the controversy, and each was able to construe it and use it as a basis for arriving at widely different values for the same property. The municipality's value was little if any more than the cost of reproduction new less depreciation, while the utility urged and insisted that in addition to that value there should be added various sums for good-will or going concern value and the like. The commissions felt that it was unfair and unjust to limit the value of the property for rate-making purposes to the value of the physical property, and, feeling that nothing could be allowed for good-will, as in most instances the definition as given by lexicographers and the courts would not fit the condition with which they were confronted, cast about for some means of doing justice between the parties which means should not be deemed to be in contravention of the language of the statute under which they were proceeding.

In one of the earliest cases an element called "going value" was added to the value of the physical property, and the elements which went to make it consisted of the sums expended by the company for promoting business during its early history if they had not been absorbed in the cost of operation or the dividends had not been unduly large; and where it was found that the utility had not been able to earn and pay a reasonable return upon the money invested, the amount so unpaid should be added to make up total value of the property. These two elements were added to the capital investment upon which the utility should be permitted to earn, and were considered in fixing rates for its service. The same commission which took this action also used language which could be construed as adding another element, under the term "going value," but did not define any method of determining it. It held that, although a franchise could not be considered, and while there was no such thing as good-will within the strict meaning of the word, nevertheless, as the plant was a going concern, it had a value over and above what it would have were it not a going concern, and that must be taken into consideration. Other commissions construing similar statutes reached a different conclusion and held that it was not proper to add the amount expended for promotion of business and deferred dividends to the capital, and took the position that, while such losses should be made good to the investors, nevertheless they should be made up out of the rates to be charged and not added to the capital upon which the company should be permitted to earn for all time.

In some jurisdictions it has been insisted that there is a distinction between the elements of value which should be considered when determining the value of the utility for rate-making purposes and for municipal acquisition, it being admitted that where a municipality was to acquire the utility a sum should be added to that found as the value of the physical property, which sum was that which was added by reason of the fact that the company was a going concern.

As the whole matter is of such recent origin, but little help has as yet been received from the courts. In the various cases which went to the United States Supreme Court, notably the San Diego Land & Town Company case, the Knoxville Water Company case and the New York Consolidated Gas Company case, the decision went upon the ground of whether the rate fixed by the state court was confiscatory. There are many cases wherein the fair market value of public service property was involved under franchises reserving to the municipality the right to purchase the plant at or after a stipulated time for the bare market value thereof. These cases, so far as we have been able to examine them, uniformly hold that, in the absence of a provision in the franchise to the contrary, the going concern element of value must be considered in ascertaining the fair value of the plant.

In determining value for rate-making purposes, it would seem that to the value of the physical property there must be added a sum which must be fixed with reference to the earning capacity of the utility, and, within limitations, further sums for promotion of business and the accrued deficit in earnings unless the rate be fixed so that those sums may be returned to the investors.

It is generally conceded that in determining the amount or value upon which a utility may be permitted to earn a reasonable sum should be included for working capital. This amount is usually only such sum as it may need to take care of its current accounts, discount its bills, etc. But in the actual operation of a utility, and particularly a traction utility, it is well known by the operators that a large sum must be set aside to pay claims commonly classified under the head of "injuries and damages." The larger the traction property, the greater this sum must be. Claims involving large amounts may be litigated for a number of years, and it would be unwise if an amount sufficient to meet them should not be set aside and carried in the same manner as working capital is carried. Otherwise the cost of operation of any given year might be so large as to prevent a reasonable return being made for that year. Should

*Abstract of paper read before the American Electric Railway Association, Atlantic City, N. J., Oct. 13 to 17, 1913.

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not utilities be permitted to carry such a sum as might be reasonably necessary to discharge these obligations, the amount of which cannot be determined until the close of the litigation? This may be called working capital if you please, but under whatever heading it may be classified it would seem that it should be considered as an element of value.

Another element of value which it would seem proper to consider for rate-making purposes is what is known as insurance reserve. Such reserves are as necessary as working capital, and it would seem that they should be so considered.

Under the present system whereby commissions have control of rates, it is necessary to set aside from earnings an amount to take care of the depreciation which is going on in the physical property. This amount is carried as the depreciation reserve and should represent at all times the difference between the cost of the property used for the public service and its then depreciated condition, and the utility must be ready to make good this amount in whatever manner it may have it invested—whether invested in additions or renewals, or in the securities of other companies. It stands for that portion of the original plant which through depreciation has been changed from machinery or other equipment into money, but it still represents the original investment, and the utility is as much entitled to earn upon it as it is upon that portion of its investment which still remains unchanged. To deny the utility the right to have the sums carried to depreciation reserve treated as capital invested in the business for the purposes of rate-making would be to deny it the right to a reasonable return upon all of the property used for the providing of the public service. Depreciation reserve should be considered an element of value by utilities and commissions in all valuations made for the purpose of fixing rates. No hardship can be inflicted upon the public by including this element of value, as the depreciation reserve is always under the control of the commission.

VALUATIONS FOR TAXATION

As distinguished from the valuation for rate-making purposes, we are met with a valuation for the purposes of taxation. At about the time commissions were organized for the purpose of regulating rates, powers were also given to such commissions, or to other similar bodies, to fix and determine the valuation of such utilities for the purpose of taxation. The laws requiring a valuation to be made usually provided that all of the property of the utility should be assessed. The physical value of the property was determined with reasonable accuracy, but when the valuation for taxation was made it was found to be far in excess of—in some instances several times larger than—the valuation of the physical property. So, too, in many instances, it was found to be at least double the amount of the valuation fixed for rate-making purposes. And it has been the experience of almost all of us, I think, who have had occasion to endeavor to ascertain the basis upon which such high valuation was made, that we were met with no detail, no description of a measuring stock, nothing which would guide us, and were merely told that that was the value of our property. And by studying the results from year to year it has become apparent that the taxing bodies proceed merely upon the doctrine of ability to pay, and it will be found that the value for taxation conforms to the gross value of the property if you take the net earnings and capitalize them at a rate at which money might be expected to flow into the business in the locality in which the utility is located. This basis is very similar to one of the methods suggested for determining value, rate-making and for sale, that is, the value as determined by the amount of net income. This tax must, of course, be treated as an expense, and, therefore, the public in the end pays it, but the valuation so fixed is not deemed by the public to be any criterion of value for the purposes of rate-making.

I do not wish to be understood as believing that utilities should not be taxed to the same extent as other property. They should contribute their just and proper share to the expenses of the government, and any subterfuge by which a utility succeeds in paying less than its just proportion is certain to result in some method of retaliation, either by reduction in rates or by means of harassing legislation which will take more out of the company's strong-box than would have been taken if it had paid its proper amount of taxes. As the taxing officers are apparently fixing the value for taxation purposes at an amount which approximates the exchange or sale value, it would seem that the utilities will be placed in a better position in their efforts to secure a high valuation for rate-making purposes, municipal purchase or consolidation. The public in the end is fair and no fair-minded man would feel that the utilities should be taxed upon a value which was considerably higher than that fixed for rate-making purposes or for municipal acquisition.

VALUATIONS FOR MUNICIPAL PURCHASE

The value of the utility about to be purchased by the public is viewed by the public and the utility from widely different positions. The public, in construing the language that it must pay for the property actually used by the utility for performing its public service, deems that property to mean only its tangible assets. In some communities they are more generous and concede that some amount should be added to the value of the tangible assets, because of the fact that the company is in operation and has a business developed. Either of these values so conceded by the public through its representatives would, in most instances, be less than the bonded debt. However, the courts, having in mind the constitutional limitation that when the public takes the property of the individual he must receive just compensation and that just compensation would mean such an amount as another desirous of purchasing and continuing the business would be ready to pay, have clearly indicated that when the public seeks to acquire a utility it must pay what we may call the exchange value.

PRIVATE PURCHASE

When a utility is to be purchased or consolidated it is important that no errors be made in determining the proper elements going to make up the value or sum to be paid and the amount to be allowed for each of those elements in fixing the total price. The investors considering the purchase deal with the securities outstanding against it and their market price, which is, of course, dependent upon their earnings past, present and prospective. They will also consider the regard in which the management is held, the condition of its funds of trust and whether the company is properly financed for future additions. They must also consider the demand for such securities. Great care must be taken not to give undue values to any of the intangible assets lest they be not allowed either in fixing rates or issuing securities when such questions are submitted to the bodies having authority in the premises.

As a result of the litigation construing the questions involved, we may say that we are gradually reaching common and equitable views as to what constitutes the value of the intangible property of public utilities. Good-will as such will not be considered. Going value is made up of various elements, namely, cost of promotion of business and deferred dividends when the question is one of reasonableness of rates, to which will be added a further sum for intangible values based upon the capitalization of the net earnings available for dividends. For municipal acquisition, the same elements will be considered and the same rules followed as would be followed if the sale were between private parties. The valuation for taxation purposes approaches the exchange value.

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PHYSICAL VALUATION

[As the gentleman to whom the subject of physical valuation had been assigned was unable to be present, Mr. Rosecrantz was asked to discuss that topic briefly.—Eds.]

In making a physical valuation, cost is, of course, the best test, but few companies have accurate data of the original cost of more than a small portion of the equipment, including the visible and non-visible, upon which they claim they are entitled to earn, or for which they should be paid if the valuation is made for municipal acquisition. The cost when found is based upon price lists or other similar data and is at best but an approximation of the true cost. Such price lists or similar data can be and are properly used as a test to determine the propriety and weight to be given to the claims for value made by the utility or the commission.

The amount of the accrued depreciation is always the question toward which the fiercest fire is directed and about which the hardest battle is waged. This is because there are no common or accepted methods of determining the life of the various forms of property which go to make up the plant and equipment. Experts differ so widely in their estimates of the life of buildings, pipes, wires, conduits, machinery and the like that it is not strange that the decision by commissioners or courts satisfies no one. The experts rarely if ever agree upon the life of any given part of the physical property—even those testifying on the same side. If by any chance, they do agree, base their opinions upon such widely different reasons that one is reminded of the opinions of the United States Supreme Court in the insular cases, where, as you will remember, the justices, though concurring in the result, could not adopt the reasons therefor advanced by any of their brethren.

As an illustration of this wide difference of opinion, I may say that in a rate case in which I participated the expert called by the city insisted that the life of gas mains was at least upward of 1000 years, and based his opinion upon the discoveries made in the work of excavating at Nineveh, Pompeii and ancient Rome. As compared with this, the claims made by the companies' experts would lead one to think that the mains of which he had knowledge were of that delicate gossamer of which dreams are said to be made.

We are all familiar with the widely different claims of medical experts, whether the question is the extent of an injury or the capacity to make a will or commit a crime, and little credence is given to many of such opinions because of their fantastic character when viewed in the light of every-day experience. It would seem, then, that those interested in securing a proper and just valuation of their property must approach the question of accrued depreciation of the property of the utility with fairness and to that end call only such experts and offer only such evidence as will appeal to reasonable minds. Common ground must be reached and definite percentages, and the life of stones and mortar, machinery, overhead and underground structures and all other portions of the physical property must be fixed within reasonable limits.

Accrued depreciation is a matter largely of definition, and until the definitions are agreed upon those who are honestly endeavoring to determine the physical value of utilities may be likened to the mariner in charge of the vessel described by Lewis Carroll in "The Hunting of the Snark," who, you will remember, was guided only by the sound of the bell wielded by the bellman on board his ship, and it was found that at times the bowsprit became entangled with the rudder.

In all valuations of physical value we may as well recognize it as an axiom that only the depreciated value will be considered, that is, the then value of the physical property. All efforts to have the basis fixed upon the cost of reproduction new have been unavailing, and the courts are committed to the rule that the cost of reproduction new, less depreciation, is the test of determining physical value. It would then seem of the highest importance that definitions for determining accrued depreciation be agreed upon, and that speedily and with fairness.

I wish to emphasize the importance of keeping accurate records of the cost of all items going to make up the physical property, including the charges which are urged by the utility when its rates are challenged or its value for municipal purchase is to be determined; for example, the cost of engineering, superintendence, insurance—both fire and accident—interest during construction, and the like, so that counsel will have something definite to present and urge when he is endeavoring to get the appraisal of your property fixed at a value which will most accurately represent the actual cost with proper allowance for depreciation. I know of nothing more trying than the position in which the counsel for a utility finds himself when he represents it before a commission or a court without proper evidence of the cost of the various items of the physical property and is expected by his client to procure a determination as to value which shall be in accord, or nearly so, with his clients' belief as to the proper and true value.

REPORT OF COMMITTEE ON STATISTICAL UNIT FOR CAR OPERATION*

C. H. LAHR AND C. B. BUCHANAN, CO-CHAIRMEN; E. L. KASEMEIER, C. S. MITCHELL, A. L. DEWEY, NATHAN H. DANIELS, JR., J. A. EMERY, W. J. HARVIE

Your committee held a meeting during the midyear conference but is unable to report any definite conclusions or suggestions of units which would be an improvement over the car mile and the car hour now in such general use. The investigation carried on by your committee last year seemed to indicate more or less satisfaction with the units now used, and in view of this, your committee feels that it will be difficult, if not impossible, to develop a unit which would meet with the general approval of our member companies. Certainly the committee is not now in a position to do this, and from discussions it has had it does not think it at all likely that it will be in a position to offer anything of tangible value in the near future. The committee would, therefore, suggest that it be discharged and the matter taken up at some subsequent time should this appear desirable.

Government purchasing agents, designing and operating engineers, and the fuel departments of industrial concerns, large dealers in coal, and persons interested in the distribution and character of the different coals in the United States will find valuable information in a report just issued by the United States Bureau of Mines as Bulletin 22, entitled "Analyses of Coals in the United States, with Descriptions of Mine and Field Samples Collected Between July 1, 1904, and June 30, 1910." This report contains the analyses of 5,000 samples of coal taken from 1,500 coal mines and prospects situated in the various coal fields of the United States. All of the important fields and practically all of the more important mining districts are represented. The purpose of the bureau in compiling and publishing this information is to present reliable information regarding the chemical composition and heating value of the coals. The samples of coals were collected by experienced men according to a definite and uniform system, and were analyzed under carefully controlled conditions, so that there might be no question as to the relative merits of the different coals so far as this can be determined by chemical analyses and determination of heating values. Copies of this bulletin may be obtained from the Director of the Bureau of Mines, Washington.

*Abstract of a report read before the American Electric Railway Accountants' Association, Atlantic City, N. J., Oct. 13-17, 1913.

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THE WELFARE WORK ON ONE CITY SYSTEM*

BY H. A. BULLOCK, STAFF ASSISTANT TO THE PRESIDENT BROOKLYN RAPID TRANSIT SYSTEM, BROOKLYN, N. Y.

The attitude of the Brooklyn Rapid Transit System on the subject of employees' welfare is thoroughly in accord with the general recommendations made by the committee on employees' welfare of the American Electric Railway Association. Tangible evidence of this endeavor is presented in the Brooklyn Rapid Transit Employees' Benefit Association, which was formed in 1901 and is one of the oldest organizations of its kind throughout the country. We agree with the committee of the association that welfare work must not be regarded as a form of charity and is too important in its influence upon operating conditions to be considered as a fad or treated primarily from the point of view of public advertisement. For a recent article describing the activities of our system in the welfare field, I chose the title "Maintenance of Men" and called attention to our recognition of the broad proposition that the maintenance of men is as important as the maintenance of equipment, or track, or structure, and should be provided for systematically on the basis of scientific study. I quote a single paragraph from the same article:

"The B. R. T. openly professes self-interest in all these things. It desires its men to co-operate also on the basis of their self-interest and seeks to educate its employees to an appreciation that the interest of the company and the interest of the men is a common interest, which alone can be satisfactorily served by the efficiency of the service which the B. R. T. System provides for those who patronize its lines."

This general declaration of attitude should be borne in mind as underlying any suggestion I may have to make on the particular subjects referred to in the report of your committee. To consider, then, that report section by section:

SICK BENEFITS

Our present plan of sick benefits, conducted by the Benefit Association, does not differ materially from the plan suggested by the committee's report. Sick benefits are obtainable only upon payment of dues in the association, and the total disbursements of the association to members or their families on account of illness or death exceed the amount paid in dues per man per year. The running expenses of the association are provided for by the activities of the men themselves in patronizing pool tables, bowling alleys, etc., in the club rooms in the various depots of the company, and by a system of indirect contribution applied at points where the operation of the association comes into contact with operating conditions in the company itself.

I might emphasize here our strong conviction against a benefit association or any similar organization which does not, in the regular order of things, produce sufficient revenue to meet the normal demands upon it. So long as the employees feel that their association is supported by themselves they will take pride in it and be jealous of its success. The moment it appears obviously to depend upon support given it by the company, the suggestion occurs to the employees:

"Why should we contribute at all if the company can afford to donate part of our benefits? Let us see if we cannot make the company assume all of the burden."

Therefore, in the support which the Brooklyn Rapid Transit Company has given to its benefit association, care has been taken to apply such support in directions where the company had a natural and necessary incentive for spending money. We provide, for instance, club rooms in our depots, rent free, lighted, heated and supplied with janitor service. We furnish and maintain the equipment, such as pool tables, bowling alleys and the like. This means that the receipts at the rate of 1 cent a cue for pool and 1 cent a string for bowling are practically net profit, so that a substantial revenue approximating $15,000 a year is derived from these particular activities of the men. We have an obvious reason for all of this expenditure. Club rooms are, in fact, the extra rooms of our depots. We desire the men to spend their loafing time between trips in these club rooms, rather than visit the saloons, which infest almost every district where a street railroad depot is located. The operating department notices, the make-up tables, bulletin boards—all are placed in the club rooms. The club rooms are in fact company property and serve a distinct company purpose, although at first sight their facilities appear to be solely for the entertainment of the employees. Similarly, the company pays the salary of a "welfare administrator" and contributes his services, without cost, to the Benefit Association as its president. Direct contributions of money are made only for the purpose of relieving actual suffering or to provide entertainments and prizes for international competitions, such as bowling tournaments and the like. We believe that this theory of conducting the support of our benefit association is the logical and proper one; we know it is successful in practice.

DEATH BENEFITS AND INSURANCE

The present death benefit of our benefit association is only $200. We have under consideration a plan of group life insurance whereby, by means of the machinery for the writing of business and the collection of premiums which we can supply free, life insurance in substantial amounts, say $1,000 per policy, can be supplied at rates well within the means of the average conductor, motorman or guard. I shall not undertake to discuss our plan in this particular at this time, inasmuch as it is not yet in effect, but definite proposals to provide the insurance have been submitted by two of the largest companies in the country, and the form of policy upon which this insurance would be based has been approved by the New York State Insurance Department. One thing in this connection I wish to say by way of caution. The only policy, to my mind, which should be considered in group insurance of this kind is a level premium limited payment policy in some form, which becomes paid up at a certain age within the working years of the employee and gives to the faithful who survive in service the actual protection to which they have been looking forward. I emphasize this point at the risk of over-burdening this gathering, because of the fact that group life insurance is new and is being talked up by the representatives of certain companies in much the same way that real estate is sold or de luxe editions are peddled. The term policy offers an abnormally low premium at early ages and appears attractive, but it is my conviction that it is full of dynamite, and my own experience demonstrates that it is possible to obtain a satisfactory and inexpensive form of level premium, limited payment policy, if sufficient persistence is shown.

PENSIONS

The pension system of our company has been in force now since 1910. It provides for the retirement of employees who have seen service twenty-five years or more. It operates automatically when an employee has reached the age of seventy and may be availed of in cases of incapacity at the age of sixty-five or over. We have now seventy pensioners on the roll receiving an average of $27.10 a month, ranging from $18 to $40.30 per month. We consider these pensions purely as a service annuity earned by the recipients, and they are supported entirely by the company without contribution of the men.

ACCIDENT BENEFITS

I will pass over this topic, because the subject of workmen's compensation is still undetermined in the State of New York, and the uncertainty in this respect has operated to postpone

*Abstract of paper read before the American Electric Railway Association, Atlantic City, N. J., Oct. 13-17, 1913.

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final action in the life insurance plan I have referred to, because in divising the life insurance plan I have thought it wise to attach an accident insurance feature thereto.

PROFIT SHARING

No definite action has been taken along this line by the Brooklyn Rapid Transit System.

SAVINGS FUNDS

We thoroughly concur in the general observations of the committee regarding savings funds. There has been enacted in the State of New York during the last year an amendment to the banking law providing for the formation of credit unions somewhat on the lines of the Massachusetts statute. I believe that through some such organization as the credit union the best solution to the savings fund problem in large corporations will ultimately be found. The subject is too broad to enter into at this time, but I may say that in the credit union the savings function is provided in all the varieties presented by the savings and loan association, i. e.: straight savings accounts and the several kinds of instalment savings-investment accounts. Arthur H. Ham, director of the division of remedial loans of the Russell Sage Foundation, at 31 Union Square, New York, is in a position to supply information as to the credit union idea, and I am sure will be glad to do so to any who may apply to him.

There is also in operation in many cities a form of "poor man's bank," called the Morris plan, which includes many of the features of the credit union but does not involve the idea of a mutual organization. Although I have worked out a plan applying the credit union theory to our own situation, I am reserving my own recommendation until I can have opportunity to look more closely at the Morris plan in operation. I feel that a street railroad company should act slowly in this matter. It can relieve cases of actual need by well applied donations, and by means of its legal facilities it can do much toward rescuing any of its men who have come into the clutches of loan sharks. To take on a relation with the savings of its employees is so important a matter that our own company at least is proceeding with the utmost care and proposes to make sure that we have the best system obtainable before taking definite action.

LOAN FUNDS

The matter of loan funds need hardly be discussed in view of what I have said above. My personal feeling is that employees hesitate to disclose their necessities to their employer and will go to a loan shark before they will go to the employer for help. A welfare administrator or similar official, keeping in touch so far as possible with the employees and their families by means of systematic and well-directed social activities, can supply charitable aid in cases where it is needed. The ultimate formation of a proper form of savings and loan institution will do the rest.

SOCIAL AND ATHLETIC CLUBS, ENTERTAINMENTS, ETC.

It is our belief that all activity of this kind which represents a sincere desire of employees for collective amusement should be encouraged in so far as consistent with operating necessities, and that operating officials should make special effort to provide opportunity for such social and athletic activities.

I have already referred to the club rooms which we maintain in our depots and to the bowling tournaments. We also arrange for cheap excursions to the beaches for the families of employees in the summer time. We provide free entertainments at the Railroad Men's Building, which is the headquarters of our welfare establishment, at frequent intervals during the winter, and buy the equipment for depot baseball teams. We assist in the support of an employees' band. At one of our largest depots we have a house committee, elected by the men themselves, to keep watch over the use of the club rooms and assist in preserving the facilities there provided for the comfort of those men who desire to use them properly. This house committee has been an unqualified success. It has made discipline easier at the depot in question, and, in the judgment of our operating officials, has been a most favorable influence upon the morale of the men. We look forward to the early establishment of these committees in a number of other depots.

MERIT SYSTEMS AND REWARDS

A merit system obtains throughout our company, personal records are kept, and the effort is made constantly to regard discipline not from the point of view of retribution but, so far as it is possible, from the point of view of correction and education, so that the offender himself may ultimately learn by his own mistakes and shortcomings. We employ a system of credits, as well as demerits, and promote on merit thus demonstrated.

SAFETY AND SANITATION

We thoroughly indorse the statements of the committee in this particular and are carrying on at the present time extended studies looking to the organization of a permanent safety committee within the company itself, embracing in its activities the entire force from top to bottom.

SICK BENEFITS

We have had free service to members of the Benefit Association throughout its existence. We found, however, in the course of a general investigation on this subject two years ago that the medical function was more or less intimately connected with operation through the intermediary of the sick excuse and that certain loose practices had developed which were having an unfavorable effect both upon operating discipline and upon the finances of the Benefit Association. As the result, I undertook a special investigation of the subject of medical attendance, and out of this investigation came a plan for a medical inspection bureau as a part of the operating department.

We assumed that when a man was actually sick it was as much to the interest of the company as to the interest of the man himself that he should be restored to healthful condition at the earliest possible moment. We knew as a matter of practice that the average employee taking cold or beginning to suffer from any other form of common complaint generally neglected his case for a few days until he felt pretty bad, then applied for sick leave, loafed around his home or some less desirable place for a few days more, and finally either became seriously ill or went back to work without having really recovered from his indisposition. We knew that a considerable number of men systematically worked the sick excuse as a means of recreation, doing an injustice not only to the company but to all those faithful employees who were thereby deprived of recreative opportunities. We had in the Benefit Association the nucleus of a splendid medical establishment, and we therefore took the staff of doctors of the association over directly into the service of the company and required that a man, when he reported sick at his depot, should go to one of two medical inspection offices located at convenient points on the system for examination. If a man thus reported sick, his depot officials could not require him to work. If he was diagnosed as sick by the doctor examining him, he was relieved from work and put under treatment until the doctor certified to his recovery. Facilities were provided for the examination of men reporting sick from their houses and for their subsequent treatment. In case of attempted faking, the doctors promptly notified the depots and terminals and summary discipline was applied. The system was, of course, worked out in harmony with operating conditions, and involved a close exchange of information between physicians and depot officials. The attendance thus supplied at the direct expense of the company continued to provide members of the Benefit Association with the medical attendance to which they were entitled by reason of their membership in that organization.

This system has been in effect since Jan. 1, 1913. In this period of over nine months we have reduced the sick list

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throughout the system by nearly 25 per cent as compared with the corresponding nine months of 1912. This reduction has been accompanied by an increase in the number of new sick cases reported as compared with the corresponding months of last year, and our physicians, in providing the attendance above described to 9000 men in the operating department, have answered more than double the number of office and house calls that were answered in providing medical service to 7000 men under the previous régime, when it was optional with members of the Benefit Association whether they called on the doctors or not.

Thus it appears plainly that our gain in the reduction of the sick list has been accomplished by restoring men to work with shorter intervals of disablement than of old. In other words, we have improved the average health of our force. The medical inspection system has the entire approval of the operating department and is rapidly popularizing itself with the men themselves, particularly as we are undertaking to make systematic provision for recreative excuses to replace the fraudulent sick excuses that formerly were obtained for the purpose of recreation.

I personally consider this line of activity fundamental in any welfare establishment. The cost is surprisingly small, our own experience showing an average of not much more than $1.50 per man per year. The results gained, in the judgment of men whose knowledge of operation is as broad as my own is limited, are most gratifying. I strongly urge that compulsory medical inspection be made an essential feature of any systematic planning for welfare of street railroad employees.

REPORT OF THE "AERA" ADVISORY COMMITTEE*

C. LOOMIS ALLEN, CHAIRMAN; A. L. LINN JR., L. P. CRECILIUS, H. V. BROWN, H. E. REYNOLDS, W. H. HEULINGS, JR.

Aera ended the first year of existence with the July number.

The first volume contained 1163 numbered pages in addition to 268 pages, carrying indices, list of officers, etc., and advertising. Of the numbered pages, four were blank, leaving 1159 pages, the contents of which may be classified as follows: Association affairs, 276 pages; Question Box, 221 pages; communications, 18 pages; operating matters, 239 pages; public relations, 333 pages; relations with employees, 44 pages; yearly table of contents, 28 pages; total, 1159 pages.

The issues of August, September and October have devoted rather more attention to matters affecting public relations and relations with employees, and it should be the policy of *Aera* to give to these subjects a generous proportion of its space.

Beginning with the issue of April, the magazine has carried no advertising. The elimination of advertising was the result of a recommendation embodied in a resolution passed by the executive committee of the American Electric Railway Manufacturers' Association. The Manufacturers' Association was asked to contribute toward the expense of publishing *Aera* and the thanks of this association are due the Manufacturers' Association for their most liberal support.

Your chairman believed that the most effective results from *Aera* could be obtained if a trained, competent editor was secured. After considering the applications and looking over the field generally for a man to fill this position, an offer was made to Harlow C. Clark. Mr. Clark is a man of ripe experience in the newspaper field. For many years he was engaged in municipal government and chamber of commerce work, and he has brought to us a viewpoint fully developed from the public's standpoint and can express to the public and the employees who are dependent directly and indirectly upon this industry in language they will understand the corporation side of one of the most interesting problems that confronts not only we who are engaged in this work, but the general public.

The many letters of approval and encouragements, and the verbal congratulations, as each issue has been distributed, bear favorable testimony to the work Mr. Clark has done. Mr. Clark began his duties as editor with the May issue and devotes his entire time to the magazine and other publicity matters in connection with the association work.

To him we give full credit for:

(1) The articles in the editorial columns of *Aera*; (2) the preparation of the newspaper clipping sheets, their distribution, and the co-operation of the newspapers in using this material; (3) the publicity for this convention and the co-operation of the Associated Press.

Your committee believes that the general purposes of the *Aera* should be fourfold, namely:

First to act as a medium of communication between the officers and members of the association in the presentation of matters affecting the organization, in the dissemination of association news and the creation of interest in association affairs.

Second, to educate the members of the association in the problems which the industry faces and in means and methods of solving such problems.

Third, to present to the public, in as great a degree as is possible, through *Aera's* circulation, the electric railway's side of the controversies that are being waged, and to educate the public to the fundamental facts affecting the industry.

Fourth, to practically assist association members in the technique of their work by printing such contributed articles as may be of benefit in illustrating methods and means.

Any publicity program that may be adopted by the association is closely allied to the second and third of these purposes, as here outlined. The education of officers and employees is as essential to success as is the education of the public, and no better means can be devised than such a publication as *Aera*, through which the leaders may talk directly to the men who must be looked to to carry out such policy of public relations as it may seem wise to adopt.

The education of the public is a by-product of *Aera*. If the magazine can be given a standing which makes it the recognized mouthpiece of the industry in matters affecting the relations between the companies and the public, it will gain a hearing in the press.

To give the magazine this standing, it is necessary that association members give it loyal support in the matter of contributions. *Aera* must depend upon association members for the great bulk of the articles it prints. It has no other staff than these afford, and it may be said with emphasis that no better staff could be desired. We believe that those men in the industry who speak with authority, whose words carry weight and who realize the necessity of bringing to the attention of the personnel of the electric railway business the questions with which that business is confronted, realize also that in *Aera* they have a medium which assures them a hearing. The importance of furnishing *Aera* with the right kind of matter cannot be too strongly emphasized. The committee desires to thank those who have contributed so splendidly to *Aera's* columns and to appeal to all members to not only respond to requests for contributions, but to volunteer articles which they think will be of interest.

This appeal applies equally to the Question Box, which has increased amazingly in size and usefulness.

The experience which the use of clipping sheets, made up of excerpts from *Aera*, has furnished is proof that if *Aera* can print matter of interest to the public, that the papers of the country will make use of it.

*Abstract of report read before the American Electric Railway Association, Atlantic City, N. J., Oct. 13-17, 1913.

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On *Aera's* mailing list are nearly 1200 papers, located in cities in which member companies operate. The clipping sheets are sent to all of these and are quite generally used. In addition, the help of member companies has been enlisted to secure publication, and it is through company members that any extensive campaign of publicity must be waged.

Although it is impossible at this time to report upon the final results of the effort made to secure publicity for the present convention, enough is known to prove that it is not difficult to secure extensive publication of matter having news value. The clippings shown in a frame in this convention hall were those received within ten days before the convention and were cut from seventy-five papers, in forty-five cities in twenty-four states, these papers having a combined circulation of nearly 3,600,000. Because of the necessarily early arrangement of these clippings, they consist of the most part of clippings of matter sent directly from the office to the newspapers. Clippings of articles inserted through the aid of company members will form an even larger collection.

A large number of such clippings have since been received and probably have had more extensive publication than those sent directly to the papers. They indicate what may be done if the member companies will co-operate.

It is, of course, impossible to indicate in detail to member companies methods of establishing close relations with the press of their territory. In many cases such relations already exist, and it but remains to take advantage of them. In the preparation of *Aera* clipping sheets, a careful selection is made of such matters as are of general interest and that are of a character that will recommend them to an editor as proper for publication.

Very often it is possible for the officers of companies receiving the sheets to add something that will give them local interest and thus make them additionally attractive.

Your committee feels that a satisfactory start has been made toward securing a hearing for the electric railway industry. The machinery for giving proper publicity to matters in which the industry is interested is being assembled and put in working order.

The machinery is at the service of the officers and committees of the association. From them must come the material for any effective movement for publicity.

In conclusion, your committee desires to state that in its opinion *Aera* is already admirably fulfilling its functions and that its effectiveness and usefulness is a cumulative growth, increasing with each number issued.

It has accomplished and is accomplishing a great work for the association in stimulating interest in association work by constantly keeping members in touch with association affairs.

The commendatory letters received, the demands made for prompt delivery, the complaints made when the magazine is delayed and the favorable comment of *Aera* readers encourage your committee to believe that the magazine is appreciated.

Aera needs a larger subscription list; it needs contributions, and it needs the support of association members.

Your committee believes that all of these will be forthcoming. *Aera*, it is convinced, has achieved an assured place in the activities of the association and will continue to be one of the strongest agencies for promoting the good of the organization and of the industry.

The Metropolitan Street Railway, Kansas City, is utilizing the reverse side of its transfers for educational purposes. All sorts of reading matter are being used. "Save yourself" is one heading. "It is safe and easy to get off with face to front of car. It is dangerous to get off the car backward." This warning is illustrated with views of the correct and incorrect method of alighting from a car. The text is changed several times weekly.

CLOSING SESSION OF THE CLAIMS ASSOCIATION

The closing session of the Claims Association was held yesterday morning with President Avant in the chair. The attention which the claim agent is giving to new developments in the transportation field as they affect the accident question was indicated by the first paper. The subject was "Motor Vehicles," presented in a paper by M. B. Bracken, claims department United Railways of St. Louis, with written discussion by C. G. Rice, superintendent claim department Pittsburgh Railways; W. F. Weh, claim agent Cleveland Railway, and James R. Pratt, assistant general manager United Railways & Electric Company of Baltimore. The next and final paper was that on "Adjustment of Accident Claims," by F. D. Edmunds, assistant to general attorney Interborough Rapid Transit Company, New York. After a general discussion on both papers and after a report on the index bureau, by B. P. Holmes, of the Hooper-Holmes Information Bureau, the report of the nominating committee was received and adopted unanimously. The officers of the association for the ensuing year are the following: President, W. F. Weh, claim agent Cleveland Railway; first vice-president, W. Tichenor, claim agent Terre Haute, Indianapolis & Eastern Traction Company; second vice-president, George Carson, claim agent Puget Sound Traction, Light & Power Company; third vice-president, R. E. MacDougall, claim agent New York State Railways, Rochester, N. Y.; secretary-treasurer, B. B. Davis, claim adjuster Columbus Railway & Light Company. Speeches of thanks were made by the new officers.

The executive committee, in addition to the officers, is composed of the following: P. C. Nickel, claim agent New York Railways; F. J. Whitehead, claim agent Washington Railways & Electric Company; S. B. Hare, claims attorney Altoona & Logan Valley Electric Railway, and C. B. Proctor, claim agent Memphis Street Railway. The subject committee for the next convention comprises L. S. Hoffman, general counsel Public Service Railway; M. P. Spillane, claim agent Boston Elevated Railway; J. H. Handlon, claim agent United Railroads of San Francisco, and Wallace Muir, claims attorney Kentucky Traction & Terminal Company. The committee on ways and means is composed of J. S. Kubu, claim agent New York State Railways; P. B. Dixon, claim agent Jackson Light & Traction Company, and J. S. Harrison, claim agent Jacksonville Traction Company. The employment committee is composed of A. D. Brown, claim agent Syracuse Rapid Transit Company, and C. J. McAleer, claim agent Schenectady Railway.

The meeting adopted a resolution offered by Mr. Nickel that the past-presidents and present officers and executive committee be appointed a committee to prepare data on ways and means for accident prevention. C. A. Avant, retiring president, was presented with a badge similar to that which has been presented to other past-presidents of the Claims Association. Mr. Avant acknowledged this gift in a happy speech in which he thanked the members for the assistance they had given him to secure a successful administration. Remarks were made by E. C. Carpenter and H. K. Bennett, expressing their sorrow at the sudden death of R. H. Schoenen, late claim agent Lehigh Valley Transit Company and a former vice-president of the association. The memorial prepared on Mr. Schoenen by the ex-presidents of the association had been left inadvertently at the office of Secretary Donecker of the American Association and consequently could not be read. It will, however, be made a part of the minutes. Remarks were also made on the death of L. L. Austin, claim agent Metropolitan Elevated Railroad, Chicago, Ill., and on the death of S. W. Gonsalus, claim agent Southwest Missouri Railway. The meeting was then adjourned after the most successful gathering the association has had for years.

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REPORT OF COMMITTEE ON PUBLIC RELATIONS*

THOMAS N. M'CARTER, CHAIRMAN; PATRICK CALHOUN, O. T. CROSBY, JAMES H. M'GRAW, W. H. HEULINGS, JR.

An important development in the work of this committee was a conference held on Feb. 18 between the public policy committee of the National Electric Light Association and the members of this committee. The interests of the two associations as affected by public relations are so nearly identical that your committee was more than pleased to avail itself of the opportunity offered by an invitation received from Arthur Williams, chairman of the N. E. L. A. public policy committee, to meet and to discuss matters which both of these bodies were authorized to consider.

The representative character of those present at the meeting gave assurance of the interest taken in the matters upon which they deliberated. President Harries of this organization and President Tait of the National Electric Light Association were both in attendance, and from the N. E. L. A. were Arthur Williams, E. W. Burdett, H. L. Doherty, C. L. Edgar, W. W. Freeman, T. E. Murray, S. Scovil and C. A. Stone; from the association, Chairman Thomas N. McCarter, Patrick Calhoun, O. T. Crosby, J. H. McGraw and W. H. Heulings, and representing important public utility systems or groups were Frank Hedley, J. H. Pardee, H. G. Bradlee, E. A. Maher, C. C. Peirce, John W. Lieb, Jr., and C. Loomis Allen. Judge E. P. Matthews was also a guest, and the two associations were represented by their secretaries, T. C. Martin and H. C. Donecker.

A discussion replete with valuable suggestions and of great importance as developing the ideas of men prominent in both the electric railway and the electric light industry as to ways and means for bringing about what all are striving for—a better condition of affairs as between the companies and the public—lasted from 8 o'clock in the evening until 1:30 a. m.

As a concrete example of what joint action by the two bodies represented can accomplish may be cited the appointment at this meeting of a committee to act with and advise the National Civic Federation in the preparation of a model utility law. Previous to this meeting much publicity had been given to a draft of such proposed law. It was felt by both committees that the advice and counsel of men thoroughly in touch with the practical side of street railway management and operation were needed before such a model statute was placed before the public sealed with the approval of such an organization as the National Civic Federation, and the co-operation offered by the two committees was gladly accepted by the National Civic Federation. The committee's representatives have had a voice in the preparation of such a law, as will be explained to you later in the week by William D. Kerr.

Thanks of the association are due to Judge Armstrong, who represented this association and its committee on public relations in the preparation of the draft.

As a further result of this conference, it was resolved to establish a joint committee representing the two associations to handle such matters or to devise means of effective publicity to deal with questions of public relations and to consider the molding of public opinion by the presentation of real facts regarding public utility interests and the controverting of the mass of misinformation being spread by propagandists of socialistic and semi-socialistic ideas relative to the control of public utilities. The National Electric Light Association has already appointed its members of this committee. The names of our own representatives will shortly be announced. Our members, together with the National Electric Light Association members, will choose a member at large, and it may be expected that effective and energetic work will shortly be undertaken, and that results will be obtained which cannot but prove pleasing to the association.

Your committee has kept in mind the importance of publicity for the industry. Many plans suggested by it have been put into effect and are now being carried out. We are seeing the results in editorials in the public press and in the news columns. We are still impressed with the importance of an energetic effective campaign along these lines. The apostles of change, both those operating under a misunderstanding of the real conditions as affecting public utilities and those who are wilfully spreadng false doctrines and false information, are not resting. It is necessary that our side of the controversy be placed before the public and we believe that every effort should be made to interest the member companies of this association in the work of refuting the arguments presented everywhere by our opponents. This can be done if proper assistance and co-operation is given to your committee in its efforts, and we feel sure that such assistance and co-operation will be forthcoming.

*Abstract of report read before the American Electric Railway Association, at Atlantic City, N. J., Oct. 13-17, 1913.

ANNUAL ELECTION OF MANUFACTURERS' ASSOCIATION

The annual meeting of the American Electric Railway Manufacturers' Association was held in Engineers' Hall at 4 o'clock yesterday afternoon, with President W. H. Heulings, Jr., in the chair. The meeting was well attended, and there was a lively rivalry among the friends of several candidates for the five positions on the executive committee that had to be filled.

President Heulings delivered a brief address reviewing the general business conditions that have prevailed during the year. He stated that in spite of somewhat unfavorable business conditions the association had added forty-seven new members to its roll. He stated that the committee had been doing its utmost, and it was the expectation and endeavor that it would continue in work designed to raise the fund of $12,000 for the support of *Aera*, the official publication of the parent association. Of this fund $4,200 had already been collected and upward of $700 additional had been pledged.

The nominating committee, consisting of B. A. Hegeman, Jr., D. W. Smith, George Stanton, R. H. Herzog and Edwin C. Folsom, was appointed to report nominations of candidates to succeed Messrs W. H. Heulings, Jr., E. H. Baker, Scott H. Blewett, E. M. Williams and J. L. Replogle.

After the nominating committee had withdrawn for consultation Gen. George H. Harries, president of the American Association, delivered a short address in which he expressed his personal and official appreciation of the work which the manufacturers had done on behalf of the American Association and for the industry as a whole.

The report of the nominating committee recommended the election of W. H. Heulings, Jr., E. H. Baker and Scott H. Blewett to succeed themselves, and of E. F. Wickwire, of the Ohio Brass Company, and Thomas Finigan, of Pierson, Roeding & Company, to succeed Messrs. Repogle and Williams. The report of the nominating committee was received, and then Edwin B. Meissner, of the St. Louis Car Company, seconded by A. H. Sisson, of the Southern Car Company, placed in nomination a second ticket as follows: Thomas Farmer, of the Consolidated Car Heating Company; Bertram Berry, of Heywood Brothers & Wakefield; F. A. Elmquist, of the Sherwin-Williams Company; E. H. Baker, of the Galena Signal Oil Company, and Thomas Finigan, of Pierson, Roeding & Company.

As the names of Mr. Baker and Mr. Finigan were on both tickets they were unanimously elected by one ballot cast by the secretary. On the formal ballot on the other six candidates Messrs. Farmer, Berry and Elmquist received the highest number of votes, and were declared elected.

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It was announced by the chair that the new committee would meet at the office of the association in the pier entrance at 12.30 to-day for the purpose of organization.

On motion the meeting adjourned.

RAILWAY SIGNAL ASSOCIATION CONVENTION

Among the various committee reports presented to the Railway Signal Association yesterday at its convention in Nashville, Tenn., that of the committee on electric railways and alternating-current signals perhaps aroused most interest. The committee brought up to date previous specifications for alternating-current automatic block signal systems for railroads using either alternating current, direct current or steam for propulsion. It also gave historical data on thirty-three installations for alternating-current signaling on both electric and steam railways. W. Morrison, of the New York Central Railroad, presented the report in the absence of Chairman H. S. Balliet. Mr. Howard, of the Union Switch & Signal Company, gave useful suggestions and will co-operate with the committee further. There was no discussion on the historical section.

The association delegates visited the Hermitage, the old home of Andrew Jackson, yesterday evening as the guests of the Manufacturers' Association. The concluding session will be held to-day.

The annual meeting of the Signal Appliance Association was held yesterday forenoon. The officers elected are: Chairman, W. P. Hawley, New York, United States Light & Heating Company; vice-chairman, L. T. Thomas, Chicago, General Railway Signal Company; secretary and treasurer, F. W. Edmunds, New York, Dressed Railway Lamp Works. Executive committee—W. T. Gillingham, Chicago, Hall Switch & Signal Company; George H. Porter, Chicago, Western Electric Company; W. T. Kyle, New York, Duplex Metals Company, and Fred Cameron, Corning, N. Y., Corning Glass Works. Committee on arrangements for next year's convention—E. E. Hudson, Orange, N. J., Thomas A. Edison, Inc.; Mr. Cameron and George Blackmore, New York, Union Switch & Signal Company. Committee to confer on place of convention—Mr. Gillingham.

It is probable that next year's convention will be held at Bluff Point, Lake Champlain, N. Y., during the last week of September. The appliance association is carrying out a fine entertainment program at Nashville.

A SUGGESTION IN REGARD TO CONVENTION LOCATIONS

A representative of one of the manufacturers present at the convention has made a suggestion with reference to the annual meeting of the American Electric Railway Association which appears to be thought worthy of consideration by a number of those members and manufacturers to whom he has presented it. He argues that the scope of the annual meetings has grown so greatly that it is increasingly difficult to find facilities properly to take care of the attendance and at the same time afford the space adapted for the exhibition of manufactured apparatus and supplies. When the exhibition can be made in proximity to the convention halls and to the hotels so that those attending the convention are close together and can reach the exhibition and convention halls quickly and without inconvenience, the advantages of attendance, both for representatives of member companies and manufacturers' representatives, are fully obtained. On the other hand, when the convention and exhibition halls and the hotel accommodations are widely separated, it is difficult, if not impossible, for delegates to get the full benefit of the meetings.

After the experience of many years, this manufacturer says, it has become obvious that there are few places available which meet the conditions first outlined above. Of these places, Atlantic City is clearly the best. He suggests, therefore, that following a meeting one year at Atlantic City, the convention of the following year should be held at some other point to be chosen by the association, and at that meeting there should be no exhibits of manufactured apparatus. That meeting would then be primarily devoted to the special business of the association—the representation of the manufacturers being, perhaps, smaller, and in any case made up more of the commercial and less of the technical men. At such a meeting, obviously, the sessions of the member companies would receive greater attention than is possible at a full meeting with the diversions of the exhibition and its attendant attractions and large list of visiting delegates.

In the third year, according to this plan, a full meeting would again be held at Atlantic City, and the fourth year there would be a limited meeting without manufacturers' exhibits, at another selected point in the West or Middle West as the case may be; and so on, alternating between Atlantic City with full exhibition and various other points without exhibition. It has been argued that this plan would insure the holding of the full meeting with exhibitions at a point perfectly adapted for this purpose, where facilities for the holding of the formal meetings of the convention, for the showing of apparatus and the housing of delegates are ample and convenient. It would insure in every second year a meeting for the transaction of strictly association business under possibly more favorable conditions than are now possible when the convention is accompanied by manufacturers' exhibits. It is further suggested in support of this plan that it is practically impossible for manufacturers to make exhibits at such short intervals as one year without considerable monotony in the nature of products shown.

The man whose suggestion is quoted admits that there are many pros and cons that may be put forth in connection with this proposal, but believes that the former outweigh the latter.

LETTER BOXES ON CARS IN HUDDERSFIELD

Some years ago the Hudderfield (Eng.) Corporation entered into a contract with the Government Post Office Department for gathering letters in boxes on electric railway cars. Regular cars to the number of sixty carry an iron letter box hung on a rail at the rear of the car, easily removed and attached. The slot in these boxes is large enough to receive any letter or single paper. As often as once an hour, from 6 a.m., until 10 p.m., the conductor on the car removes the box and takes it into a special office devoted to that purpose by the railway department, at a central point which is passed by all cars during their regular runs. The conductor there places the box on a shelf designated for that purpose, takes from another shelf an empty box and attaches it to his car, and then proceeds on his way. As this is done at a regular waiting point, no time is lost by this additional work of the conductor. Every hour special collectors gather all the letters from boxes thus left and carry them to the post office. A person may signal the car to stop, as if he were intending to board the car, and then mail his letter, giving the conductor the usual single fare, the conductor punching a ticket the same as for a ride. The outlying districts, to which the cars on some of the lines run, make much use of the system. The corporation owns and furnishes the boxes, and the Post Office Department pays 1,500 a year for the service and free transportation on cars of collectors who have to travel some of their routes by car.

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DIXON-LUBRICATED NORTHAMPTON GEAR STILL DOING GOOD SERVICE

W. O. Hay, general manager of the Northampton (Pa.), Easton & Washington Traction Company, has the following interesting remarks to make concerning the half gear and pinion on show at the exhibit of the Joseph Dixon Crucible Company: "Both of these came with the original equipment furnished us by the General Electric Company and were put in service in the early summer of 1906; they have been in service since that time, continuously. They have made more than 275,000 miles, and we expect to use them again when returned to us. During all this period the only lubricant we have used has been Dixon's graphite wood gear grease. When we first put this equipment into service, we filled the gear case full of Dixon grease and after that it was our custom each week to add about a double handful in each gear case."

J-M SAND SPOUTS AND STOVEPIPE INSULATORS

Among the items of unusual interest shown by the Johns-Manville Company this year is a sand spout for cars and electrobestos stovepipe insulators. The sand spout is made of strong metal ribbon, wound spirally, the edges being crimped in during the winding to form a continuous interlocking metal hose which can be bent to the desired curve without fear of fracture.

This spout will stand a crushing strain of 300 lb. to each four turns of its spirals and under ordinary conditions will last as long as the car on which it is used. It is said to give much better service and for a longer time than coiled wire spouts as the latter usually kink and have an opening which gradually enlarges, thus permitting the sand to leak out. There is also no danger that this spout will pull out.

The J-M electrobestos stovepipe insulator is a molded fireproof insulator for use in car heater stovepipes to insulate that portion of the pipe extending above the car roof from the heater proper. It offers absolute insurance against damage to the heater equipment or personal injury in the event of a broken trolley or other live conductor coming in contact with the upper portion of pipe.

THE PETER SMITH HEATER COMPANY'S NEW HOME

The Peter Smith Heater Company, Detroit, Mich., has recently purchased the buildings and grounds formerly occupied by the Grabowsky Power Wagon Company on Mount Elliott Avenue, adjoining the right-of-way of the inner belt line used by steam roads for interchange of cars. This new site comprises 8½ acres, five buildings and side tracks to accommodate sixty cars. The main building, four stories in height, is of the Kahn system of reinforced concrete construction and contains about 75,000 sq. ft. of floor area. It is fully equipped with a sprinkler system, model heating plant and electric elevators. A portion of the second floor is devoted to suites of offices. The main office building, near the entrance to the property on Mount Elliott Avenue, is a one-story brick structure with oak interior finish. The other buildings on the property include a modern power plant and a one-story building containing 15,000 sq. ft.

The Peter Smith Heater Company plans to park the property surrounding the main office building, erect an ornamental fence as well as beautify the entire grounds in various other ways. The rapidly increasing heater business of this company has caused it to outgrow its old quarters, and the new plant will give it ample room to expand. It is said that the Peter Smith Heater Company now is the largest manufacturer of forced hot-air and hot-water coal heaters for electric railway cars in the world.

NEW TONGUE SWITCH AND FROG AT WHARTON'S

William Wharton, Jr., & Company, Inc., Philadelphia, Pa., have departed this year from the usual order of things, and instead of exhibiting a miscellaneous lot of track pieces with which railway men are more or less familiar, they have devoted spaces 626-634 to showing a few pieces, which, however, are entirely new. First among these is a tongue switch built on the principle of the Wharton heel-less switch, but with a larger bearing for the pivot portion of the tongue. The entire switch is of manganese steel, and the tongue pivot fits into a complete cylindrical bearing which is set back underneath a projecting portion and is therefore protected from the direct blow of the car wheel, a feature of this heel-less switch which has recommended itself to many. The tongue of this switch is reinforced throughout its entire length. The holding device consists merely of a piece of spring steel and a bolt and nut. This switch has been in actual service only a few months, but it has already been favorably commented upon by authorities on street railway track work.

Another new type of work is a solid manganese steel frog with a separate manganese steel center. The under surface of this center is ground true and rests directly on the larger manganese steel casting, which is also ground in the same way. The center is held in place by bolts and can be renewed without difficulty, as there is no spelter to melt out except that which surrounds the bolt heads, and to remove that is a small matter. Work of this type has been in satisfactory use for the past three years. Other new articles are Type "N" and "O" spring controlling devices which have been used for some months with satisfactory results. With these articles is exhibited one of the heel-less manganese steel center switches, as well as a complicated solid manganese three-way frog piece. All the manganese steel in this exhibit is of the noted "Tisco" brand, made by the allied Taylor Iron & Steel Company, High Bridge, N. J., which is the only American company making manganese steel under the original patents of the inventor, R. A. Hadfield.

The Forged Steel Wheel Company at space 538 has a novel demonstration of the uniformity of the steel used in the construction of its wheels. Two samples were made up from the top and the bottom of an ingot respectively and samples were taken from the webs at a number of points. Chemical tests on these showed great uniformity in carbon, the percentages being marked on the samples, the maximum variation being but 0.03 per cent. The company has on exhibition a variety of standard wheels designed for all classes of service, including a sample from a lot furnished the Interborough Rapid Transit Company and designed for three turnings. There is also a pair of wheels which were in service in Washington with a record of 197,000 miles. They are good for some service yet.

To eliminate the breakage of tungsten lamps and obtain a perfect control of light distribution, the George Cutter Company, South Bend, Ind., has developed the "Idealite" lighting equipment which it displays at the booth of the Western Electric Company. It is of interest to learn that this development had its origin in the tungsten lamp troubles of the Oliver Plow Works at South Bend. In the Cutter mechanism, crystallization of the tungsten filament is prevented by suspending the socket between six springs, three above and three below. Three bolts extending through the socket hold the springs in place and assure uniform tension regardless of the vertical adjustment of the socket or the weight of the shade. The shades and reflectors are of various materials and shapes as may be best suited for indoor or outdoor purposes. F. X. Cleary is on hand to demonstrate the economy of modern lighting.

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Among the Exhibits

The Curtain Supply Company has an attractive exhibit of curtains and curtain fixtures in space 638.

* * *

The Gulick-Henderson Company, inspecting engineer, Pittsburgh, Pa., is represented as usual by Henry Gulick.

* * *

Edward H. Chapin, vice-president of the National Car Wheel Company, is looking after its interests at the convention.

* * *

Although without an exhibit the E. W. Bliss Company, Brooklyn, N. Y., is represented at the convention by B. W. Stone.

* * *

Representatives of the Railway Materials Company are entertaining their friends in their reception booth at space 535.

* * *

Wylie Brown, general sales agent of the Bridgeport Brass Company, is present at the convention, looking after the interests of Phono-electric wire.

* * *

The Vacuum Car Ventilating Company has a reception room showing blueprinted and printed matter on the Cooke system of car ventilation in space 539.

* * *

The Protective Signal Manufacturing Company, Denver, Col., is exhibiting in space 133 its highway crossing protector. In addition to two fully equipped crossing standards, the company is showing the separate oscillator bell and signal light mechanisms.

* * *

J. W. Griffin, of the Wheel Truing Brake Shoe Company, says he has been attending every convention since the Boston meeting in 1898. He says that on his first offense, at Boston, he took forty-five bona fide orders from electric railway men, and that he still has nearly everyone of them as a regular customer.

* * *

The American Steel & Wire Company, Chicago, Ill., has on exhibit, at spaces 558, 559, 560 and 561, a machine for applying to a rail its well-known type of twin terminal bond, and also a vibration machine for testing the mechanical life of its bonds. The company is also showing its special galvanized woven wire fence for right-of-way fencing.

* * *

The Woods fare box is one of the interesting devices shown in the exhibit of the Holland Trolley Supply Company, space 357. This type of box has been in service in Illinois for several years and has proved very efficient. It has four compartments which automatically lock when withdrawn from the box. This box takes either coins or tickets. Other devices shown are the Holland ball-bearing trolley boxes, harps, wheels, etc.

* * *

The Herr Fender Company, New Orleans, La., is one of the new exhibitors at the convention. It has an exhibit of its motorman-controlled fender in space 530. The features of greatest importance are the light-weight, only 90 lb., and the lever which controls the drop device that is placed in line with the controller handle. The fender is carried 9 in. above the rail. The Herr fender is now in use in New Orleans, Shreveport and Baton Rouge, La., and in Laurel, Miss.

* * *

A new device, the automatic change maker, is exhibited in space 312 by the Rooke Automatic Register Company, of Providence, R. I. It consists of four tubes for quarters, nickels and dimes. With one stroke of the locking device five coins are released, so that in the case of nickels change for a quarter can be obtained at one time. It was especially designed to accelerate change-making for the Rooke register and for fare boxes on prepayment cars.

* * *

In space 127 the Scientific Railway Appliance Company is showing the various safety appliances for cars. These include the motorman's valve which automatically drains the accumulation of moisture in the pipe line and prevents freezing and clogging of the air. This valve is of the piston type, which reduces the amount of packing otherwise necessary. Other devices shown include the conductors' control device, which places the control of the car in the hands of the conductor, and the Scientific automatic sander, which has attracted a great deal of attention.

* * *

"A fare collecting and accounting device for every service on city cars" is the slogan of the International Register Company in spaces 300-306. The company is giving demonstrations of the International coin register and the International money-counting fare box. The coin register combines in one machine a fare box, a coin-counting machine and a car register. The money-counting fare box is similar to the coin register except that the car register is omitted and the totalizer, showing the amount of money deposited, is located just above the money-counting mechanism.

* * *

A. C. Terwilliger, representing M. Welte & Sons, Inc., New York, is in charge of that company's automatic brass band orchestrion. Railway park managers who desire to furnish any variety of dance, popular or classical music at lowest cost and in a most agreeable manner should ask Mr. Terwilliger to give a demonstration on this instrument in Aquarium Court. That severe climatic conditions do not affect this orchestrion is shown by its performance under the severe conditions which obtain at a seaside resort like Atlantic City. The Charlottesville (Va.) & Albemarle Street Railway is one of the recent purchasers of these instruments.

* * *

A general line of apparatus for railway air-brake and industrial service is being shown by the National Brake & Electric Company in space 15. Special attention is being directed to this company's latest development in light-weight air-brake compressors known as type A-5B 18 ft. It retains all the excellent features of the standard A-5 type introduced two years ago and has proved satisfactory in every respect under service conditions. A new type of governor for controlling all classes of air compressors in both railway and general use and an improved type of motorman's brake valve and handle are also receiving unusual attention.

* * *

At the exhibit of the National Tube Company of Pittsburgh, located at spaces 554 to 557, there is a large array of devices and supplies of interest to street railway men, of which not the least important is the Kewanee union testing machine, used for testing unions to 125 lb. compressed air pressure under water. This is used in the Kewanee works, where specialties are manufactured under the trade name "Kewaunee." A piece of crushed National casing, concerning which considerable space has been used in the trade papers recently, is shown. This piece of casing withstood the tremendous shock due to the explosion of 120 quarts of nitro-glycerine, at the bottom of a 3000-ft. well, without showing the slightest fracture. Among the other exhibits are tubular steel poles, pole joints and an important trolley-pole testing machine. Several trolley poles are shown machined to show construction. One exhibit is a table top made from a number of pieces of Shelby seamless steel tubing. These items are mentioned simply to indicate the general nature of the exhibit, which contains samples of the standard products of the company.

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The Lobdell Car Wheel Company, Wilmington, Del., is represented by F. A. Lex.

* * *

Edward J. Hunt, of Newark, N. J., is here furthering the interests of his transformers and transformer-oil purifiers.

* * *

Mr. Richard F. Kruse is attending the convention in the interest of the C.-A.-Wood-Preserver Company, St. Louis, Mo.

* * *

The P. Edward Wisch Service, of New York and Electric-Railwaydom, is represented at the convention by its founder, P. Edward himself.

* * *

The J. W. Paxson Company, Philadelphia, manufacturer of Paxson's steel wire frog and switch brooms, is represented by John S. Gilbert.

* * *

George H. Sanford, of Bridgeport, Conn., is present at the convention in the interest of his own business. George says that when "Bill" Dugan gets here there will be something doing.

* * *

In yesterday's announcement of the new herringbone gear recently perfected by the R. D. Nuttall Company and shown at spaces 142 and 144 the word "not" was inadvertently omitted. The advantages of the new gear are, of course, simplicity and the absence of pockets for the accumulation of dirt.

* * *

The Ackley Brake & Supply Company, spaces 117-119, is carrying on some interesting demonstrations of Monarch refillable fuses. Various sizes and types of refillable fuses are blown, refilled and blown again to illustrate their current-carrying capacity. Three types of fuses are exhibited, namely ferrule contact, screw clamp contact, and knife blade contact.

* * *

C. H. Florandin, sales manager of the C. & C. Electric Manufacturing Company, Garwood, N. J., is crowding a week's work in two days among the electric railway men at the convention. Mr. Florandin expected to have one of the C. & C electric arc-welding outfits on exhibit, but contract work kept this company's shops too busy to get out an extra set on time for this show.

* * *

E. E. Daglisch is at the convention, having made a special trip from England in order to demonstrate the application of the "Limit Stop" brake staff, which is being exhibited by the Ackley Brake & Supply Company, spaces 117-119. George H. Anger has also come over from England for the purpose of demonstrating the application of the Anger improved automatic brake adjuster, which is being exhibited by the same company.

* * *

W. Frank Carr, manager of the railway department of Parrott & Company, San Francisco, Cal., is attending this convention. Incidentally Mr. Carr is seeking additional agencies whereby his company will handle the Pacific Coast sales for reliable Eastern manufacturers. He was formerly the chief engineer of the Falk Company and before becoming associated with the latter company had a broad experience in the construction and operation of street railway properties.

* * *

The National Tube Company has distributed paper drinking cups to the various booths bearing a photograph of a piece of the company's pipe, exhibited in its booth, which was crushed and twisted, but not fractured, by 170 quarts of nitroglycerine while in an oil well 3000 ft. below the surface. Moving pictures illustrating the complete process of manufacturing National pipe, from the mixing of the ore through the blast furnaces and up to the loading and shipping of the pipe, are being shown on the screen in the ballroom at 11 a. m. and 4 p. m.

* * *

The Pittsburgh Insulating Company, at space 529, has an interesting line of oiled fabrics, the basis of the coatings being refined linseed oil. By the process used in preparing the oil it is obtained in such condition that it does not injure the fabrics. The novelty of the exhibit is oil-treated canvas used in armature construction. The sample shown is 37 mils thick. This canvas has received favorable attention from the master mechanics who have called at the exhibit, as it is something for which they have felt the need. The company is distributing rolls of oiled bias-fabric tape such as is used in insulating armature coils.

* * *

The great interest exhibited at this time in the use of anti-friction bearings and of improved rail joints makes a visit to the headquarters of Marburg Brothers, Inc., New York, one of exceptional interest. L. C. Marburg and John Bell are representing the company and are showing the S. R. O. ball bearings, the product of one of the oldest and largest ball-bearing factories of Europe. An important feature of this bearing is the design of the cage, which insures the guidance of the balls at the axis of rotation, while the openings near the outer edge assure free lubrication. These bearings are made in all standard sizes of annular and thrust types and special bearings will be furnished on request. Another product shown by the company is a novel rail joint with splice bar and wedges.

* * *

The Duff Manufacturing Company at space 637 has examples of several effective designs in lifting jacks. The Bay State emergency jack, which during the past two years has been put upon a large proportion of the electric cars in Massachusetts, has been recently adopted in other states on a large scale. It is claimed that with this jack, which is provided with a drop-forged steel claw hanging near to the ground, a car can be raised to a height of several inches by two inexperienced operators in approximately a half minute. Another recent product is the high-speed ball-bearing jack equipped with the Cyclone lowering device. This is simply a worm gear attachment added to the standard bevel-gear connection between the ratchet and the nut. When a crank is inserted in the worm-wheel axle the load can be quickly lowered.

* * *

More than usual interest attaches to the exhibit of the Railway & Industrial Engineering Company, with which is combined that of the Transmission Engineering Company. In view of the increasing attention being given to the outdoor, high-tension substation, the complete substation set up on the pier has great educational value as showing a self-contained equipment, which can be put together in a few hours by persons without previous experience. The station consists of a structural steel tower with three 50-kw outdoor transformers mounted on I-beams about half way up. Three high-tension switches are located on the top of the structure and arranged for operation from one lever on the ground level. In the indoor exhibit of the company, at space 609, samples of the switches for 30,000 volts and 60,000 volts are shown. The important feature of these is the arrangement used for eliminating torsional stresses in the insulators. Each knife blade is mounted on two pin insulators on a swinging arm, and an auxiliary break is made by a horn gap, which interrupts the arc finally. An ingenious arrangement of triangular-shaped choke coil and horn-type static interrupter is well worthy of study, as it is evidence of a successful effort to apply the same substantial construction and good mechanical design to overhead, high-tension equipment as is found in the older and better standardized low-tension apparatus.

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George A. Parmenter is at the convention in the interest of Parmenter Fender & Wheel Guard Company, Boston, Mass.

* * *

The Hon. W. B. Hoggatt, C. H. MacDonald and W. R. Kerschner are present at the convention in the interest of Keys Products Company, New York.

* * *

The T. H. Symington Company shows at space 575 samples of 3¾-in. by 7-in. and 5-in by 9-in. journal boxes. These are mounted on iron standards for convenient examination. A complete ball-bearing center plate is also exhibited.

* * *

An additional feature of the exhibit of the National Lamp Works of General Electric Company is a collection of interesting photographs of lighted cars. These show the results from using National Mazda lamps and Holophane reflectors in contrast with the undesirable effects produced by bare clusters.

* * *

The forces of the General Railway Signal Company, Rochester, N. Y., are divided this year between Atlantic City and Nashville, Tenn., where the annual convention of the Railway Signal Association is held this week. H. M. Sperry and Salisbury M. Day are with us, looking after the interests of the company at the convention.

* * *

The McKay steel form for contract work is being exhibited by the American Concrete Form Company at space 607 of the G. Drouvé Company. This form offers many economical advantages to the builder of concrete structures and eliminates many of the disadvantages of the wooden form system. The company is represented by its president and sales manager, W. R. McKay, who is attending his first electric railway convention.

* * *

The Western Electric Company is showing the Brookfield Glass Company's line of high-tension glass insulators. The various types, ranging from 600 volts to 60,000 volts, have proved of intense interest by reason of their practicability and economy. This is the first time a comprehensive exhibit of glass high-tension insulators has been made in this country, notwithstanding the fact that glass is standard practice abroad for high-power lines. The sales engineer in charge of this department of the Western Electric Company exhibit is H. C. Law.

* * *

The Corliss Carbon Company, Bradford, Pa., has in space 513 a complete plant for testing the friction coefficient of carbon brushes. A large commutator is mounted in bearings and is driven at high speed by an electric motor. One end of the commutator is surounded by a gas heater so that the commutator can be brought to any desired temperature. Electrical instruments are provided for measuring the electrical input to the motor with the brushes on and off. As the motor is large compared with the load the difference may be considered the power loss in the brushes. The normal brush pressure is 3 lb. per square inch, and at a commutator speed of 4,500 ft. per minute 75 watts are consumed by brushes having an area of 12 square inch. The friction coefficient of the railway brush recommended by the company is 6 per cent. At one side of the entrance to the booth is a mammoth dummy brush with an enormous imitation copper "pigtail."

* * *

The Standard Steel Works Company, space 635, has fitted up its booth as a reception room with no materials on exhibit. The popularity of this company's products is exemplified from the fact that numerous samples of its wheels are scatttered throughout the various truck exhibits of other companies. Steel tired wheels of "Standard" manufacture are shown in the Baldwin Locomotive Works exhibit in spaces 540, 542 and 600. Particular attention is called to the 22 in. bolted-section, steel-tired wheels which will be exported to the Imperial Government Railways of Japan. The Hess-Bright Manufacturing Company, spaces 143 and 145, is exhibiting "Standard" rolled steel wheels. Bolted-section tired wheels of "Standard" manufacture will be found in the Railway Roller Bearing Company's exhibit, space 140, and "Standard," rolled steel, single mileage wheels are shown in the "Halsey" radial truck being exhibited just off the board walk opposite the exhibition pier.

* * *

Several aluminum models of standard trucks, showing the latest improvements, are in evidence at space 536, the headquarters of the Standard Motor Truck Company. One model represents the truck with 6½-ft. wheelbase equipped with single hanger, pressed-steel side frames, and bronze ring center plate arranged for oil lubrication. These features may be considered typical of recent progress in the design of the trucks of the company. There are also models of trucks with 7-ft. and 4½-ft. wheel base. The company has perfected the joint having a parabolic head pressed into its seat by a spring which has been successful in reducing chattering in the brake gear. The exhibit also contains actual samples of single-roller and double-roller side bearings and the adjustable, hooded journal wedge.

* * *

The Railway Track-Work Company, Philadelphia, Pa., has in operation at spaces 161 and 163 one of its reciprocating track grinders. This type has been in successful operation for eight years. It consists of an apparatus for grinding the rails by means of corundum blocks rubbed backward and forward at high speed under heavy pressure. The stroke is about 18 in. and there are four bricks 2½ in. by 4 in., giving a rubbing area of 40 sq. in. The Crocker-Wheeler motor of special design requires 5 amp at 500 volts and is rated at 3¼ hp. The claim is made that the reciprocating grinding action permits an economical surfacing of the rail-head because the grinder is operated until the hollows disappear and no longer. The grinder is provided with wagon wheels and a lifting device so that it can be derailed promptly.

* * *

The Hale & Kilburn Company is represented by a large corps from the sales department, under the general direction of V. Von Schlegell and A. F. Old. The company occupies spaces 576 to 579, which is filled with a complete exhibit of all kinds of Walkover and stationary seats finished in leather, imitation leather, plush and rattan. Special features of this part of the exhibit are the operating mechanism and all-steel construction recently perfected by this company. The other exhibits give an indication of the wide range of products turned out by this company. They include pressed steel doors, suitable for city and interurban steel cars, the samples being selected to show typical designs called for by railways which have recently adopted all-steel construction for their new rolling stock. Superintendents of rolling stock will be particularly interested in the pressed steel moldings, panels and trim for city and interurban electric cars. These illustrate the wonderful progress that has been made in approximating and even improving upon the appearance of wood interior finish. Samples of the steel integral window finish largely used on steam railroad systems are also shown. These are now being taken by leading Eastern and Western electric lines. A full line of samples of rattan seat covering is also exhibited both lined and not lined. This exhibit is intended to demonstrate the performance of a new waterproof cement by means of which the canvas lining adheres so tenaciously to the cane as to render it doubly durable. The cement is said to free rattan covering entirely from the effects of bleaching processes, heretofore so largely used. As a whole, the Hale & Kilburn exhibit is as complete a demonstration of the products and processes of the company as could well be given, even in as large a space as that occupied.

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DAILY EDITION

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FRIDAY, OCTOBER 17, 1913

PROGRAM FOR TO-DAY

CONVENTION MEETINGS

9:30 a.m. Closing Session of Accountants' Association, Accountants' Hall, Second Floor of Convention Pier.

9:30 a.m. Closing Session of Engineering Association, Engineers' Hall, Convention Pier.

ENTERTAINMENT

11:00 a.m. Concert by William Fenrich and Orchestra, Lobby, Convention Pier.

Fare Research

The proposed Bureau of Fare Research is, in its conception, one of the most important acts in the history of the association. It means, in effect, that the association proposes to institute an investigation into the operation of other systems of fares than the flat-rate system on which the urban lines are now generally conducted. There are satisfactory reasons why such an investigation should be undertaken with all the resources of information which the industry can bring to bear upon the subject. The flat-rate system has proved that it is not adequate in all cases to overcome the combined influences of longer hauls and higher wages and costs of materials. Under this system what the railway loses on the excessive long haul of one passenger it must make up on the short ride of another passenger. The fact that electric railways have been developed on the basis of this fare scheme has contributed most successfully to the upbuilding of suburban districts around large cities. The settlement of these districts, remote as they are from the business centers, has been so happy and healthful a part of our national progress that we should regret to see it hampered by the establishment of fares proportioned rigidly on the length of haul. The time has come, however, when the companies find it necessary to analyze more closely their revenue-producing methods. Perhaps some middle ground may be discovered which will solve the problem without pressing too heavily on the country districts that have been built up under the protection of a single fare from congested city centers.

Innovations in the Work of the Standards Committee

The work of the sub-committee appointed by the committee on standards for the purpose of revising procedure and compiling a manual of approved practices of the Engineering Association will probably be of greater advantage to the member companies than any other which has been lately attempted. For a long time the value of the material handled by the numerous committees of the Engineering Association has been largely obscured by the fact that the information is scattered among the volumes of proceedings for several years back and in addition is subject to confusion with other reports or specifications which have been superseded through the inevitable development of the industry. In consequence, the decision to collect all this material under one cover, at the same time eliminating superseded data and drawings, will be a welcome one. At the present time there are twenty-two standards and eleven recommended practices. Every one of these is of distinct value from the accuracy and sufficiency of technical information included—a condition which has, however, been attained only through a process of trial and elimination, as many of them have been revised from time to time. In addition to these, the manual will include recommendations covering thirty-three miscellaneous methods and practices which represent approved procedure so that the volume when complete will afford a most excellent medium of reference.

To the smaller member companies this innovation will be of even greater importance than to the larger properties. The value increases, in fact, inversely with the size of the railway, for a diminution of operating force naturally involves a reduced opportunity for obtaining the services of specialists such as are available on the largest roads for the many subdivisions of electric railway engineering. In the new manual, however, there will be easily available the recorded opinions of the experts in every line who are called upon by the association in its committee work.

The changes in procedure which are contemplated are no less along lines conducing to efficient and definite action. The letter ballot to member companies—always a clumsy means for determining opinion—has never given thorough satisfaction and has at the same time been a prolific cause of confusion and delay. Its elimination in the new procedure is most logical and places the final responsibility for setting the stamp of approval where it belongs, or upon the shoulders of the executive committee of the American Association. As any proposed standard will still have to pass in a definite routine, after approval at the hands of the standards committee, to the Engineering Association in convention, none of those really interested in the matter is deprived of a hearing. Possibly more authority will rest with the committee on standards than before, but as the size of this body is to be doubled by the appointment of individual members in addition to the chairmen of the various committees, its representative quality will be extended in even greater proportion.

Training Transportation Employees

The report of the committee on training of transportation employees marks a wide departure from earlier methods of committee work on this subject. In former years the principal duty assigned to such a committee was diligently to

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prepare a data sheet of the "yes" and "no" type, send it forth to the members of the association, beg and re-beg for replies, and finally report that a given number of the respondents did one thing and that another given number did just the opposite. A data sheet may be highly valuable where statistical information is the prime purpose, but it must fall short where the more abstract question of managerial policy toward human beings is involved. The question, for instance, of paying a man for platform time only is ethical as well as financial, and therefore should not be decided by the committee on a vote of "for" and "against."

The report of the present committee is based on a general review and is distinguished for these broad conclusions: that the variety of existing practices indicates lack of adherence to any set of fixed principles; that standardization is logical, desirable and necessary; that such standardization can follow only after an agreement upon what constitute fundamental principles and, finally, that with such fundamental principles established each company can determine wherein its practices are at variance with those principles. Although the report of the committee is of almost Spartan brevity, attention may be called to those of its recommendations which are of more than usual interest. Under "Organization Requisites" it mentions the need for "an administrative and directive head to whom may be referred for decision all disputed questions arising within the organization" and recommends "an established atmosphere of definite co-operation between organization units to be fostered and enforced by the directive head." The first of these requisites apparently suggests the installation of a judicial officer whose freedom from operating duties would permit more deliberate and unbiased decisions, while the other requisite might be attained in part by frequent business and social conferences between the representatives of various divisions.

Under "Operating Policy" the committee recommends that as much of that policy as possible be reduced to writing, that regulations be so carefully worded that only one interpretation is possible and that the avenues of promotion be clearly defined to all. The recognition of seniority in the selection of work is also embodied as a part of operating policy. Under "Treatment of Employees" the committee places itself in line with the most advanced thought on welfare work by suggesting the establishment of pensions, sick benefits, accident benefits, medical attendance, hospital service, loan and savings institutions, restaurants, club rooms and supply depots. Some of these features may be impracticable on smaller systems or may require the co-operation of groups of companies, as abroad, but aside from humanitarian reasons they must be seriously considered in view of like steps in other industries. In discussing "Training of Employees" the committee calls for the systematized and uniform instruction of platform students in the lecture room, on the school car and in practical line operation; but it goes still further in suggesting the re-examination of experienced men to keep them abreast of advances in the art, etc., and also the examination of subordinate officers. The only operating detail discussed by the committee is that of paying for breaking-in time. To this it is opposed as fundamentally wrong in principle. The training of employees is costly enough without this burden, yet, no matter how bad the principle may be, most applicants for work will always expect some remuneration during the breaking-in period, and if such a plan will encourage a higher class of men to enter the service it may be the best kind of economy.

Fares on Unprofitable Lines

In not a few instances where a petition for reduced fares is brought before a public service commission the question of the profits on specific lines which are an essential but interwoven portion of a complex system comes early to the front. The injustice of requiring the proposed reduction in rates to be made on segregated routes on which the local management knows it cannot be afforded often cannot be shown without elaborate estimates of the cost of service and the yearly fixed charges and administrative expenses on a particular piece of the system. But where extended calculations are required along these lines the necessity of many assumptions is liable in a good many cases to detract from the force of the company's plea. To determine the precise cost of service for a single line of track in a street railway system or for any one customer or class of consumers in the central station field is a most difficult task. But this does not mean for a moment that instances are not common where the discrepancy between revenue and expenses is so marked that it may be shown at once that no rate reduction can be tolerated, even where some weight is given to the earning power of the system as a whole.

Thus, in a typical instance, the company successfully resisted an invasion of its rates on a particular line because it was able to show to the commission having jurisdiction that the earnings of the line were unequal to meeting the cost of wages on the cars run over it. There was no need of going further. If the aggregate compensation of motormen and conductors had fallen inside the receipts, it might still have been possible to show that the latter were insufficient to pay for the power consumed and to meet the actual repair charges enforced upon the particular cars used on the line. In other words, an attack upon the rates of a line of low traffic density may be overcome in many instances if a company will assemble the known expenses chargeable to that line and compare them with the revenue, without going to the trouble of exhibiting general or overhead costs which must be apportioned and which may not be needed except in close cases to defend the existing tariffs. Some commissioners hold strongly to the idea that no public utility corporation can expect to derive a profit from the operation of every segregated portion of its system, but even where this view is maintained it is not easy for petitioners to secure a rate reduction if the company can show that its bare operating costs cannot, or can only with difficulty, be met by the earnings of the line in question.

Advancing the Joint Use of Poles

The report made to the American Electric Railway Association yesterday by the committee on the joint use of poles should prove a long step toward the accomplishment of an end which is surely in the line of progress and economy. It will be recalled that this work had its inception with the report made to the annual meeting of the New York Electric Railway Association in June, 1911, by a committee of which W. J. Harvie was chairman. After numerous conferences with other electrical bodies of the State and following the painstaking preparation of a tentative form of joint agreement, the parties in interest wisely concluded that further study of the subject should be made co-operatively by their several national associations. Upon this the present committee was organized, but the continuity of the work of the New York Association was maintained by retention of Mr. Harvie as chairman of the new committee. The 1913 report is thus a compendium of the harmonized opinions of leading men in the electric railway, power, lighting, telegraph and telephone fields, and as such it may well be considered as an authoritative guide. The economic advantages of reducing the number of pole lines have been set forth often enough, but it should be equally apparent that if the voluntary joint use of poles is delayed much longer its arbitrary use may soon be imposed by public regulating bodies. It is to be hoped, therefore, that the approval of this report by the American Electric Railway Association will be followed by the indorsement of the American Institute of Electrical Engineers and the National Electric Light Association.

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Conventionalities

The exhibits will close officially on Friday afternoon at 2 p. m., as announced at the annual meeting of the Manufacturers' Association on Wednesday. It is earnestly requested that no exhibits be dismantled before that hour.

Good-bye! See you next year!

C. W. Wilkins "failed to tip the waiter so the water tipped the plate." Ask him about it.

Charlie Davis dropped in on us yesterday on his way to Oyster Bay. He brought his "N-gine" with him.

Little Gracie Grayson, the erstwhile Beau Brummell from the "show-me" state, has been very much in evidence among the exhibits.

The general bossissimo of the Illinois Traction System is not at the head of his retinue this year, but M. L. Harry of the Decatur Railway & Light Company is.

It's tough luck the Athletics had to win the World's Championship so quickly. We should have liked to hear Charlie Clark's fog-horn voice again this year.

Tom Elliott, the Doctor Jekyll of the Cincinnati Traction Company and the Mr. Hyde of the Cincinnati Car Company, is pumping his friends for new ideas in car construction.

No; the hedges around the booths where they have such a fine decorative effect are not of a new blonde variety. Jack Frost visited Atlantic City ahead of the convention, that's all.

Some of the young ones on the Boardwalk thought Woodrow of White House fame was here for the week, but upon further investigation found the important personage was none other than Ed Besuden.

Thomas Vaughan, master mechanic of Armour & Company, who fathered many enjoyable parties and excursions at last year's convention, thinks he's a long way from home this year, although he's not complaining.

Edmund LeChevalier Hegeman, an electrical engineer of Iquique, Chili, arrived on Wednesday evening and is looking at the convention through the eyes of his uncle, B. A. Hegeman, Jr., the well-known statesman, diplomat and metal manufacturer.

Bill Sawyer was agreeably surprised yesterday when a number of his friends caught him in the Traymore and presented him with a handsome cane and umbrella set. In acknowlelging the gift Bill said in part: "Gentlemen, with regard to the umbrella you certainly have put one over me."

F. R. Coates, president of the Toledo Railway & Light Company, had expected to attend the convention, but at the last moment was detained by important business matters. He is pleasantly represented, however, by his assistant, T. Lee Miller, who has been a decided ornament in the social affairs of the week.

S. S. Stolp and H. L. Garbutt, since they blew into town with two packages of gawp-seed, have been trying to wear out all of Shill's roller-chair pushers on the Boardwalk. Last night they were heard complaining that the scenery here was not so fine as that along the lines of the Chicago Tunnel Company.

By reading the program of entertainments one can see that the Convention Pier is quite a commodius structure, as there is a lobby, a Persian garden and a ballroom. It's almost a shame to tell the unfortunate stay-at-homes that they're all the same. The committee worked in a lightning change by rearranging the shrubbery.

An ode for clean-up day:

Before you can say "come" and "go"
And breathe but twice and cry "so so,"
Each porter, tripping on his toe,
Will be here with mop and mow.

—*From McConnaughy's "Shocks from Shakespeare."*

The exhibitors and delegates at this convention have every reason to feel pleased with the splendid work of H. G. McConnaughy, director of exhibits. The exhibit halls were spick and span from the very first day, while the thousand details which had to be settled throughout the week were handled with commendable dispatch and smoothness.

The advance card system for individual members of the several associations has proved a complete success in saving time and avoiding any annoyance to the delegates. In fact the registration and finances have been handled in a way which reflects the greatest credit on the skill, tact and experience of Waldo Berry, chairman of the finance committee, and his faithful aids.

Tom AH Hay cycloned in yesterday in tow of S. G. Memory, of the Delaware, Lackawanna & Western Railroad. Mr. Memory told us quite earnestly that he had never realized how many things were required to keep an up-to-date electric railway going in a manner satisfactory to Phoebe Snow, and that he was astounded at the amazing variety and interest of the exhibits. Mr. Memory says he will never forget them.

There is a larger attendance of representatives of the Canadian roads this year than at any past convention. The country to the north has always been most loyal in its support of the American Association and has taken an active interest in many ways in its support. This year so many are in attendance that headquarters has been established in the office of the general secretary, where Acton Burrows, secretary of the Canadian Electric Railway Association, is maintaining a separate registry for members of that association. He says that between eighty and ninety members of the Canadian association have been in attendance at the convention this week.

Col. J. H. Stedman, our own "contributing editor," presents his farewell batch of brilliancy on another page of this issue. He says in a pencil note on his last piece of copy: "We supply-men call our decorations the 'Red Badge of Courage'" Right! Indeed, the colonel is always right as well as the prince of story-tellers and good fellows, and we are sure that those who have read these daily issues have enjoyed his contributions as sincerely as we have appreciated his assistance. In reply to numerous inquiries and complimentary remarks we wish to say that we hope next year to expand this spiel, so to speak, and have a full page edited complete by the colonel, himself.

When Rabbi Ben Akiba, the noted Celt, uttered that aphorism about the absence of anything new under the sun he must have had the modern efficiency engineer in mind. Apropos of this our Havana correspondent informs us that the "rest factor" was discovered many eons ago by the local cigarmakers. They do not "knock off" in the approved Taylorian fashion but hire a professional reader to amuse them while creating, on a piecework basis, Henry Clays, Romeos, Manual Garcias and other supplymen's specialties. Should this principle be applied to maintenance practice, we may expect to look for a banjo and bones quartet in every carhouse to lighten the monotony of replacing brushes, oiling controller fingers, cleaning windows and performing similar more or less rhythmic duties.

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THE CONCLUSION OF THE ENTERTAINMENTS

With last night's promenade concert and ball there was concluded one of the most genuinely successful series of entertainments ever provided at an A. E. R. A. convention The last event of the week was indeed quite as enjoyable as any which had gone before, and it is likely to remain long in the memory of those in attendance.

The music commenced shortly after 9 o'clock with an overture from "William Tell," and from that time until the strains of the inevitable final waltz were completed the ballroom was continually filled with dancers. The revival of the use of dance cards was a happy thought of the committee, and these programs, which were artistically designed in conformity with a color scheme of gray with a replica of the association seal, were preserved by many as mementos of the occasion. During the evening the winners of the golf and auction bridge torunaments were announced from the floor.

As the ball represented the last of an extraordinarily entertaining succession of social events arranged by the American Electric Railway Manufacturers' Association, through S. K. Colby, of Baltimore, for the visiting delegates and their guests, it is only fitting that recognition be made of the efforts of the entertainment committee which has had charge of all the details. Much of the work of arrangement involved very great personal sacrifices on the part of the various committeemen, whose reward should include, in addition to a knowledge that the entertainments were in every respect a perfect success, a record of the appreciation felt by all of those who had the good fortune to be in attendance.

Henry G. Pearce, Standard Steel Works Company, Philadelphia, was chairman of the entertainment committee, and upon his shoulders rested the general burden of the whole week's arrangements, the able manner in which these were conducted standing as evidence of his exertions. His fellow-committeemen were divided into various sub-committees which managed the details of the separate features.

Of these sub-committees, that in charge of the auction bridge tournament and card contests for ladies was made up of Henry N. Ransom, Westinghouse Electric & Manufacturing Company, New York, chairman; H. A. Hegeman, United States Metal & Manufacturing Company, New York, and H. H. Helins, Aluminum Company of America, Philadelphia. The difficult task of this committee involved two afternoons of play and the recording of scores from three separate games, yet all errors and confusion were eliminated.

The committee on golf included N. M. Garland, Ohio Brass Company, New York, as chairman, and H. G. Barbee, Maryland Steel Company, Boston, and R. W. Read, Pennsylvania Steel Company, Philadelphia, as members. Of the door committee Allen E. Goodhue, Midvale Steel Company, Philadelphia, was chairman, his work involving many difficult situations as well as very long hours and close attention.

The annual reception of the officers of the affiliated associations, which was held on Monday evening, was in charge of a committee composed of Edward F. Chaffee, O. M. Edwards Company, Syracuse, N. Y., chairman, and S. T. Bole, The J. G. Brill Company, Philadelphia; J. H. Denton, Railway Utility Company, New York; E. L. Folsom, Railway Materials Company, Cleveland, and W. A. Lake, Pantasote Company, New York.

The committee in charge of the promenade concert and ball of last night consisted of W. L. Wright, William Wharton, Jr., & Company, Philadelphia, chairman, and William P. Hunt, Jr., The Buda Company, Chicago; Henry N. Ransom, Westinghouse Electric & Manufacturing Company, New York; Robert W. Read, Pennsylvania Steel Company, Philadelphia, and W. H. Wilkinson, Pressed Steel Car Company, New York, N. Y.

The committee to which special thanks are due for that unique feature of the convention, the night at Steeplechase Pier, as well as for the excellence of the arrangements made for handling the enormous and enthusiastic crowd of delegates who were in attendance, was headed by W. G. Kaylor, Westinghouse Traction Brake Company, New York. He was assisted by the following list of committeemen: Charles H. Machen, Standard Roller Bearing Company, Philadelphia; Robert Coe, Carnegie Steel Company, Pittsburgh; Alfred Green, Galena-Signal Oil Company, New York, and A. A. Hale, Griffin Wheel Company, Boston.

In view of the thorough success of this year's program not only in the management of details but also in the ingenuity displayed in devising means for the practically continuous entertainment of the delegates, it is to be hoped that many of the present committee may be induced to serve again in future years.

ALWAYS IN GOOD HUMOR

A COLOSSAL CONGLOMERATION OF CULTURE AND COGNIZANCE COLLECTED BY OUR CRUSTACEOUS COADJUTOR

The advantage of crisp new money is that when you put it into your wallet you double it and when you take it out you see it in creases.

A cowboy dropped into a "hash house" in "Lucky Hit" and while eating his corned beef and cabbage spied a little red bottle which he sized up for ketchup but which was tabasco. He soused his beef with it and tucked a liberal piece into his mouth. The hot stuff burned him instantly. He grabbed the hunk he was chewing, hurled it onto the floor and yelled: "There! d—n you, blaze!"

They say one of our good fellows is diverted to the coal trade for a little while. This is for him:

Teacher—"Jimmy, if coal is $5 a ton and your father gives you $30, how much coal will you get?"

Jimmy—"I'll get about four tons."

Teacher—"That's wrong, Jimmy."

Jimmy—"Yes, I know it is, but they all do it."

The young lawyer pinned a card on his office door: "Will be back in twenty minutes." When he returned he found another item: "What for?"

With his motor car crippled, a man accosted a Swede farmer in Idaho, asking for a monkey-wrench. "This bane no monkey ranch," says the Swede; "this bane sheep ranch."

"Dad, I had to stay after school to-day and got licked too." "Why, my boy, were you very bad?" "No, dad, but I asked you last night how much is a million of dollars and you said, 'It's a h—l of a lot of money,' and that wasn't the right answer."

OUR FARE BOX

Where automatic indication
Lies in wait for agitation
To prepay you and record it on the spot,
'Tis no use to hedge or higgle,
The recorder will not wiggle
Unless you drop your nickel in the slot.

And unless there's some omission,
Some conductor's rescue mission,
Or th' inspector or the cashier should get funny,
Or the messenger should swipe it,
Or some clerk or checker flipe* it,
Then the company perhaps will get the money.

*Scotch for "turn inside-out."

J. H. Stedman.

George D. Casgrain decided at the last moment to join the crowd. He made an exceedingly profitable trip from Chicago.

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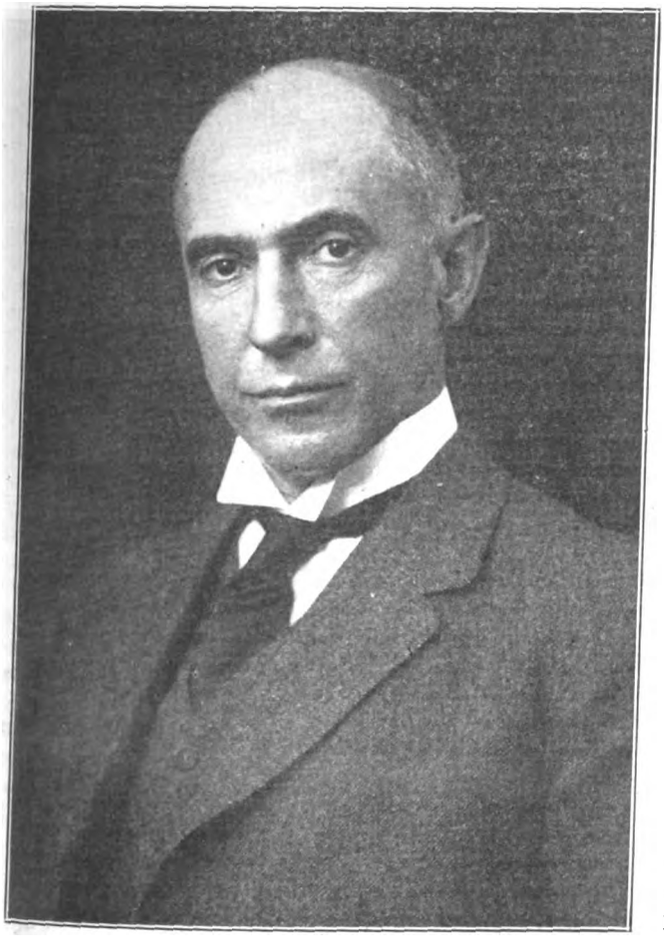
THE NEW PRESIDENT

Charles N. Black, the newly elected president of the American Electric Railway Association, was born in New York City in 1867. He was educated in his native city and later at Princeton University, from which he was graduated in the class of 1888 with the degree of A. B. At Princeton he was a classmate of Past-president Thomas N. McCarter.

After a two-year graduate course in electrical engineering at the same university Mr. Black received the degree of E. E. He immediately began the following of his profession of electrical engineer by entering the employment of the Brush Electric Company, of Cleveland. With this company he advanced rapidly from one position to another and had become superintendent and general electrician when he resigned to take charge in New Haven, Conn., of a branch factory of the Walker Manufacturing Company, of Cleveland. In 1899 he became connected with the Westinghouse Electric & Manufacturing Company, first in Pittsburgh and later in Philadelphia. His next office was with the firm of Ford, Bacon & Davis, of New York, where he remained five years. In 1902, in the interests of Ford, Bacon & Davis, Mr. Black went to Kansas City, Mo., where the reconstruction work in connection with the Metropolitan Street Railway of that city was intrusted to him. This work was finished in September, 1903, but Mr. Black was induced to continue in Kansas City as chief engineer of the company.



Charles N. Black, Elected President of the American Electric Railway Association

Bernard Corrigan was at that time president of the Metropolitan Street Railway. There was no vice-president or general manager, and Mr. Corrigan really performed the duties connected with these offices until, on Jan. 1, 1905, Mr. Black assumed the position of vice-president and general manager of the operating company. At the same time Mr. Black became the vice-president of the Kansas City Railway & Light Company, a holding company controlling the Metropolitan Street Railway, and also vice-president of the Kansas City Electric Light Company, which is controlled by the Kansas City Railway & Light Company.

In September, 1907, Mr. Black accepted the position that he holds at present, the vice-presidency and general managership of the United Railroads of San Francisco, succeeding to the duties of George F. Chapman, who died in May of that year. He is also a director of the United Railroads of San Francisco and of the Sierra & San Francisco Power Company and vice-president of the latter company, which is a successor to the Stanislaus Electric Power Company and the Tuolumne Water Power Company, purchased at a foreclosure sale. It is also affiliated with the United Railways Investment Company. In March, 1912, Mr. Black became president of the Monterey & Pacific Grove Railway, to succeed W. P. Hammond. At the same time he became president of the Coast Valleys Gas & Electric Company, a new company organized to effect the consolidation of several lighting plants furnishing service to Pacific Grove, Monterey, Salinas, King City and other places.

In July, 1912, Mr. Black was elected a member of the firm of Ford, Bacon & Davis. He is also a member of the American Institute of Electrical Engineers. During the year 1909-1910 he was fourth vice-president of the American Electric Railway Association, and since that time has advanced through the third, second and first vice-presidencies to the office to which he is now elected for the coming year.

CORNELL ELECTRIC RAILWAY DINNER

About twenty-five Cornell men gathered at the Shelburne at Atlantic City for dinner on Thursday, Oct. 17, starting a precedent which they hope will be followed in subsequent meetings. This university is well represented in the electric railway field on both the operating and manufacturing sides. Among the older men present were A. H. Woodward, president International Register Company; R. E. Danforth, general manager Public Service Railway; C. H. Clark, engineer maintenance of way Cleveland Railways Company; W. K. Archbold, Archbold-Brady Company; E. H. Chapin, vice-president National Car Wheel Company; Lee H. Parker, Stone & Webster; H. C. Holloway, Rail Joint Company, and C. W. Gennet, Jr., R. W. Hunt Company.

More recent graduates were E. A. Palmer, of the Public Service Railway; W. K. Page, electrical engineer and master mechanic Western New York & Pennsylvania Traction Company; W. L. Wright, vice-president Wm. Wharton, Jr., Inc.; Wylie Brown, general sales agent Bridgeport Brass Company; H. E. Carver, engineer Public Utilities Commission, New Jersey; L. H. Snyder, Joseph Dixon Crucible Company; A. D. Blake, associate editor *Power;* Dudley Montgomery, vice-president Southern Wisconsin Railway; E. A. Stillman, president Watson-Stillman Company; J. F. Ohmer, Jr., Ohmer Fare Register Company; R. R. Harrison, Watson-Stillman Company; G. N. Brown, electrical engineer New York State Railways, Syracuse-Utica lines; H. S. Johnson, engineer maintenance of way New York State Railways, Utica lines; Thomas Farmer, Jr., vice-president Consolidated Car Heating Company, and J. R. Bolziano, Wm. Wharton, Jr., Inc.

A movement was started looking toward the development of Cornell interest among electric railway men, and a committee was appointed, consisting of R. E. Danforth, T. Farmer, Jr., L. H. Parker, E. A. Stillman and H. H. Norris, to arrange for a gathering in connection with the mid-winter meeting of the association. Nearly fifty Cornell men were present at the Atlantic City convention and took an active part in the proceedings and exhibits. Mr. Farmer was elected a member of the executive committee of the Manufacturers' Associations. All Cornell men who expect to be in New York for the mid-winter meeting of the association are urged to communicate with the committee.

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THURSDAY JOINT SESSION OF THE ENGINEERING AND ACCOUNTANTS' ASSOCIATIONS

President Schreiber of the Engineering Association called the joint session of the Engineering and Accountants' Associations to order at 10.15 o'clock yesterday morning. M. W. Glover, first vice-president of the Accountants' Association, presided as co-chairman.

In the absence of the co-chairman of the joint committee on engineering accounting, H. H. Adams, Chicago Railways Company, presented the report of this committee. An abstract of this report is published elsewhere in this issue.

Following the presentation of the committee report, J. Vipond Davies, chief engineer Hudson & Manhattan Railroad, made an address on the subject of "Engineering Accounting." On motion the thanks of the two associations were given to Mr. Davies for his paper.

In opening the discussion, George W. Kalweit, Milwaukee Electric Railway & Light Company, said that that system followed the practice of adding overhead charges to work done in the shop. The scale of overhead charges took into consideration the question of whether material, labor, machine tools, etc., were furnished. Overhead charges were added to the cost of work done for other departments in the shop.

Charles H. Clark, Cleveland Railway, in speaking of cost accounting in connection with the report, said that all costs in Cleveland were kept by the accounting department. He believed that this was the best practice.

W. G. Nicholson, Omaha & Council Bluffs Street Railway, said that on that system cost accounting was handled by the accounting department.

William McClellan, New York, said he thought that the question was one of men rather than of departments. The necessary thing to do was to get a man who was willing to put sufficient time on the work to keep the accounts straight. He had tried many ways and his last conclusion on a large work was that the matter should be in the hands of the accounting department and also directed in some way by the engineering department. He had found that the average engineer was so intent on accomplishing things in his work that he could not see certain matters and could not digest his reports. A man should have sufficient respect for the needs of the engineer and at the same time despise too much detail accounting so that the result would be what was wanted.

Mr. Adams said that he thought that co-operation between the accounting department and the engineering department would give the best results.

T. B. MacRae, Chicago Elevated Railways, said that he had never found an engineer who was not thoroughly able to understand accounts. He tried in all cases to find out what the engineers wanted and kept the books and data in such shape that he could give them what they let him know in advance they wanted. The paper criticised the accounting department.

A criticism that the accounting department did not give the engineer what he wanted was made readily. If both departments were compiling data there was a double expense. All accounting work should be done by the auditor. The engineer was not paid by the company for accounting work. He was paid to get results. In order to secure results he must co-operate with the accounting department and the accounting department must co-operate with him so as to help him and not arbitrarily keep the books in such a manner as to fail to consider the engineering department needs.

James Adkins, United Railways of St. Louis, said that if the engineering department could ask for information in advance instead of waiting until the job was finished, it would simplify the work of the accountants.

R. B. Stearns, Milwaukee Electric Railway & Light Company, said he thought that the engineers had trouble in getting data from the accounting department. This was due in part to the inefficient distribution of accounts by engineers. It would be a great advantage if the engineers could anticipate their needs for information. He could see where it was easy for an engineer to go out on the street and by the rule of thumb and the information of the foreman tell what the job cost. He had done that himself many times and had been deceived. The Milwaukee company after exhaustive investigation by a committee of heads of departments formulated a plan some time ago for the separation of overhead charges. The committee had a great deal of difficulty in getting comparable data. Usually the large manufacturers could supply such data.

Mr. Stearns thought that many in the street railway industry were losing sight of the fact that unless the overhead charges were added they did not know what the job cost. He was certain that within a reasonable degree of accuracy the policy that had been adopted in Milwaukee gave a far more intelligent idea of the cost of the job than the old method.

President Schreiber said he thought that Mr. Stearns was right in regard to overhead charges. There was no doubt that many thought they could do the work themselves for a great deal less than the work would cost outside when the fact of the matter was that it cost more in that way. It was certainly true that that was the case in new construction, especially with small articles. Even in the way department the cost of work cars and tools was often omitted and that meant that the final count did not represent what the work actually cost.

P. V. See, Hudson & Manhattan Railroad, said that he had introduced an overhead charge on the Hudson & Manhattan system, although arguments had been presented against this on the ground that it was interdepartmental work and no charges should be added.

Mr. Adams said that the question which interested him was how often the percentage of overhead charge should be changed in order that the accounts might be kept where they ought to be.

P. S. Young, Public Service Corporation of New Jersey, said he thought that the discussion was somewhat confused by the lack of clear distinctions between interdepartmental charges and overhead charges in connection with construction work. In his opinion an effort should be made with construction charges to determine the exact overhead charges and to charge them to each job; in other words, not to take a percentage but to charge a figure, which could be determined at the time the work was done. The so-called overhead charge to be made by one department to another in the conduct of ordinary business was less vital to the company than the charge in connection with construction work. In fact, if too great detail was attempted it might appreciably add to the cost of the work. He heartily indorsed the recommendation of the committee in connection with overhead charges. The recommendation of the committee for some definite rules for the determination of overhead expenditures on construction work was an extremely important matter.

Continuing, Mr. Young said that the discussion on cost accounting during the joint meeting of the Transportation & Traffic and the Accountants' Association on Wednesday showed that the subject was not entirely clear. Cost accounting was an entirely different matter from the general accounting work of the company. It could be made to fit in with the general accounts of the company, and that should be done. He sometimes thought that in some cases the only way to get a proper system of cost accounting was to have the engineering department keep the cost accounts. Unless the possibilities of the matter were presented properly to the engineer he might not think it worth while to analyze his costs sufficiently to arrive at an intelligent result, which could be used in his work.

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Notwithstanding that, Mr. Young believed that by co-operation and a thorough understanding of the advantages of cost accounting by the engineer and the accountant, it would be possible for all companies, small or large, to get data which would prove most valuable, not only in protecting the properties against assault, but also in determining the basis of estimates of cost and possibly in determining the question of whether bids submitted for work were reasonable or unreasonable. It would be extremely desirable if the two associations could settle on some standard units of cost in connection with each class of work.

Philip F. Maguire, Public Service Railway of Newark, N. J., said he thought that timekeeping should be under the jurisdiction of the engineering and maintenance of way department but the different accounts and charges should be supervised by the general auditor to a certain extent. To do the accounting separately in the engineering and auditing departments would involve an extra expense. The auditing department could give any information desired. In his company there was no difficulty in getting detailed costs of any job four or five days after the end of the month in which the job was completed.

M. W. Glover, Mobile Light & Railroad Company, said that it seemed to him that the engineering department would not be able to determine the costs. The foreman of a job would not know anything about the cost of material or the overhead charges which might be taken into consideration. If the engineers could not get the information they wanted from the accountants, they should get accountants that would give it.

H. H. Adams said that in the work he was doing he was co-operating with the auditor. They were co-operating to the fullest extent in the consideration of the problem.

Another speaker thought that, generally speaking, the accountant should be expected to furnish all figures, but in some particular cases where the work could be done more economically by another department the accountant should be broad enough to recognize that and agree to it.

Charles H. Clark, Cleveland Railway, said that twenty years ago he was building a railroad in Philadelphia and had a list of questions which it was necessary for him to answer for his company each day. In this list there were the costs of carrying dirt, taking up track, taking up old ties, excavation, laying new track, spiking and bolting, everything being in detail. He showed how many feet of track were laid in one day, how much paving was done, etc. He thought that when information desired by the engineers was not obtained it was because the accountants had not received the details from the engineers. If it was necessary to have the information, daily reports must be made.

A. H. Kayser, San Diego Electric Railway, said it seemed to be a matter that required hearty co-operation from all of the departments.

In closing the discussion, Mr. Adams said he wanted to emphasize the importance of co-operation in the work. He thought that that embodied the basis of a practical solution of the problem.

President Harries of the American Association was then introduced by Mr. Schreiber. He spoke briefly to the delegates and said that it was the teamwork that counted in the association. It was a long pull, a strong pull and pull all together with each one helping the other and all for the industry. Without that spirit the association would not get anywhere. That spirit was more apparent this year than ever before.

Robert N. Wallis, Fitchburg & Leominster Street Railway, co-chairman of the joint committee on the life of railway physical property, then presented the report of that committee. An abstract of this report is published elsewhere.

William McClellan, New York, then spoke on the "Life of Railway Physical Property." He said he regarded the report of the committee as a fine piece of work. When provision was made for depreciation it meant that it was being figured as a part of the total expense of doing business. The man who set aside too little margin for the slow destruction of apparatus was doing himself an injustice and the day of reckoning would come. The man who charged up too much was doing himself an injustice in the end because he might have a day of reckoning of a different sort. In many towns the companies did not get the earnings to do what the man in charge knew should be done. He sacrificed the life of his present property in the hope that he might land right in the end though it cost him more. The problem was a serious one. The engineers must recognize that it must be cared for in their accounts and they must do the best thing possible under the circumstances. It was necessary to see, first, that all costs were included and, second, that when the day of change arrived there would be something in the depreciation reserve to meet the expenses.

Continuing, Mr. McClellan said that the engineer must consider whether life was left in a piece of apparatus. If there was, and the life was to be destroyed, adequate reasons must be given and so the engineer must study the question of the life of physical apparatus. It was a simple matter to respond to fads and fancies, especially where a neighboring town introduced a fine double-truck car, but that was no reason why it should be introduced in other towns. The engineer should show that if the earnings did not permit expenditures, much as the community would like to have other cars, it was not paying enough to have the improvements.

Mr. McClellan said that one argument that was made was that in a large company where the number of pieces of apparatus was great a law of averages would work and therefore life tables could be compiled for physical property. It was extremely important to remember, however, that the number of companies in which such an average would work was very small.

A vote of thanks was passed to Mr. McClellan for his discussion of the subject.

C. M. Larson, Railroad Commission of Wisconsin, said that that commission had had occasion to try for many years to determine the life of physical property. It had a tentative life table for most of the properties. The engineers in valuing a power plant or piece of apparatus took the life table only as a starting point. They studied the plant or apparatus, the state of the art and the surrounding conditions, and then reached their conclusion. He did not believe in an attempt to build a life table without necessary inspection and study when it was used.

Mr. Young said that it was very important that each company shall follow the recommendation of the committee and study the life of its physical property.

Charles Rufus Harte, Connecticut Company, said it should be remembered that, as pointed out by the committee, the life table was useful only as there was a very large and varied ground to cover. In the appraisals made for almost every purpose the law of averages did not operate. It was necessary to go into detail to ascertain just how a property had been maintained. Life insurance was based on life tables but there were different risks or classes. The larger the insurance of the individual, the more careful the investigation would be. In an appraisal for the purpose of getting a rough estimate of the property life tables could be used, but if the elements of value were to be taken seriously the appraisal must be an appraisal of fact and not what someone thought it would be.

Mr. McClellan said that a court or a commission would ask for the basis of the valuation of the detail.

Mr. Wallis, in closing the discussion, said that he was glad to find such strong support of the position of the committee from a speaker who had had experience from the standpoint of regulation. The engineers went into other and deeper matters, such as appreciation and the effect

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of the use of preservatives and the subject afforded opportunity for a wide field of investigation.

The report of the committee on the life of railway physical property was accepted and filed.

This ended the joint session of the Engineering and the Accountants' Associations.

THURSDAY SESSION OF TRANSPORTATION & TRAFFIC ASSOCIATION

The Thursday morning session of the Transportation & Traffic Association was called to order by President Stevens at 9:45 a. m.

TRAINING OF TRANSPORTATION EMPLOYEES

The first order of business was the report of the committee on training of transportation employees. This report, which was published in abstract elsewhere in this issue, was read by Bruce Cameron, in the absence of C. B. Wells, chairman of the committee.

E. E. Strong, Rochester, explained why a dissenting comment had been added to the report. The reason was that a final report was not sent by the chairman until such time as it was absolutely necessary to send it to the secretary of the association. It therefore became necessary, on the question of paying learners, either to have no report at all or to handle it in the manner adopted. Mr. Strong then read a letter from the vice-chairman of the committee, C. E. Learned, Boston, who wrote that in the main he heartily agreed to the report as written, though with an exception as to learners' wage. As a matter of argument it was not proper to compare stenographers and bookkeepers with motormen and conductors. The former had opportunity in public or private schools to perfect themselves for given duties and could do so long before reaching the age of twenty-one, while men must of necessity reach that mature age before they are even eligible for railway positions. The absence of apprenticeship opportunity and the minimum age limit gave an entirely different aspect to the subject. As there was no other way open for instruction than the present and as the period necessary to qualify was a short one, it seems only just that the student platform man should receive a nominal wage during the breaking-in period. If it was possible to go into the open market and pick up at random men trained for the service, the question of paying learners would never arise. Location, working conditions, etc., were also important factors. To pay men when learning was of far more importance than that of minimum wage and just the opposite in effect. It tended to keep the new men at ease by the payment of a sum perhaps equal to their cost of living or, at least, their rent, thus encouraging them to give ample and proper time for instruction. The tendency of the minimum wage was to make men lazy, especially so when work fell to them that would net them little or nothing over their guarantee.

After reading this letter Mr. Strong expressed himself as agreeing with Mr. Learned that the paragraph on learners should not be in the accepted report.

C. S. Ching, Boston, also agreed with Mr. Learned. One question which had not been touched upon in any report so far was the necessity of training subordinate officials. They were seldom trained especially for the work and lacked sufficient knowledge of the company's policy both toward employees and public.

Upon motion Mr. Learned's letter was placed on file with the report.

N. W. Bolen, Newark, said that the committee had recognized the importance of training the supervisory officials, but the all-important subject of "personal interest" seemed to have been left out of the list—yet "personal interest" was the yeast that leavened the entire mass. There was much to learn from the principles of scientific management, but a supervisory force made up of individuals thoroughly imbued with the spirit of personal interest in every platform man under their direction and trained in character study was worth infinitely more than a similar number of the best efficiency experts obtainable. He also took the same standpoint as Mr. Learned on the question of paying learners.

J. K. Choate, New York, did not agree with the exceptions made to the report of the committee, although there were isolated cases which made it necessary to pay the men while learning. When a man became a motorman he ought to go into it as a part of his lifework. It was wrong to adopt a policy which would attract a poorer class of applicants.

C. D. Emmons, South Bend, thought that the men would be likely to learn faster if they were not paid during the instruction period.

Mr. Bolen said that the custom of his company was to give the new men $10 for their breaking-in time after they had been with the company for one year.

Nelson H. Brown, Buffalo, stated that the International Railway paid a learner $1 a day, but the total of such payment to each man is deducted from whatever is due to him if he leaves within six months. Extra men receive a minimum of $1.25 a day when they remain for twelve-hour periods, and all work performed after the twelve hours is paid for at the regular rate. The system has resulted in getting better men. Before it was inaugurated it was impossible to procure enough men to handle the rush-hour traffic.

F. A. Boutelle also took exception to the committee report on paying learners. In the territory where he had been for the last few years (Tacoma) he had found it almost impossible to get a sufficient number of men who had enough money to maintain them during a fifteen-day instruction period.

Referring to the training of subordinate officers, C. H. Coe, Newark, said that when a man on the Public Service Railway was promoted from conductor to inspector, for example, the candidate first had to take the regular motorman's course, with written and oral examinations. The conductors and supervisory force must also report at the school every thirty days to keep up to date on equipment standards and changes in regulations.

George D. Radcliffe, Cleveland, thought it was necessary to consider the personal character of a man more than the result of a formal examination. In selecting men for promotion he picked out those who seemed to be capable. These men were not examined but were put on as extras, possibly a dozen times, after which he could determine whether the candidate was capable of handling the higher job permanently.

E. E. Strong, Rochester, said that he made it a practice to pick a man as instructor first and then promote him to inspector, but sometimes an excellent instructor turned out a poor inspector because he was then on his own responsibility.

Upon motion of Mr. Ching, the report of the committee was adopted with a vote of thanks.

CONSTRUCTION OF SCHEDULES AND TIMETABLES

The next order of business was the repor of the committee on construction of schedules and timetables, which, in the absence of the chairman, John E. Duffy, was presented by Alexander Jackson, superintendent of timetables Public Service Railway. This report is published in abstract elsewhere in this issue. The brief discussion on this report was a cordial indorsement of its various features. Professor A. S. Richey, Worcester, pointed out, however, that the runs in the committee's table could not be carried out under the Massachusetts nine-hours-in-eleven law, which went into effect Jan. 1, 1913. J. V. Sullivan, Chicago, and M. C. Brush, Boston, expressed themselves in favor of the near-side stops on general principles. Upon motion the report of the committee was accepted with a vote of thanks.

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UNIFORM DEFINITIONS

M. C. Brush, chairman of the committee on railroad definitions, referred to the work which this and previous committees on the subject had done to date and said that his committee had found it impossible to cover as many definitions as it desired. He therefore suggested that, instead of reading the present report, the subject be postponed for another year, to be handled, not by the present committee but by a sub-committee to be appointed by the president. Upon motion the report was accepted with a vote of thanks and ordered filed. An abstract of this report will appear in Saturday's issue.

PASSENGER TRAFFIC

The next order of business was the report of the committee on passenger traffic, which was read in part by J. E. Gibson, chairman. An abstract of this report is presented elsewhere in this issue.

In discussing the report F. D. Norviel, Anderson, referred to special cars. Most of the Indiana lines, he said, had no special car rate any more, although they do furnish special cars. His company had a car rate, which was based upon fifty or more passengers and on which it gave a reduction of a fare and a half for a round trip.

Mr. Norviel also said that he did not know of any traction line in the Central Electric Traffic Association territory that owns and operates bus lines in connection with its interurban service, but he did recall several independent bus lines operated to serve communities not touched by interurban lines. At some points these bus lines are operated in connection with the railway, through tickets being sold good on both the bus and electric lines. In this way the bus lines act as leaders and create traffic which would not otherwise come to the electric railway. On the subject of round-trip fares he stated that it was a problem which interurban lines had never been able to settle as yet. He said, however, that the round-trip fare is an excellent medium for inducing additional passenger traffic. In some instances where the same round trip fares in effect on steam roads have been adopted by electric roads it is necessary to increase the length of trains, making them from five to ten cars in length. As a rule, however, three or four car trains are of sufficient size to handle an excursion business, and it has been found that when trains of this size are run in competition with steam roads they were excellent business getters.

Mr. Norviel next took up the question of excursions and discussed the advisability of electric lines running them as well as the rates of fare to be charged for this last service. It had been his experience that the excursion business did not affect the regular business, but usually the regular passenger traffic for the same day is greater than for days when excursion trains were not operated. In connection with this subject he mentioned some recent excursion trips furnished by the Union Traction Company of Indiana to Niagara Falls, N. Y. Although these offered a rather long trip, they have been very popular. Undoubtedly these excursions have created new traffic and have been an excellent source of additional revenue. In closing, Mr. Norviel said that he believed parks operated in connection with interurban railways were a good thing, and even though the park itself was not a paying proposition the additional passenger traffic gained would more than offset this cost.

D. A. Hegarty, New Orleans, requested additional information on the question of free transportation of mail carriers. It appears that eight companies named in the report were transporting mail carriers free of charge.

In explanation of this J. E. Gibson stated that while only eight companies reported that they were transporting mail carriers free, the majority of companies were doing so under contract with the government.

Mr. Hegarty stated that one of his franchises required that mail carriers be transported free, and upon investigation it was found that they were doing about $12,000 worth of riding. This was taken up with the city council, which, after due consideration, eliminated the clause from the franchise. Following this action, the postmaster enjoined the railroad company from putting the clause in operation, and a later decision of the court upheld the action of the city council.

M. W. Glover, secretary and auditor Mobile (Ala.) Light & Railroad Company, stated that he had had some experience similar to Mr. Hegarty's in carrying mail carriers in the past, but upon investigation he found that as a result of serious objection to this practice on the part of the railway companies, the government is paying more for transportation than it did before.

M. C. Brush said that his company had made a contract with the post office department on a basis of six rides per day to letter carriers and furnished them with tickets at a fixed rate of $5.50 per year, but only one transfer is allowed on each ticket.

J. E. Gibson, in discussing this subject further, stated that his company had recently compiled information concerning the laws of various states on the subject of free transportation. It found that the advent of the public service commission, which replaced the railroad commission, brought with it more stringent restrictions regarding the issuance of free transportation. The laws in all states are practically the same and permitted free transportation to be issued only to uniformed officers, policemen and firemen and members of the public service commission, their inspectors and the railway companies' own employees. In many instances it is now necessary to submit a request to issue charitable tickets to the public service commission. Upon motion the report of the committee was accepted and filed and a vote of thanks was tendered to the committee for its services.

ADDRESS BY GENERAL HARRIES

President Stevens then introduced President Harries of the American Association, who in addressing the association commented on the quality of the reports submitted this year, saying that they were better than ever before. He also said that he believed that the joint sessions were exceedingly desirable as they gave all of the departments in the industry an opportunity to discuss subjects of mutual interest. They also gave all an excellent opportunity for acquiring information that is worth while. In closing he said: "If we can't get together, if we cannot work harmoniously in solving the problems we have before us, which means to improve in every way, to make more desirable electric railway service—and this is more desirable to accomplish than anything else in the world—if we can't be homogeneous—that is, have our faces in one direction and our elbows touching—what can we expect from the public?"

SANITATION

President Stevens then introduced Dr. W. T. Rucker, assistant surgeon-general United States Bureau of Public Health, Washington, D. C. Dr. Rucker had very kindly volunteered to address the association on regulations on sanitation as relating to public carriers. Before beginning the reading of his paper Dr. Rucker stated that he desired to take up the question as it affected railway companies locally, but as the United States government did not have local jurisdiction, he was unable to handle the subject in this manner. In an endeavor to collect some of the laws regulating sanitation of carriers locally, however, he found he had an enormous task as there was a great body of law. Some of it appeared to be very just and very good and some of it seemed to be framed with the idea if you don't know what else to do you should kick the railway company. As a result of this endeavor his paper was confined to sanitary regulation of interstate carriers. He suggested, however, that a committee be appointed for the purpose of assembling a digest of the laws on sanitation affecting local railways,

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and stated further that the surgeon-general, General Blue, had authorized him to say that if such a committee was appointed he would be very glad to co-operate with it in any way he could. Such a committee would have a magnificent opportunity to standardize what the railroad companies are required to do locally.

At the close of the reading of his paper a special vote of thanks was accorded to Dr. Rucker.

RESOLUTIONS

President Stevens then called for the next order of business, which included the report of the resolutions committee. J. N. Shannahan, chairman, read a resolution, and moved its adoption, which referred in the highest terms to the work of H. C. Donecker, the retiring secretary of this association. It also extended the gratitude of the association for the services he had performed for it and offered its best wishes for continued success in his new field. Upon motion, this resolution was adopted unanimously and Mr. Donecker thanked the association for its resolutions of praise and wishes for his future success.

The president next called for the report of the nominating committee, of which Mr. Shannahan was also appointed chairman. The report of this committee put in nomination the following officers, who were unanimously elected to office:

President, D. A. Hegarty, manager New Orleans Railway & Light Company, New Orleans, La.

First vice-president, M. C. Brush, second vice-president Boston Elevated Railway Company, Boston, Mass.

Second vice-president, H. A. Nicholl, general manager Union Traction Company of Indiana, Anderson, Ind.

Third vice-president, L. C. Bradley, assistant district manager Stone & Webster Companies, Texas district, Dallas, Tex.

Secretary and treasurer, E. B. Burritt, American Electric Railway Association.

Executive committee: J. K. Choate, of New York, N. Y., vice-president of J. G. White Management Corporation; Bruce Cameron, superintendent of transportation United Railways Company, St. Louis, Mo.; C. B. Wells, superintendent of transportation Denver City Tramway Company, Denver, Colo.; R. E. Danforth, general manager Public Service Railway Company, Newark, N. J.

Following the election, President Stevens requested Mr. Shannahan to conduct the new president to the chair. President Hegarty then thanked the association for the honor it had bestowed upon him and said that all he could ask of it was the same cordial support it had given his predecessors in office. Upon motion, a vote of thanks was extended to the retiring president, Dana Stevens, who said that he greatly appreciated the co-operation he had had during the past year, particularly the co-operation of the members of various committees. They had done much hard work and were greatly assisted by the other railway members in the work they had accomplished.

M. C. Brush, Boston, the newly elected first vice-president, was then invited to address the association and after a few remarks introduced the new secretary, Mr. Burritt.

Mr. Burritt said that he realized the work carried a very heavy responsibility, but he shouldered it with willingness and had the example before him of Mr. Donecker. In concluding he said he was deeply grateful for the honor of the election.

The meeting then adjourned.

The Manchester (Eng.) Tramways committee has decided to run the all-night service of cars in the city recommended by J. M. McElroy, general manager of the tramways department. The service will be continued until statistics can be compiled to ascertain whether the service should be made permanent.

THURSDAY SESSION OF THE AMERICAN ASSOCIATION

President Harries called the last session of the American Association to order at 2:30 o'clock yesterday afternoon.

The first business was the report of the committee on company sections. This was presented by the chairman, C. N. Duffy, Milwaukee Electric Railway & Light Company. An abstract of the report is published elsewhere.

In the absence of E. C. Foster, chairman of the committee on gold medal, the report of this committee was read by the secretary. It stated that the medal, which was designed for presentation to the author of the best paper read before a company section during the year, had been awarded to C. N. Duffy.

Arthur M. Harris, of Harris, Forbes & Company, New York, then read a paper on "Electric Railway Securities from the Investor's Standpoint." An abstract of this paper is published elsewhere.

On motion of Charles N. Black, a vote of thanks was given to Mr. Harris for his paper.

Charles L. Henry, Indianapolis & Cincinnati Traction Company, chairman of the committee on constitution and by-laws, presented the report of that committee. An abstract of the report is published elsewhere. The report was received, approved and filed.

Mr. Henry then read the report of the committee on relations with sectional associations, of which he was the chairman. The report was accepted.

The reports of the committees on compensation for carrying United States mail and taxation matters were read by title.

Arthur W. Brady, Union Traction Company of Indiana, chairman of the committee on federal relations, read the report of that committee. An abstract is published elsewhere.

In the absence of W. J. Harvie, Hagerstown, Md., chairman of the committee on joint use of poles, the report of that committee was presented by Mr. Henry. An abstract of the report is published in this issue.

After presenting the report, Mr. Henry said he wanted to say for Mr. Harvie that the work had been very arduous. He was not as vitally interested in the matter as the other members, but had agreed to do what he could with the other members to help work the matter out. It was impossible to get any considerable number of men to agree on a subject of this kind. The ideas that were presented by the different members of the committee were so diverse from each other that it seemed in the beginning like a hopeless undertaking to try to agree, but after two years of work the committee agreed unanimously on the contract and specifications. The members did not do this with the idea that when their findings came before this association and other associations there would not be other and diverse opinions regarding them, and all he wanted to say for the committee was that, while these were its conclusions, the committee did not assume that it had been able in all cases to cover each condition in the exact way in which it should be covered.

In the opinion of Mr. Henry, the question ought to be settled, because it was a very live one in many parts of the country and the joint use of poles was becoming so much more common than in the past that it was important to come to an understanding regarding it. He therefore urged that if the report did not meet with the approval of the association it be amended so as to receive the approval of the association and be adopted in some form.

G. W. Palmer, Jr., Bay State Street Railway, made a detailed criticism of the report of the committee.

J. D. Mortimer, Milwaukee Electric Railway & Light Company, moved that in view of the importance of the subject the report be referred to the committee with instructions that the committee ascertain the sentiment of the association members with respect to the contract and the specifications

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in the report at the mid-year convention. This motion was carried.

The report of the committee on cost of passenger transportation service was read by the secretary. An abstract of this report is published elsewhere.

President Harries said that the work which Mr. Mortimer and the committee had undertaken was probably the most important work with which the association had ever had anything to do.

Frank Hedley, Interborough Rapid Transit Company of New York, read a paper on "Present Tendencies of Public Utility Laws and Regulations." An abstract of this paper is published elsewhere in this issue.

C. L. S. Tingley, American Railways Company, then read his paper on the same subject as that assigned to Mr. Hedley.

Richard McCulloch, United Railways of St. Louis, who had the third paper on this subject, said that owing to the late hour and as the paper had already been printed and distributed he would submit it without reading.

William D. Kerr, New York, then read a paper on "A Model Utility Law." An abstract of this paper is published elsewhere.

H. C. Hockin, Mayor of Toronto, extended the association an invitation to hold its 1914 convention in that city. He assured ample hotel accommodations, all the necessary space for exhibits in the buildings at the permanent fair grounds and said that a hearty welcome awaited them.

The report of the committee on nominations was then presented, and the secretary was instructed to cast a ballot for the nominees, as follows: President, Charles N. Black, San Francisco, Cal.; first vice-president, C. Loomis Allen, Syracuse, N. Y.; second vice-president, Charles L. Henry, Indianapolis, Ind.; third vice-president, John A. Beeler, Denver, Colo.; fourth vice-president, L. S. Storrs, New Haven, Conn.

President-elect Black was escorted to the chair and said that it was with a great deal of pleasure that he accepted the honor of the presidency.

Retiring-president Harries renewed the expressions in his annual address and congratulated the new president on having for friends and supporters those who had been so loyal and helpful in every sense during his term of office.

President Black read a telegram from the Boston Chamber of Commerce, extending an invitation to the association to hold its convention next year in Boston.

A letter from W. Caryl Ely, extending greetings to the association, was read.

The secretary then read the report of the committee on resolutions and on motion these were adopted.

The resolutions mentioned those who have died during the year. They expressed thanks to the president, officers and committees for their work, and congratulations to Mr. Donecker and wishes for his future success and prosperity. The resolutions further gave credit to the Manufacturers' Association for the remarkable exhibit which added so materially to the benefits of the association and also extended thanks to the manufacturers for the arrangements made for meeting halls and co-operation in the work. The thanks of the association were also extended to the ELECTRIC RAILWAY JOURNAL and *Electric Traction* as well as the daily papers and the Associated Press for the fair and impartial manner in which the proceedings of the convention were handled by the press of the country.

The committee on recommendations in the president's address made a report suggesting the appointment of a committee on ways and means to devise and report a financial scheme for the support of the organization and especially calling the other suggestions in the president's annual address to the favorable attention of the incoming officers and executive committee for their consideration.

The association then adjourned.

SPECIAL THURSDAY SESSION OF ENGINEERING ASSOCIATION

A special session of the Engineering Association was held on Thursday at 12:30 o'clock with President Schreiber in the chair.

WAY MATTERS

The report of the committee on way matters was presented by J. M. Larned, chairman, who said that the committee had held one meeting of three sessions. It had used data collected by previous committees but had been able to close up three important matters. An abstract of its report is published elsewhere in this issue.

The discussion was opened by R. C. Cram, Brooklyn, who pointed out that a dimension in the 9-in. rail, covering the width of the web at its junction with the underside of the tram, might be shown more completely. It was given as ½ in., but there was considerable latitude as to its location. While in hearty accord with the committee in most recommendations he did not agree as to the thickness of the base of the rail. Steam railroads were increasing the thickness of their rail base and electric railways had even more reason to do so because of electrolytic action. However, he did not think this point was of sufficient importance to delay any longer the adoption of these rails as standard. With regard to the 7-in. grooved girder rail, he noted that the center dimension was lacking in the width of the deeper plate.

After some discussion on the joint plate specification, R. C. Cram referred to the paving data in the report. He said that special nose blocks, no matter of what character, were a delusion and a snare. In a very narrow street with a sufficient amount of team traffic following the rails it would pay any company, other conditions being equal, to use a grooved girder rail in preference to a T-rail. It was essential to gather life tables of different kinds of pavement under specified traffic conditions if a real knowledge of paving was wanted. He also thought that the committee could take up to advantage the use of high-grade steel bolts with bolted joint plates.

Charles H. Clark, Cleveland, said that it was very necessary properly to choose the kind of pavement used against T-rails. The nose-block was the material to use and then teams could not follow the rails.

Mr. Cram said that in New York the streets were so narrow that teamsters had become educated to believe that they had a right to use the track, and independent of the paving used this practice would be followed to a considerable extent.

Mr. Larned explained some of the reasons for the adoption of the dimensions of the standard rail. Some had criticised it as being too thin in the web, but if any company wished to increase the weight of the rail by increasing the web this could be done without making any change in the dimensions. The plan of the committee was to design one rail to meet average conditions rather than to design a series of rails, although this might be done later.

Upon motion of Mr. Harte, the report of the committee was accepted and a vote of thanks tendered to it for its work.

The meeting then adjourned.

TOTAL REGISTRATION AT CLOSE OF FOURTH DAY

At the close of the fourth day of the convention at the registration booths of the Manufacturers' and railway associations Thursday 245 new names had been added to the list of those registered, which makes a total of 3085. The above additional registrations include twenty-six added to the total of the Manufacturers' Association and 220 to the railway associations. The new names added to the railway association registration undoubtedly include a large number of those who were compelled to remain at home in charge of operation during the first days of the convention while the heads of other departments were in attendance.

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REPORT OF THE COMMITTEE ON TAXATION MATTERS*

C. L. S. TINGLEY, CHAIRMAN

In May a data sheet was sent out through the members of the committee to practically every electric railway in the United States, and to the inquiries in it 259 replies have been received. Fifty-two companies report a tax on gross receipts, six on net receipts, nine on capital stock, three on bonds, 108 on the tangible property, and fifty a tax on the property as a whole. With regard to special taxes, 227 report a paving tax; fifty, car license; twenty-seven, pole license; seven, street sweeping; fifty-five, street sprinkling; thirty, a bridge tax, and forty-one, other forms of special taxation. Two report special franchise taxes and six report no taxation by the municipality or any other burdens.

An effort has also been made to ascertain the percentage of gross receipts paid in taxes of all kinds by electric railway companies in the several states, and it is found that the percentage ranges (ignoring Texas, where state tax alone is recorded) from 2 per cent in West Virginia to 11.11 per cent in Colorado.

Since the last report the United States government has issued Part IV of the Report of the Commissioner of Corporations on Taxation of Corporations, covering the Western Central States—Minnesota, North Dakota, South Dakota, Iowa, Nebraska, Kansas and Missouri. To the letter of transmittal the commissioner observes:

"Taking the Western Central States as a whole, a noteworthy feature of their tax systems is that they depend in the main upon the general property tax and rely to a comparatively small extent upon special taxes from corporations, as compared with states in the three groups already studied. Minnesota is a notable exception, securing two-thirds of its revenue from special corporation taxes. . . . Of corporation taxes in these Western States, those from railroad companies are the most important, although insurance companies contribute largely to such taxes. . . .

"Minnesota is perhaps the most interesting member of this group. A conspicuous feature of its tax system is the taxation of gross earnings of railroad and other public service corporations. The gross earnings method is here applied more extensively and yields a greater percentage of state revenue than in any other state thus far studied. It is regarded by the state as one of the most satisfactory features of its tax system. . . .

"Only two of these Western Central States—Minnesota and Kansas—have permanent tax commissions whose members devote their entire time to taxation matters. In the remaining states the tax boards are composed of state officials who usually can devote but a fraction of their time to such duties. . . ."

Before taking up the discussion of the states in detail, the bureau makes the following comment on the methods pursued by the various taxing bodies:

"It has been found in many states, among them some of the states covered by the present report, that the central official body which values railways for purposes of taxation has no system capable of statement. The officials take into account mileage, double trackage, sidetracks, cars, expenses, indebtedness, market value of shares, and so on, and in some way they combine these various elements and make up an opinion as to the railway's taxable value. Yet, so great is the difficulty of solving such a problem that they cannot explain how they solve it. The difficulty of the problem is perceptible enough, but it is equally clear that a solution—or, at least, an accurate solution—is not facilitated by approaching the problem without any rule. While the officials may have some rule in mind, in many instances they have not yet found a rule which is so satisfactory to them as to be expediently stated as a final test of the fairness of their results. There is no occasion for commenting unfavorably upon the failure to announce a rule not yet fully existent nor upon the delay in finding a rule that is satisfactory. The difficulties of the case are an adequate defense. Yet what is very important is to notice that as yet there is no exact rule, that there must be one some day, and that the rule, when adopted, should be made public. Here is a place where publicity is the best and, indeed, the only guard against inaccuracy, unfairness and suspicion."

In view of the small percentage of replies to the data sheet received and the evident misapprehension under which some of them have been given, it does not seem to the committee to be advisable to tabulate and publish the statistics gathered with respect to municipal taxation. The data, however, are on file in the secretary's office and are available for study by the member companies.

A table in this report gives a very interesting analysis of the state tax of the states so far studied by the bureau and to which reference has been heretofore made in the reports of this committee. This is appended.

PERCENTAGE OF TOTAL STATE TAXES, AS DISTINGUISHED FROM LOCAL TAXES, CONTRIBUTED BY CERTAIN SPECIFIED SOURCES OF TAXATION FOR 1910:

States	Corporation Tax	General Property Tax	Inheritance Tax	Liquor Tax	Miscellaneous Tax Receipts	Total State Taxes
New England Group:						
Maine	54	34	6	5	1	100
New Hampshire	39	47	9	..	5	100
Vermont	82	..	8	5	5	100
Massachusetts	41	41	12	6	..	100
Rhode Island	46	41	..	8	5	100
Connecticut	71	9	9	..	11	100
Middle Atlantic Group:						
New York	29	..	23	27	*21	100
New Jersey	91	..	8	..	1	100
Pennsylvania	71	5	7	7	10	100
Delaware	67	..	1	..	32	100
Maryland	33	34	8	12	13	100
District of Columbia	*16	74	..	8	2	100
Eastern Central Group:						
Ohio	*54	25	..	20	1	100
Indiana	*19	81	..	..	..	100
Illinois	*34	58	6	..	2	100
Michigan	45	52	2	..	1	100
Wisconsin	71	22	5	..	2	100
Western Central Group:						
Minnesota	66	27	6	1	..	100
North Dakota	*24	76	..	..	..	100
South Dakota	*18	81	..	..	1	100
Iowa	*26	62	7	..	5	100
Nebraska	*25	74	..	..	1	100
Kansas	*31	69	..	..	..	100
Missouri	*20	43	6	30	1	100

*Includes state's share of general property tax collected locally from certain corporations. (See table of financial results under each state.) With the exception of the District of Columbia, as previously noted, it is impossible, practically, to ascertain or estimate from the information available the amount thus received from corporations in the states included in this table.

YESTERDAY AFTERNOON'S DANCING CLASS

A very enjoyable dance, which really was a dancing class instructed by Miss Judson and Mr. Chidsey, who have been giving exhibitions at all of the dances during convention week, was held at the Shelburne yesterday afternoon. Although the students were really post-graduates they found during the lesson that there was much in the art of dancing which could be learned from their expert teachers, and in consequence the afternoon was not only pleasantly but profitably spent.

Among those present were Mr. and Mrs. H. C. McConnaughy, Mr. and Mrs. W. L. Wright, Mr. and Mrs. S. K. Colby, Mr. and Mrs. Robert Radford, Mr. and Mrs. William P. Hunt, Jr., John C. Jay, Jr., Mr. and Mrs. M. T. Kirschke, Jr., W. F. Corry, Thomas Blagden, the Misses Hedley and R. W. Read.

The dancing class was an impromptu affair and unfortunately the attendance was limited owing to the short notice. Owing to the success of the affair, however, it is expected that these little gatherings will be made a feature of future conventions.

*Abstract of report read before the American Electric Railway Association at Atlantic City, N. J., Oct. 13-17, 1913.

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REPORT OF THE COMMITTEE ON CONSTRUCTION OF SCHEDULES AND TIMETABLES*

J. E. DUFFY, CHAIRMAN; C. E. MORGAN, T. F. GROVER, ALEXANDER JACKSON, E. J. DICKSON, J. J. DEMPSEY

It is, of course, an easy matter to obtain statistics on car mileage, short trips, lost trips and time of trainmen where the operation does not vary from normal and where cars make, without delay or interruption, those trips which are called for on the timetable within the time there set forth. Turn-backs and lost trips, however, are of more or less frequent occurrence, and each happening of this sort requires, in order that records may duly set forth actual operation, a statement of the variance from the standard established by the timetable. Investigation shows that in almost every case the trainmen, generally the conductor, are held responsible for making these reports, these being supplemented, of course, by additional reports from inspectors or others who personally observe or are acquainted by the conductor with the facts. The checking of cars passing a given point is carried on by stationmasters or inspectors in many cases, but this method, of course, does not provide information of short trips at points other than those in the vicinity where such observer happens to be placed.

The above relates to city operation, the dispatching system on interurban lines generally taking care of this matter for that class of service. The trainman in city service is either requested to place this information on the back of his trip card or he is provided with a special form of report. There seems to be no accepted standard as to the checking of these reports, some companies requiring the station or depot master to do the work, others the superintendent of transportation, some the managers, and still others having the checking done directly by the auditing department, evidently without intermediate check by the transportation department. Only one company reports the use of a dispatching system whereby each car reports at the conclusion of each half trip to a dispatcher centrally located. This, of course, provides an absolute check.

The committee is not prepared to make a recommendation as to the proper method, but in view of the fact that it is essential that the operating companies know the exact operation of each of their cars, to the end that they may, wherever possible, make the complete trips called for on the timetables and in this way insure to their patrons the full service which the timetables have provided, and as well that the operating companies have accurate information as to the terms of service of their trainmen, it is suggested that the topic be again considered.

TRAFFIC STATISTICS

Investigation developed the following methods employed by companies to ascertain the service required to take care properly of traffic offered:

(a) Personal observation by the superintendent, supervisor or inspector in charge of the line.

(b) Reports by conductors upon printed slips provided them and calling for information as to the number of passengers on the cars at a designated street which is the point of maximum load. These slips are turned in with the day card after completion of work and are subsequently compiled at the carhouse or in the general office of the company.

(c) Information obtained from the day cards, the plan usually followed by the smaller companies.

(d) The employment of young men, known as "car timers," stationed at designated points.

The committee does not feel that plan "a" is satisfactory, for the reason that it does not provide records for future reference. As to plan "b," while a few companies appear to have had some success with it, the committee feels that better results will be obtained by having this work performed by employees other than the trainmen in charge of the car. Undoubtedly, however, on the smaller lines the practice of having conductors provide the information will be found useful. The committee would recommend, however, for these smaller sized companies that a competent motorman, conductor or other transportation employee be properly instructed so that he will be available, when necessary, to obtain proper records and develop these for use as reference or in cases of complaints regarding service.

As to plan "c," tabulations from day cards will always be found more or less helpful, but they do not provide statistics of intermediate conditions, through riding between terminal points, etc. The committee would therefore recommend, particularly for the larger companies, the employment of young men who may be designated as "car timers," "traffic checkers," etc., to obtain, tabulate and compile information concerning operating conditions. One of the larger operating companies has in its employ fifteen young men who are assigned by the transportation department to various points on the lines where record is taken of the number of passengers on each car.

As one of his duties and to determine the adequacy of short line service, the "car timer" should check through cars at the point where short line car turns back, such record to show the car number, the time and the number of passengers, also the number of passengers arriving and leaving on the short line cars. During the time this check is being made, a second "car timer" should be stationed at the point of peak load, and his record should show car number, time and passengers on board. When these records are tabulated in the form of a chart showing the time of arrival of cars and the load on each one the amount of the business between points of check may be seen, as well as the actual conditions at points on the lines where record is taken of the number of line service will also be shown.

TIMEKEEPING

The methods of keeping time of trainmen vary greatly. Some companies report that they allow the trainmen to pay themselves, others that their time sheets are made up from the report of the dispatcher, while other companies have time sheets made up upon which the men sign for the number of hours made during the day, this being checked up by the dispatcher or by the station foreman against the timetable.

The committee feels that this is a very important question and one that should be standardized, if possible, because of the large expenditure involved in the pay for platform time. We would recommend as the best method the practice of posting sheets for each separate division made out by the station foreman, upon which are shown the number of hours of each individual run, both for motorman and conductor, and extra sheets made out for extra runs, time that crews leave the station to be marked upon these sheets by the timekeeper or station foreman, and time marked up upon the return of crews to the carhouse by same officials. These sheets should then be turned over to the timekeeping department, which should check the same against the timetables, the extra trips being approved by the station foreman and superintendent of transportation or division superintendent. These sheets should also show any allowances made for reporting time or "deadhead" time from station to point of relief and all other allowances made by the companies, these to be approved by some person in authority in the transportation department. Timekeeping should be done by a representative of the auditing department, but the information shown by the methods outlined above should be under the direction of the transportation department, however.

*Abstract of report read before the American Electric Railway Transportation & Traffic Association, at Atlantic City, N. J., Oct. 13-17, 1913.

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NEAR-SIDE STOPS

The investigation conducted by the committee upon the subject of the near-side stop has developed many interesting facts, chief among which seems to be the growing tendency toward the plan. The tabulation of replies shows practically an equal division in more than 110 operating companies, with the advantage slightly against the far-side operation. It is, of course, understood that there has been more or less legislation on this subject, much of it requiring the institution of the near-side stop, especially in the business or congested sections. However, the inquiry as to whether the plan was required by ordinance or was optional with the companies shows in the majority of cases that the companies have elected of their own accord to institute the near-side plan. In some few instances where ordinances are in effect the companies have noted that the same was enacted at the request of the companies.

The committee made inquiry as to the type of car used, and again an equal division as between the prepayment and ordinary types leads to the conclusion that the type of car has not been a determining factor.

Inquiry was made as to the effect of the near-side operation on the maintenance of schedules, and in almost every case where answer was given and there had been any noticeable results favorable reply has been made; in other words, the near-side operation has enabled the operating companies to maintain their schedules better. One point brought out most forcibly is that of its effect as to accidents, nearly 50 per cent of the companies operating "near-side" claiming that there has been a decrease, in some cases as high as a 50 per cent reduction being named. The companies having experience with it are also a unit in the recommendation of the near-side stop as against the far-side, objections generally being on account of unpaved streets. In a few isolated cases the statement is made that headways have been disturbed by crossing vehicles. The committee endeavored to ascertain the steps taken by companies to advertise properly change in stops and finds that in only a few cases did the new plan become effective without considerable advance notice to the public. Newspaper advertisements—display form—seemed to be the most popular plan, being carried for from five days to two weeks in advance of the date set for the institution of the change. Posters on the dashers and windows of the cars, notices in boxes within the cars and pasteboard cards hung within the cars were some other methods used. One company painted the line poles white to indicate where car would stop, while another company sent cautionary letters to owners of automobiles and wagons.

Summing up the expressed opinions of different railways pro and con, a few of the advantages claimed for the near-side stop are reduction in the number of stops, less interference with schedules, decreased power consumption and decrease in number of accidents. The committee desires heartily to indorse the near-side stop and to recommend its adoption by the members of the association.

TIMETABLES

The desirability of standarizing all forms of schedules and timetables is obvious. Previous committees have recommended a standard form of interurban working timetables, and the committee desires now to recommend as a standard a form of timetable for city operation in which each car is followed without confusion throughout the entire day or entire length of service, the times of arrival and departure being entered along horizontal lines and the run numbers shown in large figures at each change of the car crews. The members of each crew can there see at a glance what run they relieve and by what run they are relieved. In a line with only two terminals the trips follow in sequence, and the headway can be followed without trouble. It is also possible with companies tabulating individual mileage to show the standard car mileage schedules to be made by each car for the entire day.

The committee concurs in the thought expressed by previous committees that no rules should be shown on interurban or other timetables, for the reason that their inclusion would tend to minimize the importance of other rules not so shown. The committee would recommend, however, the desirability of showing on timetables the speed limits in the different cities and towns, the names of company physicians in the different cities and towns and their addresses and telephone numbers, the location of telephone boxes on the line in question, the designating points where trainmen will report to dispatcher, designating point where trainmen will register their trains in or out.

TRAFFIC

The committee has collected a comprehensive file of traffic ordinances in force in the various cities of the country, and these are available for the use of member companies on application to the secretary of the association.

A collection of detention and delay reports in use by member companies of the association has also been made by the committee, and these may be inspected at any time by applying to the association headquarters. In the time allowed it has not been possible to develop and recommend a standard form and the committee would therefore suggest that this subject be continued another year.

The results of an inquiry show many practices in the matter of destination signs. A tabulation of replies shows that the number of companies using colored lights or disks is three, perforated and illuminated deck signs, twenty-one; roller cloth signs, fifty-one; numbers or letters, two; sheet-iron reversible signs, four; glass vestibule signs, six; metal dash signs, sixteen, and four-sided deck signs, two. In view of recent developments in the signing of cars, the use of numbers for route designations, etc., your committee feels that this subject should be continued and that special attention be given to it during the coming year.

In conclusion the committee believes that no company, large or small, can afford to be without the service of men, or a man, whose duty shall be the study of traffic and the preparation of schedules that will meet the conditions adequately and economically. It therefore recommends a thorough study of the reports on schedules and timetables for 1910, 1911 and 1912 and the application of the recommendations contained therein.

FINALS IN GOLF TOURNAMENT YESTERDAY

A large number of post entries were received in yesterday's finals for the golf tournament, bringing the total number of stick wielders up to fifty-two. The large field naturally caused a great deal of excitement over the day's play and the interest was heightened by the fact that the play was exceedingly close, owing to the excellence of the work done by the handicappers.

In the eighteen-hole medal play handicap W. L. Conwell and R. H. Gwaltney were tied for first place in class A with net scores of 83 each, and in class B B. E. Bramble and H. C. Small were tied for first place with scores of 78. F. M. Nellis won the first prize in class C with a net score of 68, and L. F. Braine was runner-up in this class with a net score of 81. The ties for the first prizes in classes A and B were settled by drawing lots last night. The winner of the draw was J. H. Sisson.

In the blind handicap no less than nine men were tied for first place with scores of 84 based on self-selected handicaps. These fortunate players were Frank Hedley, J. H. Sisson, W. O. Wood, L. A. Wilson, N. M. Garland, C. R. Ellicott, W. L. Conwell, G. B. Dobbins and F. E. Donohoe. They also drew lots last night for the single prize which had been offered for this contest.

The prizes for both contests were formally presented at the promenade concert and ball which took place last night.

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REPORT OF THE COMMITTEE ON PASSENGER TRAFFIC*

J. E. GIBSON, CHAIRMAN; J. L. ADAMS, S. W. GREENLAND, W. S. WHITNEY, J. A. CLEVELAND, E. E. SOULES

The subject of factory closing hours was considered by the 1912 committee and recommended to be continued this year, but since there seems to be very little interest in this matter the committee does not feel that at the present time the subject should be continued. From the replies of fifty-eight companies, it was found that fifty-three companies have made no efforts during the past year toward a possible extension of peak hours by arrangements with factories, mills, etc., for closing at different hours. In Rochester, N. Y., it is stated that the various manufacturing companies are co-operating with the railway company with the best results to both. In Kansas City, Mo., it is stated that perhaps their largest industries are stockyards and packing houses, employing about 35,000 persons, and in this case the rush-hour problem and peak load is somewhat lessened by the fact that these selections are served by from three to six lines where extra cars are put in operation at closing hours. They have conducted a trial, however, with Montgomery, Ward & Company, employing from 2000 to 2500 people, in furnishing cars for employees of that company at the various hours of closing. The company agreed to make the hours of closing 5:50, 5:55 and 6 p. m., dividing the force in practically three equal parts. Later the time was changed to 5:10, 5:15 and 5:20 p. m. Extra service was placed on the lines by the railway company to meet these conditions, and the result was most pleasing to the employees and managements of the companies concerned.

In answer to the question of whether such a plan is feasible or possible, the majority of the companies replied that it is not, and especially as applied to their local conditions. This feeling was stronger among the interurban and smaller companies than with the companies serving populations of 100,000 or more, quite a number of whom thought such a plan would be of benefit, although no efforts had been extended in that direction.

INDUSTRIAL DEVELOPMENT

In many localities street railway companies have found it to be of mutual advantage to the manufacturer and to themselves to co-operate with the local board of trade, to the end that the street railway company may have knowledge of contemplated factory sites. In other places, particularly along the Pacific Coast, the managements of interurban lines have purchased tracts of land along their right-of-way. This land is disposed of from time to time for factory sites, seaside residences and amusement and public parks. This policy, in the years to come, will doubtless yield the transportation companies an increased revenue, not only from the advanced valuation of the land but also from increased transportation.

SPECIAL-CAR TARIFFS

From the reports of committees in past years there appears to be the greatest diversity in the charges and conditions governing the special or chartered car service. There are two points, however, that appear to be in common on nearly all roads—the use of regular equipment and payment in advance—either one or both of which may be resultant from past unprofitable experience. While there seems to be no uniformity in charge, yet a tendency is noted toward the basis of $3 to $5 per hour, after which time the charges vary.

The practice of the Illinois Traction System is given herewith, to show the result of exhaustive investigation of this question by this company. The rates applying via this line are 80 cents per car mile one-way movement, with a minimum of $15 per car, maximum fifty people, with the same proportional rate in excess of fifty people; 65 cents per car mile on a round trip movement, with a minimum of $25, with the same restrictions as to the maximum number of people. For a chartered trailer attached to regular train, one-way movement, 75 cents per car mile, minimum $15; for return movement on regular train, 60 cents per mile, minimum $25—maximum, fifty people in each case, with proportional rate in excess of the maximum number of people.

PASSENGERS RIDING IN FRONT VESTIBULES OF CLOSED CARS

The recommendation of the committee is that passengers should be permitted to ride in the front vestibule of closed cars. The main objections to such a rule are found to be the accident risk and distraction of the motorman's attention. The former has been greatly minimized by the use of steel cars, stronger under-framing and body structure, anti-climbers and the standardization of types and heights of platforms. In connection with this question should be mentioned the difficulty of enforcing at all times the order prohibiting riding on the front platform. In 1909 the Pennsylvania State Railroad Commission drafted a rule against permitting passengers to ride on the front platforms of cars. In the early part of 1910 the Philadelphia Rapid Transit Company stated that during the afternoon rush hour it was impossible to enforce the order without employment of physical force, and it would require the assistance of the police forcibly to remove passengers. In September, 1912, the Chicago City Railway issued a folder stating that on near-side cars passengers were not permitted to remain upon the platform, but from investigations it was found that this rule cannot be or is not adhered to during the rush-hour travel, platforms being filled to capacity during such times.

On the other hand, many companies are realizing the value of the space for passengers, as well as the use of passengers as witnesses to accidents. During 1910 the prepayment cars of the Metropolitan Street Railway Company, New York, and the Third Avenue Railroad, were provided with folding seats on platforms in order to secure as much seating capacity as possible. The latest Pittsburgh cars at that time had no front platform. The new near-side cars in use in Chicago, Buffalo and Philadelphia would tend to show the ancient prejudice against having passengers on the front platform is being overcome. This is also true of the type of cars now being placed in use on the New York Railways, Pittsburgh Railways, Brooklyn Rapid Transit, United Railroads of San Francisco, vestibuleless type in Kansas City, where seating capacity has been increased 10 per cent, and various other companies.

The following figures are given by the claim department of a large urban property in regard to the number of passengers injured while riding in front vestibule of cars in collision accidents during the months of October, November and December, 1912:

Month	No. of Collisions	Passengers Injured
October	26	3
November	32	2
December	32	0
Totals	90	5

This same company reports that a very large percentage of witness statements of passengers in front vestibule are favorable to the company, and the information obtained therefrom is most valuable.

FREE TRANSPORTATION

It is found that the question of free transportation is governed quite largely either by franchises or state laws, and these have recognized to a large extent local conditions in cities and in states. Information was requested from 217 companies and replies received from nearly all, on all questions. Of the total number of replies, 177 companies issue transportation to all employees, thirty-eight companies issue

*Abstract of report read before the American Electric Railway Transportation & Traffic Association, at Atlantic City, N. J., Oct. 13-17, 1913.

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transportation to a portion of their employees. Free transportation issued by the larger companies is limited in a majority of cases to trainmen, trackmen, officers and operating officials. It appears to be the general policy of the smaller companies to issue transportation of some form to all employees. It seems to be general practice to allow the use of badge or uniform for transportation of trainmen. Other employees are furnished with tickets, card passes, coupon books or limited trip books.

In regard to transportation furnished employees' families, 104 companies report that they supply transportation to families of certain employees, while 106 companies report that they do not issue transportation to families. A large percentage of the companies replying in the affirmative are interurbans. Out of thirty of the largest companies from which information was received, twenty-five do not issue transportation to employees' families; four issue transportation to employees' families, and one company reports issuing transportation to employees' families on interurban lines and no transportation to employees' families on city lines. The general form of this transportation is in trip passes or limited number of coupons, and in a number of cases such transportation is issued only on request.

Out of 217 companies making replies to the question of free transportation to outside parties, sixty companies issue transportation to police, forty-eight to firemen, forty-five to public officials, twenty-eight to employees of other roads, twenty to charity, seventeen to the press, eight to mail carriers, fourteen miscellaneous, and eighteen companies issue no free transportation to non-employees. A decided tendency is noted toward discontinuance of all such free transportation. It seems to be the general custom to allow free transportation of police and firemen, either in full uniform or upon presentation of badge.

Very few companies replied to the question regarding the restrictions of granting free transportation to other than employees, as to whether such regulations are voluntary or otherwise, but from replies received in the majority of cases this matter appears to be regulated by franchises and state laws. There is a decided tendency in many states toward the regulation of issuance of free transportation along with that of rates and service rendered by public utilities. As an appendix to the report of this committee there was submitted a classification of state laws.

PARKS

Out of fifty-six companies submitting replies on the subject of park business the committee found the number operating parks at the present time equal to the number which do not, and of the companies now operating one-half feel that the returns do not justify the investment.

REDUCED FARES FOR THE ROUND TRIP

In the majority of cases a reduction on the round trip fare is allowed on electric railways. Several years ago the steam roads allowed apparently the same reduction as is now given by most electric lines. The steam roads have, however, recognized the necessity of increased rates of fare and as this is one of the easiest and most profitable means of increasing their earnings, this change was made and it has been proved, so far as they are concerned, that it is not necessary to make this reduction in order to stimulate traffic.

It has been found that the one great objection to the doing away with this reduction is that there would not be any inducement to purchase tickets and, as a result, an additional temptation would be placed in the way of the conductor on account of a greater amount of cash passing through his hands; this is no doubt true, but is has been proved in several cases that a dishonest conductor can manipulate tickets almost as easily as by the straight "knock-down" of cash.

Another interesting feature has been brought out in the investigation of this subject, and that is that there seems to be a general movement on foot among the various member companies to do away with the reduction on round trip fares. There have been several changes of this kind made within the past few months, and it is reported by these companies that a very material increase in earnings has been shown, the argument having been put forth by these companies that in consideration of the frequent and convenient service furnished by the interurban lines, it is not necessary to give an additional inducement in the way of a reduction of fares.

Most roads, it is found, do not make any reduction in one-way tickets. In other words, most roads are charging the maximum 2 cents per mile cash fare on their cars, making no reduction on their one-way tickets. Reductions are given in most cases for commutation tickets and mileage books. This practice is pretty general, or, indeed, is almost universal where roads charge 2 cents per mile. There are a few roads charging less than 2 cents per mile which do not give any reduction. However, in almost all cases where an excess cash fare is charged over the one-way ticket fare, the tickets sold amount to about 90 per cent of the total one-way fares.

APPENDIX

The report of the committee was accompanied by an appendix giving the federal law and the laws of the several states on the subject of reduced fares, passes, etc.

PRESENT TENDENCY OF PUBLIC UTILITY LAWS AND REGULATIONS *

BY C. L. S. TINGLEY, SECOND VICE PRESIDENT AMERICAN RAILWAYS COMPANY.

Until 1907 the legislation on this subject was chiefly aimed at the steam carriers and it was only as time went on that other public utilities were brought within the purview of the statutes and the commissions. To-day, however, the commission, under its various titles of railroad commission, public service commission, public utilities commission, or corporation commission, is practically universal throughout the United States.

During the past two years a number of states have passed legislation which may possibly guide us in determining what is the present trend of the public and legislative mind along these lines. Connecticut, for example, has changed its Railroad Commission into a Public Utilities Commission with broad powers. In the little state of Delaware, while there is no commission with general jurisdiction throughout the state, one has been created for the city of Wilmington, the only municipality of any great moment within the State, with wide jurisdiction over utilities therein. Congress on March 4, 1913, passed a broad utilities act for the District of Columbia with large powers of inquisition and supervision, having jurisdiction over account, records, stocks and bonds. Florida has greatly enlarged the powers of her Railroad Commission during the present year. Illinois has abolished its Railroad & Warehouse Commission, during the current year, and substituted therefor a Public Utilities Commission with broad powers.

[Mr. Tingley's paper gave extensive extracts from laws, decisions, articles and addresses bearing on the subject of regulation.—Eds.]

Rules have been issued by the Public Service Commission of West Virginia for the guidance of companies which desire a permit to develop hydroelectric power. The rules are designed to make companies show that they are not seeking the permit for speculative purposes or to monopolize the power of streams. The companies are required to give full information in reference to physical matters incident to construction work and also in regard to their financial resources.

*Abstract of a paper read before the American Electric Railway Association, Atlantic City, N. J., Oct. 13 to 17, 1913.

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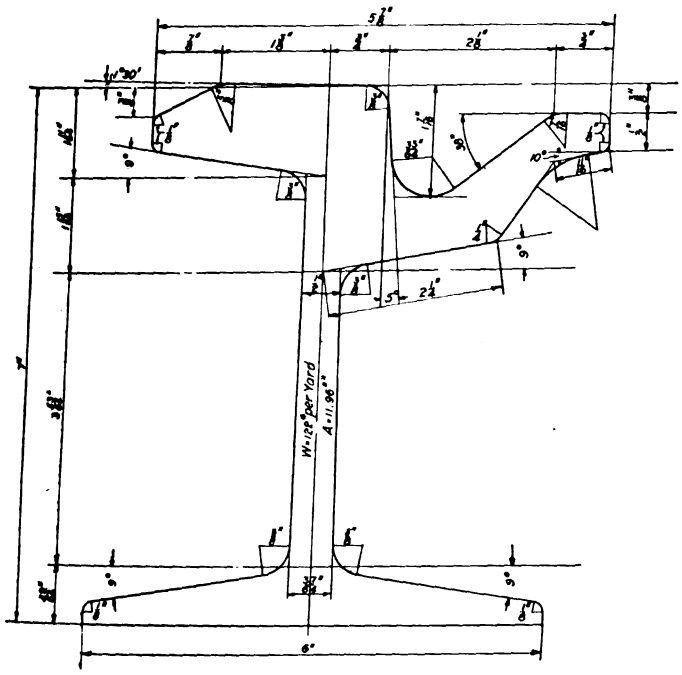
REPORT OF THE COMMITTEE ON WAY MATTERS*

J. M. LARNED, CHAIRMAN; C. S. KIMBALL, H. F. MERKER, E. P. ROUNDEY, C. H. CLARK, E. H. BERRY, C. W. GENNETT, JR., R. F. KELKER, JR., J. D. EVANS

It has been the aim of the committee to obtain information regarding modern rail fastenings used on track, where the heaviest types of electric locomotives are operated and where the traffic is fast and frequent. In the New York Central & Hudson River Railroad Company's electric zone 100-lb. rails are used exclusively, the joint plates consisting of 36-in. angle bars with six ⅞-in. bolts 4⅜ in. long. Two shoulder tie plates are used on every tie, on both tangents and curves, four track spikes being used with every tie plate. The spikes are standard, 5½ in. by ⅝ in., of both the chisel and Goldie types, and the plates are at least ⅜ in. thick

On the New York, New Haven & Hartford Railroad Company's electric zone the rails are 6 in. high and weigh 100 lb. to the yard. The joint fastenings consist of four-hole angle bars 24 in. long with four ⅞-in. standard track bolts,



Section of 7-in. Girder-Grooved Rail

4¾ in. long. Two shoulder tie plates are used on every tie, both on tangents and curves, and four ⅞-in. screw spikes are used with each tie plate on curves and two screw spikes on tangents. It was formerly the practice of this road to use rail braces on curves, but at the present time no rail braces are used, the shoulder tie plate serving to take their place.

From the above descriptions it will be seen that these companies are providing against excessive mechanical wear of their ties in the electric zones and have doubled the number of spikes per tie to guard against spreading track, it being generally conceded that the electric locomotive with its lower center of gravity exerts a greater outward pressure on the rails than the steam locomotive.

SPECIFICATIONS FOR SPLICE BARS

The committee had several meetings with a committee of the American Society for Testing Materials, but cannot recommend any of these specifications for girder-rail work, as in the matter of tolerance a vertical camber is permitted in the center 1/16 in. high in 24 in., and it is not specified that if there is any variation from the straight line in a horizontal plane it shall be such as to make the bars engage the rail first at the juncture of the rail ends. The committee believes that the permissible vertical camber should not exceed 1/32 in. in 24 in., high in the center, and that it is essential, if there should be any variation from a straight line in a horizontal plane, that it should be such as to engage the rails first at their ends where the greatest wear takes place and an accurate fit is of prime importance.

The committee, therefore, presents specifications covering two grades of steel for girder rail splice bars, one moderately soft which may be used in the various patented joints now in use, as well as with the softer grades of steel rail, and the other quite hard and more suitable for use with the high-carbon rails which are rapidly coming into such general demand.

SPECIFICATIONS FOR GIRDER-GROOVED AND GIRDER-GUARD RAILS

The committee submits new designs for 7-in. and 9-in. girder-grooved and girder-guard rails which differ in some respects from those submitted by the committees of 1911 and 1912. The principal changes in the 9-in. girder-grooved rail included a decrease in weight from 140 lb. per yard to 134 lb. per yard; lowering the under surface of the tram at the fishing surface 3/16 in. and at the same time deepening the groove 1/16 in., thereby increasing the thickness of the tram ⅛ in.; increasing the radius of top fillet at gage side of head from ¼ in. to ⅜ in. to reduce the flow of metal over the side, and to reduce the wear on the fillet of the wheel flange; decreasing the thickness of the web at the base from ¾ in. to ⅝ in. principally to effect reduction in weight; decreasing the thickness and width of base principally to effect a reduction in weight, as in any event a rail having a 6½ in. base would require tie plates on wooden ties under heavy service; changing the fishing angle from 10 deg. to 9 deg. to enable the proposed section to fish with certain other sections now being rolled. The 7-in. girder-grooved rail has been designed along the same lines as the 9-in. rail, the width of base not being affected by the depth in respect to wear upon it and upon the structure immediately supporting it.

In the 7-in. and 9-in. girder-guard rails the slope at the guard side of the groove conforms practically to that required for a standard wheel flange with a 6-ft. wheelbase upon a curve of from 40-ft. to 50-ft radius. The width of the groove has been changed from 1 9/16 in. to 1 1/16 in. There will, therefore, be less widening of groove required upon sharp radius curves. This width will pass an M.C.B. wheel flange with very little alteration, if any, on curves of 125-ft. radius and upward. Guard rails L.S.Co. 441 and P.S.Co. 283 conform very closely with the proposed standard 9-in. guard rail and fish exactly with it, as also with the proposed standard groove rail, and either may acceptably be substituted for the standard, so that mills would not be required to carry in stock standard 9-in. guard rails until such time as the increased use of the straight line rail developed that necessity.

The committee also presented designs for joint plates for 7-in. and 9-in. girder-grooved and girder-guard rail which, however, did not include size or spacing of bolts or their accuracy of fit. These were submitted as recommended practice.

APPENDICES

Accompanying the report as Appendices A, B and C were specifications for splice bars for girders and high T-rails, revised specifications for open-hearth steel girder and high T-rails, and a brief discussion on the use of T-rail in paved streets.

RECOMMENDATIONS OF THE COMMITTEE

The following were recommended by the committee on way matters for adoption as standard:

Nine-inch girder-grooved rail.
Nine-inch girder-guard rail.
Seven-inch girder-grooved rail.
Seven-inch girder-guard rail.

*Abstract of a report read before the American Electric Railway Engineering Association, at Atlantic City, N. J., Oct. 13-17, 1913.

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The following were submitted for adoption as recommended practice by the association:

Specification for splice bars.

Revised specification for open-hearth girder and high T-rails.

Design for joint plates for 9-in. girder rails.

Design for joint plates for 7-in. girder.

All of these above recommendations were approved by the committee on standards with the understanding that the new designs and specifications should supersede previous ones adopted as recommended practice of the association.

REPORT OF THE JOINT COMMITTEE ON ENGINEERING ACCOUNTING*

BY F. B. LASHER AND J. H. HANNA, CO-CHAIRMEN; J. A. M'GOWAN, H. H. ADAMS, J. M. JOEL, E. O. ACKERMAN, J. C. COLLINS, JOHN SIBBALD, M. W. CLOVER AND GEORGE WESTON

Of the sixteen replies received from the letters sent out three companies made interdepartmental and overhead charges, and they varied in amounts from 10 per cent to 110 per cent.

It appears that the companies deemed it inadvisable to make overhead charges for interdepartmental transactions, and in the opinion of the committee this is a matter which must, in each case, be governed by local conditions and the committee does not feel justified in making any recommendations.

With regard to the matter of covering overhead expenses on construction work done by companies, the committee is of the opinion that some definite means or rules for arriving at such charges should be determined. The matter is, however, under consideration by a special committee of the Accountants' Association.

COST ACCOUNTING

In connection with a detail system of cost accounting on an electric railway property the following elements are essential:

A detail system of cost accounting must necessarily vary in detail to suit the conditions of the property to which it is applied. There are, however, certain underlying principles which must be recognized in the establishment. The use of any such system of accounting must be common to all properties, and to be of direct practical benefit the system must possess flexibility, accuracy and utility.

Flexibility can be secured only by the closest co-operation between the accounting and engineering departments, and to accomplish this end it is necessary that the classification of work by jobs be such as to serve the necessities and conveniences of the engineering department without placing any unnecessary burden upon the accounting department. The reports should be in such form as to show the essential information at a glance and all unnecessary or immaterial detail should be excluded while the book records showing full detail should be available to the engineering department at all times.

Original records consisting of time cards covering the labor and requisitions on the storekeeper for material should show sufficient detail to serve as the basis for any one of several different classifications. For example, the time card should show enough detail to permit a distribution by accounts as well as job numbers, at the same time serving as the basis for the payroll.

It is better for the sake of uniformity to put all material purchased through a material and supplies account so that all distribution will be handled in the same way.

Under the job order system a number is assigned to each particular job whether it be special or general in character. A group of numbers may be assigned to those operations which are repeated at frequent intervals and maintained throughout the year as running job orders. All special jobs, such as the overhaul of some particular car or the replacement of some particular piece of special work, can be covered by a job number which will be closed when the work is completed.

To insure accuracy of the accounts all original records should bear the approval of the responsible person directly in charge of the work, countersigned when possible by the head of the department under whose direction the work is being done.

Original forms should be of so simple a nature as to permit so far as possible the making of the original record by the man who actually did the work or the sub-foreman directly in charge.

The system should be so designed that reports may be had by the engineering department at intervals frequent enough to meet its requirements and render possible the cost comparison between estimates and actual performance. It is frequently advisable on jobs where this feature is particularly important to render statements monthly or weekly for brief periods of time until the general trend of costs has been thoroughly analyzed. The value of such a system of cost accounting is inestimable when considered as a basis for estimates of proposed work and may profitably be reduced to unit costs for this purpose.

To call attention again to the matter of co-operation on the part of both the accounting and engineering departments, which must be full and complete on both sides in order to obtain the fullest measure of success and benefit of such a system of detail accounting, the engineering department should advise the accounting department as soon as a particular form of report or summary of detail has served the purpose for which it was intended and authorize its discontinuance at once.

IS TIMEKEEPING DONE BY THE ENGINEERING OR ACCOUNTING DEPARTMENT?

From the replies received in regard to this question, it is evident that there is a wide diversity of practice. In the majority of cases the timekeeping is done by the department doing the work. There are objections to this practice due to the fact that a complete audit by the accounting department should cover all work in connection with the preparation of pay rolls. It seems to the committee, however, that this would naturally be controlled by expediency and local conditions.

CONCLUSION

The committee desires to refer to its report of 1912 regarding the subdivision of the maintenance of equipment accounts, and urges the committee on a standard classification of accounts to give its favorable action on the recommendation as outlined therein, at the earliest possible moment.

MEMORANDUM FURNISHED BY PORTLAND (ORE.) RAILWAY LIGHT & POWER COMPANY

As an appendix to the report the committee included a memorandum received from the Portland (Ore.) Railway, Light & Power Company, which described the practices of that company in the directions covered by the report of the committee.

According to this memorandum, a company doing only about $2,500,000 worth of construction work a year and with an operating expense of $700,000 per year could very well handle the work of cost keeping and efficiency records with the following force at an expense of $950 per month: One cost engineer, one chief clerk, one general timekeeper, two cost clerks, one inventory clerk, two estimate clerks, one follow-up clerk, one special investigation clerk and one office boy.

*Abstract of a report read before the American Electric Railway Accountants' and Engineering Associations, Atlantic City, N. J., Oct. 13-17, 1913.

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REGULATIONS ON SANITATION AS RELATED TO PUBLIC CARRIERS*

BY W. C. RUCKER, M. S., M. D., ASSISTANT SURGEON GENERAL UNITED STATES PUBLIC HEALTH SERVICE

The relationship between commerce and the spread of communicable disease has long been recognized, and in 1348 the city of Venice established a so-called "Board of Supervisors" which laid down a set of hygienic rules which were afterward adopted by many other European ports for the purpose of protecting themselves against invasion of epidemic disease. These rules were based upon the assumption that in times of pestilence safety lay only in non-intercourse or in commercial intercourse after a period of detention. This period was arbitrarily fixed at forty (quarante) days; hence our word quarantine.

This method did indeed protect many cities, but it was frequently quite as disastrous to commercial interests as an epidemic of the disease itself would have been, and in many cases the cure, from a financial point of view, was quite as bad as the disease itself. The method of control of the spread of disease by non-intercourse remained in practice, however, for many years, and it was not until the investigations of modern science determined the causative factors in epidemic disease and the exact mechanism of their spread that its harshness was abated.

With regard to ships, the application of this knowledge has turned the attention of sanitarians away from the cargo and the ballast, and has focused it upon the living things on board. The idea of dead things as the spreaders of disease is being relegated to the past, and ballast is no longer laboriously dipped in bichloride solutions in the hope of killing the miasmata which were one time believed to be clinging to it. Neither is the cargo fumigated in the rigorous manner of former days with the idea of killing the diseases believed to be lurking in it. Nowadays ships are fumigated to kill rats and mosquitoes and the human cargo is subjected to close scrutiny in order that chronic cholera carriers and other persons afflicted with communicable disease may be excluded.

The control of the spread of disease by trains is much more difficult and complex. The exact role which they play in the carriage of plague-stricken animals is difficult to determine, and it is doubtful if it can ever be definitely known under just what conditions and to what extent railroad trains may carry and distribute rats and mosquitoes. It has been thought that the railroads played a certain part in the spread of plague in California, and it is true that in the single case which occurred in Los Angeles the sufferer probably received the disease from an infected squirrel which was afterward found in the railroad yards. It is conceivable that both rats and ground squirrels, particularly the former, might gain access to freight-laden cars and thus be transported many miles, and in time of plague goods which originate in rodent-free surroundings and which are afterward protected against invasion by rodents and shipped in rodent-free cars may be regarded as harmless agents so far as the dissemination of plague is concerned. This plan was evolved by Surgeon General Rupert Blue, head of the United States Public Health Service, during his memorable work in San Francisco, and for the first time in the history of the world a plague-stricken city was able to continue its trade relations without danger to the outside world.

In the spread of yellow fever the three factors necessary are a patient in the first three days of the disease, the striped-legged mosquito and a non-immune population. This is a disease in the spread of which common carriers play an enormous role. During the yellow fever epidemic of 1905 the trade relations of the city of New Orleans continued undisturbed, the only precautions taken being the prevention of the shipment of mosquitoes and of persons having the disease—simple, inexpensive, effectual.

Satisfactory as has been the solution of the transportation problems of plague and yellow fever, it must be admitted that the result cannot be viewed with such complacency in the case of smallpox. There is, however, an absolute preventive for the disease, and if anybody prefers the disease to the protection, he certainly should be allowed the privilege.

A class of traveler should be mentioned which in my opinion plays a great and unrecognized role in disease spread. I refer to the undisciplined, careless or malicious vagabond who rides on the trucks. The control of the tramp will one day be recognized as a protection to public health as well as a commercial safeguard.

The common carrier bears a more complex relation to the spread of disease, however, than the mere carriage of diseased men and animals. In the first place, the carriage of diseased persons must be regulated in such a manner that fellow passangers may not be exposed to the disease, and, secondly, in such a way that persons living along the route traveled by the carrier shall take no harm. As an example of the first class may be cited the transportation of lepers. Leprosy is a communicable disease against which the general public has the greatest horror and antipathy, yet a leper was transported from Minnesota to the State of Washington several months ago without exposing a single person to the slightest danger, by the exercise of proper precautions.

The control of the migration of tuberculous persons is not by any means entirely in the hands of the common carrier, and the solution of this problem will not come until the education of the general public develops a sanitary conscience, so that persons who know they have tuberculosis will not wittingly expose other persons to the disease. It has been proposed that the transportation lines plying between the East and West and which annually carry large numbers of tuberculous persons to health resorts run either tuberculosis trains or special tuberculosis cars at stated intervals. This would indeed be a safeguard, but thus far the transportation companies have not deemed this scheme feasible.

The relation which the general government bears to the sanitary regulation of common carriers is the prevention of the interstate spread of disease, and the Secretary of the Treasury has promulgated rules bearing upon the transportation of lepers, the common roller towel, the common drinking cup and the purity of water and ice furnished to passengers in interstate traffic. It would seem at first glance as though the enforcement of these regulations would entail an enormous amount of energy and perseverance. As a matter of fact, the bulk of the common carriers have obeyed them readily. In some instances they have gone much further than the law requires, even to the extent of spending thousands of dollars for the purpose of installing water coolers in which the ice and water do not come in contact. In several instances the railroads have established laboratories for the purpose of making periodic examinations of the ice and water which they use, feeling that the added security which was afforded their passengers in this way was well worth the cost of installation and operation of such a laboratory.

About eighteen months ago Surgeon-General Rupert Blue issued orders that all of his officers traveling on official duty should make a quiet inspection of the common carrier on which they were traveling. The readiness with which suggestions based on these reports have been received and the promptness with which they have been acted

*Abstract of a paper read before the American Electric Railway Association, at Atlantic City, N. J., Oct. 13-17, 1913.

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upon speak well for the spirit of the transportation men of this country.

There is still another problem which remains unsolved, and that is the question of track pollution. The amount of human excrement which is being scattered along the thousands of miles of rights-of-ways in this country is appalling, and almost everyone who has looked into this subject admits the possibilities of the spread of infectious disease in this way. There are several patented devices for the holding of excrement from railway coaches. They do not seem to be in general operation, however, nor is their practicability proved beyond question. This is a matter of great interest to the federal Bureau of Public Health, and it is hoped that the inventive genius of this country will bring forth the mechanical solution of this important problem.

The question of the sanitation of waiting rooms is quite as important as that of vehicles, and it is another place where the general public could and should help. It is believed that the posting of proper notices might assist in this regard.

Finally let it be said that the sanitation of common carriers is, after all, a matter of economic consideration. A healthy people produce, buy, sell and travel, all of which operations mean increased revenue for the common carrier. The common carrier which shows its patrons that it is really interested in their welfare is the one which gets the patronage. The transportation interests of this country are looking at the health movement from a business standpoint, therefore the American common carriers lead the world in sanitary matters.

REPORT OF THE COMMITTEE ON TRAINING TRANSPORTATION EMPLOYEES*

C. B. WELLS, CHAIRMAN; C. E. LEARNED, J. T. CRABBS, BRUCE CAMERON, E. E. STRONG, H. A. DAVIS

In part the collective views of the committee on matters which are believed to be involved in a comprehensive treatment of the general subject include the necessity for establishing avenues of promotion from platform men to subordinate offices which are clearly defined and, other things being equal, are adhered to without exception. Working conditions should be permanently established in printed form to cover hours of duty and rest, which are based upon the requirements of local conditions as to service required during the different hours of the day, these to be adjusted to the best possible advantage of the men; maximum length of swing, which should not be excessive and should be definitely fixed and adhered to except under compelling emergency; reporting and clearing time, which should be established on a reasonable basis and time thus consumed paid for at hourly rates, and recognition of seniority in selection of work.

In the treatment of employees it is desirable to establish a system of discipline which provides for a complete history of performance, forming the basis of disciplinary award, equality of treatment, firmness, fairness and justice. It is also desirable to establish between company and employees a policy of welfare work which will provide for pensions, sick benefits, accident benefits, medical attendance, hospital service, loan and savings institutions, restaurants, club rooms and supply depots.

TRAINING OF EMPLOYEES

In the selection of platform employees, the physical examination should be sufficiently rigid to insure rejection of those possessing disqualifying defects. The rules covering mental and moral qualifications should be sufficient to meet the requirements of the position, and by investigation of references, reputation and standing with previous employers should be established. For subordinate officials the selection should be based on written examination, operating record, seniority (other things being equal), and general appearance and deportment.

CONCLUSIONS

The committee summarizes its conclusions as follows:

The variety of existing practices, not all of which can approximate correctness, indicates irregularity in adherence to any set of fixed principles. Standardization is logical, desirable and necessary, and this can be accomplished only by first agreeing upon what constitute fundamental principles. Having agreed, introspection will enable each company to determine wherein its practices are at variance with the methods set forth.

Referring briefly to the subject of paying for breaking-in time, it is the sense of your committee that to do so would be fundamentally wrong in principle. In classes of industry where beginners are paid at a low rate, some compensation is received by the employer by reason of the effort expended. During the training period of conductors and motormen the employing company receives absolutely no benefit from their labor. Frequently their presence upon a car becomes a burden and greatly hampers the work of instructing trainmen. This disadvantage is further augmented by the cost of their schooling. As a concrete example in support of our contention, no firm would employ a stenographer or bookkeeper unless the applicant possessed the necessary qualifications, which must previously have been acquired in his own time and at his own expense.

Touching the matter of establishing a minimum rate of pay for extra men, it is the opinion of your committee that owing to the wide variance of practice among railway properties due to locality and general working conditions, no recommendation which would meet the approval of all its members could be made at this time.

*Abstract of report read before the American Electric Railway Transportation & Traffic Association, at Atlantic City, N. J., Oct. 13-17, 1913.

ELECTION OF OFFICERS OF MANUFACTURERS' ASSOCIATION

A meeting of the new executive committee of the Manufacturers' Association was held yesterday morning at the Marlborough-Blenheim to elect officers for the ensuing year. Those in attendance included the five new members of the executive committee elected Wednesday. At the meeting the following were elected:

President, Cornell S. Hawley, Laconia Car Company.

Vice-president in charge of exhibits, E. H. Baker, Galena-Signal Oil Company.

Vice-president in charge of finance, S. K. Colby, Allen & Peck, Inc.

Vice-president in charge of entertainment, Charles R. Ellicott, Westinghouse Traction Brake Company.

Vice-president in charge of relations with the parent association, William L. Conwell, Transportation Utilities Company.

Secretary and treasurer, H. G. McConnaughy, Dearborn Chemical Company.

At the same meeting Thomas Finigan, Pierson, Roeding & Company, was appointed chairman of a sub-committee which will be organized in San Francisco to take charge of any arrangements which will have to be made in connection with the meeting of the association in that city in 1915.

A committee was also appointed to draft resolutions to be presented to Past-president William H. Heulings, Jr., expressing the high opinion of the association of the faithful and conscientious services which he rendered during his term of office as president. These resolutions will be suitably engrossed and presented to Mr. Heulings.

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REPORT OF THE COMMITTEE ON JOINT USE OF POLES*

W. J. HARVIE, CHAIRMAN; ALBERT S. RICHEY, FARLEY OSGOOD, CHAS. L. HENRY, PERCY H. THOMAS, W. S. TWINNING, F. B. H. PAINE, N. T. WILCOX, W. T. OVIATT; F. H. BETHEL, CONFEREE

The report consists of two sections, of which one, Appendix A, is an agreement form, dealing with all of the questions which might arise in connection with the joint use of a pole line by two or more companies. In the treatment of the subject of joint ownership so many debatable questions arose that it was thought best to develop a satisfactory agreement, omitting those clauses which have to do exclusively with the matter of divided ownership. The agreement section of the present report, therefore, provided only for joint use on a rental basis.

The second section of the report, Appendix B, consists of a specification for the use of companies entering into the joint use agreement above mentioned, and includes definite and complete descriptive matter treating of the location of attachments, etc., arranged and indexed in convenient form. Following the descriptive matter are illustrative drawings showing graphically the arrangement called for in the specifications. The specifications are applicable to joint use on either a rental or joint ownership basis. The committee and its conferees gave no small amount of attention to making the agreement and specification such that the joint occupancy of poles would prove not only feasible but advantageous.

The committee recommends that the agreement be adopted as a standard of the American Electric Railway Association, and that the secretary be instructed to advise the National Electric Light Association and the American Institute of Electrical Engineers of the action taken by this association, and that a standing committee be appointed, whose duty it shall be to revise this agreement from time to time as may become necessary, and to which shall be referred all inquiries, criticisms or suggestions, until such time as its services shall be unnecessary.

*Abstract of a paper read before the American Electric Railway Association, at Atlantic City, N. J., Oct. 13-17, 1913.

APPENDICES

APPENDIX A—AGREEMENT COVERING THE JOINT USE OF POLES ON RENTAL BASIS

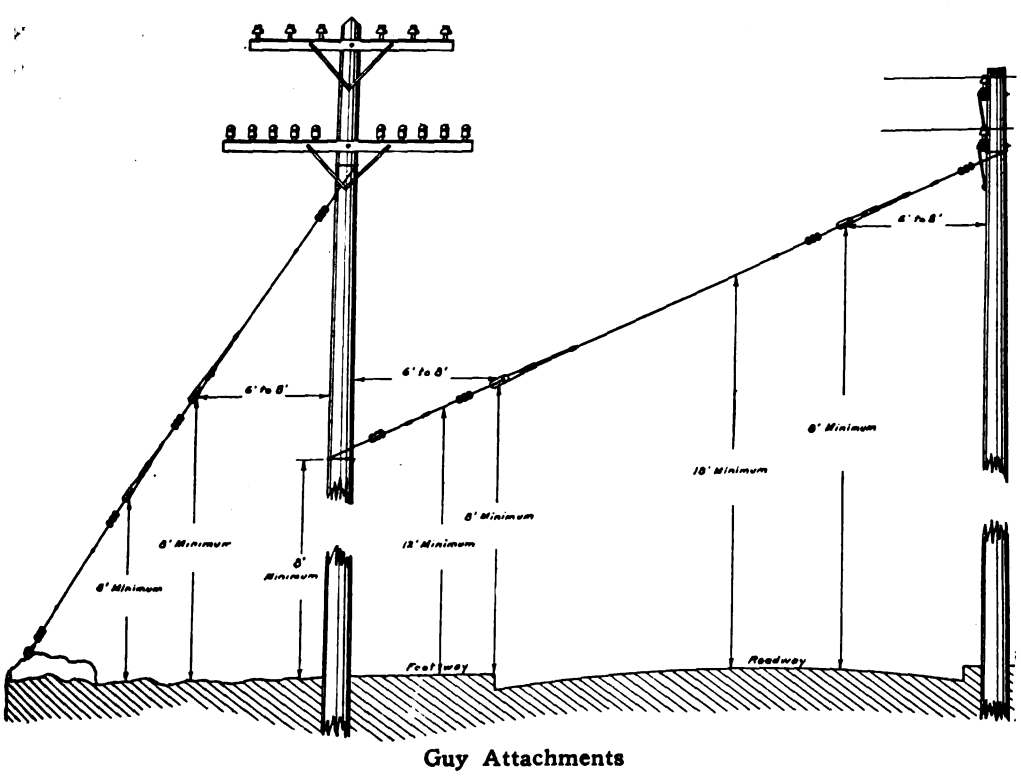
For the purpose of this agreement the following terms when used herein shall have the following meanings: Attachments shall be held to include all wires and apparatus or fixtures used on the poles. The Licensor is a party having sole ownership, or collectively the parties having joint ownership, of a pole jointly used with the Licensee, who is any party making joint use of a pole of a Licensor. Transferring is the moving of attachments from one pole to another. Rearranging is the modification or relocation on a pole of attachments thereon to bring them into conformity with the specifications. Transferring and rearranging each includes the expense of the necessary tree cutting or trimming due to the changed position of the attachments, and of obtaining the necessary rights therefor.

If any Licensee desires to place attachments upon a pole which is of sufficient size and strength for the existing attachments thereon but not for such existing attachments and the proposed attachments, then before placing its proposed attachments, the Licensee shall replace the pole with a new one of such size and strength and with such guys, and make such necessary changes in the existing pole line, as the Licensor may deem proper.

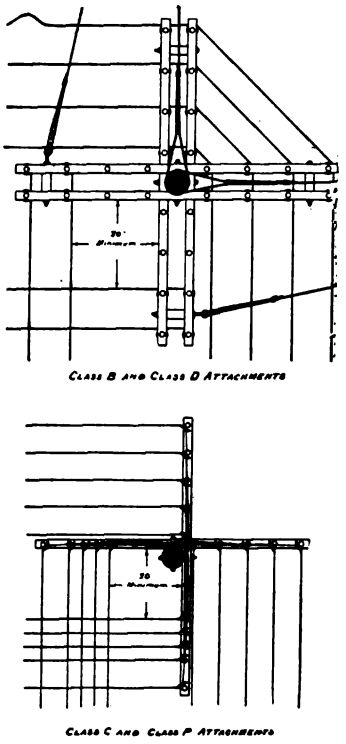
If the Licensor at any time desires to place additional attachments upon any pole jointly used with any Licensee which is not of sufficient size or strength, the Licensee shall either replace such pole or remove from such pole sufficient attachments to provide the space required for such additional attachments of the Licensor.

Such new pole or poles erected as provided in this section shall be the property of the Licensor, and the cost and expense of such new pole or poles and the erection thereof and the transferring of attachments incident thereto shall be borne by the Licensor and the Licensee respectively in such proportions as are equitable and fair; or in case of disagreement, adjusted by arbitration.

If the placing of attachments of the Licensee makes it necessary for the Licensor to rearrange its attachments, the Licensee shall bear the cost thereof, except that the Licensor



Guy Attachments



Reverse Work

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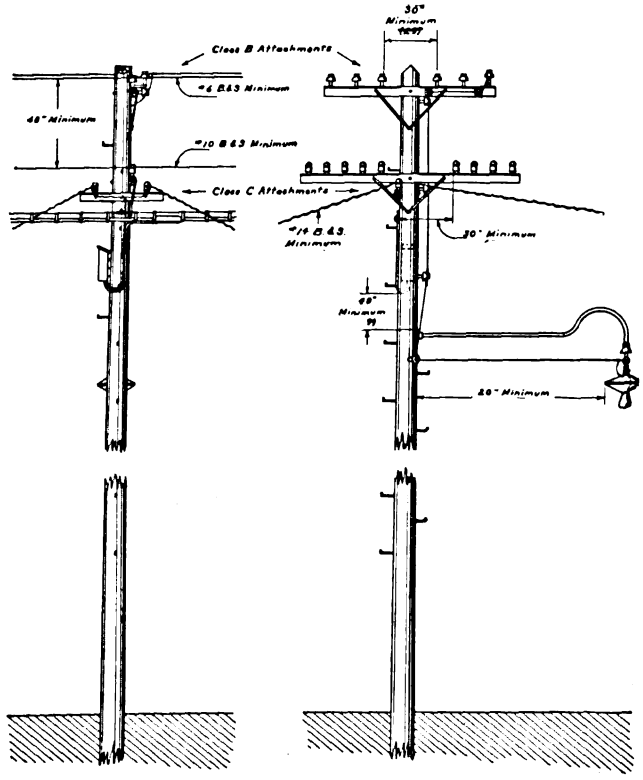
shall at his own expense rearrange any attachments not in accordance with the specifications. If the placing of such attachments of the Licensee makes it necessary for any occupant of such pole other than a Licensor to rearrange its attachments, the cost thereof shall be borne by such occupant.

The Licensor shall maintain its poles and guys and replace such as become defective without expense to any Licensee thereon.

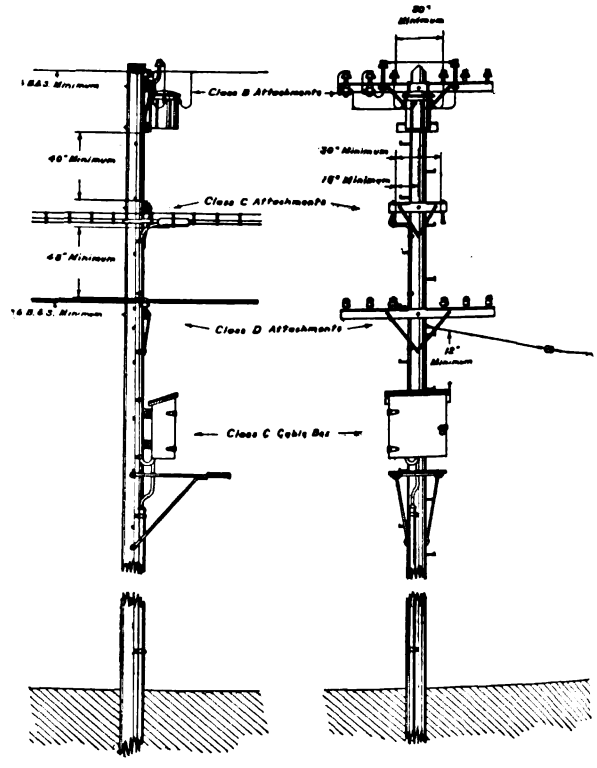
If the Licensor abandons the use of any jointly used pole the Licensees shall have the option of purchasing such pole, the price and the terms of payment to be fixed by agreement or arbitration, or of removing its or their attachments therefrom.

Each Licensee shall pay rental to the Licensor at the agreed rates per annum for its attachments. No rental shall be charged for crossarms or other fixtures to support wires or cables, guys, ground wires, distributing wires, connecting wires, or cables on a pole and connected to wires or cables for which attachment rental is paid on the same pole.

If, by reason of any State, municipal or other public regulation, the joint use of any pole makes necessary the use of any special construction or reconstruction differing in the specifications the cost and expense of installing such special construction or of making such changes shall be borne by the Licensor and the Licensee respectively in such proportions as are equitable and fair, to be agreed upon by them or adjusted by arbitration. Each party shall do the work of placing, maintaining, transferring or rearranging its own attachments.



Positions for Class B and Class C Attachments



Positions for Class B, Class C and Class D Attachments

Each party hereto shall assume the entire liability for damages to its own property and for injuries to its employees or their property and shall have exclusive control of all settlements by compromise, action at law, or otherwise, which may arise from accidents to its employees or their property.

All claims for damages arising from injuries to persons not in the employ of any party hereto or to property not belonging to any of the parties hereto or their employees shall be acted upon and managed by all the parties jointly. If any such claim can be compromised by settlement out of court before or after suit is brought, and one of the parties shall desire to make settlement, said party upon payment to the other party or parties of the sum of money which would be its proportionate share of such settlement, if all parties had agreed thereto, shall be relieved from all liability which may arise thereafter from such claim, and the party or parties to whom such payment is made shall thereupon assume the entire liability for such claim and shall save said party harmless from any loss, cost or charge by reason thereof.

ARBITRATION

Earnest effort shall be made by the parties, or persons designated by them, to settle all controversies, but in case any two or more of the parties to this contract disagree, each of such parties, upon written notice and request from one or more of the others, shall, within ten days, name an arbitrator and the arbitrators thus named shall within ten days name an additional arbitrator or such additional arbitrators as may be necessary to make the entire number an odd number. To the arbitrators thus selected the question in controversy shall be promptly submitted and the decision of a majority of the arbitrators shall be final and conclusive on all. Provided, however, that such finding may be reviewed by any court of competent jurisdiction on proper application by any parties to the arbitration. The expense of such arbitration, including the compensation of the arbitrators, shall be borne equally by the said parties.

APPENDIX B—SPECIFICATION FOR JOINT USE OF WOODEN POLES

Attachments are classified in these specifications by the character and the operating voltage of the circuits as follows:

Class A covers constant potential attachments exceeding 2500 volts when one side is grounded and exceeding 5000 volts when neither side is grounded. Trolley contact wires are excepted from this class.

Class B covers constant potential attachments of less volt-

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age than the foregoing and in addition includes constant current series lines. It excludes trolley contact wires.

Class C attachments include telephone, telegraph, district messenger, burglar alarm, fire or police alarm, and similar attachments, except those included in Class P.

Class D attachments include constant potential lines, one side grounded, not exceeding 2500 volts. Trolley contact wires of all voltages are, however, included in this class.

Class P attachments include telephone, telegraph or other signaling attachments, not exceeding 250 volts, used by the owners or operators of Class A, B or D attachments and not available for the use of the public.

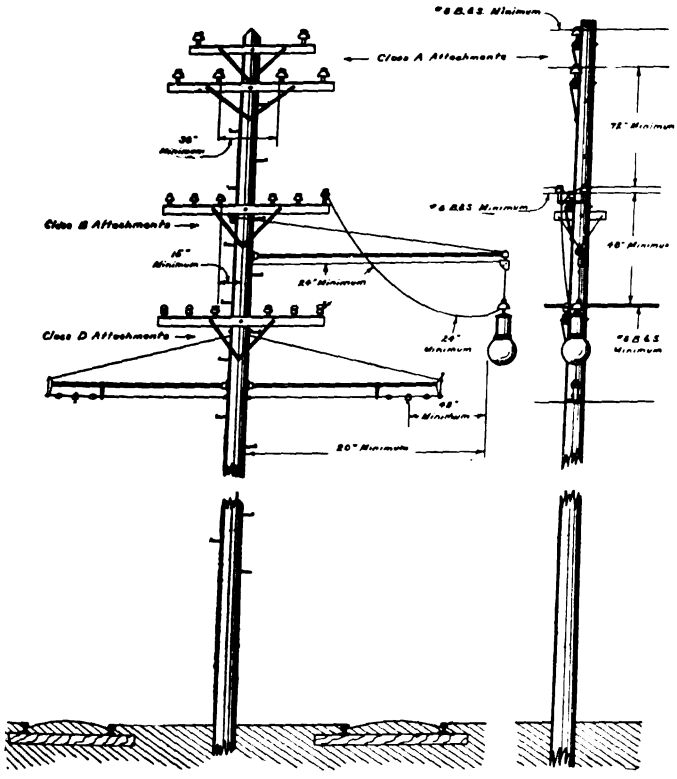
The positions of the different classes on the pole and the minimum sizes of wire are shown in the accompanying illustrations subject to the following limitations:

All single line crossarms shall be attached upon the face of the pole. Line wires shall not be carried on pole brackets but shall be carried on insulators and pins on wooden crossarms.

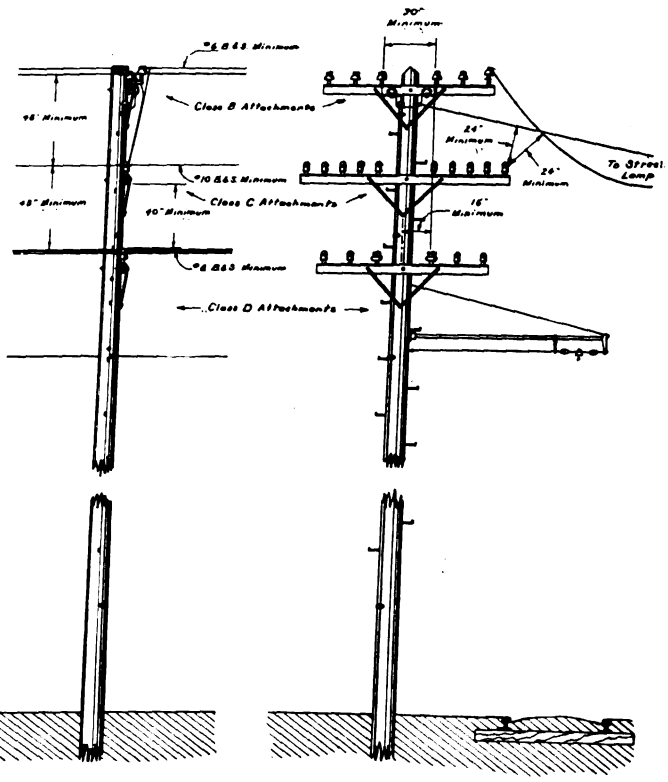
Open wire on insulators shall be carried down the pole taut and fastened upon standard insulators, which shall be supported upon pins or brackets so located and maintained that the conductors will be firmly held at a distance of not less than 5 in. from the surface of the pole.

Ground wires may be of bare wire but shall be inclosed within a conduit of solid insulating material throughout their entire vertical length, except that, within 8 ft. of the ground, iron pipe may be used. Such pipe or conduit shall be securely attached to the pole.

Transformers, signal and cable boxes, switches, cut-outs, and similar apparatus may be installed on the pole at a convenient height for operation, provided they do not interfere with climbing the pole and with the location of attachments. Where apparatus of this character is located upon a pole below other attachments and within a horizontal distance of 20 in. from the center of the pole, it shall be placed upon the face of the pole or crossarm, except that



Positions for Class A, Class B and Class C Attachments



Positions for Class B, Class C and Class D Attachments

Wherever practicable the spacing of line poles shall not exceed 125 ft.

Excepting Class A wires, connections to wires or apparatus upon a pole may be run laterally across the pole provided that the wires crossing the pole shall have standard rubber insulation (or its equivalent) and braided covering, shall be run horizontally along their respective crossarms, and shall, except in the case of Class C or Class P wires, be carried on insulators on pins or brackets on the face of the crossarm and at least 6 in. away from the crossarm. Class C or Class P lateral wires may be attached either to the under side or face of the crossarm.

No Class A wires shall be run through the climbing space. All vertical wires and cables shall be placed upon the semicircumference of the face of the pole. Vertical wires and cables shall be run behind the crossarms. Poles with vertical wires or cables shall be furnished with pole steps. Conductors shall have an insulation consisting of a standard rubber compound or its equivalent.

For vertical runs of two Class B wires of the same circuit, twin conductor wire or cable shall be employed.

small Class C or Class P distributing terminals may be placed on the back of the pole. Where a transformer comes within a horizontal distance of 20 in. from the center of the pole, and is less than 6 ft. below other attachments, there shall be firmly fastened to the pole, immediately above the transformer but not in contact therewith, a wooden cover, capable of bearing 300 lb., which shall prevent any one from stepping or standing upon the transformer.

No fixture or any of its metal parts shall encircle the pole. These must be restricted either to the face of the pole or to one-half of the pole. Span wires shall be attached by bolts passing through the pole. Every railway span wire and bracket shall be insulated from the railway potential, and, in addition, a strain insulator shall be placed in each span wire on each side of the trolley wire in the suspension wire of every trolley bracket.

Every guy which passes over or under any electric wires other than those carried upon the guyed pole shall, wherever practicable, be so placed and maintained as to provide at all times a clearness of not less than 2 ft. between the guy and such electric wires.

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THE PRESENT TENDENCY OF PUBLIC SERVICE REGULATION*

BY RICHARD M'CULLOCH, VICE-PRESIDENT AND ASSISTANT GENERAL MANAGER UNITED RAILWAYS OF ST. LOUIS

The first state to establish control of public utilities was Massachusetts, which, in 1885, placed its gas and electric light companies under the jurisdiction of the State Gas Commission. Other public utilities in this State were regulated by different commissions until July 1, 1913, when street and interurban electric railways, as well as gas, electric light and water companies, were placed under the jurisdiction of the new Public Utility Commission.

In 1907 New York and Wisconsin placed all of their public utilities under the control of State commissions and gave these commissions what were then considered the widest and most arbitrary powers. Vermont followed in 1908, and Maryland in 1910.

The laws of New York and Wisconsin serving as models, in 1911 public utility commissions were established in New Jersey, New Hampshire, Kansas, Oregon, Ohio, Washington, Nevada, Connecticut and California. Rhode Island followed in 1912.

In 1913 an epidemic of regulation seemed to be prevalent, and during that year public utility commissions were established in Missouri, Indiana, Pennsylvania, Maine, West Virginia, Illinois, Idaho, Montana and Colorado.

At present twenty-four States have public utility commissions, and in this number we do not include those States having railroad and warehouse commissions having jurisdiction only over steam railroads, nor do we include the municipal commissions, some of which have been later replaced by State commissions. Neither do we include corporation commissions exercising some of the functions of public utility commissions. Corporation commissions exist in Oklahoma, Arizona, New Mexico, North Carolina and Virginia.

MUNICIPAL COMMISSIONS

Municipal commissions have been established at various times in Washington, D. C., Wilmington, Los Angeles, St. Louis, Kansas City, St. Joseph and Denver. The Board of Supervising Engineers in Chicago, appointed to carry out the provisions of the rehabilitation ordinance, exercised some of the functions of a municipal commission. The Public Service Commission of New York, First District, although deriving its powers from the State, is to all intents and purposes a municipal commission, as its jurisdiction extends only over Greater New York.

In this connection it may be stated that where municipal control through a commission already existed municipalities have not welcomed the advent of State commissions.

A municipal commission is too close to the seat of contention to exercise a fair and impartial judgment. It is too apt to be swayed by unreasonable public clamor, newspaper attacks and personal grievances which interfere with the broad view of the situation necessary for a finding based on the rights of the public, while taking into account also the rights of the utility. A municipal commission also, for the lack of something to do, is apt to interfere unnecessarily in the operating details of the business and attempt to become manager instead of regulator.

ILLINOIS PUBLIC UTILITY LAW

The general tendency of public utility laws is indicated in the Illinois law passed during the spring of this year. As expressed by a writer in the Electric Railway Journal, "It aims to give power to regulate and to surround that power with various protective measures which shall make it easy for the regulators to regulate and hard for the regulated to object to any act which inexperienced commissioners may do."

* Abstract of a paper read before the American Electric Railway Association, Atlantic City, N. J., Oct. 13 to 17, 1913.

CALIFORNIA PUBLIC UTILITY LAW

In the California public utility law it is stipulated that existing powers of control vested in any city or county shall not be disturbed, but the city or county may by majority vote surrender such powers to the State commission. In case any city or county is not satisfied with State control it may by majority vote reinvest itself with control of utilities. In other words, in the State of California, municipal or state control of public utilities is optional with each municipality.

TENDENCY OF COMMISSIONS IN FINANCIAL MATTERS

With few exceptions, the public utility laws provide for control of capital security issues, providing for the sale of stock at par and authorizing the commission to require bonds to be sold at a discount which is established in each case by the commission. This regulation adds to the difficulty of financing a public utility, as the price may be set too high or so much time may have been consumed in the investigation that the favorable moment for the sale of the securities may have passed.

Stock without nominal or par value, which was strongly recommended by the National Railroad Securities Commission, has not been provided for in any of the public utility laws. New York has a law providing for the issue of stock without nominal or par value, but public utilities are not permitted to take advantage of it, although the law was strongly urged by former Chairman Stevens of the Second District, and was subsequently opposed by the First District Commission.

It is fortunate for the public that the mergers of independent companies into large electric railway systems occurred before commission rule, because under the rulings of present regulating commissions such mergers would become a difficult problem. The large amounts of cash or par value of securities which were expended in purchasing competing street railways or in payment for going concern values may be much in excess of the value of the physical property, and may not make themselves evident in an appraisal.

In order to effect these mergers, or in order to electrify or rehabilitate the properties, large amounts represented either by cash or by capital securities were issued. The par value of the capital obligations usually exceeds the physical value of the property, and in some cases the funded debt is greater than the physical value. These securities have been issued in good faith and have passed into the hands of third parties. As the state laws and the commission rulings would require in the issue of new securities a substantial reduction in the par value of capital obligations, the satisfactory reorganization of companies so situated is practically impossible except through the tedious, expensive and distressing process of receivership.

VALUATION

There are almost as many theories regarding valuation as there are experts in the valuation business, and the number of these is growing daily. The literature on the subject of valuation, most of which has appeared during the last two years, is stupendously appalling. A bibliography recently compiled by the American Society of Civil Engineers consists of exactly 999 books, theses and articles on valuation. As an instance of the application of theoretical methods, one of the members of an influential commission, in a recent address, states that in his state the valuation of a public utility property is mathematically obtained by two theoretical methods. These two values are then carefully compared, but the final finding of the commission is neither of these values but is the estimate of the commission as to what the property is worth. The question naturally arises, Why should not the commission guess at it in the first place without bothering with the two theories?

Notwithstanding which theory is followed, the final valuation never represents what has gone into the property. Most of the large city properties have been built up piecemeal.

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under different supervision, during various stages of the art, under operating conditions, and sometimes under opposition. No theory of contingencies takes all this into account. Anyone connected with large enterprises knows the great differences which often exist between the final cost of work and the original estimate of the engineer. Some commissioners have great difficulty in appreciating that engineers' estimates of reproduction cost are only, at the best, more or less intelligent guesses having relatively large probable errors.

The question of valuation is at present in a more or less chaotic condition, with a strong tendency on the part of each new commission or chief engineer to advance some new theory to solve this particular problem.

RATES OF RETURN

The wide variation in the rates of return upon the estimated capital invested in public utilities seems to be due to a great extent to the tendency on the part of commissions and public officials to confuse non-confiscatory interest rates as discussed, but not defined, by the United States Supreme Court with reasonable rate of return. In the proper performance of their duties, both to the public and the utilities, regulating commissions should allow a rate of return sufficiently high to induce capital to flow into the business which they are attempting to regulate.

Rates of return varying from 6 to 8 per cent have been allowed, and in some instances commissions have declined to reduce rates where the rate of return was as high as 10 per cent.

Reasonable rates of return should vary with the circumstances of each case, with the location of the utility and with the hazard of the business. The rate should be higher for street railway utilities than for other public utilities of similar magnitude.

DEPRECIATION REQUIREMENTS

Some of the state laws require utilities to set aside a depreciation reserve, and it is usually left to the commission to determine what this reserve shall be. The question of a depreciation reserve often arises in hearings before commissions on the reasonableness of rates. This depreciation reserve may be a fund set aside to be used only for a specific purpose, or the commission may take the conservative view and permit the reserve to be invested in property.

RATES AND SYSTEMS OF FARE

In some instances, after investigation, the fares have been allowed to remain without change. In one instance the fare was raised, and in the well-known Milwaukee case the fare was ordered reduced. There seems to be a growing desire on the part of regulating commissions to abandon the usual 5-cent zone system of suburban and interurban fares and substitute therefor one proportionate to the distance traveled. The New Jersey, Pennsylvania and Wisconsin commissions have considered this matter. It is anticipated that such a plan would tend to reduce the public clamor for an enlargement of the 5-cent zone, and eliminate many of the discriminations now alleged to exist.

EXTENSION OF CITY LIMITS

In several instances where cities have extended their limits, a demand has arisen for the preservation of the city fare as far as the new limits. Where such cases have arisen these concessions have been required. There seems to be a general tendency on the part of commissions to consider lightly, or even set aside, agreements between the railway and the municipality where it is to the interest of the public to have these set aside, but to hold the railway firmly to these agreements where the advantage is the other way.

REGULATION OF SERVICE

It is left to the commissioners to determine in each case what is safe, what is adequate, what is just and what is reasonable. What is adequate service is largely a matter of opinion, as no standards for measuring the reasonableness or adequacy of service have been developed. Some regulating commissions, starting out with a desire to obtain a seat for each passenger during rush hours, have concluded that the scheme was not financially possible, and if it were, the passengers would not wait for the seats.

DETAILS OF OPERATION

Commissions have spent a great deal of time in determining the proper height of a car step, the manner of designating routes and destinations, the manner and extent of heating and ventilation, the near-side versus the far-side stop, the width and spacing of seats, the relative proportion of seating and standing capacity, types of brakes and fenders and their operation in service, accidents in which passengers and pedestrians are injured, and all the problems of street railway operation and management. Some of the commissions have manifested a disposition to delve into the minutest details of electric railway technique.

APPEAL

The tendency to make appeal from the rulings of the commissions more difficult has been noticed. That the commissions resent the interference of the courts is evident from a public address by a member of the New York commission on March 1, 1912, in which he said that the success of governmental regulation depends in large measure upon the attitude of the courts toward the decisions of commissions and the scope of judicial review.

QUALIFICATIONS OF COMMISSIONERS

If public utility commissioners are to consider intelligently public utility questions in all their relations, the financial problems of the utility, the needs present and future of the public, the operating details of the companies, and deal fairly and broadly with the public and with the utility, they should command the wisdom of sociologists, economists, financiers, engineers, lawyers, and transportation experts. The previous professions of twenty-five commissioners appointed during the past two years, whose biographies appeared in the technical journals, were as follows: Twelve lawyers, 48 per cent of the total; 6 politicians, 24 per cent; 3 engineers, 12 per cent; 1 locomotive engineer, 4 per cent; 1 hotel proprietor, 4 per cent; 1 publisher, 4 per cent; 1 newspaper man, 4 per cent.

The lawyers and the politicians between them got 72 per cent of the places. Assuming that the lawyers are all learned in the law, and that the politicians are all statesmen and economists, the proportion still looks a little unbalanced. Why the locomotive engineer should have been appointed does not appear, and the only excuse for the hotel proprietor is that he must be considered an expert in rates and service.

It is a fact, however, that as a general rule commissions have been composed of high-class men, and that they are conscientiously struggling with the work before them, but it is also a fact that few of them at the beginning of their terms had any knowledge of the public utility business, and that they are acquiring their training at the expense of the utilities. The period during which this training is acquired is often a trying one for the utilities subject to their control, and their only consolation is the faith that with knowledge comes conservatism. It has been proposed by some of the commissions that the state universities prepare young men for this work, but it would not seem that a young man fresh from a state university without business, engineering or other experience would be a competent adviser on questions requiring for their solution the highest degree of ability and experience.

CONCLUSION

Public service regulation has come about in most of the states within the last three years. The conditions of operation without regulation and operation under regulation are quite different. The change has been sudden, and it will require time for the utilities to adapt themselves to the new conditions as well as time for the commissions to digest the immense amount of detail which they must do before they can intelligently pass on the problems presented. Reg-

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ulation has been in force too short a time to summarize its results and determine whether it is worth what it is costing, or is accomplishing what it was intended to accomplish. Public service commissions may have been instrumental in putting an end to certain bad financial practices, but their growing disposition to interfere in the details of the business, and their policy of cutting the rate of return to a barely non-confiscatory basis is not encouraging to investors.

Any community is better served by a prosperous utility than by one which is struggling for existence, and it would appear that a far-seeing regulation would be one which would encourage the investment of private capital. The best interests of the public are surely not conserved when conditions of operation are made so onerous and rates of return are cut so low that capital cannot be procured for betterments and extensions to existing properties, to say nothing of capital for the building of new properties.

BIBLIOGRAPHY

A bibliography of articles in reference to public service commissions is published as an appendix to the report.

PRESENT TENDENCY OF PUBLIC UTILITY LAWS AND REGULATIONS*

BY FRANK HEDLEY, VICE-PRESIDENT AND GENERAL MANAGER INTERBOROUGH RAPID TRANSIT COMPANY, NEW YORK

"The Present Tendency of Public Utility Regulation" is a live issue and an important concern of the railroad man. To quote the words of the letter notifying the speaker before you: "This matter should prove of great general interest to all members of the association, particularly to those who desire to know the results of the administrative assistance given us by regulating commissions, which all electric railways can look forward to with a considerable degree of certainty."

I think that contains the meat of the desired tendency of public service commission regulation when it refers to administrative assistance. It is a spirit of co-operation that is supplanting the idea that the railroad is to be slammed into submission by legislative coercion or similar methods. It is beginning to be admitted that the railroad company has a side to present on questions of public service and does not always have to be in the role of a defendant.

I naturally know more of the workings of the public service commission law in the State of New York because of my railroad work being centered in that part of the country. The law became effective in July, 1907; this was at a time when the politicians had used to the limit a plank in their political campaign that practically all the nominees running for office had adopted, namely, that if elected they would take such steps as they found necessary substantially to relieve the congested condition of the cars on all the transportation lines in New York City.

The people of New York City for a long time prior to 1907 had followed the writings in the daily papers and these papers frequently charged the railroad company with running cars solely for the purpose of making money without regard or reasonable consideration for the public convenience.

Immediately after the commissioners were appointed the public and the press were demanding all sorts of radical departures and impossible performances from the operators of the railroads. The speaker spent the greater part of his time during the first three years of the commission, viz., from 1907 to 1910, attending public hearings and testifying before the commissioners. This was good educational work for the commissioners and put some facts before the public that even the radical journals in New York took notice of.

In the rush hours on the subway and elevated systems in New York City the maximum number of cars and trains practicable is run consistent with the primary consideration of safety. Owing to the limited facilities at the command of the railroad, the congestion in the rush hours is excessive. We are at the present time on the subway division working under an order of the Public Service Commission which requires either a seat for every passenger (only possible during non-rush hours), or the maximum number of trains and cars that can be operated safely with the existing facilities. On the elevated division the order is practically the same, but the number of trains per hour during the non-rush period is prescribed by the commission.

We are constantly taking checks of our service both as regards the train schedules and also referring to ticket selling accommodations at the stations. The commission also has its inspectors check these items and at times joint checks are taken to determine the traffic requirements.

The tendency at the present time in constructing entrances and exits for subway stations is that wherever possible the entrances and exits be through a building, thus avoiding the kiosks on the sidewalks which are a feature of the original subway construction. The engineers of the commission, together with the engineers of the railroad company, work in conjunction with the owners of the buildings and a plan is then adopted satisfactory to the city's representatives, the railroad company and the owner.

Another method of increasing transportation facilities has been the erecting of new stations. In the outlying districts the rapid growth of the population accompanying the operation of the new subway lines has made it necessary to build new stations. The commission co-operates with the railroad company in the securing of consents from the abutting property owners. New stations have also been provided in the downtown business district where a shift in the business character of the neighborhood has made necessary the providing of additional accommodations for the public. The same investigation as to the necessity for additional stations has been afforded in these instances also.

The Rapid Transit Commission, which preceded the present Public Service Commission, planned for a maximum traffic in the subway of 400,000 passengers per day. The traffic, however, quickly exceeded all expectations and to-day averages 1,000,000 a day. The railroad company's engineers worked on the problem and, co-operating with the Public Service Commission, devised ways and means to handle the enormous traffic. Various improvements resulted which vastly increased the passenger-carrying capacity. Among these improvements were the lengthening of station platforms, side doors, speed control, etc., which in turn reduced the length of the station stop and reduced the minimum train interval to 1 minute, 48 seconds.

Between 9000 and 10,000 complaints a year are received by the Public Service Commission for the First District. Probably not one-quarter of them are unworthy of investigation. Under the New York law each day's violation of an order of the commission makes a railroad company liable to a fine, the maximum being $5,000 per day. In practice, however, this drastic action has been little used and the present tendency of the commission is to remedy by conference and mutual investigation. Co-operation between the companies and the commission is on the increase and beneficial results to the public have followed as well as to the transportation companies. In the city of New York the rates of fare have been fixed by legislation and very little work of this nature has come before the commission. One case arose, however. Complaint was made that a 5-cent fare was all the company should demand. After a thorough investigation the Public Service Commission decided in favor of the transportation company because a 10-cent fare was necessary in order to safeguard the rights of the stockholders and investors and in

*Abstract of an address before the American Electric Railway Association, Atlantic City, N. J., Oct. 13-17, 1913.

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order to permit the railroad to remain in a solvent and prosperous condition. In order properly to safeguard the employees of the company it was also much to their interest that the railroad should be secured in its solvency. The decision met with general approval.

The existence of a Public Service Commission with ample power to regulate is a great assistance in defeating demagogic bills introduced in the Legislature for political effect and violently opposed to corporation rights. The recent trend, except in the instance of the "full crew" bill, has been to allow the commission to regulate through its plenary powers and not enact burdensome and ill-advised legislation.

An important work of the commissions has been the preparing and prescribing of a uniform system of accounts. By this prevention of financial juggling, assuring the investor that the earnings will be properly guarded and dividends declared only when all proper charges have been made, the field of railroad securities is made a safe and inviting one with the resultant benefit to both the transportation company and the public.

Ten years ago, because of the agitation against public service corporations, the securities of these companies as an investment were generally discredited. The public attacked the companies because they did not deem the service provided adequate. The companies were unable to secure proper money terms because the attitude of the public made it practically impossible to secure capital in quantities necessary to make needed improvements. The problem of the relations of the city and the public service corporations had to be met and conquered.

The right of a municipality to own its transportation system is fast becoming a recognized function of city government to be faced in all cities. The public is joining in the profits, exercising supervision over construction and operation in a more direct manner than heretofore, and more intimately concerned with the capitalization of the companies. Besides Chicago, Philadelphia and New York City, Toronto, Detroit, San Francisco, Boston, Seattle, London and Paris may be cited as examples of this present-day tendency for a much closer relation of transportation companies and the municipality, and hence the public. On the other hand, the public sees the necessity of protecting the companies in the enjoyment of franchise privileges for a fixed term of years, with terms securing adequate compensation for the outlay of capital. The railroad corporations are recognizing the rights of the people to ownership and control and the right to share in the profits of operation.

The railroad companies for many years have needed some properly constituted authority that could and would protect them against radical and unjust attacks from the public press and the politician.

The Public Service Commissions can, and in a great many cases do, act as arbitrators and settle cases in dispute in a fair and equitable manner, and when this is done a better relation will exist between the railroad companies and the public.

Some day perhaps the commissions created for the purpose of supervising the railroads and other public utilities will be formed without a view to political considerations and wholly with the end in mind of putting the best men in office. When the personnel of commissions of this nature embraces men of practical experience, fairness of mind and education suited to the tasks confronting them (a discharge of duty without consideration for political expediency), then I think we shall have that degree of co-operation and hand to hand work desirable to the railroad man, the public and the people's accredited representatives, the Public Service Commission.

The Metropolitan Railway has taken over the Great Northern & City Railway, an underground line which extends from Finsbury Park to Moorgate, London Eng. The whole system will be overhauled and improved.

ELECTRIC RAILWAY SECURITIES FROM THE INVESTOR'S STANDPOINT*

BY A. M. HARRIS HARRIS, FORBES & COMPANY, NEW YORK

We are living in an age of constantly more refined specialization, which tendency has extended to the banking business, resulting in the development of the so-called bond houses. These institutions specialize in investment bonds, loaning funds to meritorious enterprises, taking in payment their mortgage obligations or bonds, which are in turn distributed among investors. Under favorable conditions the sound and stable character of the street railway business cannot be questioned, and it is my purpose to endeavor to place before you some of the safeguards with which, owing to the hazards peculiar to the street railway business, the bond houses must surround issues of street railway bonds to make them attractive to conservative investors.

On a proper basis, I know of no better situation on which to loan money than a street railway serving a large population, and there is no reason why street railway bonds, now, generally speaking, less in favor than other classes of public utility bonds, should not be equally popular with the investing public. But to make them so a distinct change of attitude on the part of municipalities and rate-regulating bodies is in part a condition precedent, as is an increasing disposition on the part of the operators themselves to accede more freely to the requirements of bankers in safeguarding their issues of securities.

You will, of course, appreciate the fact that the bankers who are supplying the "sinews of war" are in a position to dictate the terms upon which capital will be furnished, and looking at the subject in a broad way, such reasonable requirements as the bankers insist upon to make securities not only safe but salable accrue eventually to the benefit of the company by establishing its credit and a good market for its securities.

Unfortunately, the memory of the over-estimates of value indulged in while financing the consolidations of the traction systems in many of our large cities is still green in the minds of investors, creating a prejudice that must be overcome and an insistence upon ample safeguards that must be complied with. It is a well-known fact that the hazards, if you please, of the street railway business are greater than those of practically any other class of public utility. Among these hazards the following are worthy of consideration: (1) rapid depreciation and obsolescence of property; (2) labor troubles; (3) municipal interference; (4) damage suits; (5) economic disadvantage.

The first item is by all means the most vital and important, and fortunately, is the most easily overcome. More emphasis is constantly being laid by public service commissions and other rate-regulating bodies on physical duplication value as a basis for determining fair rates of charge for service. Therefore, the banker must satisfy himself as to the continuing ability of the company to earn, even under the most adverse circumstances, an amount sufficient to take care of the interest on his loan, and this may be accomplished by assuring himself as to the duplication value of the property in question.

Conservative bankers for these reasons limit an original issue of bonds to a figure within the duplication value of the property covered thereby. But what of the future? Looking to the maturity of the bonds twenty, thirty or forty years hence, and the payment of the interest thereon in the interval, it is apparent that it is equally important to insure the preservation of a safe relation of value of property to amount of outstanding bonds throughout the life of the bonds.

What has become of the investment which was represented

*Abstract of a paper read before the American Electric Railway Association at Atlantic City, N. J., Oct. 13-17, 1913.

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by the old cars and equipment that has, in the comparatively short life of the electric railway, either worn out or become obsolete and found its way to the junk pile? The answer is plain. If the day of their obsolescence was not anticipated and provided for through some adequate depreciation reserve, the investment was irretrievably lost, and similar unprovided processes occurring with respect to all of the property used in the operation of an electric road have undoubtedly been a very material factor in causing the long list of receiverships and reorganizations that is to be found in the history of the electric railways of this country.

Depreciation is a subject so comprehensive that it is almost inexhaustible. Numberless monographs have been prepared as to the most scientific method of accurately figuring it, covering the straight line method, the sinking fund method on various rates of interest, the insurance method, decreasing payments toward end of life, per cent of gross earnings basis, per cent of unit output basis, loss of value as determined from loss of efficiency, the mortality method and the 50 per cent method.

I shall not attempt to discuss the technical questions herein involved except to make the brief comment that we have found that around 22 per cent of the gross operating revenues of the average electric railway property comes very close to being the proper amount which shall be set aside from year to year for maintenance and depreciation. This arbitrary percentage of gross checks surprisingly with the amount arrived at by estimating the average life of the various parts of the property and arriving at a depreciation allowance in that manner.

As has been previously stated, the function of depreciation is to preserve the relation between bonds and property, so that if instead of increasing the property the bonds are decreased by a sinking fund the result is accomplished practically as satisfactorily, at least from the standpoint of the bondholder. Of recent years we have been adopting a modified form of sinking fund in those mortgages which do not make a specific provision for depreciation. This modified sinking fund provides that the company shall set aside so much per annum—either a percentage of gross earnings or a percentage of bonds outstanding—such money to be deposited with the trustee and used either (a) to pay for permanent extensions and improvements to the property which might otherwise have been made the basis of the issuance of bonds, or (b) to retire outstanding bonds in the hands of the public. This arrangement, while not quite so satisfactory from the standpoint of the house selling the securities in that it does not insure the sinking fund being in the market for the bonds each year, from the standpoint of the company is infinitely more desirable than a straight sinking fund, as it obviates the possibility of the company being placed in the position of going into the market to buy bonds for the sinking fund at a premium, and at the same time being forced to sell escrow bonds of the same issue at a discount to provide funds for the extension and improvement of its property.

It is customary to limit the issuance of escrow bonds, among other things, by a requirement to the effect that the net earnings of the property must be a certain number of times the interest on all bonds outstanding, together with those proposed to be issued. As supplementary to the foregoing remarks regarding maintenance and depreciation, it is interesting to note that the appropriations for maintenance and depreciation included in operating expenses naturally affect the margin of net earnings over bond interest required by conservative bankers.

Street railways are affected by labor troubles more than the other public utilities. The latest census reports available show that while only 13 per cent of the gross earnings of the electric light and power companies is spent for wages and only 16 per cent is spent by the gas companies, the electric railways are spending over 30 per cent on this item. You will see that the amount of labor employed in practically every other class of public service is relatively small. Unfortunately, labor difficulties of traction systems in particularly the larger cities usually receive such nation-wide publicity that, aside from the actual effect on the finances of the company, among investors a sentiment is created against it which is extremely difficult to overcome. Street railway companies have been a very prominent mark for unscrupulous politicians and grafting officials demanding an issue, and aside from this, municipalities have themselves not been slow to attack street railway companies on every conceivable pretext. Another unfortunate part of this phase of the situation is the fact that in some cases maturing franchises have made it necessary for companies to go to the council for new franchises, which in many instances in the past, such as in Detroit and Kansas City, has resulted in a long-drawn-out controversy which has discredited the company's securities and made it next to impossible during that time to finance its legitimate requirements. And this, of course, has not increased the general popularity of street railway bonds.

Another hazard peculiar to the street railway business, and a particularly insidious one, is the liability to accident and the ensuing damage claims. According to the United States census report for the year 1907, the electric railways of the country spent over 4 per cent of their total gross earnings for damages and the legal expenses incident thereto.

In talking a short time ago with the president of a large gas company which is charging unusually low rates, and which has even voluntarily reduced the rates from time to time, he said in effect that it has been his experience that reductions in rates within reasonable limits invariably result in much larger consumption of gas per capita and ultimately increased earnings, which with the proportionate reduced cost of manufacture results in greater profits. The same is true, to a certain extent, of the electric and the telephone business, but experience has demonstrated that the number of passengers carried per annum by a street railway system is not affected to any great extent by reduction of fares. Thus it stands at an economic disadvantage in this respect.

While I have been discussing my subject purely from the standpoint of a purchaser of investment bonds, I wish especially to emphasize the fact that to make such bonds attractive to capital there must be an ample margin of earnings over and above the interest thereon. Net earnings of twice the bond interest is the usual requirement of conservative bankers. This means that in order to make its bonds salable the company must be permitted to earn a substantial amount for dividends over and above operating expenses and fixed charges.

Viewing this phase of the situation from another angle, it is essential that there be a substantial equity in the market value of the property over and above the bonds, and to produce this the stock must be permitted to earn and pay a dividend that will give it a ready and definite market value.

As the purpose of this paper is constructive, I have set down below a brief statement of the conditions precedent to so safeguarding issues of street railway bonds that they will enjoy the popularity which should be their right:

First—More reasonable atttitude on the part of the public, which may come through the knowledge obtained by regulating commissions that the profits of the street railway business are not unduly large, and that to enable the street railway companies to obtain from investors the funds necessary for the development of their business their securities must be made not only safe but attractive.

Second—Larger rates of return to insure investment of additional capital in the business and give larger margins of net earnings over funded debt charges.

Third—Relief from burdensome taxes and free street im-

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provements and maintenance that have no relation to the street railway business.

Fourth—Introduction of proper systems of fares so that no part of the service may be performed at a loss.

Fifth—Development of more stable relations with employees, reducing the hazards from that source.

Sixth—Recognition by street railway operators of the necessity of carefully safeguarding their capital obligation account and properly maintaining their physical properties.

Seventh—Safeguarding public against accidents by better equipment and safety devices and increased vigilance on the part of employees.

SINKING FUNDS*

BY WILLIAM H. FORSE, JR., SECRETARY-TREASURER UNION TRACTION COMPANY OF INDIANA

A great many of the early electric railway mortgages contained sinking fund provisions.

Theoretically, the sinking fund should be sufficient, with its accretions, to pay off the entire debt at maturity; in practice this is not usually considered necessary unless the company operates under expiring franchises or is limited in its charter or other rights. There is no universal rule of application which governs. Sinking funds are accumulated in a great many different ways. The following examples are cited for illustration:

The Central California Traction Company thirty-year mortgage provides that payments to the sinking fund shall commence six years after date of issue and shall be $15,000 per year for ten years, $30,000 per year for the next ten years and $45,000 per year during the last four years. These payments are to be proportionately reduced if the entire authorization of bonds is not issued.

The Butte Electric Railway twenty-five-year mortgage provides for a sinking fund of 10 per cent of the bonds outstanding, beginning sixteen years after the date of the mortgage.

The Muncie, Hartford & Fort Wayne Railway mortgage provides that payments to the trustee shall be made semi-annually for sinking fund purposes. The payments are to be 2½ per cent of the gross receipts, and the company has the option of depositing its own bonds at par in lieu of cash.

The Columbia Railway, Gas & Electric Company mortgage provides for payments to the trustee annually, commencing three and one-half years after date of the mortgage, of an amount equivalent to 1 per cent of the outstanding bonds.

The mortgage of the Citizens' Street Railway, Muncie, Ind., provides for the payment of a lump sum semi-annually, plus a sum equal to the amount which would have then accrued upon all of the bonds then and theretofore redeemed and canceled through operation of the sinking fund. The fund is used in redeeming bonds, called by lot, at 105.

Sinking funds are not so common in recent electric railway mortgages. It is considered better policy to use cash in keeping the physical property up to high standards instead of depositing it to remain idle in sinking funds or using it to pay off bonds in instalments through the operation of such funds. When the bonds mature they are refunded, frequently at lower rates of interest, provided the company has maintained its property and credit well and is not hampered by short-term franchises, rights or charters.

An examination of the accounting systems prescribed by regulatory commissions discloses the fact that in some cases the methods of accounting for sinking funds are broadly defined.

The Wisconsin system of accounting for electric railways groups "contractual sinking fund requirements" under the head of "deductions from gross income." The text of the account provides that all accruals required to be made by the railway to sinking funds in accordance with the provisions of trust deeds, mortgages or other contracts requiring the establishment of sinking funds shall (without exception) be included in the monthtly income account.

The New York system of accounts for street and electric railways contains an account entitled "sinking fund accruals," to which shall be charged month by month all accruals required to be made to sinking funds in accordance with the provisions of mortgages or other contracts requiring the establishment of such funds. This account is to be included in the income account in a group of "income deduction accounts."

The Interstate Commerce Commission form of "income and profit and loss account" for steam roads provides accounts in the income statement and in the profit and loss statement for contributions and accretions to sinking funds, the amounts of which are to be credited to certain balance sheet accounts. The text of the income account provides that "amounts of appropriation of income for sinking funds" shall be included in this account, and it is further explained that "the terms of mortgages, deeds of trust or other contracts providing for the allocation of income or for the payment of definite sums into sinking funds and for accretions to such funds on account of income from previous investments may be made the basis of such appropriations." A footnote to the text explains that if appropriations for direct payments are made from surplus they should be charged to the account "appropriations of surplus to sinking and other reserve funds."

Dicksee, in his "Advanced Accounting," says that "the advantage of employing a sinking fund lies not in any direct economy of revenue charges that it may effect but in the assurance which it gives that when the wasting asset against which it has been created has become valueless there will be moneys in hand available for the purchase of another asset of equal cost."

M. M. Kirkman, a steam railway executive and a writer on accounting subjects, has this to say: "Sinking fund is unrepresented capital. It is not chargeable against income account any more than any other capital expenditure. The reason why we so often find it included in the income account is because of the conservatism of proprietors."

Hatfield, in "Modern Accounting," writes as follows: "Neither national banks nor foreign corporations consider the compulsory establishment of a surplus a reason for understating the annual net profits, and they do not charge the required percentage of their profits as if it were an expense, but show it properly as an appropriation of profits. So the compulsory nature of the sinking fund, while lessening the amount which may be available for dividends, should not diminish the net profits shown."

The chief object sought to be attained by the presentation of this paper is a full and frank discussion of a subject which concerns some, though not all, electric railway accountants.

*Abstract of a paper read before the American Electric Railway Accountants' Association at Altantic City, N. J., Oct. 13 to 17, 1913.

The directors of the Melbourne Tramway & Omnibus Company, Melbourne, Australia, report that the balance shown after paying 3s. per share in dividends and bonuses for the year, and including £95,991 brought forward from last year, is £202,754. From this they propose to pay a final bonus of 1s. per share, £480,000; to carry to reserve for return of capital, making it £480,000, £105,741, leaving to carry forward £49,013. The traffic receipts for the year to June 30 improved by £34,181, and 4,284.810 more passengers have been carried than during the previous year. The negotiations for the sale of the company's business to the government that were in progress at the time of the last report ultimately lapsed. For the quarter ending Sept. 30 the directors announce a dividend amounting to 6d. per share and also a bonus of 6d. per share.

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ENGINEERING ACCOUNTING*

BY J. VIPOND DAVIES, CHIEF ENGINEER HUDSON & MANHATTAN RAILROAD

With respect to the question of interdepartmental and overhead charges, the conditions are totally different in shop work and in construction work, and should, it seems to me, be considered differently if such work of construction is being done within the organization itself or without the organization, as the two items appear to me to be distinctly separable. Interdepartmental charges for work executed and disbursements distributed from one department to another should be considered as separate from the question of overhead, and any interdepartmental charges so made should be rendered as bills which must be passed upon by the debtor department just as though they were bills of any outside concern. I believe this to be the usual practice, but I have in my personal experience had illustrations where such interdepartmental charges were made by the creditor department and entered as a cost of the work without any notice to the debtor department and there were no means whereby the debtor department might know what was being billed against it. Such departmental bills should be open to just as much criticism and adjustment as bills of outside parties.

The question of overhead, where no additional officers or expenditures are needed for carrying on the interdepartmental work, does not appear to me to be a reasonable or sensible proposition. If any additional expense, over and above the normal operating overhead, is necessary to carry out any construction or extensive maintenance, then such extra overhead expense incurred should legitimately be made as a charge against such work. On the other hand, where work is done by a railroad organization for outside parties and charges for such work are made against outsiders, then unquestionably an adequate overhead charge should be distributed to and charged against such outside parties. As an illustration of this, I would instance such cases as those of street railroads having to reconstruct or carry out extensive repairs in consequence of the construction of subways or other subsurface improvements within the limits of cities. In such cases I think it is perfectly reasonable and proper to distribute an overhead expense to represent the cost of general administration and the general accounting, which cannot be charged in and accounted for as items of cost detail. In my experience I have been charged by different companies for this item amounts ranging from 7½ to 20 per cent on the cost of labor and materials employed and used in the work, and this nowithstanding the fact that the unit prices of such labor and materials have in themselves indicated an inflation more than sufficient to cover any reasonable and proper overhead expense. Of course, it has occurred to me that 20 per cent was unduly high and that probably an amount between 7½ and 20 per cent, or say about 12½ per cent, would be a fair, reasonable and legitimate charge for overhead and administration. This feature has been recognized by the city of New York, and in certain franchises granted by the city for the construction of subways the city has inserted in the text of such franchises a limitation of 7½ per cent.

COST ACCOUNTING

In respect of accounting it is also very important to bear in mind the text of the interstate commerce act applicable to railroads doing interstate commerce business and reporting to the Interstate Commerce Commission. This says, in part, that it shall be unlawful for such carriers to keep any other accounts, records or memoranda than those prescribed or approved by the commission.

I have quoted this clause for the further reason that there has been an attempt, in preparing recent contracts for the construction, operation and maintenance of rapid transit railroads, to insert the substance of this act in the contracts and to require that no accounts, records or memoranda shall be kept other than in accordance with the uniform system of accounts laid down either by the Interstate Commerce Commission or the state commission governing public utilities. To comply literally with such a prescription as this would make an intelligent operation of cost accounting ridiculous and would permit the officers of a railroad to know nothing whatever about what the costs of work involved. The fact of the matter is that in any accounting of costs for work done by the engineering departments of any railroad it is not sufficient to follow out a hard and fast system, but it is necessary to conduct such accounting of costs in such form as will convey to the engineer a definite understanding of the relative value and costs of any piece of work executed so that such information as to value and costs may be of use and service in making comparison with the costs of other work or in arriving at an understanding to guide the engineer in his ability to estimate on the cost of proposed work.

What is really wanted in this respect is that the engineer shall be posted in the same manner as a contractor is informed as to the resulting value of labor and materials used and employed in executing any piece of construction work, and, further, shall be so informed as to know that the labor so employed is honestly and intelligently executing its work economically and rendering value for the money paid out.

This work, it seems clear to me, involves the greatest possible flexibility in cost accounting and can only be done by an accounting department that is thoroughly familiar with the engineering end of the work. In many large construction works with which I have been identified I have found that the results of the cost accounting as executed through the auditing departments have been utterly valueless in establishing the true value of work executed, particularly in such forms as are nowadays necessary for supplying costs of reproduction, such as are essential in the evolution of the provisions of the federal valuation act. Hence, I have long since ignored entirely the auditing departments of corporations in respect of arriving at the actual costs of construction work and have organized definite departments of engineering cost accounting, which segregate the quantities of labor and materials involved in any given piece of work so that the result furnishes the engineer with information which can be applied to any of the purposes to which cost accounting is essential and necessary. In the final wind-up of a construction work the disbursements distributed by the engineer's cost accounts should aggregate the same as the costs according to the books of the auditing department, but with the units segregated and distributed so differently that it is only in the final wind-up that these figures will tally and correspond. The value and advantages of so keeping and maintaining the engineer's costs have time and again been demonstrated with several organizations for which I have acted as engineer, when they have been called upon to furnish information regarding costs of the properties in response to demands from public commissions, tax boards, etc. In all such cases it has been the engineer's cost account which has been accepted as against the accounts of the auditing departments. I do not mention this as disparaging the system of accounting followed by auditors generally, but as illustrating the point that costs as maintained by the engineer convey more clearly and concretely to the engineering representatives of public commissions, tax boards and the like the information which they are seeking and which it is essential they should have to enable them to arrive at conclusions which are fair and equitable to all parties involved in determining the cost of reproduction of public utilities. The influence of

*Abstract of paper read at joint meeting of Accountants' and Engineering Associations, Atlantic City, N. J., Oct. 13-17, 1913.

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federal legislation in due time, I have very little doubt, will spread into the state laws.

TIMEKEEPING

With respect to the matter of timekeeping, there is a great deal that could be said on either hand. If timekeeping is considered to be purely the recording of time expended in the service of the company by each individual employee, then I have no doubt that the weight of evidence would be in favor of the timekeeping being administered and directed through the auditing department and independent of the engineering department. Such a plan, theoretically at least, would insure the least likelihood of collusion between the superintendents and foremen, on the one hand, reporting to the engineering department, and the timekeepers, on the other hand, reporting to the auditing department. However, the distribution of the labor accounts is as essential to proper cost accounting as the distribution of the materials, and with the view to obtaining the most intelligent record of the work executed by each employee or gang of employees and the cost of labor involved in such work, comparing the work of an individual or a gang with another individual or gang, then without any question the weight of evidence would lead to the conclusion that the timekeeping should be under the control and supervision of the engineering department. One thought that occurs to me strongly is whether collusion would be reduced or prevented entirely by timekeepers reporting to the auditing department. The honesty of a timekeeper is absolutely and solely a question of the personal equation of the individual, and the question as to what department he reports to has nothing whatever to do with it. If this view is agreed to, then there seems to be no question that the most satisfactory and advantageous manner of keeping the time of labor is by maintaining it within the control and under the supervision of the engineering department. As a compromise, I submit the suggestion that the work of the timekeepers might with advantage be audited from time to time by the auditing department as a check on the responsibility and honesty of the individual timekeeper. I mean, in the broadest sense, that a superior timekeeper or superintendent timekeeper should have the right of supervision over the timekeepers with powers of detection if necessary to establish freedom from collusion.

EFFICIENCY ENGINEERING

There is still another item regarding which I would like to say a word, and that is in regard to Appendix B on efficiency engineering. This portion of the report is prefaced by the remark that men are to turn out so much work and of such a quality and are to be paid accordingly. I doubt if anyone interested in this question of accounting will question or criticise this desire. It is what we should all like to attain to, but it is that which the tendency of all labor organizations is to upset and destroy. Unfortunately, owing to the socialistic development of labor unions, they will not consider any such proposition as a possibility, and the main aim and purpose of the labor unions, it seems to me, is to level down to the standard of the least competence the work of all labor, both skilled and unskilled. From the point of view of efficiency we should, of course, all desire to attain the results indicated by Mr. Maize, but we have the labor union conditions confronting us, which I am afraid will make this proposition of little effect. Carrying this to the greatest extreme that I have heard of is the case of the condition of the Paris labor unions, where in the execution of tunnel construction under compressed air every man is classed at the same rate, whether he is shoveling mud or whether he is doing skilled engineering and construction work, the labor unions in that case putting a definite premium on the degradation of labor. Some elaboration, I think, should be given by the committee to the "authority for expenditure" forms for construction work.

STUDY OF ECONOMIC CONDITIONS BY CIVIC FEDERATION

The National Civic Federation is planning a study of industrial and economic conditions in this country to determine whether during the last few years there has been progress or retrogression.

Here are a few of the many questions that the investigators will seek to determine:

"Is wealth being concentrated in fewer hands? Has the organization of large corporations resulted in a great withdrawal of wealth from the people or a more general distribution of wealth

"How do the provisions for the wage-earners' health, safety and comfort during working hours compare with those of a generation ago?

"How about our political and business ethics? Are our moral standards and our aspirations higher or lower now than at any time in the past? What, if anything, are the gains for purity and cleanliness in politics, through the regulation of primaries, publicity of campaign contributions and other changes in election machinery?

"Should philanthropy be undertaken by the State?"

COST OF PASSENGER TRANSPORTATION SERVICE*

JAMES D. MORTIMER, CHAIRMAN; PATRICK CALHOUN, PAUL SHOUP, HENRY G. BRADLEE, THOMAS N. M'CARTER

1. We have considered your directions for the establishment of a permanent organization by the American Association to study the problems of rates and fares.

2. We have considered the cost of conducting such a bureau for a period of about three years, and have ascertained that the association will appropriate $7,500 toward the conduct of such a bureau for such period. We have estimated that the additional cost of carrying on this work will be not less than $15,000 or that the total cost of such work will be about $22,500, distributed in annual expenditures of about $7,500.

3. We have determined that the additional $15,000 can be obtained from contributions by member companies. We have agreed that this work shall be begun immediately after the annual convention, and that it should be carried on under the title of "Bureau of Fare Research." The man in active charge might properly be known as the director of Bureau of Fare Research.

4. We have determined that, for the present at least, it will be advisable for this director to be subject in his work to the guidance of the committee on cost of passenger transportation service, although in all other respects subject to the orders of the officers of the American Association.

5 We recommend that the scope of the bureau be defined to include:

(a) The determination of the factors affecting the cost of passenger service, including investment, investment charges, operating expenses, length of haul, traffic density and the distribution to the member companies of the results of these studies as far as they were completed, and developed in as simple language as the subject permits.

(b) The assembly, statistical compilation and distribution of various operating data now being received by the secretary of the association.

(c) The assembly, statistical compilation and distribution of financial operating results of member companies.

(d) The study and distribution of results of such study of unusual conditions, affecting either the rate of fare received or operating expenses of electric railways.

(e) Providing a source of authentic, accurate and detailed information relating to the economies of the subject of rates of fare, on which member companies may draw.

*Abstract of report read before the American Electric Railway Association, at Atlantic City, N. J., Oct. 13-17, 1913.

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REPORT OF COMMITTEE ON COMPANY SECTIONS*

C. N. DUFFY, CHAIRMAN; W. M. CASEY, R. J. CLARK, E. J. COOK, P. H. GADSDEN, D. A. HEGARTY, P. N. JONES, MARTIN SCHREIBER

Since the first report of the committee, made at the 1912 convention, only one company section has been organized—Company Section No. 3, the Denver City Tramway Company. In only one company have any definite steps been taken looking to the organization of a company section, namely, the Washington Railway & Electric Company, Washington, D. C.

While it is gratifying to your committee to know that the membership in the three company sections already established numbers some 600 or more, that this number is slowly but steadily increasing, that the three companies in question, as well as the employees composing the membership of the three company sections, are well satisfied with the work already accomplished and feel hopeful for the future, your committee is keenly disappointed with the poor results of the company section movement thus far attained. Instead of three company sections there should be fifty. Instead of 600 company section members there should be 5000.

So much has been written, spoken and printed regarding the advantages of company sections for both the companies and the employees that it is incomprehensible why the electric railway companies in the membership of the American Electric Railway Association do not, in their own interest and in the interest of their employees, make use of these advantages. This indifference or failure to respond to and co-operate with the American Electric Railway Association in its efforts to broaden its field of usefulness to its members through the company section movement is in strange contrast with the quick response, hearty co-operation and splendid results accomplished through the company section movement of the National Electric Light Association.

It may be of interest and importance to the association to present briefly some of the advantages of the company section movement as viewed by each of the three company sections now organized, based upon experience.

Company Section No. 1, The Milwaukee Electric Railway & Light Company, has put forth these advantages to its members in the following:

"An opportunity to attend monthly conventions, so to speak, of the American Electric Railway Association.

"An opportunity to present papers and to take part in the discussions of the monthly conventions, thereby enabling each member to add to his knowledge of the business he is engaged in, enlarge his field of action and develop himself in a broad educational way.

"An opportunity to compete for the gold medal offered by the American Electric Railway Association for the best paper presented at a company section meeting.

"An opportunity to acquire without effort the ability to 'speak out in meeting' and participate in debates. This inspires reading, studying and thinking, thereby lifting one out of a deadening rut.

"An opportunity for members to meet and be brought in close touch with the officials, department heads and employees of the company.

"An opportunity to learn from company officials and departmental heads the broad principles of management, a knowledge of the problems with which the company may be confronted and the relation of the company to the public and its employees.

"An opportunity to develop into missionaries for the education of the public and to spread the gospel of truth and fair play, as opposed to misunderstanding and prejudice, regarding the company and the conduct of its business.

"An opportunity for members to bring to the attention of company officials and departmental heads, at close range, some of their problems. This means enthusiastic co-operation which spells success, alike for the employees and the company.

"An opportunity for the members to learn what it means to carry responsibility of management and what employees must do in order to fit themselves to carry such responsibility, if departmental heads and officials are to be chosen from the rank and file of the employees."

Company Section No. 2, Public Service Railway Company, has this to say:

"The principal advantage of monthly section meetings is on account of the application of particular local problems, which are a matter of vital concern to the company and employees in their everyday existence. Problems that are not theoretical are the ones that the men can see, appreciate, investigate and experiment upon for themselves. It is not possible to bring one of these operating problems, that are met with day by day, to the attention of a body of men who are directly or indirectly interested without gaining some knowledge or new thought that later may be capitalized. Nor, on the other hand, can the employees consider the subjects of the section meetings without developing and broadening their viewpoint and themselves. It is from these men that the people at large, to a great degree, get their impressions of what the railway company is really doing toward carrying out its obligations. A man who doesn't know cannot explain that his company is carrying on its work according to the best modern practice, or in a way that compares favorably with it and possibly meets certain difficult local conditions.

"It is well known that anyone practising a profession or carrying on a business who is not able to show or explain the benefits arising can never expect anything but a small success, if success at all. So it is with a railroad company: its very existence and operation must be defended.

"The better the company's employees are trained and educated and are able to think for themselves, the more efficient the army of the general manager to fight his operating battles and uphold his true position with the public that he serves. A great many railroad men believe in educating the public, or general publicity. Why not begin at home and train our own men first by the association section movement?"

Company Section No. 3, the Denver City Tramway Company, hits the nail on the head with respect to the fundamental principle of company section work:

"Membership is open to all employees, as a result of which each department of the company is well represented, trainmen being in the majority. Every employee who becomes a member very quickly develops into a booster for the section as well as an enthusiast for the industry which it represents, displaying his pride at every opportunity when coming in contact with the public. This is especially true of trainmen, who are constantly dealing with the public. It would be difficult to estimate in dollars and cents their value as molders of public opinion.

"The question has been asked 'Should motormen, conductors and other employees, irrespective of their positions, be invited to become members?' I should unhesitatingly answer yes. I think any company would derive its greatest benefits from this class of membership. Only the most intelligent and ambitious among them will want to join, and the more of this type there are on any property the more valuable the property. The same applies to length of service. Only the man who desires to remain will become a member, and the more of such men we have the greater is our business. This type of employee when he registers as a member usually becomes very active, studying the business he is following, constantly improving his work as his knowledge increases. He is not satisfied with this but knows several other good fellows whom he induces to become members by telling them the advantages to be derived by such association. Before adding their names to the section rolls, when

*Abstract of report read at meeting of American Electric Railway Association, Atlantic City, N. J., Oct. 13-17, 1913.

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discussed with outsiders, the affairs of the company were referred to as 'they' and 'theirs.' After admission the words 'we' and 'ours' at once took the places of those formerly used, with a corresponding feeling of friendliness and loyalty. Put several hundred of such men on our cars to deal with the public, and, as before stated, it would be difficult to estimate their value."

In the face of this testimony it is the duty of every one interested in or concerned with the electric railway industry to do everything possible to further the company section movement and co-operate with the association in the work it has undertaken for the benefit of the member companies and the employees of the member companies.

The success or failure of the company section movement and all that it stands for rests, not with the association, not with this committee, but with you. Therefore it behooves each of you, individually and personally, to take this home to himself to see that he does his full duty.

REPORT OF COMMITTEE ON COMPENSATION FOR CARRYING UNITED STATES MAIL*

BY T. H. TUTWILER, CHAIRMAN (RESIGNED); J. MCMILLAN, H. A. NICHOLL, E. C. SPRING, C. H. HILE J. K. CHOATE, A. R. PIPER, GEORGE B. WHEELER

While the committee is not able to report any successful conclusions at this time, nevertheless some progress has been made, and if the statistical information now in hand can be augmented by that from a considerable number of companies which have not yet responded, we should be able to put our case clearly before the proper authorities during the next Congressional session. However, the individual companies, which will gain by any successful results, will have to provide us with our ammunition in the form of general and authentic figures.

One departure during the present year was the appointment of a special committee, representing a few of the larger elctric railways particularly interested, which went to Washington to attend a hearing arranged by Henry S. Lyons, secretary Boston Elevated Railway.

The members of the special committee met at a hearing before the joint committee on postage and second-class mail matter and compensation for transportation of mails, held in Washington Jan. 28 and 29, and Feb. 7, 12 and 17, 1913. To support their contention that 1.5 cents per linear foot for each car mile should be the compensation, they submitted statements showing that the actual cost of operation was substantially that amount.

As a result of this conference, Senator Bourne, chairman of the joint committee, suggested that it might be expedient for the railway association to offer an amendment to the so-called Talbot bill or the so-called Postmaster-General's bill, which were pending action. Full consideration was given to this suggestion, and after full deliberation and advice of counsel we advised Senator Bourne that it was impossible for us to suggest amendments to these bills that would cover the needs of street railway service. These bills referred only to steam railroads.

Shortly after this, Senator Bourne stated that the post office appropriation bill for the year ending June 30, 1914, would give his committee authority to consider an independent bill.

Counsel for the association drafted a bill entitled "A Bill to Equalize Pay for Mail Service on Electric and Cable Car Routes," which was presented to Senator Bourne. Since this was presented to Senator Bourne, we have kept in close touch with the matter, and in our opinion the prospect seems bright for railways to obtain increased compensation this coming year.

*Abstract of report read before the American Electric Railway Association, at Atlantic City, N. J., Oct. 13-17, 1913.

The bill presented to Senator Bourne authorizes the Postmaster-General to readjust the compensation to be paid from and after July 1, 1914, for the transportation of mails on electric and cable car routes.

For space the full width and height of the inside of the car and not exceeding 30 ft. in length, authorized to be used in independent or trailer cars or in apartments in independent or trailer cars (except on interurban routes as defined), the bill provides 1.5 cents per linear foot for each mile run in the performance of service.

For closed-pouch service not performed in independent or trailer cars or apartments thereof entirely devoted to mail service, the bill provides $150 per annum for consignments of not more than three pouches 2000 miles or less in a year, $175 per annum for the carriage of such consignments more than 2000 and not more than 3500 miles in a year, and thereafter 5 cents per mile for the carriage of each such consignment 5 miles or less, and 3 cents per mile for each mile in excess of 5 miles, and for all pouches in consignment in excess of 3 miles, 1 cent per mile additional.

For all service on routes over 20 miles in length outside of cities (designed as interurban routes) the bill stipulates the same rates provided by law to be paid for like service on steam railroads.

A minimum annual rate on the basis of 30,000 miles run shall be paid for all independent cars or apartments in independent cars required in the service.

The Postmaster-General is directed by the bill to provide for the carriage of the mails to and from the electric and cable cars by the Post Office Department.

[The report also contains a tabulated statement prepared by the Boston Elevated Railway of the estimated cost of the operation of United States mail cars on that system. This statement was published in the ELECTRIC RAILWAY JOURNAL for Feb. 15, 1913.—Eds.]

Consul C. P. H. Nason at Grenoble, France, said recently in a report to the Bureau of Foreign and Domestic Commerce, Department of Commerce, made as a result of investigations: "With great dispatch in recent years the waters from the melting snows and glaciers of the French Alps have been put to industrial uses. The very large, picturesque, and mountainous section of southeastern France, which extends 375 miles from Lake Geneva to the Mediterranean and which some thirty years ago was given over mostly to pastoral industries, has become the home of hydroelectric installations on an ever-enlarging scale. The electric current developed from the streams fed by the melting snows furnishes the motive power for prosperous metallurgical industries in the valleys. These include industries having to do with ferroalloys, aluminum, electrosiderurgy and electrochemicals, as carbonate of calcium, carborundum, chlorates, explosives, phosphorus, sodium, etc. The manufacture of wood pulp and that of paper are equally well developed. According to statistics compiled by the engineer-in-chief of the hydraulic forces of this region of the Alps and published by the Ministry of Agriculture in the latter part of 1911, the total installations represented a maximum of 475,000 hp (with a minimum at lowest water of 180,000 hp), distributed as follows: Basin of the Isere, 260,000 hp; Durance, 93,000 hp; Arve, 54,880 hp; Rhone, 22,410 hp; Guiers, 14,760 hp; Siagne, 8,000 hp; Var, 8,350 hp, and other places, 13,000 hp. Of this total 210,000 hp were used for metallurgy, 155,000 for the distribution of force and light, 60,000 for chemical products, 30,000 for paper making and woodwork, 10,000 for traction, and 10,000 for divers other purposes. Nor is this the limit of available power. Concessions for other installations have been granted and the total horse-power of projects contemplated rises to some 700,000, of which by far the most important is that at Genissiat on the Rhone, which would produce more than 220,000 hp for transmission toward Paris."

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SOME ASPECTS OF THE MODEL PUBLIC UTILITY BILL*

BY WILLIAM D. KERR

The National Civic Federation on June 23, 1911, called a conference to consider the regulation of public utilities. Some four years previously the federation had completed the most extensive investigation of the municipal ownership of public utilities which had been attempted up to that time. Its conclusion, based on detailed analyses of the operation of typical privately and publicly owned plants in this country and abroad, was adverse to public ownership and operation when adequate regulation of privately owned and operated utilities was obtainable. An investigation of the regulation of public utilities was a logical outgrowth of the earlier investigation.

The conference was largely attended by representatives of public service commissions, public utilities and by men in various walks of public life. The efforts of the federation in the public utility field were known and highly appreciated, and the federation was able at this time to command the attention and co-operation of men experienced in public utility management and regulation.

An investigation of public utility regulation was decided upon by the conference, a committee was appointed to report on the plan and scope of the investigation, and at an adjourned meeting the report of this committee was adopted. In pursuance thereof the department on regulation of interstate and municipal utilities was organized, and its executive council proceeded with the organization of the investigation and its conduct.

The department and the executive council had for its chairman Emerson McMillin, chairman of the board of the American Light & Traction Company. Mr. McMillin was widely known in the gas industry and was extensively interested in the electric central station and railway industries. The vice-chairman was a banker, Franklin Q. Brown, of Redmond & Company, New York, who was extensively interested in railroad and public utility investments. As secretary, John H. Gray was appointed. He was head of the departments of economics and political science at the University of Minnesota, historian of Boston gas, and had been an active member of the earlier municipal ownership commission of the federation.

The other members of the council, as finally constituted, and their associations were as follows: Hon. Edward M. Bassett was a practising lawyer in the city of New York, and had served one term on the New York Public Service Commission, First District. Hon. Martin S. Decker was a member of the New York Public Service Commission, Second District, and is now its chairman. Mr. Decker has not been able to give active attention to the work of the federation for some time. Hon. Halford Erickson was a member of the Railroad Commission of Wisconsin, having served in that capacity continuously since the organization of the commission. Perhaps no individual in private or public life has contributed more to the success of public utility regulation than Mr. Erickson. Hon. Franklin K. Lane, at the time of his appointment, was a member of the Interstate Commerce Commission and now is Secretary of the Interior. It had been the expectation that special attention would be devoted to certain phases of railroad regulation. When this was found to be impracticable Mr. Lane withdrew his active participation in the work. Blewett Lee, of Chicago, was general solicitor of the Illinois Central Railroad. William D. Kerr, of Chicago, was a lawyer who, as assistant to the director, was associated with the department at the time of his appointment to the council. Hon. Milo R. Maltbie had been a member of the New York Public Service Commission, First District, since its organization, and had been an active member of the earlier municipal ownership commission of the federation. With propriety it may be said of Mr. Maltbie that his presence on the Public Service Commission has constituted in the past, and to an increasing extent to-day constitutes, a bulwark of strength for the safe, sane and progressive regulation of public utilities. Arthur Williams was general inspector and general agent of the New York Edison Company and chairman of the public policy committee of the National Electric Light Association.

All appointments to the executive council were made by the president of the National Civic Federation, Hon. Seth Low, one time Mayor of the City of New York, former president of Columbia University, and a man distinguished for his long, disinterested and able service in the public interest.

PROGRESS OF WORK

Dr. Gray was appointed director of investigation. The recruiting of a staff and the actual work began in February, 1912. From that time to the first of March, 1913, the work progressed with all possible speed. Public utilities and public service commissions in all parts of the country were called on for advice and assistance. Investigators visited all of the important commissions in this country, and special investigations were conducted in England and on the Pacific Coast.

The drafting of a model bill for the regulation of public utilities was decided on very early in the investigation. To this end existing statutes were compiled and analyzed, the results of this activity being embodied in a 1300-page volume recently published, which is entitled "Commission Regulation of Public Utilities."

Seven sub-committees were organized, to which the council looked for recommendations in drafting the bill. These committees were widely representative, but limitations of time and the press of other duties prevented many of their members from devoting to the work the close, personal application which was required.

In the latter part of February, 1913, representatives, designated as such, of the electric railway, electric lighting and telephone industries requested a conference on the subject of the bill. This request was gladly acceded to. Throughout the investigation it had been the policy of the council to encourage the fullest and freest discussion of the bill.

The first of the series of conferences resulting from this request was held the last of February at Atlantic City. It was attended by a number of prominent public utility representatives and by representatives of the National Civic Federation. The public utility representatives at the conclusion of the conference appointed a so-called conference committee composed of E. W. Burdett, Boston, chairman, and E. A. Armstrong, H. J. Hemmons and J. L. Swayze. This committee presented to the council early in April a detailed report on the bill which amounted practically to a substitute bill. The report was considered at length in conference and by the council alone.

In the latter part of June the conference committee presented another detailed report at a meeting of the department. At this time the committee was designated to represent the views of certain members of the department, and a number of conferences have been held by representatives of this committee and of the council.

In the time that has elapsed since the Atlantic City meeting the bill has been improved both with respect to a few important principles and a great number of minor details. It was to have been expected that any further time and effort spent on the bill would be productive of some improvement. The council at no time has believed it possible for it to produce a perfect bill. Its purpose has been rather to develop the best bill possible in a reasonable time and with the resources of information and experience available.

*Abstract of paper read before the American Electric Railway Association, Atlantic City, N. J., Oct. 13-17, 1913.

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FUTURE PLANS

The course which the National Civic Federation will pursue in the future cannot be predicted. It is to be hoped, however, that it will arrange before the beginning of another legislative year to publish a bill which commends itself to the federation as representing fairly a progressive attitude toward the subject. It would have been desirable, had it been possible, to publish such a bill prior to the legislative sessions of 1913. It is quite improbable, however, that any legislature will adopt a model bill in entirety. But there is reason to believe that the legislatures of the country will pay respectful attention to the principles embodied in a model bill promulgated by such a body as the National Civic Federation and carrying the support of all parties concerned as to its essential provisions. Of even greater importance, however, than the direct effect of the bill on legislation is its effect on public opinion. The publication of this bill with the approval of the industries affected will serve as a convincing argument to the entire country of the sincerity of the public service industries in their expressed desire for proper regulation of public utilities and of the desire of the advocates of public regulation to do justice and encourage the proper development of public service agencies.

The publication of the model bill will mark an important step in the development of sound relations between the public and its public service agencies. It will be only one step, however. Of equal, if not greater, importance to the public as well as to the corporations is the growth and development of a sound and discriminating public opinion respecting the administration of commission laws. No public utility law will administer itself. The success of regulation depends as much upon the personnel, integrity, intelligence and initiative of the regulating body as upon the perfection of the regulating statute. To obtain and maintain these qualifications, constant effort on the part of those who are informed is an imperative necessity.

IMPORTANCE OF WORK

This is one of the important suggestions arising from close association with the drafting of the proposed model bill. On the success or failure of the regulation of public utilities depends the future of private industry and investment in the field of quasi-public service. This opinion might be supported with public statements of many men prominent in private and public life, but this would involve repetition of what any observer of the tendencies of the present day must already appreciate. That a termination of the system of private ownership and operation in this field would be accompanied by general losses to the public in the lowering of the standards of service, in additional and uncompensated burdens on the tax roll, and in a virtual revolution in political conditions, I believe most thoroughly. The alternative to such a change undoubtedly is the establishment on a sound and responsible basis of a well developed and well founded plan of state regulation of public utilities.

The model bill of the National Civic Federation is a joint product of unofficial representatives of the public and of public utilities. The same parties in much the same way should give serious consideration to a joint undertaking with the avowed purpose of strengthening the administration of regulating laws and of opposing unwise and destructive theories and tendencies. The model bill will be an important step in a much needed program of informing the public of the true nature of the issues raised from time to time. The greatest benefit could be derived from a continuous organization of the character of the department of the National Civic Federation which developed the proposed model bill.

The facts concerning the developments of the past and the requirements of the future in the important public service industries should be brought forcibly to the attention of the public. How many of us realize that the entire history of such wonderful industries as the telephone, the electric central station and electric traction embraces a period no longer than the active lives of some of the still young men now directing their destinies? What then may not the story of the next twenty-five years be? Destructive tendencies are rampant. Fanciful theories are finding resting places in many an uninstructed mind. There is a great dearth of intelligently collated and easily digested information with which to combat these tendencies and establish a sound understanding. There is an unwarranted lack of organization with which to meet intelligently the active propaganda of the enemies of the present form of social organization.

A model public utility bill will afford a common ground on which all who believe in the principle of public regulation may stand. Time will necessitate changes in the bill. Experience will show the need of advancing or retiring on one line or another. It will be many years, at least, before an ideally perfect bill is drafted. In the meantime, however, a standard will be available wherewith to measure legislative proposals.

The model bill is not yet published. The future program with respect to the bill rests with the federation, and I am unable to say what it may be. I hope that when the model bill is published all who are interested in promoting sound and lasting public relations may be able to give it their indorsement for what it purports to be. Let us look upon the product of the federation with sympathy for those who have contributed to its creation, appreciation of the difficulties of reconciling a vast amount of conflicting experience and a great number of contending facts, and confidence in the patriotism and high purpose of the National Civic Federation.

No discussion of the proposed model bill of the National Civic Federation is complete without a word of appreciation of the tireless energy, undaunted enthusiasm and unselfish generosity of the chairman of the department. Without stinting in any degree the praise to which all are entitled who have been associated directly or indirectly in the undertaking, it may well be said that the inspiration of Mr. McMillin's broad-minded leadership has been indispensable to a successful outcome. Mr. McMillin is entitled to the generous thanks of the public service industries and of the public at large for this unofficial service for the public welfare.

LORAIN STEEL COMPANY EXHIBIT

The Lorain Steel Company, space 418, has a number of special pieces which merit careful study. One of these is a switch for a temporary cross-over, using 110-lb. grooved rail. This is the heaviest grooved rail which has been rolled, but the demand for heavy temporary special work is now sufficient to warrant the expense. This cross-over is designed to be non-obstructive so that by throwing dirt around it a wagon can run over it. A remarkable piece of special work on exhibition has been made for use in New York at Tenth Avenue and Forty-second Street. It is a steel casting with manganese inserts, containing three wheel frogs, six slot frogs and three slot bonds. There are five hand plates located over the insulators. The company is also showing the largest tongue switch yet made for steam railroad service in paved streets. This will be placed in San Francisco for use by the Southern Pacific Railroad. It is a solid manganese steel casing 20 ft. long with an entry guard casting 10 ft. long. It is designed to accommodate a Pacific type locomotive with eight flanged driving wheels and having a 22-ft. wheelbase. The piece is a tongue switch and is made for a curve of 400-ft. radius. The main casting weighs 5400 lb. and the entry 1500 lb. Among the other important exhibits is the standard tadpole heel switch, of which more than 3000 were called for last year. A short length of manganese mate and frog is also exhibited.

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REPORT OF COMMITTEE ON LIFE OF RAILWAY PHYSICAL PROPERTY*

BY ROBERT N. WALLIS AND MARTIN SCHREIBER CO-CHAIRMAN

The 1913 joint committee on life of railway physical property has reached the following conclusions:

(1) That the basic elements which determine the life of railway physical property are: (a) use; (b) climatic and soil conditions; (c) maintenance; (d) inadequacy; (e) obsolescence; (f) the human element; (g) public demand; (h) earnings.

(2) That it is not practical or even theoretically possible to assemble compositely these several elements into any form of a logical life table that will apply equally in Maine as in California, in Minnesota as in Louisiana, or on different routes or lines of the same system embracing such physical property.

(3) That the ultimate solution of depreciation of railway property is insured earnings.

A discussion of the foregoing basic elements is presented as follows:

USE

The electric railway industry came into general practical commercial use only about twenty years ago, and the principal elements of which it has been composed, through various wonderful developments in the art during this period, have not been permitted to remain in use long enough, under the conditions which they were designed to meet, to determine their physical life.

An illustration of the demand for railway physical property to do or withstand a service over and above that for which it was originally intended is the rail and joint and track foundation problem. A track construction is designed of such section and weight of rail and joint and such depth and character of material of foundation as are ample to carry the load to be put upon it by the rolling stock which it was intended to carry, but no sooner has such construction been completed and put into use than the weight of the rolling stock and its movement over the structure are almost immediately increased to provide increased carrying capacity to take care of the ever increasing business.

If this is a fact, how is it possible to determine in advance the ultimate life of such physical property, when its use is constantly changing from day to day, month to month and year to year?

Similar illustrations could be cited relative to rolling stock, generators, engines, boilers, and in fact every physical element of electric railway property.

The use of railway physical property is necessarily a purely local one with each individual property, and no two properties, even though of very similar construction and nature, would have the same amount and character of use to an extent making them comparable.

The use of one item of physical property depends greatly upon some other item to which it is closely related. For instance, the use of track depends largely upon the weight and physical condition of rolling stock, and also, to some material extent, on the character and amount of vehicle traffic. The physical condition of track and rolling stock is also closely related to the condition of the overhead construction, motors, generating plants, etc.

Use may wear out the same items of physical property in one, five, ten, thirty, fifty years or more, depending upon the amount and character of such use, which is necessarily governed by some or all of these other basic elements. To attempt to establish the life of railway physical property based on use would result in as many different periods of life as there are properties under consideration.

*Abstract of a paper read before the American Electric Railway Engineering Association, at Atlantic City, N. J., Oct. 13-17, 1913.

CLIMATIC AND SOIL CONDITIONS

On no two separate properties are climatic and soil conditions so similar that the physical elements of such properties would not be affected differently. A coast property would be affected by the salt water and salt air, while one inland not 50 or 100 miles away would not be subjected to such more or less destructive elements. Property in a mild climate would not be affected by the conditions met with in a cold climate. Wet and dry climates affect physical properties differently, as also do the different soils of different localities. Construction on a rock foundation has a physical life materially different from construction on any less firm foundation. Two localities may have the same soil, but one is situated topographically so that it is easily subjected to adequate drainage, while the other may be almost impossible of drainage owing to its topography. This would also affect differently the physical life of each. Any attempt to establish the life of railway physical property based on climatic and soil conditions would result in as many different periods of life as there are properties under consideration.

MAINTENANCE

On maintenance necessarily depends the amount of use to which physical property can be subjected, and the kind of maintenance depends to a most material extent on the amount of earnings. A property maintained to a high standard of operating efficiency would naturally have longer life than a similar property maintained in a less high state of efficiency. To illustrate: A firmly constructed and adequately maintained, smooth-running track must affect more favorably the life of the rolling stock and its electrical equipment, the overhead construction, the generating plant, etc., than would a rough track less firmly constructed and less adequately maintained. A study of the maintenance costs of various street railway properties will develop the fact that any attempt to establish a life of railway physical property based on maintenance would result in as many different periods of life as there are such properties under consideration.

INADEQUACY

This is a subject relating to life of railway physical property that is too often confused with physical depreciation. As stated in our opening paragraph on "Use," an item of physical property may have been at the time it was installed fully adequate for the purpose for which it was designed, but owing to the wonderful strides in electric railway art and the ever increasing demand of the public, which to a large extent is responsible for the increased weights and sizes of various elements of a property, such property has become inadequate though no material apparent physical deterioration exists at the time of its inadequacy. Physical property could be adequate in one locality and inadequate in another locality though used for the same purpose.

To attempt to establish the life of railway physical property based on inadequacy would result in as many different periods of life as there are properties under consideration.

OBSOLESCENCE

As in the case of inadequacy, obsolescence is often confused with physical depreciation. Obsolescence is also often confused with inadequacy, whereas they are not necessarily related. Physical property becomes obsolete not necessarily through depreciation of such property itself but by reason of the improvement in the art and the ever increasing demand of the too critical public, often voiced through demagogues. The end-entrance car of yesterday may be obsolete as compared with the improved side-entrance car of to-day, but nevertheless this end-entrance car of yesterday may be in as good physical condition as the side-entrance car of to-day, or the four-pole motor of yesterday may be obsolete as compared with the interpole motor of

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to-day. Numerous other illustrations could be made along this line concerning various elements of physical property to the end that any attempt to determine the life of railway physical property based on obsolescence would result in as many different periods of life as there are properties under consideration.

THE HUMAN ELEMENT

This is the most variable and inconsistent element, both as relating to the public and the utility, with which we have to deal. The public of one locality may be content and satisfied with the physical railway conditions of its locality, while the public of a different locality would take an entirely different viewpoint and enforce more severe and often unjust conditions on its railway utility.

Again, those in charge of physical elements of property and the force under them in one locality may not be as efficient as those of some other similar locality; also their methods may be entirely different, occasioned possibly by the differing conditions to be met with. Any attempt to establish the life of physical property based on the human element, as found in each of such properties, would result in as many different periods of life as there are properties under consideration.

PUBLIC DEMAND

Public demand has a material bearing on the physical life of railway property. This demand is often inconsistent, without reason and unlimited, and receives serious attention from municipal and state authorities and commissions regardless of contract agreements, rates of fare, earnings, etc. It is an ever increasing element that cannot be applied equally in one locality and in another, as such demands on different properties affect different physical items of such properties. Any attempt to establish the life of physical property, based on public demand, would result in as many different life periods as there are properties under consideration.

EARNINGS

After devoting as much time as you will to unitizing into composite form all of the foregoing elements affecting the life of railway physical property, you come against the very essence of the whole problem, namely, earnings. A study of this subject will more than likely undo all of the so-called unitizing that you may have in some theoretical manner worked out, for all of these other elements are necessarily correlated to earnings. On no two electric railway properties are the numerous conditions affecting earnings similar.

In addition to the wide difference, as between localities, of the basic elements affecting the life of railway physical property, there is also a great difference relating to franchise conditions and rates of fare which directly and unequally influence the earnings of contrasting properties.

Those representing the Engineering Association here to-day must bear evidence that, while they provide in their yearly estimate for certain renewals of the property in their charge, it is a fact that such property may not have been renewed at the time they provided for it to be renewed, and sometimes not for several years later, their estimate having in the interim been held up by the management for financial reasons. This same property continues to give nearly the same service at no material increased cost of operation proportioned on the earnings it produced.

These engineers will also tell you that in making up their yearly estimate for renewals they do not turn to a pigeonhole in their desk and take out an "average life of railway physical property" table and reason that the table shows that an item of physical property has been in use for so many years, therefore it must be replaced. They will state that they determine these problems from an intimate knowledge of their property supplemented by a direct examination of the physical condition of the item under consideration.

Who has yet been able to define satisfactorily where maintenance ends and depreciation begins? The necessity that is vital to the electric railway of to-day is not for some theoretical rule or theory for estimating the life of railway physical property, but rather for some definite and fixed means of insuring the earnings necessary to take care of any amount of deterioration the public through its city, state and government authorities may demand. Our electric properties can be maintained at any state of improvement and efficiency that the public demand and will pay for, but so long as the maximum fare is limited while this public demand is unlimited, the amount to be deducted from earnings for such purposes must necessarily rest in the judgment of those having in charge the financial management of these properties.

CONCLUSION

The committee of 1913 has used sincere and earnest endeavor to comply with this purpose for which, in part, it was brought into being and came to the foregoing conclusion only after a thorough study of the subject with all the data before it. This committee, in order to enlighten itself as much as possible, amplified the forms which had previously been sent out and used earnest endeavor to have such forms filled out as completely as possible to the extent of the experience of the many members to whom they were sent.

This committee during the past two years has consistently endeavored to secure from qualified representatives of member companies of these associations and others figures expressing in years the length of life of the elements of railway physical property. Two inquiry forms have been sent out and personal solicitation for careful consideration and answers made. During the past year the form which had previously been sent out was amplified along lines suggested in the discussion at last year's joint convention.

The result of this careful effort was (a) that several replies were received; (b) that many wrote confessing inability to express any opinion of value; (c) that many, as usual, ignored the matter entirely.

An examination of replies received shows a wide divergence of opinion as expressed in figures among those qualified to judge by actual experience and training. Those having had practical experience for the most part felt that any attempt to express at present the life of railway property exclusively in years was at best a guess.

All this goes to emphasize the conclusions of the committee that life of railway property cannot at present be expressed in any tables measuring the life either in years or units of use; that where such are attempted they are merely estimates and often no better than guesses.

In the present inconclusive state of the data received the committee does not feel justified in submitting any compilation. We suggest, however, that the replies be filed in the secretary's office for the use of members. We also suggest that the work be continued with an endeavor to establish actual life conditions in individual instances, rather than estimates.

Plans for a vigorous campaign for the prevention of blockades and delays of cars of the Philadelphia (Pa.) Rapid Transit Company was outlined at a recent meeting of the co-operative committee by T. E. Mitten, chairman of the board. Mr. Mitten said that the management of the company desired to enlist the co-operation of the public, the city authorities, the bureau of police and the motormen and conductors in its efforts to remove the causes of blockades and delays. In order to accomplish the desired result it was deemed necessary first to determine the most frequent causes of delays. To this end motormen and conductors will, begining Oct. 15, be supplied with blanks upon which they will report all delays of five minutes or over, together with the causes and any suggestions they may have as to how similar delays can be avoided.

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REPORT OF THE COMMITTEE ON FEDERAL RELATIONS*

ARTHUR W. BRADY, CHAIRMAN; FRANK R. FORD, H. S. LYONS, F. W. BROOKS, L. S. CASS, RICHARD M'CULLOCH, R. I. TODD, L. S. STORRS, J. N. SHANNAHAN

The executive committee at the beginning of the year authorized the appointment of E. B. Burritt as the representative at Washington of the association. Mr. Burritt has kept closely in touch with affairs at Washington and the labors of your committee have been materially aided and lightened by the efficient work which he has done.

Three matters of federal relations stand out conspicuously in the history of the past twelve months. These consist of, first, the definition by the Supreme Court of the United States of the jurisdiction of the Interstate Commerce Commission with respect to electric railway carriers; second, the enactment of a law by the federal Congress requiring a valuation by the Interstate Commerce Commission of the property of all carriers coming within the jurisdiction of that commission, and, third, the renewal of efforts in Congress to bring about the enactment of a law for the compulsory use of steel cars by interstate carriers.

JURISDICTION OF THE INTERSTATE COMMERCE COMMISSION OVER STREET RAILWAY COMPANIES

At an early date the question arose whether street railway companies were within the purview of the original interstate commerce act, which became a law in 1887. The question was first passed on by the Interstate Commerce Commission in 1897, in a case involving a street railway 7½ miles in length, lying partly within the District of Columbia and partly within the State of Maryland (Wilson v. Rock Creek Railway Company, 7 I.C.C., 83). The commission held in that case, and has consistently maintained at all times since, that it had full jurisdiction over that class of carriers when engaged in interstate business.

In 1908 the same question arose again in a case involving the charges fixed by the Omaha & Council Bluffs Street Railway Company for transportation between Council Bluffs, Ia., and certain points in the city of Omaha, Neb. The commission contended that the position taken in the earlier case involving the Rock Creek Company had been strengthened by subsequent federal legislation, including the Hepburn act, and held (three members, however, dissenting) that the commission had jurisdiction over the respondent street railway company. It is only fair to state that the commission appears to have regarded the line operated between Omaha and Council Bluffs as an interurban line, although doing purely a passenger business, instead of a street railway line proper (West End Improvement Company v. Omaha & Council Bluffs Railway & Bridge Company et al., 17 I.C.C., 239).

The correctness of the conclusion of the commission was promptly presented to the United States Circuit Court, which enjoined the enforcement of the order made by the commission, saying that "The judges are of the opinion that the Congress never intended that the act to regulate commerce . . . or its amendments . . . should apply to, and they are of the opinion that they do not apply to, such street railway companies, that no power has been delegated thereby to the Interstate Commerce Commission to regulate or affect the rates of transportation of such companies, and that the order of the Interstate Commerce Commission was beyond its powers . . . "

The next step was, upon the creation of the Commerce Court, to transfer the cause to that tribunal, which in 1911 held that the conclusion of the commission was right and that the commission was invested by Congress with jurisdiction over the class of carriers in question. It is interesting to note that the Commerce Court marked the difference between an ordinary urban street railway and an interurban railway and apparently regarded the Omaha & Council Bluffs Company as more nearly an urban than an interurban company, because not empowered to carry freight and having no right of eminent domain.

Finally the case came for decision before the Supreme Court of the United States, which in June of the present year decided that the Interstate Commerce Commission and the Commerce Court were wrong and that street railroad properties are not subject to the jurisdiction of the Interstate Commerce Commission, even when doing an interstate business (Omaha & Council Bluffs Street Railway Company v. Interstate Commerce Commission, U. S. Supreme Court Decisions, Advance Sheets, October Term, 1912, page 890).

Thus, more than a quarter of a century after the enactment of the interstate commerce act, the question of the application of that act to urban street railway companies has finally been settled, and that class of carriers is now to be regarded as entirely beyond the jurisdiction of the commission under the laws now in force.

THE VALUATION ACT

The act approved March 1, 1913, imposes upon the Interstate Commerce Commission the duty of making a valuation of all the property of every common carrier subject to the interstate commerce act. The importance to electric carriers of securing a fair and just valuation of their property and the seriousness of the burden imposed upon them by the act are generally recognized. The valuation act, like the original interstate commerce act, was directed especially at the steam railroads, and that class of carriers have taken active steps to co-operate with the commission in making the required valuation. Various conferences have been held between representatives of the steam railroad companies and the commission, and plans for carrying out the enormous task which confronts both the commission and the railroads are being formulated.

The attention of the commission has been so engrossed with preparations for a valuation of the steam railroad properties that it has not been ready thus far to take up the matter of valuing the electric carriers. Communications on the subject have been exchanged between the commission and the president of this association, and it is believed that the commission will welcome co-operation in the work on the part of this association, as representing the electric railway industry of the country. The precedent for such action has already been established in the case of accounts for electric railways, with respect to which the Accountants' Association has co-operated with the statistical branch of the commission to their mutual advantage. The differences between steam and electric railroads which made it wise and proper that the system of accounts adopted for electric carriers should differ from that adopted for steam railroad carriers are equally in evidence when valuations are being considered. It is clear that the methods of valuation determined on in the case of the steam railroads should not, as a mere matter of course, be imposed on the electric railroads.

It will be the office of this association to represent the electric carriers of the country in presenting their position in this matter to the commission, and in securing the adoption of efficient and economical methods of valuation when the commission desires to proceed with the appraisal of electric railway properties. When that time arrives it is probable that the appointment of a special committee, composed in part of representatives of the enginering association, will be found desirable.

STEEL CAR BILLS

For several years past bills have frequently been introduced in Congress requiring all common carriers engaged in interstate commerce to use steel cars in such commerce.

*Abstract of report read before the American Electric Railway Association, Altlantic City, Oct. 13-17, 1913.

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These bills have generally been so framed as to apply to electric railroads as well as to steam railroads and differ from each other chiefly in the length of time in which the use of any other type of car is permitted. Quite recently bills of this character have been introduced in both the House and the Senate. It is not expected that any action will be taken upon the matter at the present special session, but at the regular session beginning in December it is probable that legislation of this character will be vigorously pressed. Of the bills now pending, that introduced in the House by Mr. Allen (H. R. 8187) provides that after July 1, 1918, "it shall be unlawful for any common carrier engaged in interstate commerce by railroad to operate on its lines in interstate traffic or in interstate transportation of passengers any express car, baggage car or passenger car not constructed of steel in accordance with plans approved by the Interstate Commerce Commission." The commission is authorized within ten years from the passage of the act to extend the time for compliance therewith. The bill introduced in the Senate by Senator O'Gorman (S. 3094) and in the House by Mr. Talcott (H. R. 3374) contains a prohibition almost the same as that contained in the Allen bill, providing that after Jan. 1, 1918, "it shall be unlawful for any common carrier engaged in interstate commerce to use on its lines in interstate traffic or in interstate transportation of passengers any express car, baggage car or passenger car not constructed of steel." The Senate bill authorizes the Interstate Commerce Commission to extend the period for compliance with the act "upon full hearing and for good cause," but no limitation of time is imposed upon the commission. Both bills impose a penalty of $1,000 for every violation of the act.

There is also a fourth bill, introduced by Mr. Esch in the House (H.R. 2479), which, however, excludes electric carriers from its operation. This bill is, apparently, intended to apply only to new construction after Jan. 1, 1914.

There is still a fifth bill, introduced by Mr. Roberts in the House (H.R. 6142), which requires "every railway company engaged in interstate traffic" within four years to equip all its lines with passenger cars" of steel construction, practically fireproof and indestructible." This bill also requires the equipment within the same period of four years of all lines of side companies with signals and other safety appliances approved by the Interstate Commerce Commission. No provision extending the four-year period is made.

Your committee, when similar bills were pending earlier in the year, contemplated the collection of the data necessary to demonstrate to Congress the difference between steam railroads and electric railroads in respect to the necessity of steel car equipment and the impossibility from a practical and financial standpoint of complying with any drastic requirements. The announced intention of Congress to devote its time to other matters caused the committee to refrain from gathering these data until the time for use had more nearly arrived. It will doubtless be an important part of the work of the committee on federal relations for the next year to give this matter attention.

OTHER FEDERAL MATTERS

Besides the three subjects which have thus been spoken of at length, there are others which should be adverted to briefly. Some of these are of considerable consequence and may have to receive active attention during the ensuing year. The past twelve months have, for reasons well known to you, not been marked by the pressing of a large mass of general legislation, but it is probable that the coming year will witness a change in this respect.

The "hours of service" bill, which attracted considerable attention in 1912, was reintroduced in April by Mr. Cary of the House (H.R. 2490). This bill is of great importance to the interurban railways of the country and requires amendment if they shall not be subjected to substantial and useless increases in operating expense.

There is also a bill introduced in the Senate by Mr. Kenyon (S. 958) which amends the "hours of service" act so as to require one full twenty-four-hour day off duty in every week.

The bill to provide for the coinage of 3-cent pieces has been revived, ½-cent pieces being a new addition (H.R. 1885, H.R. 1887 and H.R. 4356).

A workmen's compensation act applicable to the employees of all interstate common carriers by railroad is proposed by Senator Sutherland in Senate bill 959. This bill is compulsory and exclusive in its character.

So far does the desire to regulate railroads extend that one bill has been introduced in the House (H.R. 2461) that requires the Interstate Commerce Commission, co-operating with the civil service, to examine and pass on the competency of roadmasters, foremen and other employees of common carriers by railroad, subject to the act to regulate commerce, employed by such carriers to superintend the construction, maintenance and repair of tracks, bridges, switches and signal apparatus. Each employee thus examined and approved is to receive a certificate of competency, good for one year, and any carrier employing any person belonging to the classes named not so certified shall be liable to a penalty of $100 for each offence.

In addition to the bills mentioned there are others to provide for the investigation of labor controversies affecting interstate commerce, to make sanitary inspections of cars, stations, etc., and in other ways to regulate the affairs of common carriers. Besides these are many bills of importance applying to other businesses besides railroads.

EXPANSION OF THE SUBJECT

It is interesting to note the gradually increasing scope of the relations between the electric railway industry and the United States government. The decision of the Supreme Court already referred to will reduce somewhat the number of companies required to report to the Interstate Commerce Commission, unless the scope of the interstate commerce act be enlarged as has been proposed by an act already introduced (H. R. 8637). At the same time, the importance and seriousness of the valuation legislation already enacted and of the steel car legislation proposed to be enacted illustrates strikingly the expansion of the control which the federal government exercises over the electric railway industry. We are unfortunate in one respect. So far as Congress is concerned, the steam railroads constitute the target at which practically all of the legislation thus far enacted and proposed is aimed. The ills, actual or assumed, which the federal government has undertaken to remedy have arisen in the case of the steam railroads and not of the electric railroads. The electric carriers are a mere incident to the interstate commerce which Congress undertakes to regulate and control. At the same time, the regulatory acts are generally so framed as to be applicable to electric railroads as well as to steam railroads. It is often hard to convince legislators, commissions and courts that there are essential differences between the two classes of carriers and that these differences make laws and rules which are fully applicable to one class a misfit when applied to the other.

Moreover, the desire to enact measures strong enough to control effectually the steam railroad carriers renders legislators in some cases timorous as to the effect of excluding other carriers from the act by modifying the character of the regulation so far as any particular class of carriers are concerned, lest thereby the entire enactment be weakened or destroyed.

The phenomenon of multiplying relations between the electric railways and the federal government is a permanent and not a temporary one. It is in line with the movement toward a general expansion of the powers of that government which the last half century has witnessed. Our association will, therefore, find that in order to perform its duties to the industry which it represents more and more of its attention must be given to the consideration of the many questions which those relations present.

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Among the Exhibits

EXHIBIT NOTICE

The exhibits will close officially on Friday afternoon at 2 p. m., as announced at the annual meeting of the Manufacturers' Association on Wednesday afternoon. It is earnestly requested that no exhibits be dismantled before that hour.

* * *

The Cameron Electrical Mfg. Company, Ansonia, Conn., is represented at the convention by John T. Kent and John B. Davidson.

* * *

T. J. Ryley, of Ryley & Thomas, New York, special representatives of the National Brake Company, Inc., is attending the convention in the interests of the latter firm.

* * *

The Home Rubber Company, Trenton, N. J., has an instructive exhibit of its product. In addition to automobile tires there are various types of sheet packing, gaskets, etc. The exhibit is located in space 359.

* * *

W. H. Sauvage, president Sauvage-Ward Brake Company, New York City, formerly with the Standard Coupler Company, dropped in yesterday to meet his old friends. Mr. Sauvage states that he expects very soon to offer some new air-brake appliances to the trade.

* * *

The Western Electric Company is exhibiting Matthews pole line specialties. Some of the latest devices which have attracted particular attention are the Boltless guy clamp and telehelght. The advantages of money-saving and labor-saving devices, such as cable clamps, two-bolt clamps, sleet cutters and screw anchors, will be explained by Sales Engineer W. M. Heim.

* * *

The Atlas Preservative Company of America, New York, N. Y., manufacturer of "Atlas-A" weed killer and track preservative, has no exhibit at the convention, but R. N. Chipman, manager of the company, has been circulating among the railway men. Mr. Chipman sails on Saturday for Cuba on a business trip. He reports his first active campaign for electric railway business this past season as highly successful.

* * *

The Cooper Heater Company's exhibit consists of a hot-air heater and hot-water heater. The special feature of the former is the provision for taking air from the top or side of the car. The air is circulated by a Sirocco blower, driven by a motor specially built for this service by the Robbins & Myers Company. Three sizes of the heater are manufactured, the largest having a motor consuming 0.8 amp.

* * *

A feature of the exhibit of the Ackley Brake & Supply Company, in spaces 117-119, is the widely used Automatic trolley guard. This guard is made of aluminum coated sheet steel of selected thickness. The trough is held in place by pressed-steel yokes or hangers which take any standard type of trolley ear. The shape and position of the sides have been designed to replace the trolley wheel on the wire automatically if it jumps off.

* * *

The Lord Manufacturing Company at space 537 is showing several interesting demonstrations of the Multi-Vapo gap and Shaw lightning arresters. Most attention is attracted by the 40,000-volt horn-gap arcing produced after sending this voltage through an M. & G. 500-volt arrester. Another exhibition at this booth which attracts much attention is the operation of a Spencer or Lord screenless compressor air cleaner under service conditions. The exhibition cleaner is built with glass sides so that the dirt fed into the intake may be seen as it is caught by the oil surface within.

While the Graphite Lubricating Company, Bound Brook, N. J., has no individual exhibit at the convention, its trolley bushings can be seen at the spaces of the following firms: A. & J. M. Anderson Manufacturing Company, space 319; Electric Service Supplies Company, space 414; R. D. Nuttall Company, spaces 142-144; Bayonet Trolley Harp Company, space 545; Western Electric Company, spaces 339-341; and Star Brass Works, space 508. O. P. Johnson, of the last company, states that "Bound Brook' bushings are standard in the manufacture of his company's "Kalamazoo' wheels and have been since it began selling trolley wheels. George Smalley, assistant to General Manager L. S. Bache of the Graphite Lubricating Company, is attending the convention.

* * *

The Pennsylvania Steel Company at space 23 is making a special feature of a high semaphore switch standard for electric railway use as introduced on the Detroit United Railway. A large aluminum model has also been made to show the construction of the hook-heel switch. This model, which is full size, is mounted on trunnions so that it can be rotated. An instructive exhibit of a joint constructed with Mayari steel bolts compared with joints made with ordinary steel and iron bolts consists of three joints which have been subjected to blows from a standard drop hammer. The superiority of the special steel is quite apparent. Among other exhibits attracting attention, the popular No. 160 hard-center street railway frog is coming into use in electrical work where M. C. B. equipment is used. Visitors should notice also a simple tongue-locking device designed to take the place of the loose blocks ordinarily used in blocking switches. This is illustrated in connection with one of the standard Manard switches. This device effectively prevents the theft of the blocks which has caused much inconvenience in the past.

ENLARGING THE SOUTH LONDON TUBE

The oldest tube railway in London is the City & South London line, which was begun in 1884. This, by virtue of a very recent act of Parliament, is now to be modernized and enlarged. The method of doing this work is thus described by a British contemporary:

"The cast-iron rings forming the lining of the existing tunnels are to be taken out one by one and sufficient soil is to be excavated to allow the plates to be fixed in their new position. Each new ring is to be placed in position as soon as possible after the removal of the existing ring, and in no distance of 80 ft. will more than three consecutive rings of lining, or a length of 5 ft., be removed without the immediate fixing of the substituted lining. All such lining is required to be of plates made of iron or 'other sufficient metal.'

"The contractors for the work will be required, in the event of there being any space between the lining of the tunnel and the surrounding soil, to fill this up with lime or cement grouting supplied under pressure as each ring is bolted up. As regards the size of the tunnels, those in the stations will have a maximum internal diameter of 30 ft., the maximum diameter of the tunnels between the stations, except at cross-overs, being 13 ft. An interesting provision in the act concerns the Royal Observatory, Greenwich. For the protection of the observatory from the effect of stray currents, the Admiralty is empowered to compel the railway to use such precautions, including insulated returns, as it may deem necessary.

"The work of enlarging the tunnels must be completed within five years, and the engineers anticipate no difficulty in finishing their task well within this time limitation, though the work will naturally be very slow, seeing that the tube will continue working regularly for twenty hours every day as usual, so that very little time will be daily available."

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THE ATLANTIC CITY CONVENTION

The weather, which at the beginning of the week looked somewhat unpropitious, was again favorable to the association and was an important factor in the pleasure and success of the Atlantic City convention. The meetings as a whole were well attended, and the registration figures of Friday morning indicated that the number of those present was practically equal to that at the large Atlantic City convention of 1911. The somewhat larger registration in 1912 was to have been expected from the fact that the convention was held in a large city and consequently was attended by a large number of men from all branches of the service of the local companies. Every convention has its lessons, and in our interviews with various delegates at the convention we have sought to learn some of their views in regard to the meeting this week. All were enthusiastic in regard to the excellence of the arrangements, the quality and timeliness of the papers and reports presented, the high character and extent of the exhibits, the advantage which Atlantic City affords in permitting those at a convention to meet each other, and the benefit which results from the interchange of experience thus made possible. The attendants at the convention included several managers and engineers from abroad, and they were particularly impressed with the scale and scope of the entire convention, especially of the exhibits. The technical meetings were replete with interest, but in the opinions of some there was an effort to include too many papers and reports in the time allotted, particularly in the case of the American Association. A paper, no matter how excellent, represents the views of one man only, but a discussion is valuable, not only because it embodies the views of many but because those views are expressed in the light of the other testimony offered. Hence, to obtain the full benefit of the convention, the discussion should be made the most important feature. If there was any lack of this kind in the sessions of the American Association this year, however, it is a matter which can be easily remedied in the future. We have already reviewed a number of the papers and reports presented at Atlantic City, and shall probably have occasion to touch upon others during the next few weeks.

AN OPEN FIELD FOR SIGNAL SYSTEMS

While the recommendation of the committee on block signals presented at the joint session of the Engineering and Transportation & Traffic Associations on Tuesday did not bind the association to the policy "that for high-speed interurban service automatic signals should be controlled by the use of continuous track circuits, and that expenditures should be concentrated on continuous track circuit control with a cheaper form of indication in preference to a more expensive form of signal and a less reliable control," a number of the members and manufacturers, representing both those using intermittent control and those using continuous track circuits, stated that they believed it would be unwise to make a positive commitment to any particular signaling principle at this time. Many arguments exist in favor of the continuous track circuit form of signal control; but, on the other hand, no one can foretell what new developments may be forthcoming in block signaling, and this feeling was most emphatically expressed in the unanimous vote of the association to adopt C. L. Henry's amendment, which left the signal situation open to future consideration of any improved system.

THE PROBLEM OF SANITATION

A paper presented at the convention on Thursday, and one which was somewhat off from the beaten path, was that by W. C. Rucker, M.D., assistant surgeon-general United States Public Health Service, entitled "Regulations on Sanitation as Relating to Public Carriers." Dr. Rucker explained how common carriers are frequently the transmissal agencies of disease, not necessarily through their own fault, but through the thoughtlessness of some of the traveling public. This is true, of course, of the steam railroads as well as of the electric railways, but it is gratifying to state that the electric lines do a great deal more to keep their cars clean and sanitary than the majority of people realize. Few electric lines fail to wash and fumigate their cars every night, some interurban cars, in fact, being cleaned in some way so far as the time permits at every layover. On the other hand, steam railroad cars on a long run may not be thoroughly cleaned for days at a time. The fact that an electric car is untroubled by smoke makes it possible to supply sufficient fresh air to act as a germicide without serious annoyance to the passengers. But in other ways as well

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the electric railway lines have shown their progressiveness in sanitary construction. Perhaps, the greatest improvements of this class are the non-absorptive cements or other composition floorings and the several odor-proof compositions used for panels, headlinings and the like. Nowadays, even hand straps come with sanitary sleeving to discourage the omnipresent bacilli. There has been equal improvement in construction and interior decoration, and the ornate but dust-collecting moldings and fixtures of the past have given place to forms simple in design and easily kept clean. The problem of keeping healthful a vehicle which is used by hundreds of all sorts and conditions of people every day is not an easy one, but the practices cited make it evident that electric railways realize their responsibility in helping maintain the public health.

SELF-PROPELLED CARS

The 1912 report of the committee on equipment, read at the convention at Atlantic City yesterday, was notable for its elaborate and valuable treatise on the development and use of self-propelled cars. In the report of the same committee for the current year this subject and its bibliography have been brought down to date. This continuation is fully justified by the extensive revival of this branch of transportation. It has not been considered necessary to publish any extended abstract of this supplementary report in these pages, inasmuch as its data necessarily coincide with much of that which has been published during the past year in the columns of this journal, and especially in the Convention Number chapter entitled "Self-Propelled Cars." A comparison of the years 1912 and 1913 shows appreciable increases in the number of cars and applications. The gasoline car is still practically limited to steam railroad branches of considerable length, although single-truck cars for city purposes have been developed as noted in recent issues of this journal. The gasoline-electric car is not only a competitor of the gasoline car for long-distance work, but it has even encroached successfully on purely interurban territory. The storage-battery car, which has been applied chiefly to short interurban and small city systems in this country, has lately been operated in trains under certain exceptional conditions in Cuba and Montana. In short, the increase in the number of self-propelled cars of all types is reasonable proof that they have been greatly improved in reliability, for else they would not be acceptable for the isolated lines and small roads on which they are most desirable. Not the least valuable feature of this development is that it will do much to prevent the premature construction of full-fledged electric railways and subsequent receiverships such as followed the interurban boom of ten to fifteen years ago. The discussion on this report, as published elsewhere in this issue, brought out some most interesting figures on the costs of different types of batteries. It revealed, in particular, that the choice of battery type depends very largely upon the cost of energy per kw-hour, that only very exceptional conditions can justify battery train units and that trolley engineers freely recognize what the builders of storage battery cars have done in the way of advancing light construction.

THE SIGNIFICANCE OF THE EXHIBITS

The experiences of the week have demonstrated that the appeal of the exhibits never grows less to the convention delegate. His eyes, ears and hands are always open to receive the latest information bearing upon equipment progress. Even if the fundamental object of the display of apparatus is purely commercial, it none the less follows that here is an unrivaled opportunity for a sort of post-graduate course of a few days' duration in the technique of the transportation art. The apparatus shown is all more or less designed to advance the status of the industry as a whole and of each individual road in particular, and it deserves more than passing study. One may be tempted sometimes to pass by certain exhibits without slackening one's gait because outwardly they look very much the same as in other years, but one does this at the risk of missing some point of real advance in design or construction which may mean a hundred times the cost of the delegate's trip in money saved if applied on some local system where the conditions are favorable to its use.

It is a fact, however, that not all of the exhibitors of well-standardized equipment made the utmost of their opportunities along the line of placarding new developments which might be non-apparent to the passer-by in the aisles. The result is that a good many experienced convention attendants have made a point of getting at the new developments first by striking directly at the root of the matter and putting point-blank inquiries to those in charge as to the latest progress exhibited. Another matter of apparently trifling importance which we find the experienced convention visitor intent on making the most of his time never overlooks is the desirability of carrying a good supply of business cards when touring the displays, to facilitate getting "en rapport" with those who have information to impart or to forward. It happens not seldom that exhibits are left for short periods in charge of persons entirely unacquainted with their technical interest, or even inexperienced in the collection of visitors' names and addresses. The value of the business card in such cases is obvious.

Another hint, taken from the Atlantic City convention, is worth recording. In a large display of machinery by many different manufacturers such as was made at the convention this week, it often happens that some of the manufacturers have designs or products coming along in the factory which could not be completed in time for demonstration or exhibition. It is an excellent plan to make inquiries along this line also in studying apparatus in convention assembled. Then, too, a good many people go through exhibits without questioning whether the equipments shown represent the upper or lower limits of effective design or manufacture and apparently without realizing that only a very small part of the resources of their makers can possibly be shown under a single roof. Well-selected exhibits are often intrinsically valuable, and in not a few instances they are suggestive of great reserve capabilities in production. They may be significant of the varied product of a manufacturer, or they may illustrate the solution of a single problem for the time being, and it is important not to judge the exhibitor too hastily

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if his display is small and concentrated. All of this simply leads up to the value of inquiries by the broadside. The visitor should remember that the exhibit is there for no other purpose than to have its merits explained in any desired detail by the representative who is in charge. Common courtesy, of course, forbids the latter from obtruding himself so that the initiative must be taken by the delegate.

At all conventions where electrical apparatus is displayed on a large scale the close student of its progress in different lines is likely to come away with a feeling of discouragement that his knowledge has been getting so rusty in fields outside his own immediate specialty. Modern manufacturing methods are so far in advance of those in vogue only a few years ago, and modern designing is so often conducted in such a way, that the general visitor is very apt to find himself a long way from the forefront of practical realization of advances made just outside his daily lines of work. If he has read the technical press faithfully, his troubles will be much smaller, but in any event he is pretty certain to regret his lack of knowledge of many important details as he goes about the displays. Let all such be of good courage, for this great tide of advance marks the railroad profession as a lifework immeasurably separated from routine tasks repeated with little or no variation from day to day. It challenges the efforts of able minds to keep up with its pace, and when viewed from the right coign of vantage—an appreciative standpoint—should inspire the railroad man to do better work himself in emulation of the improvements in the tools of the great industry of which he is a part.

STOREHOUSE AND MATERIAL YARD EFFICIENCY

A centrally located stock of material sufficient to meet electric railway requirements, all will agree, is a necessity, but the interest on its cost, the cost of storage and insurance and the risk of loss through obsolescence and depreciation all urge the desirability of keeping the stock low. The storehouse on any road is a subject which will well bear study by the manager desirous of reducing the items of expense already mentioned, as well as the cost of storing and handling material.

On the latter points the first consideration is that of the location of the storeyard or storehouse. It should be centrally situated, not especially with regard to the road it serves, but with regard to the points to which most of the material must be delivered. This arrangement will reduce the cost and time of delivery, and in many instances the time of delivering is of ruling importance.

The cost of rehandling various materials is probably the largest item of expense of maintaining a storehouse and yard. Every effort should be exerted to reduce this to a minimum. Material stored either in the open or in the storehouse should be distributed with reference to the quantity required during any given period. This should not always rule its location in the yard or storehouse, however, for it is also well to place bulky material as near the receiving and delivery point as possible. Another point to consider is that of storing by department requirements. For instance, material required by the mechanical department should be stored in a certain portion of the storehouse so as to eliminate lost motion as much as possible in filling an order. This is also true of material in the open. Rail, fastenings, special work, etc., should be stored on adjoining ways so that it will not be necessary to shift a car very far in loading out a given order.

All bulky material in open storage should be sorted as to size, length, etc., and the section containing each should be marked so that there will be no delay in picking it out when it is required. A great source of economy in handling material in small yards, where mechanical unloading is not warranted, is to build ways for storing material at the same height as the car floor. When it is economical to install mechanical devices for unloading and handling various materials, the ways should be installed for this purpose so that material can be stored well up above the ground, a plan which will reduce corrosion if the material is steel or iron and will retard decay in case it is timber.

Another source of economy, on interurban railways in particular, which does not seem to receive proper consideration is that of practically eliminating the rehandling of bulky materials. In most instances when special work is ordered in track renewals or extensions it is possible to deliver this heavy material at the point where it is to be used instead of shipping it to the general storehouse for rehandling. This is especially true of bridge timber and poles. If the usual course is followed, a bill of material is made out for each particular job considerably in advance of the time it is required, and it is possible to make deliveries on the ground without re-sorting. Orders should be placed and deliveries required with a view to reducing all sorting and rehandling to a minimum. With heavy material this work becomes a considerable source of expense which could well be eliminated.

The quantity of material on hand at any given time is also an important factor, due consideration of which will greatly reduce the cost of maintaining a storehouse. Some companies fail to consider the item of interest and insurance unnecessarily spent upon portions of the stock which are not replenished for a whole year. A good rule to follow, and one which has proved satisfactory by experience, is to keep the quantity of material down to that required until a duplicate delivery may be had. This method has been solved on certain roads by carrying a maximum and minimum stock which has been computed after several years' experience. When the stock drops to the minimum automatically the maximum is ordered. These requirements may be based on the number of cars and miles of track or overhead, and the average requirements for a given period will increase, of course, with an increase in mileage or number. If this method is employed, the quantity purchased at any given time may be small, but the total for the year would be sufficient to make the company supplying it give the road the advantage of its best price. In other words, the total quantity required will be large but the deliveries will be scattered. In this way the manufacturer of the material carries the interest and insurance charge instead of the railroad. In summing up the possibilities we believe that many economies are possible in storehouse management, and it resolves itself into a question of careful consideration of methods to produce the best result.

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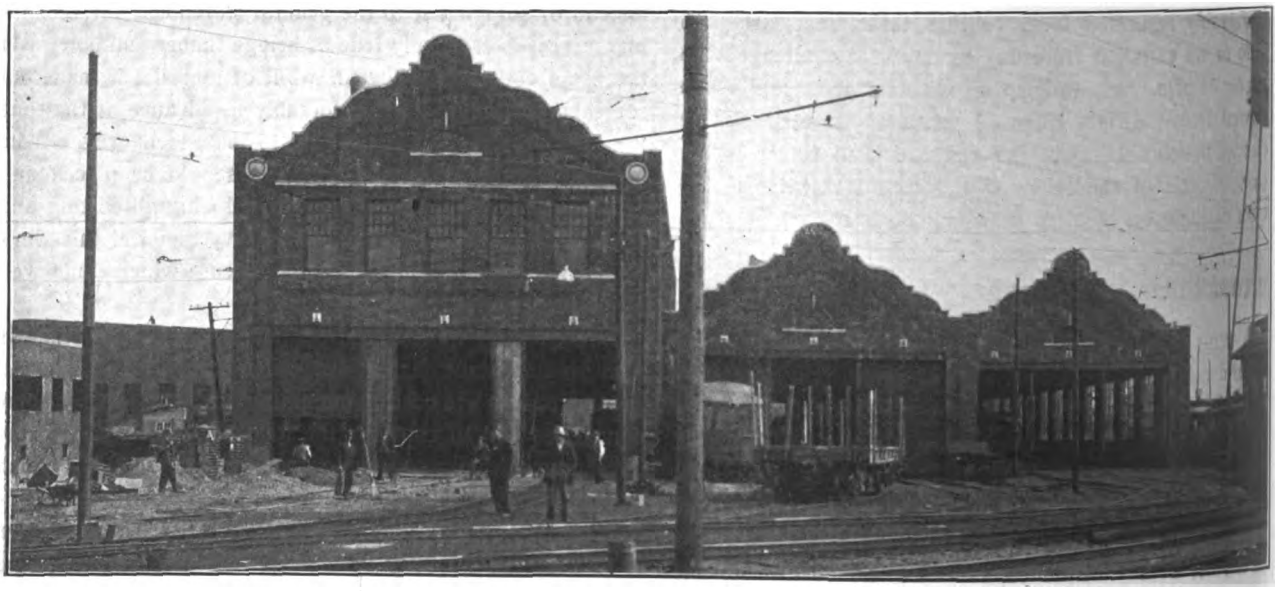
Kenmore Shops of the Northern Ohio Traction & Light Company

This Company Has Recently Constructed an Unusually Complete Car Maintenance Plant Near Akron, at Which Point the Greater Part of the Heavy Repair Work Will Be Done for the Cars on All of the Company's Lines.

BY JAY C. LATHROP

The Northern Ohio Traction & Light Company has recently built a complete set of repair shops on a property located just south of the Akron city limits on the interurban line between Akron and Barberton. The property consists of a tract of about 10 acres which lies adjacent to the Ohio Canal between the company's tracks and the main line of the Erie Railroad, and it is very conveniently situated to serve as a center for the maintenance work of the whole line.

The company now has in service a total of 343 cars, of which 164 are for interurban service. The others include 147 city cars, twenty-four miscellaneous, such as work cars, snow plows, etc., and eight baggage cars. Of the above, 130 interurban cars are in service on the lines north, east and west of Akron, the remaining thirty-four being used south of Akron to Canton, Massillon, and other towns. Of the city cars sixty-six belong in Akron, forty-one in Canton, twenty-five in Massillon and fifteen in Canal Dover.



Northern Ohio Shops—Entrance End of Carhouse

Heretofore this equipment has been stored and maintained at Silver Lake Junction, South Akron and Canton. For several years the carhouses and shops at the above points have been badly crowded, and early in 1912 fifty-five new cars were purchased and it was decided to erect new storage houses and shops. These shops are intended to care for the greater part of the heavy work, the shop at Canton being retained for the Canton city cars and the other two for minor repairs, inspection, etc. Although plans were rushed and most of the contracts were let in the spring of 1912, owing to the press of other work, the scarcity of labor and other unexpected delays, the buildings were completed and occupied only recently.

The complete layout is shown on one of the accompanying illustrations. The group consists of six buildings, the three largest being the carhouse, the truck shop and storeroom, and the paint and carpenter shop, the other three being a dispatcher's office, a pump house, and a substation furnishing electric power and light.

These buildings, together with the yard tracks, have occupied practically all of the lot except low, swampy portions which will be filled in the future. When filling has been completed there will be room for considerable growth.

A complete sewerage system has been provided, the storm water from the roofs and car-washing pits being cared for by one system which discharges into a swamp adjacent to the canal. Sanitary sewers from the toilet room and lavatories are connected to an 8-in. cast-iron sanitary sewer which passes through the company's property parallel to the carhouse and discharges into one of the main sewers of the Akron city system. Al sewers within the building limits, with the exception of the sanitary sewers, are of glazed terra cotta tile.

The relation of the three main buildings is clearly shown in the general plan. The two shop buildings are arranged on either side of the transfer table pit, which also passes the rear of the carhouse. Thus cars can easily be shifted from the carhouse to any of the shops or from one shop to another. This transfer pit is 66 ft. wide and 3 ft. 6 in. deep. A motor-driven transfer table was installed at the earliest possible date and proved to be a great aid to construction as cars of material of all classes could then be delivered almost to the exact point at which they were to be used.

FOUNDATIONS

The foundations for the main buildings, together with the pits and floors in the carhouse and truck shop and the sewerage system, were let in one contract early in 1912. Good gravel foundations were found under the carhouse and fairly good soil under the paint and carpenter shop. In fact, the only real troublesome part of the work was under the storeroom and east end of the truck shop, which had to be filled for about 10 ft. An attempt was made to build a spread concrete footing under these walls, but a decided settlement was observed before the walls were begun. Under these circumstances it was thought best to

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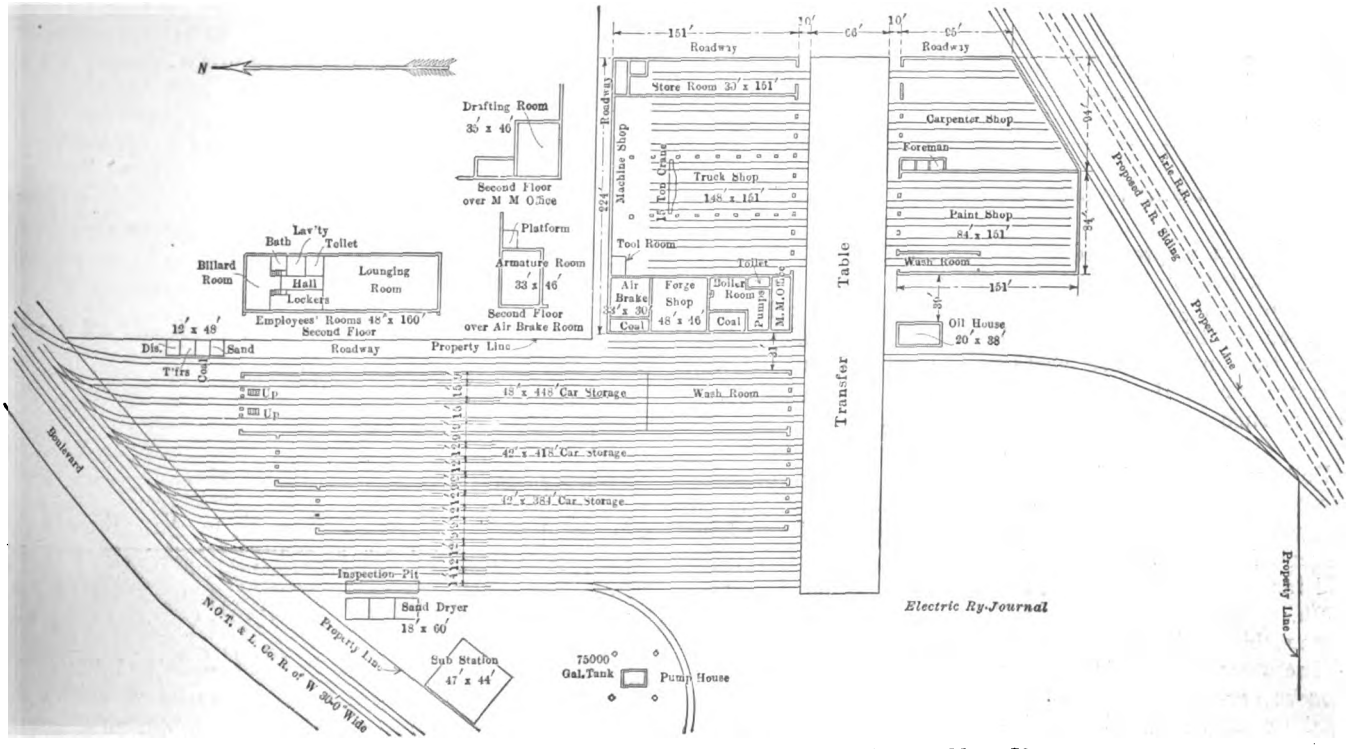
remove these footings and drive piles under the walls. This was especially desirable under the storeroom as the weight of the shelving and supplies will probably exceed that to be expected in any other portion of the buildings. All wall footings, pit walls, floors, etc., throughout the work are of 1:3:5 concrete, except reinforced floors, platforms, etc., which are richer, being made of concrete in the proportions 1:2:4.

To facilitate the installation of heating and plumbing mains and other piping of various sorts a system of tunnels was provided, starting at the boiler room. In one direction this tunnel passes from the boiler room to the carhouse and extends its full length along the east foundation wall. In the other it passes through the truck shop just below the level of the pits, with a branch passing under the transfer pit to the paint and carpenter shops.

The structural steel for the three main buildings was furnished and erected by the McClintic-Marshall Construction Company under one contract. A number of the tracks were laid by the traction company prior to the erection and the entire job was erected with a locomotive crane. The walls for the entire group of buildings were designed on the same general architectural lines, being built of common red brick laid in Flemish bond with raked black mortar joints. Gray terra cotta trimming and steel window sashes were used throughout.



Northern Ohio Shops—General Layout, Showing Location of New Shops

CARHOUSE

The carhouse really consists of three separate buildings, the three three-track bays being separated by solid 13-in. brick fire walls. The only break in these walls is a door opening about midway of their length which is protected by a metal fire door.

The east section is 48 ft. wide by 448 ft. long. Inspection pits run nearly the full length of each of the three tracks. Between the pits are concrete floors sloped to drain into the pits, which have cesspool drains at frequent intervals. It is intended that any portion of this section may be used for car washing, and hose bibs have been provided at frequent intervals on both hot-water and cold-water lines.

The walls of all pits were designed with a recess from the floor to within 1 ft. of the rail. In this recess are placed lights, the heating coils and other piping. The pits are amply lighted by 50-watt tungsten lamps at 10-ft. intervals on either side of the pit. All wires are carried in conduit, and adjacent to each lamp on one side is an additional socket to which extension lamps can be connected.

Air lines are provided in each pit with valves at frequent intervals, and near the front of the building a connection has been provided in each pit for a steam hose to be used for melting snow and ice from trucks before inspection. An attempt was made to provide all such conveniences during construction instead of leaving them for an afterthought as has been all too common in the past.

Above this bay a second floor was built, extending 160 ft. from the front of the building. This floor is for the use of the carmen, and ample facilities for their pleasure and comfort have been supplied. As the 15-ft. track centers are wide to allow for car washing, it has been found possible to place the stairways to the second floor between the tracks and allow sufficient clearance between the cars and the stairway. The stairs land in a main hall which leads to an assembly room in the rear. On one side of the hall is a locker room containing 400 metal lockers, and on the other side are found toilet rooms together with showers and tub baths. The whole front is arranged for a billiard room and is very well adapted for that purpose, being lighted from three sides as well as from above.

The other two sections of the carhouse are each 42 ft. wide, one being 416 ft. long and the other 384 ft. long. As they are intended for storage purposes only, a cinder floor was made and no heat was provided. As the cars of different types vary greatly in length, no exact statement of the total storage capacity can be given. However, the three bays will hold eighty-four of the standard 42-ft. double-truck cars used in the Akron city service. In addition, four storage tracks have been laid just west of the carhouse, and each of these will hold ten cars. All tracks in the carhouse and storage yard slope about 18 in. in the length of the building, the front end being the lowest.

The carhouse roof is supported on steel roof trusses of the Fink type and steel channel purlins. These purlins support reinforced concrete tile about 2 ft. by 4 ft., made by the Federal Cement Tile Company. In the center bay and on the inside slope of the roof on the two outside bays tiles with glass insertions 12 in. x 24 in. were used instead of skylights. This method of lighting has proved very

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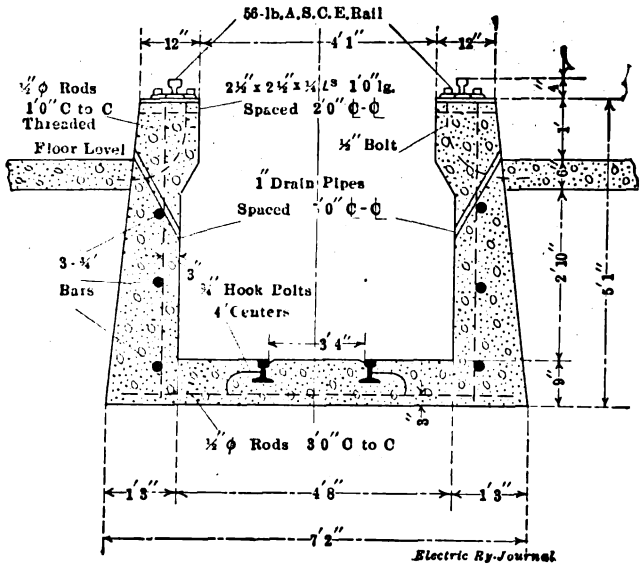
successful indeed, and as a matter of fact the lighting of the center bay is better than that of the two outside bays in spite of the large amount of window surface on the outside walls. Especially is this true when a row of cars is on the track adjacent to the windows. In the writer's opinion, this style of roof is especially well adapted to carhouse construction.



Northern Ohio Shops—Cross-Section of Pit in Truck Shop

Ventilation is provided in the center bay and the carmen's quarters by 30-in. Swartwout revolving, ball-bearing ventilators on 32-ft. centers. Kinnear rolling steel doors are used for both ends of the building. The trolley wires inside the building are protected from accidental short-circuit through the steel roof by wooden troughs which are fastened to the bottom chords of the roof trusses.

REPAIR SHOP

Both main shop buildings are similar to the carhouse except the roofs, which are of the Aiken type of depressed bay with wood sheathing and composition roofing. The larger of the two buildings is north of the transfer table and includes the storeroom, truck shop, machine shop, tool room, armature room, forge shop, boiler room with coal storage bins, offices, toilet rooms and lavatories.

The storage room is in the east end of the building. A storekeeper's office is in one end, separated from a passage to the machine shop by a wire partition and counter, over which supplies may be delivered to the men. A large door opens on the north end through which supplies may be received when delivered by wagon. When delivered in carload lots the car is set on a track in the storeroom by the use of the transfer table. An unloading platform built of reinforced concrete is provided. An incline leads from this platform to the main floor and another incline leads from the main floor to a depressed area below the platform.

A complete outfit of steel shelving 10 ft. high has been installed. In case more shelf room is desired at some future time a mezzanine floor can be built and additional shelving installed above. The shelving is arranged in sections marked in alphabetical order, and the vertical shelves are numbered from top to bottom and by the divisions of each section from left to right. The various supplies pertaining to different departments have been grouped as much as possible, but each article will be known and called for by the letters and numbers indicating its location. Thus F820 will be found in section F, on the eighth shelf from the bottom and in division 20 longitudinally. The numbers are plainly shown on metal tags attached to the shelves. Additional storage spaces for bulky material are indicated by lines on the floor, each space having a section number.

The truck shop and machine shop just west of the storeroom is divided into three bays 50 ft. wide and 150 ft. long. Each bay has three tracks which run from the transfer pit to within 40 ft. of the rear wall, leaving ample room for machines of all kinds. Pits are provided under all but one of these tracks similar to those in the carhouse. In this case the devil-strips are depressed 1 ft. for the convenience of the man working on journal boxes, etc.

In the center of one of the pits provision has been made for the installation of a wheel-grinding outfit. In three others pits for changing wheels have been provided. In each pit a track has been installed with a gage of 4 ft., and on this hydraulic motor lifts are installed. The motor lifts can also be used for changing wheels. They have double cylinders and were built to order in Cleveland, Ohio.

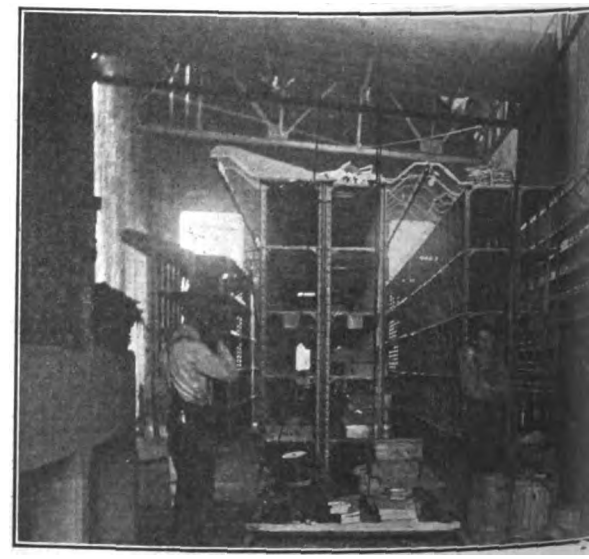
In the center bay a 15-ton Cleveland electric traveling crane equipped with two 7½-ton trolleys was installed. This crane is floor-operated, and it is useful for a great variety of work. Runway girders have been furnished in the other two bays for future cranes.

MACHINE SHOP

The machine shop is unusually well provided with machine tools, as a number have been moved from the old shop and more have been purchased for the new installation. As most of the older tools were belt-driven, arrangements were made for a line shaft to drive these as well as other minor tools. With these exceptions, however, all constant-speed machines are driven by 220-volt, three-phase, 60-cycle induction motors, and all variable-speed machines by 550-volt, d.c. motors taking current from the trolley circuit.

Following is a complete list of tools in the machine shop:

18-in. lathe.
36-in. drill press.
Wheel press.
Carwheel lathe.
30-in. x 30-in. x 6-ft. heavy Pond planer with one head and reversing drive.
30-in. x 16-ft. Pond lathe.
2-in. Landis single-spindle bolt cutter.
24-in. Stockbridge shaper.
No. 3 Williams pipe machine.
Double emery grinder.
Buffing machine.
20-in. back-geared, upright drill.
9-in. x 5-ft. lathe.
Robertson power hack saw.
Wet tool grinder.



Northern Ohio Shops—View Showing Metal Cupboards in Storeroom

The tool room is in one corner of the machine shop. Just above the tool room is a concrete platform upon which armatures can be lifted by hoists or a jib crane. This platform leads directly into the armature room, which is located on the second floor over the air-brake room and coal storage bin. The armature room has the following equipment:

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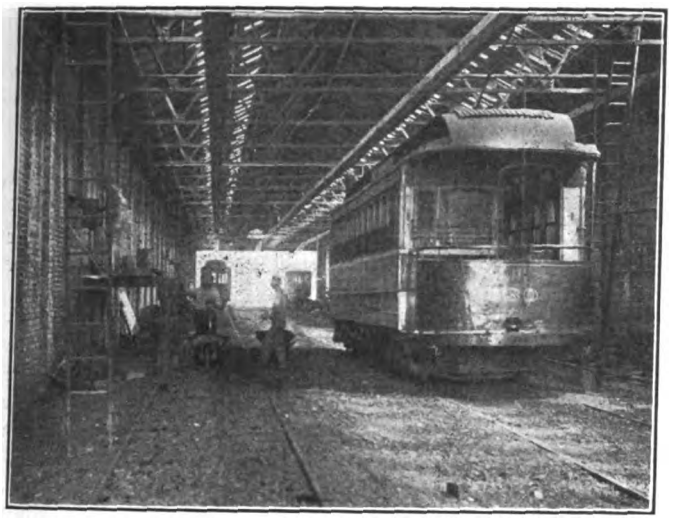
Three armature buggies.
One armature winding machine.
One armature heading and banding machine.
One axle-bearing babbitt mold.
Two pinion pullers.

The forge shop is adjacent to the truck shop and occupies a room about 40 ft. square. A 500-lb. Beaudry power hammer is placed in the center of this room and three Buffalo forges are arranged in a row along the west side.

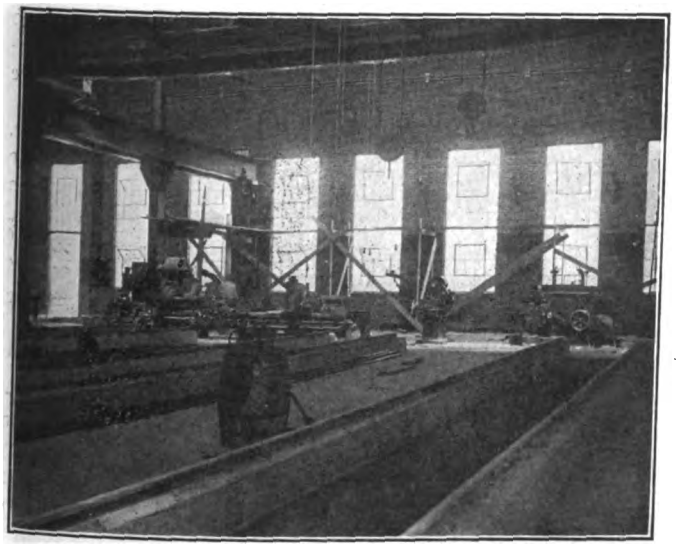


Northern Ohio Shops—Interior of Center Sections of Carhouse Used for Storing Cars

A motor-driven blower supplies air to these forges through tile conduits laid under the floor, while the gases are carried overhead to the stack, which is placed between the boiler room and the forge shop. A Ferguson melting furnace is also located in the forge shop.

The southwest corner of the building is devoted to the boiler room, pump room, master mechanic's office, lavatories, etc., the general layout of which is shown on the accompanying plan. A description of the boiler room equipment will be found in connection with the heating system. A Clayton air compressor with a capacity of 100 cu. ft. of free air per minute, driven by a 20-hp G. E. induction motor, is located in the pump room. This motor has an automatic starter arranged to start the motor when the air pressure in the receiver drops to 80 lb., and it stops when the pressure reaches 110 lb.

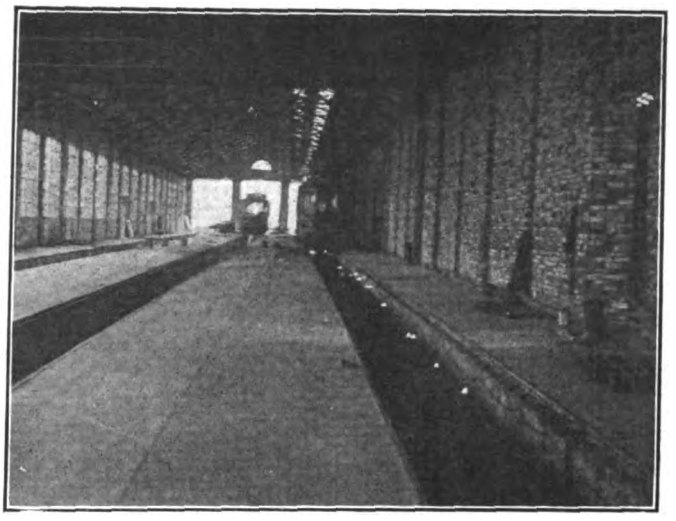
A main line from the receiver drops into the tunnel and branches both ways to the carhouse and truck shop, where numerous outlets are provided with suitable valves.



Northern Ohio Shops—Interior View of Truck Shop, Showing Crane Runway Over Center Bay

PAINT AND CARPENTER SHOP

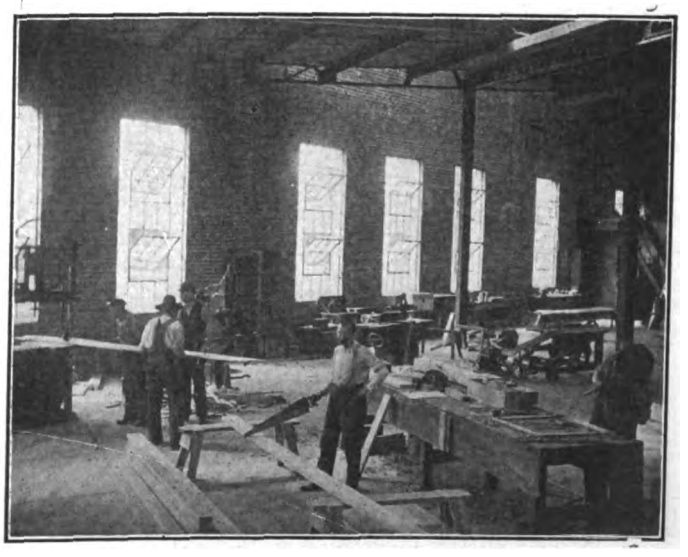
The third main building is 150 ft. by 178 ft. and is divided into two approximately equal parts, one of which is the paint shop and the other the carpenter shop. A portion of the latter is taken up by offices for the painter foreman and carpenter foreman and by toilet rooms. Above these rooms is a concrete-floored balcony running the full length of the carpenter shop which is intended for the storage of the finer grades of lumber.



Northern Ohio Shops—East Section of Carhouse Used for Car Washing and Light Repairs

The paint shop has five tracks, each of which will hold three or four cars. In one corner of the room a space large enough to hold one of the longest cars has been inclosed by tile partitions for use when burning or scraping off old paint.

The carpenter shop has four tracks, each of which will hold two or three cars, depending on their length. In the rear of this shop a very complete equipment of woodworking tools has been installed. These are all constant-speed machines, and therefore each is driven by a 220-volt, three-phase, 60-cycle induction motor. In most cases the motors are direct-connected by flexible couplings.



Northern Ohio Shops—Interior View of Carpenter Shop and Wood Mill

The following tools have been installed:

Surfacer.
Molder.
Single-spindle shaper.
Band saw, 36-in.
Tenoner.
Jointer.

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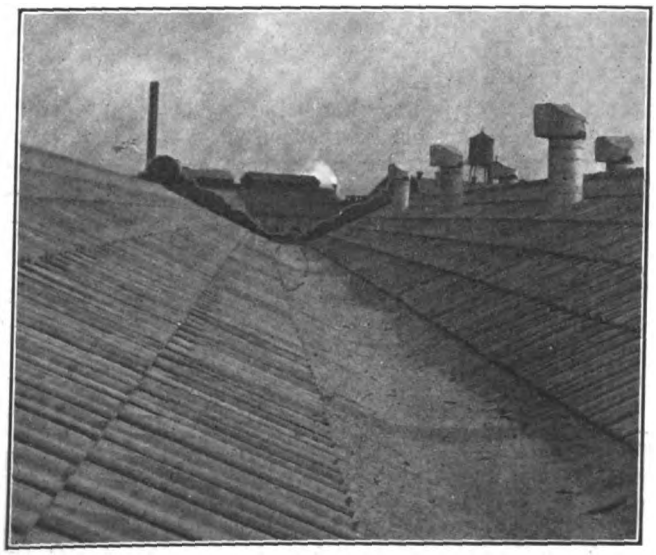
Double revolving saw.
Single-spindle vertical boring machine.
Belt sander.
Swing saw.
Vertical hollow-chisel mortiser.
Foot-power mitering machine.
Pattern maker's lathe.

The small building near the carhouse is the dispatcher's office. This office was so placed and windows so located that the cars could be seen while in the yard and also when coming from either direction toward the carhouse. In the rear of this office two bins were built under the same roof, each holding about a carload. One of these is for dry sand and the other is for anthracite coal for the cars.

FIRE PROTECTION

The three main buildings are protected by an automatic sprinkler system which is supplied initially from a 75,000-gal. steel tank on a 100-ft. tower. At the base of this tower is a pump house in which is installed a fire pump with a capacity of 1000 gal. per minute. This pump is driven by a 100-hp, 500-volt direct-connected motor. The supply for this pump will be drawn from a large well through a 10-in. suction line. The tank is of the spherical-bottom type and was furnished and erected by the Des Moines Bridge & Iron Works Company. In addition to the automatic sprinklers in the buildings, which were installed by the Automatic Sprinkler Company, the four tracks just west of the carhouse are protected by five monitor nozzles



Northern Ohio Shops—View of Roof of Carhouse, Showing Ventilators and Tile Roofing

mounted on pipes about 25 ft. high. These monitor nozzles are so arranged that one man can handle the nozzle and direct the stream upon any portion of the yard, the five nozzles being spaced at such a distance that no portion of the yard is left without protection. An electric connection to the fire pump is provided at each of these nozzles so the operator can start the fire pump without losing any time.

From this tower an 8-in. cast-iron underground main runs parallel with the carhouse along the west side and thence across the end of the carhouse along the transfer table pit. From the other end of this main a line leads across the front of the carhouse and serves a hydrant near the dispatcher's office and one in front of the carhouse. From this 8-in. main 6-in. lines are run to the valves throughout the three buildings.

In the two westerly bays of the carhouse no heat has been provided, and for this reason the dry-pipe sprinkler system is used in them. International dry-valves are used in this section, while in the bays of the carhouse and in the two shop buildings where the wet system is installed and Niagara alarm valves are used.

The carhouse has two sprinkler systems, one being above the roof of the cars and the second being in the aisle between the cars about 6 in. below the top of the windows. This latter system is on a separate valve and is designed to control fires inside the car when the heat has increased to such a point that the windows break out. In the two shop buildings a similar system was used, with the exception that the aisle lines are omitted in the truck shop on account of their interference with the traveling cranes.

HEATING SYSTEM

The central heating plant for the entire group of buildings is located in the boiler room adjacent to the forge shop. A radial brick stack of 3-ft. inside diameter and 125-ft. height was built by the M. W. Kellogg Company. The boiler is a 250-hp Stirling, which was taken from one of the dismantled power stations. This will be operated at a pressure of 61 lb. All miscellaneous equipment such as the boiler-feed pump, drip tank, etc., is located in the boiler room. In addition, a small heater connected to a hot-water tank has been installed in this boiler room for general service the year round.

Steam is taken from the boiler at high pressure through a 7-in. pressure-reducing valve which lowers the pressure to that suitable for the Warren-Webster two-pipe vacuum heating system which has been installed in all the buildings. Steam is conducted to the carhouse through a 7-in. main and to the shop buildings through a 9-in. main which reduces to 6 in. and passes under the transfer table pit to the paint and carpenter shop. The greater portion of the radiation in this system is from pipe coils placed along the side of the pits in the truck shop and carhouse. In all other parts of the works standard cast-iron radiators were used. The substation and the pump house are heated by means of an underground branch line from the main in the carhouse.

All supply mains throughout are covered with 85 per cent magnesia lagging. Where the pipes are in the open they are covered with canvas, but those that are laid in the earth are covered with an outside shell of Argentum. Under the specifications for this heating system, the H. P. Cahill Plumbing Company, by which the installation was made, is to fire up and run the plant for two weeks, putting everything in perfect running order. The total amount of radiation covered under the contract is something over 22,000 sq. ft. All the buildings and the yard are lighted by tungsten lamps. All wiring is placed in conduits, and these are hidden where possible.

The C. M. Neeld Construction Company, of Pittsburgh, was the contractor for the concrete foundations, while the superstructure was built by the Carmichael Construction Company, of Akron. All track work, filling, grading, etc., was done by the company's forces. The late J. T. Ross, of Cleveland, was consulting engineer, while the writer had immediate charge of the design and construction of the work.

The number of passengers transported by the Paris subway in 1912 was 310,782,098, or an average of 850,000 per day. The tickets collected were divided into the following categories: Workmen's, 79,877,382; first-class, 32,883,335; second-class, 198,060,192; collective (school), 71,189. To these should be added the return coupons of the workmen's tickets (79,877,382), making the total passenger traffic for the year 390,659,480. The number of tickets delivered in certain of the last ten years was: 1903, 100,090,833 tickets; 1905, 148,700,821 tickets; 1907, 194,823,182 tickets; 1909, 254,445,992 tickets; 1911, 305,442,992 tickets; 1912, 310,782,098 tickets. Comparing the figures of 1912 with those for 1911, there is an increase of 5,339,106, due to the larger number of return and collective tickets sold. First-class tickets decreased by more than 500,000. The receipts of the subway for 1912 were $10,457,280.

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Specifications for Overhead Trolley Construction

The American Electric Railway Engineering Association Has Adopted as Recommended Practice a Specification fo 600-Volt Overhead Construction Which Is Published in Abstract

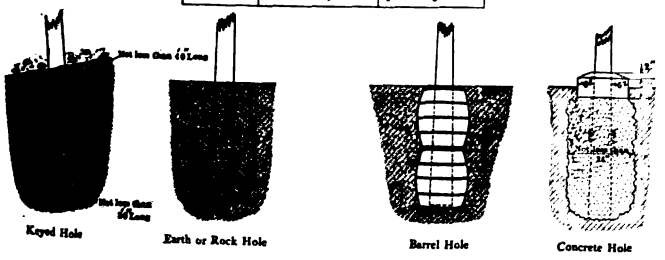
The committee on power distribution of the American Electric Railway Engineering Association submitted for consideration at the convention a set of specifications for standard overhead construction. These specifications, after a general discussion on the convention floor, were adopted by the association as recommended design with minor modifications. In view of the importance of the matter the changes have been incorporated and the specifications are published in abstract herewith in their amended form. These are intended for use only where the workmen employed on the construction have had experience and are so skilled in the work that details such as grading poles to bring the tops in line, setting cross-arms square, cutting in strains at the same relative points and the like, will be attended to without necessity for detailed instruction.

SUPPORTING STRUCTURES

The type of supporting structure will largely be governed by local conditions. In general, natural wood or concrete poles will be used for all interurban construction and wherever else practicable; steel poles may be used in streets if so desired; sawed poles and tree attachments should not be employed, and building attachments should be used only when local authorities compel such use, in which case special precautions and construction will be necessary.

Before setting, wood poles shall be roofed, butts squared, entire pole rough shaved, knots smoothed, gains and faces made, and roof, gains and faces given a coat of approved preservative or paint. The size, number and location of holes, faces and gains vary and will be given specifically for each case. In general: (a) Holes, unless specifically noted otherwise, shall be of same size as bolt or rod for which intended. (b) Faces must be of sufficient area and of proper shape to receive their fittings, and must have about 1 in. margin outside; they should be slightly hollowed to prevent rocking of fitting. (c) Gains must be square with axis of pole, ¾ in. minimum depth, of width to secure snug fit of arm, and slightly hollowed to prevent rocking. The roof shall have a pitch angle of 45 deg. and shall be either a wedge with edge parallel to line when pole is set, or a cone.

Pole Length	Depth of Hole			
	In Rock or Concrete		In Earth	
	Feet	Inches	Feet	Inches
25 "	5 "	0 "	6 "	0 "
30 "	5 "	0 "	6 "	0 "
35 "	5 "	6 "	6 "	0 "
40 "	5 "	6 "	6 "	6 "
45 "	6 "	0 "	6 "	6 "
50 "	6 "	0 "	7 "	0 "
55 "	6 "	6 "	7 "	6 "
60 "	7 "	0 "	8 "	0 "
65 "	7 "	0 "	8 "	6 "
70 "	7 "	0 "	9 "	0 "

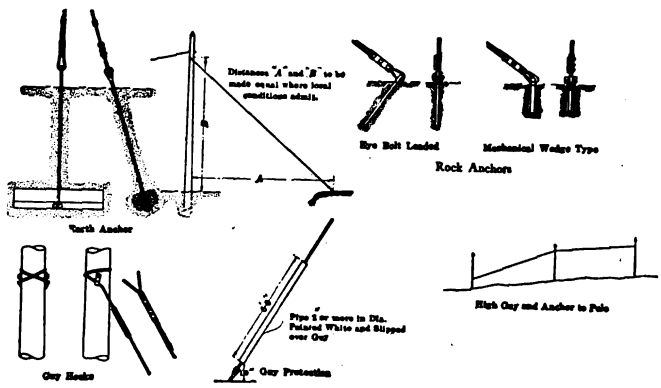


Overhead Construction—Method of Setting Poles

For steel and concrete poles, and supporting structures other than wood poles, special castings and fittings will be used, to be specifically detailed for each case.

POLE CLEARANCES AND SPACING

On private right of way and wherever else practicable, side supports shall be set with a minimum clear distance of 7 ft. from the center line of track to face of support at level of top of rail, and center supports shall have a minimum clearance of 7 ft. from center of track, this clearance to be increased if necessary on curves to allow for rail elevation and car overhang. Where curb lines are established, poles shall be set just behind the curb itself unless local ordinances or conditions prescribe other location.



Overhead Construction—Method of Making Up Guys to Anchor

Poles on tangents shall be normally spaced not less than 90 ft. and not more than 110 ft. apart. Poles on curves shall be set as nearly as practicable as in the following table:

Radius of Curve (ft.)	Pole Spacing (ft.)
40	35
50	40
60	45
70	50
80	55
90	60
100	65
125	70
150	75
200 to 500	80
750 and above	100

POLE SETTING

Pole holes in level ground shall have depths as follows:

Length of Pole, Feet	Depth of Hole	
	In Rock or Concrete	In Earth
30	5 ft. 0 in.	6 ft. 0 in.
35	5 ft. 6 in.	6 ft. 0 in.
40	5 ft. 6 in.	6 ft. 6 in.
45	6 ft. 0 in.	6 ft. 6 in.
50	6 ft. 6 in.	7 ft. 0 in.
55	6 ft. 6 in.	7 ft. 6 in.
60	7 ft. 0 in.	8 ft. 0 in.
65	7 ft. 0 in.	8 ft. 6 in.
70	7 ft. 0 in.	9 ft. 0 in.

In every compact soil pole holes may have depths intermediate between those for same lengths in rock or concrete, and in earth.

The depth of a hole on sloping ground shall be measured from the lower side of the hole; and in very steep slopes and in loose or otherwise doubtful material the depth may be increased over the standard depth by an amount to be determined for each case on the ground.

In material which caves freely one or more barrels or the like may be used as casing, and driven down as the material is dug from inside. Such barrels or casing may be of wood or steel, and shall be of sufficient size to give clear tamping room of at least 6 in. around the pole without cutting the latter.

Wood poles with brackets shall in general have a rake from the track of 6 in. in 24 ft.; steel poles with brackets, of 3 in. in 24 ft. Wood poles with span shall have a rake from the track of 12 in. in 24 ft.; steel poles with span shall have rake from track of 6 in. in 24 ft. When the strain is

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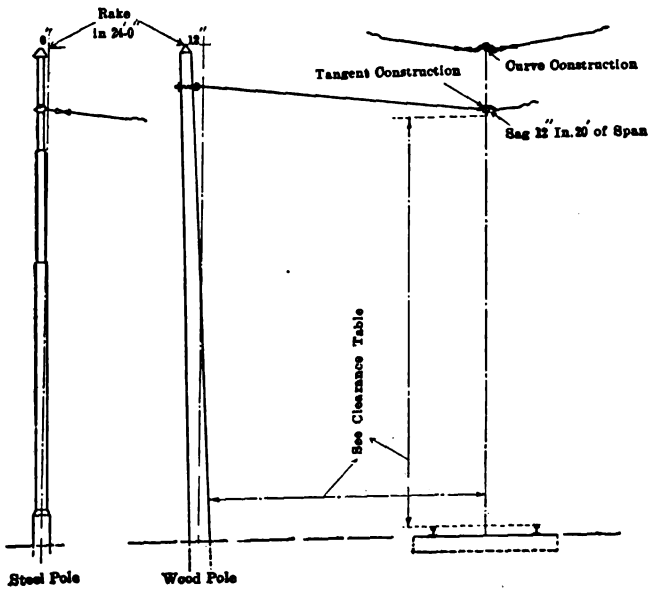
from the track, as with poles on the inside of a curve, brace poles or head guys shall be used, and standard rake maintained. Double bracket poles shall be set without rake; other poles between tracks and poles under outside jurisdiction may be so set if necessary or required.

All bracket poles on curves of radius less than 2400 ft., and such other poles as may be designated because of unusual load conditions, shall be provided with suitable keys



Overhead Construction—Span Support

of wood, stone, or concrete, at least 4 in. thick with a cross-section not less than 32 sq. in. One key 2 ft. long shall be placed on edge behind the pole at the bottom of the hole; the other key, 4 ft. long, shall be placed on edge in front of the pole, just below the surface of the ground.

In setting poles the excavated material, if suitable, shall be replaced in thin, even layers, and firmly and thoroughly tamped, not more than one shoveler serving three tampers, until the hole is completely filled, after which earth shall be well packed around the hole in a small mound, and if on a slope there shall be made on the lower side, a berm at least 6 ft. wide from pole to edge. In rock holes the broken rock shall be used to wedge the pole thoroughly in place. Black loam and similar poor material shall be replaced by suitable material.

Poles subject to heavy lateral strains which cannot well be met by guying or bracing shall be set in concrete mixed wet and consisting of one part Portland cement, three parts clean sharp sand, and five parts good hard gravel or broken stone of size to pass screen with holes 2 in. in diameter, and to be retained by screen with holes ¾ in. in diameter.

Concrete settings shall have a diameter at least 12 in. greater than that of pole, and shall completely fill pole hole to a level 6 in. below surface of the ground. In parking strips the authorities may require the concrete to finish at this level, but such latter practice is undesirable. Wherever practicable the concrete from a level 6 in. below the surface of the ground to a level 6 in. above the surface of the ground shall be smoothly finished to a diameter 8 in. greater than that of pole, and from the upper level shall slope up to pole on an angle of 45 deg.

SPAN AND GUY ATTACHMENTS

Span and guy attachments shall be made up with such of the following forms as may be prescribed:

Thimble end shall be made by bending strand around thimble of proper size. The strand end shall extend 15 in. beyond thimble, and shall be secured by a three-bolt clamp close to thimble, and by a serving of about ten turns of No. 12 galvanized wire 1 in. from end of strand.

Two-turn wrap shall be made by taking strand around pole two times. If at end of span or guy the end of the strand shall extend 30 in. beyond face of pole, and shall be secured to main part by a three-bolt clamp 15 in. from face of pole and by a serving of about ten turns of No. 12 galvanized iron wire 1 in. from end of strand. If hitch is at an intermediate point in span or guy it should be secured by a three-bolt clamp on the outside parts of the strand, center bolt of clamp being replaced by a lag screw into the pole.

Three-bolt clamp hitch shall be made by securing strand in upper groove of three-bolt clamp, fastened to pole in proper position by a lag screw through center hole of clamp.

Close tie shall be made by bending strand tightly around attachment, leaving a free end about 15 in. long. One wire of this end shall be unlaid back to the attachment and served on main part and remainder of end; the other wires shall be in turn unlaid back to the last wrap, and several over main part and remainder of end until latter is all served on.

Temporary tie shall be made like permanent tie of same kind, but end shall be left amply long to allow for adjustment and permanent make-up, and shall be secured to main part by one or more servings of wire. In making temporary ties bends should be of as large radius as possible until permanently secured.

ANCHORS AND GUYS

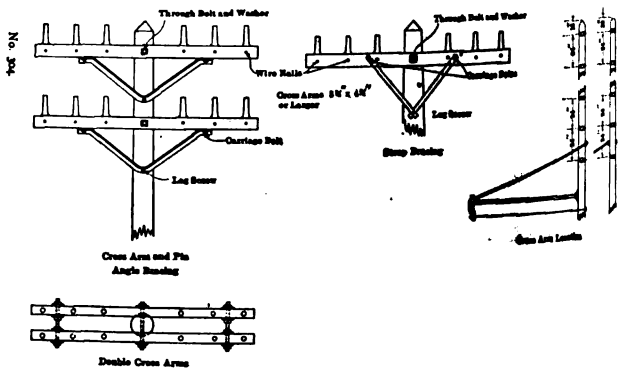
Anchors in earth shall consist of a wooden deadman 4 ft. long, at least 6 in. thick, and having a cross-section not less than 48 sq. in., buried at least 4 ft. below the surface with not less than 2 ft. of rock if reasonably obtainable well packed into hole, and the earth filling above thoroughly tamped.

The anchor shall pass through center of deadman, and must lie in line of pull of guy, to prevent bending. Patent anchors of holding capacity equal to the breaking strain of the strand to be used with them, and having rugged parts sufficiently large to allow a reasonable amount of corrosion without reduction in holding capacity, may be used in place of rod and deadman where conditions are favorable.

Anchors in rock shall consist of eye-bolt securely leaded or sulphured for entire length of shank in hole inclined at right angles to pull of guy. In rock of sufficient strength to withstand safely the action, mechanical wedge-type eye-bolts may be used, and the lead or sulphur omitted.

Where practicable guys shall be anchored to adjacent pole at point not less than 7 ft. above ground.

Guys shall be used where practicable on wood poles on



Overhead Construction—Cross-Arm Assembling

curves of radius less than 900 ft.; on poles to which are attached strain plate guys, trolley guys, and head guys; and on such other poles as may be specified.

Guys shall be used on steel poles only where specifically required.

Guys shall be of galvanized seven-wire steel strand with thimble end at anchor attachments, and two-turn wraps at proper height, for attachment.

The lead or horizontal distance from pole at ground line

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to guy at same level whenever practicable shall be equal to the distance from ground line at pole to guy wrap.

Guys located where there is a liability of persons or animals runnings into them shall be made conspicuous by a piece of pipe 2 in. or more in diameter and 6 ft. long, painted white and slipped over guy, resting on anchor rod eye. Where guy is already installed a wooden casing, 3 in. in. diameter or square, and 6 ft. long, may be used in place of the pipe. The halves shall be well white-leaded, and shall clamp the guy tightly when screwed together, the bottom resting on anchor-rod eye.

Guy hooks attached one on each side of pole at level of guy wrap by a through bolt at right angles to line of pull shall be used where local conditions compel the use of a lead less than one-fourth distance from ground line at pole to guy wrap.

Where guys cannot be run directly to secure attachments they may be carried high on adjoining poles to a point where anchorage can be obtained.

STRUCTURE ATTACHMENTS

Cross-arms shall be given one coat of approved preservative or two coats of paint before pins are installed. Pin shanks shall be dipped in the preservative or paint, and while wet firmly seated in hole and secured by a wire nail 2 in. long driven through side of arm into pin.

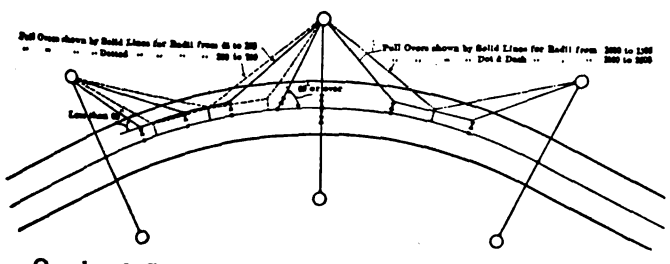
All cross-arms shall be held to pole by a through bolt driven from back of pole toward and through arm, having a washer at each end, with hole at back of pole properly counterbored to secure good seat for washer.

Cross-arms 3¼ in. wide by 4¼ in. deep shall be steadied by strap braces secured to pole by a lag screw, and to side of arm away from pole by carriage bolts on center line of arm with nuts next to the braces. Arms up to and including 48 in. in length shall have braces 24 in. long, fastened to arm 16 in. from center; arms over 48 in. long shall have braces 28 in. long, fastened to arms 19 in. from center.

Cross-arms of section heavier than 3¼ in. by 4¼ in. shall be steadied by an angle brace, fastened to bottom of arm by carriage bolt and to pole by a through bolt.

The lowest feeder, telephone or signal cross-arm shall have its center not less than 21 ft. above top of rail; other feeder, telephone or signal cross-arms shall be spaced at least 24 in. center to center. If the pole also carries a transmission line there shall be a clear distance of at least 11 ft. between the top feeder, telephone or signal arm and the lowest transmission arm.

Double arms for feeder shall be used at ends of curves, on intermediate poles of curves of radius less than 500 ft. and at such other points as may be specified. Double arms must be parallel and at the same height. Both arms shall be fastened to the pole by the same through bolt, and shall be firmly tied together by spacing bolts with nut and washer



Overhead Construction—Method of Dressing Curves

each side of each arm, located on the center line of arm, 8 in. from end.

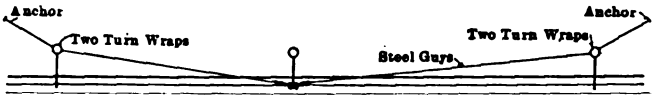
SUPPORTING SYSTEM

Bracket support on side poles shall be used for all single track where local conditions do not prevent, except for curves of radius less than 300 ft. Bracket support on central poles may be used on double track where practicable.

Span support shall be used on single track for curves of radius less than 300 ft. and where local conditions do not permit use of brackets; on double track, including turnouts, not employing central bracket poles; and for more than two tracks.

Compound spans shall be used when necessary to support the overhead for a series of tracks too closely spaced to permit poles between. Bridge support will be used only in special cases.

Supporting structures shall be of such height that the



Overhead Construction—Method of Installing Strain Anchors

trolley wire in streets and on interurban lines shall be at a height of 18 ft. above the top of rail unless local conditions prevent; on trackage operating electric and steam road equipment and at crossings over steam roads the trolley wire shall be not less than 21 ft. above the top of rail.

Brackets must be of sufficient length to allow 8 in. between hanger or strain insulator and the end casting. When poles are on outside of curve the length of bracket must be sufficient to allow for effect of pole rake and rail elevation.

The eye-bolt shall be installed at level of trolley wire; the pole casting shall be a distance above center of eye-bolt equal to distance center to center between span eye and arm socket of end casting; and the over-support rod a distance in inches above pole casting of three times the length of arm in feet. On wood poles eye-bolts and over-support rod shall pass through pole and pole casting shall be attached by two lag screws. On steel poles eye for strand, socket for arm and pole attachment for over-support rod shall be carried by special fittings, clamping to pole.

Eye-bolt shall be installed pulled out to full length, the nut, on wood pole, seated against a washer; the arm shall be given an upward rake from the horizontal of 1 in. in 4 ft. of length; the intermediate casting shall be clamped on arm so that trolley wire comes midway between it and end casting; and the steel strand shall be close tied into eye-bolt and into end castings with 2 in. of slack to permit hanger installation. On steel pole strain insulators shall be cut into strand on either side of hanger, and between end and intermediate castings, to give double insulation.

Brackets on curves shall be installed as on tangents except that pull-over with attached strains shall be close tied in strand in approximately correct position, but ties at eye-bolt and end casting shall be temporary until final dressing of overhead.

Spans shall consist of seven-wire strand, and in case of steel poles, shall have strain insulator cut in not less than 5 ft. from pole; where pole carries high-tension circuits, a strain insulator shall be used of suitable strength and creeping surface. Where a foreign line crosses close to the span two strain insulators shall be used, one at either side of foreign line to insure that if latter falls it shall be on a dead section.

Spans on tangents shall be close tied into eye-bolts at height above trolley wire equal to one-tenth distance from track center to pole. On wood poles eye-bolts shall be at least 12 in. below top of pole, and shall be installed at full length, seated against washers.

Spans on curves shall be installed as on tangents except that pull-over with attached strains shall be close tied in strand in approximately correct position and temporarily tied in eye-bolts until the final dressing of overhead.

In case of two or more tracks strand between pull-overs shall have temporary tie at one end until final dressing.

TROLLEY WIRE

Trolley wire shall be run out by mounting the reel on an arbor on which it can freely turn, and leading wire to an

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anchor or to trolley already installed. Tension may be maintained by a brake or rim on side of reel, but under no circumstances shall braking be done against the copper. The wire should be pulled to correct sag and temporarily tied to brackets or spans by rope or other soft insulating ties. Particular care must be taken to prevent twisting, kinking or bruising the wire. Parallel faced clamps of approved type shall be used; chains, cam come-alongs or other short grip devices shall not be employed.

The sags shall be as follows, and in pulling up great care must be taken that the corresponding tensions are not exceeded:

Size of Trolley	0		00		000		0000	
Temperature	Sag In.	Tension Lb.	Sag In.	Tension Lb.	Sag In.	Tension Lb.	Sag In.	Tension Lb.
0 deg. Fahr.	2½	1,920	3	2,020	2¾	2,780	2¾	3,500
30 deg. Fahr.	3	1,600	3½	1,730	3¼	2,350	3¼	2,960
60 deg. Fahr.	3¼	1,370	4¼	1,420	4¼	1,800	4¼	2,260
90 deg. Fahr.	4½	1,070	5½	1,100	5¼	1,450	5¼	1,830
120 deg. Fahr.	6	800	7¾	760	7¼	1,050	7¼	1,330

The table values are for spans of 100 ft.; for any other span the sag and tension are as the squares of the lengths. For example, with span of 50 ft., sag and tension for a given temperature are equal to 100 squared divided by 50 squared or one-fourth corresponding table values for that temperature.

After the trolley wire has been temporarily tied up with the proper sags, and the line has been anchored, the line ears and hangers shall be accurately located and attached, clinch ears being thoroughly closed down to give secure grip and smooth-running surface, and mechanical ears well seated in grooved wire, the clamp screws then being slightly upset to prevent backing out.

Splices shall be of a type to develop full strength of trolley wire, and shall be so installed as to offer the least possible obstruction to passage of trolley wheel. Grooved wire must be kept in perfect alignment, and if splice is of soldering type, it shall be thoroughly sweated on without annealing the wire.

In any case the free ends of the wire shall be bent sharply back at outlet, and cut off, forming a hook with end ½ in. long.

In bracket construction trolley wire guys shall be installed at the ends of curves and on long curves and tangents at equal intervals as nearly as possible, but not to exceed 1500 ft.

Trolley wire guys shall be seven-wire steel strand attached to strain plate supported at a bracket by double pull-over with proper insulation and led both ways to next adjacent poles. Each guy shall have a strain insulator cut in it 5 ft. from strain plate, and shall be secured to proper pole by a two-turn wrap at height of bracket arm. Where practicable the strain of these guys shall be taken by anchor guys in the line of the pull; if this is impracticable, high guys shall be used. Great care must be taken to insure equal pulls on the guys, and especially to insure that the strain plate is not twisted out of line; the ties should not be made up permanently until the final dressing of the overhead.

CURVES

Curves shall be made up with straight line clinch ears for round wire, or double clip mechanical ears for grooved wire, attached to suitably insulated pull-over bodies. Support shall be by span except where rest of line is in bracket, and radius is greater than 300 ft. Between supports curves shall be held to line by seven-wire steel strand, with single body for single track or for outside one of several tracks, and double body elsewhere, spaced as follows:

The pull-overs in each span shall have bodies and strains held radially to curve by a lacing of seven-wire steel strand at least 6 in. away from trolley wire, which lacing, however, may be omitted from any pull making an angle of 60 deg. or more with the ear to which it is attached. With odd number of pull-over bodies the middle one shall have pull-off strand to each pole. Intersections and complicated special work, particularly in city streets, will usually require special and individual study and treatment.

Curves must be dressed with uniform deflections at pull-overs, and shall be offset to the inside of the curve 4 in. for each inch of rail super-elevation, plus an amount de-

Radius of Curve in Feet	Spacing of Pull-Overs in Feet	Number of Pulls Between Supports	Distance Apart of Poles in Feet
40	7	4	35
50	8	4	40
60	9	4	45
70	10	4	50
80	11	4	55
90	12	4	60
100	13	4	65
125	14	4	70
150	15	4	75
200-500	20	3	80
750	25	3	100
1,000	33⅓	2	100
1,500-2,000	50	1	100
Over 2,000	100	0	100

pendent upon the character of the rolling stock to be used, which amount shall be determined as follows:

For cars having trolley base directly over truck center the car factor is equal to $R - \sqrt{R^2 - L^2}$.

For cars having trolley base a distance C from truck center the car factor is equal to $2R - (\sqrt{R^2 - L^2} + \sqrt{R^2 - C^2})$ if trolley base is in front of truck center, or $\sqrt{R^2 - L^2} - \sqrt{R^2 - C^2}$ if trolley base is behind truck center.

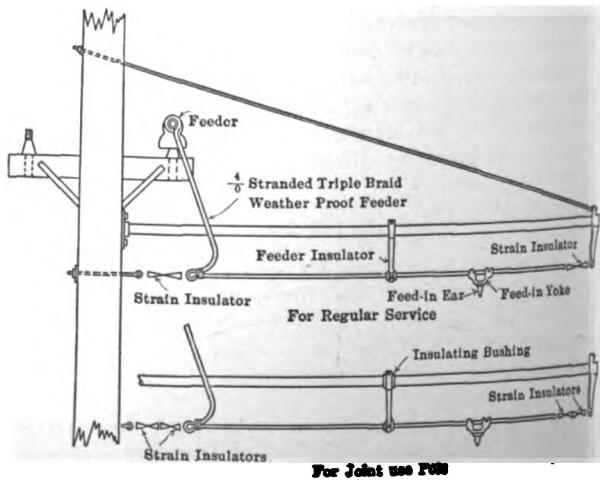
In these formulas R = radius of track center line, D = distance from point of contact of trolley wheel and wire to hinge of trolley base, H = height of trolley wire above the hinge of trolley base, L = horizontal distance from point of contact of trolley wheel and wire to hinge of trolley base = $\sqrt{D^2 - H^2}$, and C = horizontal distance from truck center to hinge of trolley base.

The total offset shall be uniformly tapered off from full value at inside easement point of track to no offset at outside easement point. If track is not eased, start with full offset at distance inside end of curve, as given by table, and run to no offset at point at equal distance outside end of curve.

Radius of Curve	Start Offset Easement
Up to 110 ft	20 ft. from end of curve
100 to 500 ft	40 ft. from end of curve
500 to 1000 ft	60 ft. from end of curve
Over 1000 ft	100 ft. from end of curve

FROGS AND CROSSINGS

Frogs shall be installed with both main line and branch trolley wires led straight through, the latter to end 6 ft.



Overhead Construction—Bracket Feed Taps

beyond frog in eye of strain insulator to other end of which is close tied a seven-wire steel strand, secured to pole at a level as nearly that of frog as will allow safe clearance over other wires. The frog itself shall be held on each side by a guy of seven-wire steel strand with strain insulator attached to frog and secured to proper poles at the point of span attachment.

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Frogs shall be temporarily located on center line of main track and one-third distance from track switch points to track frog point back from track switch points, and if need be shall be shifted to suit local conditions and equipment. Until final location is made, trolley wire should be clamped just firmly enough to prevent slipping without bruising or kinking. Care must be taken that frog is not located too far back of track switch points, as such location, while often giving satisfactory running, will result in excessive wear of trolley wire.

Crossings wherever practicable shall be installed without cutting either of the line wires, which latter should be clamped just firmly enough to prevent slipping without bruising or kinking until the crossing has been satisfactorily located. Where wire must be cut at least 3 ft. of free end shall be left outside clamp until the final adjustment, after which the end should be cut off close to the clamp.

FEEDER

Feed taps shall be at points of support and shall consist of proper size triple-braid, weatherproof stranded connection from feeder, feed yoke well soldered on at proper point, and straight line ear soldered to the trolley wire and tap bolted to yoke. In general feed taps will be located every 1000 ft.

With bracket support the feeder connection shall run from feeder, to which it shall be well soldered, to strain attached to span eye-bolt in pole, thence, replacing the usual steel strand through insulated intermediate casting to strain attached to end casting of bracket. Bracket tube must be of sufficient length to allow at least 8 in. of connection cable between feed yoke and end strain, and intermediate casting should be so located that feed yoke is midway between it and end casting.

ALLOWABLE SAGS IN FEEDERS FOR DIFFERENT TEMPERATURES

Temperature in Degrees, Fahr.	Sag for Copper in Inches	Sag for Aluminum in Inches
0	10	5
30	13½	10
60	17	16
90	20½	21½
120	23½	26

With span support the feeder connection shall run from feeder to strain attached to span eye-bolt in pole, thence, replacing the usual steel strand, to close tie in strain 5 ft. beyond trolley farthest from feeder. Span shall be completed by seven-wire steel strand close tied into strain and into pole eye-bolt and shall have sag equal to one-tenth distance from trolley wire to its pole.

Feeder reel shall be mounted on an arbor on which it can freely turn, and if practicable, run along the line on a car or wagon. Where local conditions necessitate pulling feeder on and over the cross-arms great care must be taken to prevent injury, especially to covered feeder, rollers or snatch blocks of ample size being used at each arm.

Feeders shall be strung, for spans of 100 ft., with sags not less than those of the following table:

The table values are for either bare or weatherproof feeder of any size from No. 0000 to 2,000,000 circular mils. For spans other than 100 ft. in length the sag should be in the same ratio to the table values as is the square of the span to 100 squared.

Feeder shall be installed in the top groove of the insulator on tangents and in the outer side groove on curves and at angles, and shall be tied in with No. 6 soft drawn wire of the same metal as feeder.

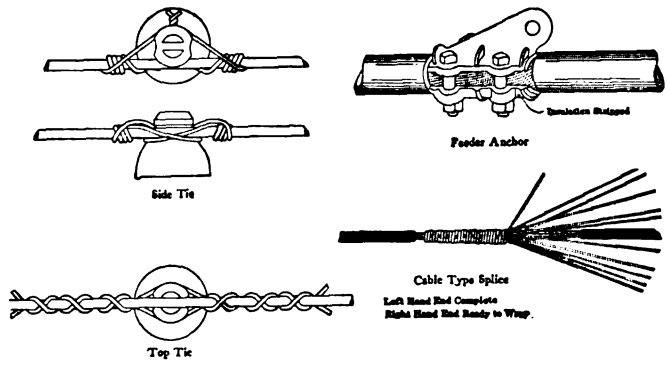
Top tie shall be made with two tie wires each 15 in. long. The first wire shall be looped around insulator in side groove, the ends crossed and twisted once under cable, then brought up, one each side, and wrapped around cable, crossing above and below until all is on. The other wire shall be used to make a similar tie on opposite side of insulator.

Side tie shall be made with one tie wire 15 in. long which shall be looped around inside groove at back and ends carried under cable, then working from center with one end each side, over top, down back, under, up front and so on for four complete turns, then around back of insulator, where ends shall be twisted together securely. The cable side of the insulator is front.

On tangents feeder shall be carried by single arms having insulators on wood pins; on angles less than 10 deg. by single arms, and on angles greater than 10 deg. by double arms, in either case having porcelain insulators on metal pins.

Splices in solid feeder shall be made with an approved connector; in stranded feeder shall either be made with an approved connector, or shall be of the wrapped cable type, tapered uniformly to size of original feeder at ends. In insulated feeder either type shall be smoothly taped to the equivalent covering.

Wrapped cable type splice shall be made by stripping the ends to be spliced for 24 in., unlaying and brightening 18 in. of these bare ends, cutting out the core strand of each, and passing wires of one end between those of other end and laying parallel with main cable.



Overhead Construction—Insulator Ties, Feed Anchor and Cable Type Splice

The wires of one strand either side of middle of splice are then close served over main portion and rest of wires of that end; a second pair of strands is similarly served on, and so on, until the last pair of strands serve simply on the main portion. The splice shall then be sweated full of solder and smoothly taped to equivalent of original insulation if cable is insulated.

Lead-covered or specially insulated or covered cables shall be spliced under special instructions, and then only by men experienced in that particular class of work.

Bare feeder may be used on private right-of-way and wherever else practicable; weatherproof feeder shall be used where required and where frequent trees or other obstacles would cause grounds if bare cable were used.

Where long spans, long heavy grades, or other conditions cause unusually heavy strains, feeders shall be anchored by mechanical clamps of approved type, secured to eye-bolt in cross-arm through a suitable strain. Covered feeder shall be bared so clamp takes direct hold on the metal. If very heavy pull is to be anticipated take guy from cross-arm to next pole.

PROTECTION

Section insulators shall be installed at a span suspended from hanger. Section switch box shall be bolted to back of pole, using bolts of proper length, each with washer under head and nut, latter being inside box, which shall rest on cross-arm carrying feeder sectionalized. The feeder shall be dead-ended in strains attached to eye-bolt at proper point in feeder cross-arm and shall then enter box. If feeder drops from dead-end point it shall be carried lower than bushings in box and then up to prevent drip from entering.

Lightning arresters where required by local conditions shall be installed at feed taps, just below the feeder cross-arm, and shall be connected to the feed tap close to its

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attachment to the feeder by solid insulated No. 4 copper wire.

The ground wire shall be of solid insulated No. 4 copper wire, stapled to back of pole, and either extended as a ground coil or well soldered into a pipe ground. In either case the lower portion shall be protected by a wood molding 8 ft. long, with groove ½ in. square in one side, well painted all sides with paint or other preservative and placed with lower end 1 ft. below the surface of the ground.

Lightning arrester grounds shall not be attached to the track rails. Where permanently moist earth is assured at reasonable depth the ground may consist of a ½-in. pipe driven at least 3 ft. into the moist earth. Where there is doubt as to the condition of the soil, excavate. If permanently moist earth is reached, install pipe ground; if otherwise, install a flat coil containing 40 lineal feet of solid No. 4 bared copper wire bedded in not less than 7 cu. ft. of charcoal. Particular care must be taken to insure that the ground is effective; unless a good ground is secured the arrester cannot give protection.

Where soldering is necessary it shall be done with non-corrosive paste or with stearine. The use of acid or corrosive salts is strictly forbidden, and great care must be taken to prevent overheating and annealing.

CLOSE OF RAILWAY SIGNAL ASSOCIATION CONVENTION

The business sessions of the Railway Signal Association's convention at Nashville, Tenn., were concluded on Thursday, Oct. 16. Revised specifications for rubber compound for insulated signal wire and for galvanized steel wire were accepted for submission to letter ballot. New specifications for enameled copper magnet wire, substantially those of the General Electric Company, were likewise accepted. In the debate on the committee report on storage battery and charging equipment, H. W. Buck, of the Electric Storage Battery Company, objected to mention of elements on jars in specifications for lead stationary batteries for signaling. This portion was withheld, but the specification otherwise was accepted.

Clarence C. Bailey, of the General Electric Company, pointed out the necessity of compensators on motor panels of battery-charging equipment. The committee on method of recording signal performance was instructed to continue its work, revision of the forms being considered advisable. The committee has a new form under consideration and promises a complete report at the next stated meeting in March, 1914. The association authorized an investigation of low-voltage switch-operating mechanism. The specifications of the Association of Railway Telegraph Superintendents as to low-tension wire crossings (applying to wires carrying not more than 550 volts) were accepted subject to letter ballot approval by the Railway Signal Association as a whole.

The next convention will be held at the Hotel Champlain, Bluff Point, N. Y., Sept. 22, 1914, and succeeding days. This change of date may avoid conflict with the convention week of the American Electric Railway Association. F. P. Patenall, signal engineer Baltimore & Ohio Railroad, Baltimore, was elected president, and C. C. Rosenberg, Bethlehem, Pa., was re-elected secretary. The total attendance was 410, and most of the delegates spent Friday in sightseeing at the nearby points of interest.

COMMITTEE REPORTS

During the week, several subjects of direct interest to electric railways were considered at length. In the report of the committee on signaling practice it was stated that the effect of metal ties on track circuits was self-evident and that each rail had to be completely insulated from its ties to prevent a short-circuit. The effect of creosoted ties was not serious and, with a.c. track circuits, was negligible. The effect of zinc-treated ties was problematic. The consensus of opinion as determined from replies to circulars sent out by the committee was that track circuits one mile in length were rendered inoperative by the extensive use of zinc-treated ties, but that track circuits 2000 ft. in length might be operated successfully even with 50 per cent or more of ties so treated. Ten per cent to 15 per cent of renewals a year would not materially affect circuits of the latter length. Where renewals were made of fifteen or twenty adjacent ties, the leakage was much greater than when the renewals were made singly at uniform distances. Where surface salts were present, more leakage occurred during wet weather than with untreated ties as these wet salts formed a better conductor than ordinary wet wood and in dry, hot weather these salts were drawn to the surface and constituted a more or less perfect conductor. However, after a period varying from three months to one year, these salts disappeared and subsequently no interference was noticeable.

In connection with the requisites for switch indicators, the committee, for the purpose of bringing out discussion, stipulated that indicators should be installed at trailing-point, main-track switches of passing sidings, at switches of trailing-point cross-overs between main tracks, and at switches at the side-track ends of all trailing-point cross-overs between side tracks and main tracks. Indicators were unnecessary at facing-point, main-track switches of passing sidings, at switches of facing-point cross-overs between side track and main track, at switches of facing-point cross-overs between main tracks, and at switches of tracks upon which trains could not clear the main line. The switch indicator should be used to indicate only the approach of trains and should indicate stop when a train reached a track circuit not less than a specified distance in the rear of the caution signal protecting the switch. It should remain at "stop" until the train passes the signal protecting the switch or a point opposite the clearing point of the switch if it is located beyond the signal protecting it.

The committee on electric railways and a.c. signaling submitted a number of specifications covering apparatus and material for a.c. systems and, in addition, submitted as information a historical section covering a number of steam and electric railway installations, including the electrified zones of the New York Central and Hudson River Railroad, the Oregon Electric Railway, the Aurora, Elgin & Chicago Railroad, the Brooklyn Rapid Transit System, the Northwestern Pacific Railroad, the Terre Haute, Indianapolis & Eastern Traction Company and the Washington, Baltimore & Annapolis Railway. All of these installations have been described in various issues of the ELECTRIC RAILWAY JOURNAL.

The sixth annual convention of the Association of Railway Electrical Engineers will be held at the LaSalle Hotel, Chicago, Oct. 21 to 24. It is expected that this will be the largest meeting ever held by the organization, and that all the principal railroads of the United States and Canada will have representatives present. Among the papers read will be reports on terminal facilities for handling car-lighting equipment, on head-end equipment and on electric head-lamps; reports on methods of charging storage batteries, on standards, on dynamo suspension, on car-lighting reports, on lamp specifications, incandescent lamps, on wire and cable specifications, on wiring installation, on outside construction and yard lighting, on illumination and on shop practice. In connection with the convention a comprehensive exhibit of railway electrical apparatus will be displayed on the top floor of the hotel, which has been reserved for this purpose. D. J. Cartwright, of the Lehigh Valley Railroad, is president of the Association of Railway Electrical Engineers, and Joseph A. Andreucetti, general foreman Chicago & Northwestern Railroad, Chicago, is secretary-treasurer.

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Concluding Session of Engineering Association

At the Last Session of the American Electric Railway Engineering Association, Held at Atlantic City Yesterday, the Report of the Committee on Equipment Was Presented and Discussed—An Abstract of the Report and an Account of the Discussion Are Published

The final session of the Engineering Association was held at Engineers' Hall, Atlantic City, on Friday morning. It was called to order by President Schreiber at 10:15. The first subject on the program was the report of the committee on equipment. This report was presented by F. R. Phillips, chairman, and is published elsewhere in this issue of the ELECTRIC RAILWAY JOURNAL.

REPORT OF COMMITTEE ON EQUIPMENT

President Schreiber, in opening the discussion, divided the report into two parts, one containing recommendations to be acted upon, the other containing data for reference. The recommendations of the committee on specifications for steel wheels, which had required the greatest effort on the part of the committee, was given first place and the manufacturers present were invited to criticise them. They declined to express any opinion at this time. In response to a question from Mr. Adams as to the tests referred to in the report Mr. Phillips stated that for two years one of the members of the committee has had in service about 2000 wheels, made under the committee's specifications. Next year it is expected that full data will be presented in the form of curves and tables.

SOLID WROUGHT CARBON STEEL WHEELS

W. Thorn, engineer of car equipment, board of supervising engineers of Chicago, suggested the omission of the word "solid" in the title of the specifications with the idea that processes may be developed whereby effective spokes could be produced by blanking out the plates. Mr. Thorn expressed the belief that wheels built under the present specifications had excessive strength in the webs and plates and that blanking out the plate will not only reduce weight but may decrease noise.

J. P. Barnes, Syracuse & Suburban Railway, called attention to the desire of the American Society for Testing Materials for an expression of views of the association in the matter of the adoption of standard specifications for wrought carbon steel wheels. He stated that the desire of the committee is to formulate some kind of a test to which steel can be subjected, either as it comes from the heat or in the finished wheel, so that the purchaser can have some indication of the kind of steel he is getting. He was not so much concerned with the chemical content of the material as he was with the physical strength, safety and reliability of the wheel.

G. Aertsen, of the Midvale Steel Company, said that there was not much information available along the line suggested by Mr. Barnes. A sub-committee of the American Society for Testing Materials had had the matter under investigation and it hoped to develop something. Mr. Benedict represented the association on this committee. The matter was not one which could be settled by a few experiments. The American Society had adopted the standard specifications for these wheels but the specifications did not contain reference to any physical tests. It was expected that they eventually would do so.

In response to a question from Mr. Adams, Mr. Phillips stated that the committee had expressed itself clearly in the report as to its attitude in the matter of the American Society specifications. The association sub-committee did not feel that the time was ripe for the adoption of the specifications for hollow wrought carbon steel wheels for electric railway purposes by anyone. It believed that any statement of data or information for specifications of such wheels should come from electric railway engineers.

Mr. Phillips agreed with other speakers that physical requirements were the most important from the engineer's standpoint. What he wanted were tests of these, but up to this time no one had been able to develop a method of determining these physical characteristics. Among the plans proposed one was the casting of a test ingot from each heat upon which physical tests could be performed. Another was to dissect a wheel from each heat, securing from the tread portions test pieces for the same purpose. A third was to test the rim of the wheel for hardness to determine its uniformity and its physical characteristics. It was doubtful whether a hardness test was sufficient for the purpose. In regard to the omission of the word "solid" from the title, Mr. Barnes stated that this word was contained in the specifications now being considered by the American Society for Testing Materials and the Master Car Builders' Association. No change should be made in the title without conference of the three associations concerned.

After an explanation by Mr. Phillips that specifications for designs of tapes, gages and templets should be considered a part of the specifications of steel wheels, the recommendations of the committee regarding steel wheels were approved.

BRAKE SHOES

The next subject taken up was that of brake shoes. F. W. Sargent, chief engineer American Brake Shoe & Foundry Company, emphasized the importance of the committee's recommendation that the spacing of brake heads should be reduced to 58 13/16 in. from the present spacing of 58 9/16 in. The latter causes the wheel flange to cut through the flange of the brake shoe, causing excessive crowding. This trouble, he said, came from the new design of wheel flange adopted by the association after the standard brake-shoe outline had been adopted. This brought the center line of the keyway ⅛ in. closer to the flange of the wheel than it should be. Mr. Sargent urged the adoption of a definite line from which to measure the spacing, the gage line being indefinite. He stated that in some cases a point on the back of the flange where the surface is practically vertical has been used. Regarding the length of brake shoe, Mr. Sargent pointed out that there should be ample length so that the end stop can be made sufficiently long to be durable. If it is cut down to 3/16-in. on each end it will give continual trouble from breaking off. If the brakehead guide is omitted, as proposed, there will not be enough metal to run over the end of the steel back and form a substantial end stop.

Ira R. Lesh, Railway Materials Company, Chicago, confirmed the statements made by Mr. Sargent, particularly in regard to over-all length. He said that with 12⅜ in. between end stops, the steel back should have ¾-in. anchorage. Insufficient anchorage will result in the continual breaking off of the end stops and the scrapping of many shoes which would otherwise be good. In selecting the point of measurement for spacing, the committee should be governed by the fact that the brake shoes should register exactly with the wheels.

In closing the discussion Mr. Phillips expressed appreciation of the suggestions made in the discussion regarding length of shoe and spacing and called attention to the desire of the committee that it be allowed to go over the whole subject thoroughly again in view of the recommendations that had been made. On motion of Mr. Adams

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the recommendations of the committee regarding brake shoes were adopted with the understanding that the committee, in making up the drawings, should make the shoes of a length found most desirable in the light of the latest information obtainable.

SELF-PROPELLED CARS

In the discussion of the part of the report dealing with self-propelled cars, J. H. Tracy, of the Electric Storage Battery Company, stated that the data given for the Third Avenue Railway were correct for that type of service, which was very severe on account of the large number of stops and slow-downs resulting from the heavy density of street traffic. The large consumption of 5 amp-hours or 66 watt-hours per car mile was not excessive under these conditions, but a car of approximately the same weight and size having the same electrical equipment in operation in Billings, Mont., consumed only 2.83 amp-hours per car mile or 37 watt-hours per ton-mile. In the latter case a smaller battery could be used for the same daily mileage on one charge, with a resulting decrease in battery maintenance cost. On the other side of the balance sheet in the comparison of these two cases was the question of the accessibility of New York compared with Billings, Mont., and the fact that the Third Avenue Company operated 160 cars, which made supervision, inspection and repairs very much more expensive for the Billings Traction Company than for the Third Avenue Company. It was a fact that the cost of battery maintenance for the Brill-Exide car, operated by the Lewisburg, Milton & Watsontown Passenger Railway, amounted to approximately 3 cents a car mile, the figure mentioned by Mr. Mullaney for his cars, but this was 1.86 mills a ton-mile, while for the Third Avenue Company the 3 cents a car mile amounted to 4.15 mills a ton-mile or 2¼ times as much per ton-mile as for the Lewisburg car. This difference was due to difference in the services rendered.

John A. Thompson, in his report on the Edison-Beach cars used by the United Railways of Havana, had said, "No matter what the efficiency of the lead battery might be it is bound to be more expensive to operate than the Edison nickel-iron battery."* This was based on an assumed cost of battery maintenance of 3 cents a car mile. It entirely overlooked the difference in first cost between the lead battery and the nickel-iron battery and also assumed an infinite life for the nickel-iron battery at zero cost for maintenance during this life. The Havana car was very similar in dimensions and speed to the Lewisburg car, the lengths being 38 ft. for Havana and 39 ft. for Lewisburg. The seating capacities were forty for Havana and forty for Lewisburg. The maximum speeds were 29 m.p.h for Havana and thirty for Lewisburg. The stops per mile were 2.1 for Havana and 1 to 1.5 for Lewisburg. The battery capacity, at 1.2 volts per cell for the nickel-iron battery and 1.965 volts per cell for the lead battery, was 61.7 kw-hr. for Havana and 69.2 kw-hr. for Lewisburg. The chief differences were in the number of stops per mile, which favored the Lewisburg car, and in the battery capacity, which was 12 per cent greater for the Lewisburg car. The Lewisburg car could take the boosting required at Havana with at least equal facility. The two cars, therefore, were generally comparable in the Havana service. The energy consumption of the Havana car was 0.79 kw-hr. per car mile; the battery efficiency, 44.4 per cent; motor-generator efficiency assumed, 80 per cent, which would give an input to a motor-generator of 2.225 kw-hr., which, at 4 cents per kw-hr., gave a power cost of 8.9 cents per car mile.

The weight of the Lewisburg car was 32,200 lb. empty. Assuming a load of the full seating capacity of forty passengers, at 140 lb. per passenger, gave a total weight of 18.9 tons. The battery had in actual service an ampere-hour efficiency of 90 per cent, a volt efficiency of 85.6 per cent and a watt-hour efficiency of 77 per cent. The energy consumption given in the report was 40 watt-hours per ton mile. This, with the loaded car weight of 18.9 tons, battery efficiency of 77 per cent, and motor-generator efficiency of 80 per cent, would give an input to the motor-generator of 1.23 kw-hours, which at 4 cents per kw-hour gave a power cost of 4.92 cents per car mile, leaving 3.98 cents per car mile in favor of the Lewisburg car. Assuming the cost of battery maintenance for the Lewisburg car as 3 cents per car mile, which was very nearly correct, this left a clear saving of nearly 1 cent per mile if the Lewisburg car were substituted for the present Havana cars. To this must be added the proper amount for maintenance of the Edison battery and interest on the difference in first cost between the Edison-Beach car and the Brill-Exide car. If the nickel-iron battery had an infinite life and the cost of its maintenance was nil, there would still be a saving of nearly 1 cent per mile in favor of the Brill-Exide car.

Mr. Tracy assumed that if the Edison battery was replaced at the end of the guaranteed life of four years at 50 per cent off the advertised list price of $20 per cell, and if the mileage of 150 miles per car a day was made for 300 days a year for four years, the renewal cost would amount to 1.77 cents per car mile. Neglecting the cost of replacing electrolyte and the interest on the additional investment, a saving of 2.75 cents per car mile was obtained by the substitution of the Brill Exide car for the Edison-Beach car. On the same basis of mileage, as above, this amounted to a saving of $1237.50 a year per car.

N. W. Storer, Pittsburgh, congratulated the committee for the very complete data it had given on the operation of the different types of cars. He suggested that the subject be pursued at greater length during the coming year by getting the actual cost of the cars, if possible. Some roads with self-propelled cars were going into multiple-unit operation, but there was very serious doubt in his mind whether there was any advantage whatever in that practice, if the conditions permitted the use of trolleys. There was one thing the trolley car people could gain from a study of these self-propelled vehicles, and that was how to make a light equipment. Lightness was not inherent to the self-propelled car at all, and unless the cost was prohibitive, it should be applied to trolley cars in very many instances. If the frictionless bearings were good for self-propelled cars, they should be good for the others. It was simply a matter of cost.

C. G. Young, New York, believed the storage battery had a field, but emphasized the importance of studying all the conditions before a choice was made.

M. V. Ayres, New York, noted that the comparison which was so strongly in favor of the lead battery was based on a cost of 4 cents per kw-hr for power. At a different rate for power the results, comparatively, would be different, and at a very low cost for energy the nickel-iron battery would show less cost of operation than the lead battery.

W. Thorn, Chicago, thought that the committee should plot curves with one ordinate showing cost of operation and the other, stops per mile or some other variable, and thereby compare the two types of cars. The critical point would be where the curves cross, and below that point one of the cars would be more efficient, and above that point the other car would be more efficient.

F. R. Phillips, chairman of the committee, concluded the discussion on self-propelled cars. He thought that Mr. Thorn's suggestion regarding the plotting of curves to show the relative efficiencies of the storage battery and trolley car would be too great a task.

On motion of L. P. Crecelius, the report of the committee on equipment was adopted with a vote of thanks.

REPORT OF COMMITTEE ON EDUCATION

In presenting the report of the committee on education William Roberts, Akron, Ohio, stated that consid-

*See ELECTRIC RAILWAY JOURNAL, Oct. 4, 1913, p. 631.

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erable progress had been made in this line during the year. He referred to the excellent co-operative work being done by the University of Cincinnati under the direction of Dean Herman Schneider. The Cincinnati plan involves the alternation of the students' work between school and shop. Mr. Roberts said that the desire of the committee is to assist in the simplification of education so that employees will be desirous of going on with it. Mr. Roberts expressed appreciation of the co-operation of Mr. Pryor and Prof. Norris and said that the committee plans to apply the methods of Dean Schneider during the coming year. Mr. Phillips commended the plan of co-operative work and stated that it is being used at the University of Pittsburgh with good effect. It is expected that a formal report of progress can be made next year.

Upon motion of Mr. Adams, the report of the committee on education was accepted with thanks.

REPORT OF THE COMMITTEE ON RESOLUTIONS

The next order of business was the report of the committee on resolutions, in which thanks were tendered to all the officers and committees, and regret was expressed at the resignation of Secretary-treasurer Donecker. The committee also expressed the gratitude of the association to the Manufacturers' Association for the exhibits. On motion the report of the committee was adopted.

The last order of business was the presentation of the report of the committee on nominations, which presented the following names:

President, J. H. Hanna, Washington.

First vice-president, L. P. Crecelius, Cleveland.

Second vice-president, John Lindall, Boston.

Third vice-president, B. F. Wood, Altoona.

Members of executive committee, F. R. Phillips, Pittsburgh; Norman Litchfield, New York; H. F. Merker, East St. Louis; J. P. Barnes, Syracuse.

Secretary-treasurer, E. B. Burritt.

These names were unanimously accepted, the secretary-treasurer casting the ballot. A telegram was received from J. H. Hanna, the new president, in which he thanked the association for the honor of election and expressed his regret that urgent business prevented him from remaining at the convention to acknowledge his election in person.

The meeting was then adjourned.

REPORT OF THE COMMITTEE ON EQUIPMENT*

F. R. PHILLIPS, CHAIRMAN; E. W. HOLST, F. G. GRIMSHAW, J. M. BOSENBURY, W. R. M CRAE, L. M. CLARK, J. P. BARNES, R. N. HEMMING, D. E. BLAIR

The report on wires and cables for car equipment submitted in Appendix A is largely preliminary in its nature. It is written with a view to arousing interest in the matter, and the committee trusts that the members will discuss and criticise this section freely.

The matter of specifications for solid wrought carbon-steel wheels for electric railway service has been under investigation for several years and was reported upon by the 1912 committee on equipment. The specification reported in 1912 was adopted by the association at the convention as a guide to the members for use in such manner as desired, with a further recommendation that the subject be again studied with a view to a refinement of the specification.

There are at present four manufacturers of steel wheels, all of whom have a method or process of their own, each differing in many essential respects from the other. In the refinement of manufacturing processes extreme caution is necessary, since reliability must be maintained at any cost without the safety features being impaired. Progress must therefore be slow, especially since determinations cannot profitably be made upon results of laboratory tests but must be based upon results in actual service.

The American Society for Testing Materials has drafted and will probably adopt a specification of this kind. This action, in the opinion of the committee, is inopportune and inconsistent, since the specification, which covers wheels for electric railway service only, would thus be declared a standard by an organization but partially composed of electric railway engineers, while this association, composed entirely of electric railway engineers, is not ready to adopt as standard any specification of this character, in view of the lack of satisfactory data in proof of its value.

Repeated efforts have been made by the committee to harmonize the various points of contention between the manufacturers and the sub-committee having in charge this specification. The manufacturers, on the one hand, insisted that the provisions of the specification proposed in 1912 were commercially impracticable, while the members of your sub-committee, on the other hand, demanded requirements in the specification which would insure uniformity of product. Individual investigations on the part of various members of the committee on equipment have led the sub-committee to believe that while the specification proposed in 1912 may not be possible of attainment at this particular time, it is in the right direction, and the committee is satisfied that improvement in the art of the manufacture of steel wheels will insure greatly improved product and that this specification will form the basis of this accomplishment.

Therefore it is recommended that this subject be continued for further investigation and that the incoming committee on equipment be instructed to collect and tabulate data covering the performance of wheels manufactured under the provisions of this specification, if any such are made.

Working specifications were submitted in an appendix to replace those adopted in 1912. These differed in minor details from the previous specifications, the more important changes in the paragraphs on chemical analysis being the omission of the dimensions of the test drill holes, the elimination of reference to segregated area and an increase in the mating limits from five points to six points of carbon content. In the new specification the expressions "machined contour" and "unmachined contour" replace the original expressions for machined wheels and rolled wheels and references to weight of wheel are omitted. The stamping on the wheel is considerably limited and the paragraph relating to patent litigation is omitted entirely.

The question as to the cause of and remedy for air hose failures is receiving the close attention at present of all users. The Master Car Builders' and Air Brake associations are also actively engaged in the investigation of this matter. The investigation of the subject this year has served to emphasize the necessity of very careful study, extended tests and research, all of which could not be satisfactorily accomplished in one year, and it is therefore recommended that the subject be assigned to next year's committee.

In the revision of brakeshoe standards some important omissions and errors were discovered in the present design. The committee believes it unwise to institute radical changes in standards, since to do so would perhaps entail much expense upon the member companies which have adopted them. Fortunately, however, the desired improvement in the standards may be attained with no interference with present practice, and the recommendations for changes in the standards act only as a refinement thereof and in many cases have already been put in practice by some of the member companies.

RECOMMENDATIONS OF THE COMMITTEE

The committee made the following recommendations:

1. That the subject of wires and cables for car equipment be continued.

2. That the specifications for solid wrought carbon-steel wheels for electric railway service be continued.

*Abstract of report read before the American Electric Railway Engineering Association at Atlantic City, N. J., Oct. 13-17, 1913.

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3. That the subject of air-brake hose specifications be continued.

4. That the standard brakeshoe drawings be revised so that all dimensions be indicated from a base line, which shall have a definite relation to the gage line of the wheel, such revision being made without changing the form of shoe, head or key except as outlined below:

(a) That certain errors and omissions noted in the report on revision of brakeshoe standards be corrected.

(b) That brakeshoe keys be made uniform in shape and dimension for treads of all widths and for flanged and unflanged brakeshoes.

(c) That the over-all length of brakeshoe be changed from 13¾ in. to 13⅜ in. to conform to M. C. B. and C. E. R. A. standards.

(d) That an additional dimension which shows the distance from the back of shoe to the back of flange portion be incorporated in the standards.

(e) That face of shoe be tapered 1 in. in 25 in. to conform to standard wheel contours.

(f) That width of "face" of shoe be made ¼ in. less than width of tread of wheel, the outer face of the shoe being sloped inward to suit.

(g) That standard designs show a dimension for depth of flangeway.

The action taken by the committee on standards was to recommend continuance of the matter of specifications for solid wrought carbon steel wheels with a view to determining whether a specification satisfactory to all parties interested can be developed. The changes in the present standard brakeshoe are recommended for adoption as outlined.

APPENDICES

Accompanying the report were five appendices as follows: Appendix A, covering the matter of wires and cables for car equipment; Appendix B, submitting a proposed revision of the present working specification for solid wrought carbon-steel wheel and designs for gages, tapes and templets for measuring wheels; Appendix C, covering the subject of self-propelled cars; Appendix D, submitting reasons for and drawings of proposed changes in the standard brakeshoes, and Appendix E, giving an analysis of existing differences between C. E. R. A. and A. E. R. E. A. standards with recommendations for harmonizing them. An abstract of Appendix A is published herewith.

WIRES AND CABLES FOR CAR EQUIPMENT

In view of the wide difference in methods and materials in use for car wiring, it was considered well to conduct an investigation of the best practice by engineers in general. The consensus of opinion bearing on certain phases is herewith presented:

It was agreed by the majority that in the case of all-steel or semi-steel cars having steel underframes, or where conditions were such as to make it imperative to use metal conduits, lead wires should be brought out of standard junction boxes and cleated to the car underframing with asbestos board or properly treated wooden cleats, these cleats holding the cables snugly and allowing a clear space between cables of at least 2 in.

In the case of double-truck cars this cleat is to be brought as close as possible to the king bolt. The leads are to be brought through the motor outlets, which are to be insulated with high-grade rubber bushings snugly fitting both the motor case and the cable.

The motor leads upon leaving the motor outlets are to be cleated to the motor frame in a manner similar to that described above in the case of the car-body lead wires and the cables to be so arranged between cleat on motor frame and motor outlet holes as to allow for a weather drip.

Brass connectors are to be firmly and permanently soldered to the ends of the car-body cables. A piece of rubber hose of suitable length and size is to be slipped on to the car cables before the connector is soldered on. The motor leads are to be joined to the connector by two set screws in the connector. The rubber hose is then to be brought down over the connector and firmly taped at both ends, and to be treated with a coating of insulating paint. However, in addition to the above described connector there are several others on the market of equal merit.

It is necessary, when installing conduit in cars, to see that a proper fall is given to the conduit and that the lowest junction boxes have a small hole drilled in the bottom to permit the proper drainage of accumulated moisture. This method of treating motor leads is the best suited to the majority of installations and also suitable for cars wherein the car cables are run in wooden conduits or treated hose. It has been found very satisfactory in preventing mechanical injury to the cables to bring motor and rheostat lead wires from wood or canvas conduits through lead pipes of a suitable size properly fastened to the underframing of the car.

It seems to be the opinion of many that it is not necessary for car cables to be made up and insulated in sets prior to being drawn into conduits, if they are received in proper condition from the manufacturer. If the cables are up to specification, they should be installed as delivered by the manufacturer. Rough places or burrs in the conduits should be carefully guarded against in their manufacture, as these are the cause of a large number of cable failures. While it is not absolutely necessary to have extra insulation applied to cable sets, it is a great convenience in handling and saves time in erection to have cables firmly held together by some such method as either lap-taping the entire length of the cables or taping them at intervals, and also to apply to the made-up sets a coating of insulating air-drying paint prior to drawing the cables into the conduits.

It is not considered advisable, for ordinary uses, to install a fuse between the trolley and circuit-breaker. In the case of electric locomotives or heavy equipments, however, it may be good practice, or necessary, to install such a fuse to protect against excessive loads or abuse of equipment by the operator. Such a fuse should be of the magnetic blow-out type, using ribbon wire of predetermined current value, protected by a suitable metal box, which should be located in a convenient place, to permit of easy access.

Investigation shows that a large majority of roads use both inside-hung and outside-hung motors, and the committee would recommend that manufacturers of motors bore or drill the frames of motors for outlet leads on both sides, to accommodate either inside-hung or outside-hung motors.

There can be no question that 30 per cent pure Para rubber will give the best results for insulating car wiring. Its use may be advisable in special cases, as where cars are operated in subways and there is a liability to small short-circuits, which might cause smoke, fire or a possible panic. However, the wire referred to by manufacturers as containing 20 per cent pure Para rubber is giving general satisfaction, and the 30 per cent composition makes an insulation probably more expensive than is necessary. [Attached to the report was a proposed specification covering 20 per cent, by weight, of dry up-river fine Para rubber or A-No. 1 plantation sheet, which has not previously been used in a rubber compound. The committee recommended submitting the specifications to the manufacturers for criticism before adoption.—Eds.]

Relative to the matter of treating insulation to make it fire-proof or flame-proof, the committee is of the opinion that this should be done at the discretion of the consumer, bearing in mind that it is more essential to have the cables moisture-proof than to have them fire-proof or flame-proof. The committee believes, however, that cable insulation could be readily treated by either the manufacturer or consumer so as to make it practically a slow-burning insulation. This would be considered good practice for the purpose of delaying or preventing the flames from making rapid headway among the cables.

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Papers at Accountants' Final Session

At the Final Session of the American Electric Railway Accountants' Association at the Atlantic City Convention a Number of Papers Were Presented on Accounting Subjects, Including Overhead Charges, the Electric Railway Census, Interline Accounting Methods and Work of the Bureau of Fare Research

The concluding Accountants' session of the Atlantic City convention was held during the morning of Friday, Oct. 17. At this time in addition to the papers and committee reports scheduled on the convention program for presentation there was read Edwin Gruhl's address entitled "The Cost of Carrying a Passenger, and Proposed Work of the Bureau of Fare Research," which had been postponed from Wednesday's session. All of these papers are published in abstract herewith.

THE COST OF CARRYING A PASSENGER, AND PROPOSED WORK OF THE BUREAU OF FARE RESEARCH*

BY EDWIN GRUHL, ASSISTANT TO THE PRESIDENT, MILWAUKEE ELECTRIC RAILWAY & LIGHT COMPANY

Writing at the beginning of our electric traction industry, Edward E. Higgins, one of the pioneers of this association, gave the assurance in his book on "Street Railway Investments," that "the municipal transportation industry in the United States is intrinsically profitable." One of he noteworthy reasons assigned for this statement was the following commentary upon the American public:

"The average American is careless of small economies. He has not time to 'split the nickel'; he despises a penny and in some parts of the country will throw it away; he will willingly pay 5 cents to save three minutes in a half-mile ride, and he will doubtless be the same man fifty years hence."

Both of these predictions have not been realized. The citizens of many of our municipalities, whatever their extravagances along other lines, have not hesitated to attempt small economies in car fare and have demanded in addition a length of ride which is no longer measured by the half mile. This, with the rising cost of labor, material, injuries and damages and the increase in taxes and municipal burdens, has led to the general conclusion by many investors that the traction business is intrinsically unprofitable.

The problem of how far it is possible to carry a passenger under existing fares is one that has claimed the attention of a committee of the association for several years. Several methods have been proposed of calculating such a reasonable haul, and much light has been thrown upon the probable outcome of any impartial investigation of the cost of service. The conclusion reached that the traction industry is "selling goods below cost" has created widespread discussion and has already reflected itself in the decisions of some of our commissions.

The completion of the work as outlined by the committee of the American Association is too large a task to place upon a single committee, and accordingly the recommendation has been made and adopted at the present convention of the American Association that the work be assigned to a separate organization to be called the "Bureau of Fare Research." Such bureau is to serve under the direction of the committee on the cost of passenger transportation service. Ultimately this bureau will have in its employ the best talent which can be secured to develop and complete the work for the present committee.

While an innovation for the Electric Railway Association, the establishment of such a bureau is not an untried experiment. The Bureau of Railway Economics at Washington has been in existence for several years and has prepared careful analyses of operating conditions for the railroads of the country. The rate research committee of the National Electric Light Association, while confining its efforts to the theories of rates and classifications of service, is performing a similar function for the electric lighting and power industry.

The success of the venture will depend largely upon the co-operation received from the separate companies and especially the accounting officers of these companies. The Accountants' Association is familiar with the form of financial and operating reports filed with governmental bodies. In many states such information has been supplied for years and forms a large part of the bulk of the published reports of various of our railroad and public service commissions. It is the purpose of the bureau to utilize such reports and to base its conclusions as to the cost of transportation service under varying conditions upon the facts with which the public is familiar and to which it has ready access. In assisting the interpretation of reports prepared under varying classifications, in furnishing supplementary information where necessary and in the preparation of suggestions, the members of the Accountants' Association can be of great service to the committee and the bureau.

The cost of carrying a passenger and the distance to which such a passenger can be profitably carried for a single fare involves a calculation of the operating expenses and investment charges applicable to the service performed. The operating expenses are usually capable of definite determination, but their allocation is not always determined with certainty. It is a common practice in apportioning costs between various services to ascertain costs varying with the car hour, with the car mile, with the miles of track operated and with the number of passengers carried. Frequently also, in analyses of this character, a separation is attempted between the costs varying with the passengers hauled and the costs varying with the passenger mile. Classifications of accounts do not so group the various items of expense as to enable such a statistical analysis without rearrangement, and the manner of this rearrangement has been the subject of much discussion. These methods of analyses will necessarily claim the attention of the bureau.

The total investment charges, in which there is included depreciation and return upon the investment, are not always determined with the same certainty as the operating costs and do not always appear from the books of accounts.

The work will accordingly devolve upon the bureau to keep closely in touch with the work of physical valuation, where it is attempted, and to attempt to analyze the factors making up such valuation. Return upon the investment, moreover, is not based merely upon physical property, but the various items of intangible value must be made a matter of special investigation before conclusions can be drawn as to the paying haul per passenger. So-called overhead charges, additive to appraisals of physical property, have already been a subject of frequent discussions before the Accountants' Association and are a matter of report by a separate committee this year.

The factors affecting reasonable return, where the value upon which such a return is to be calculated has been determined, are another problem, which, while not capable of definite solution, may be fixed at its lower limit by the discounted price of securities.

*Abstract of paper read at meeting of American Electric Railway Accountants' Association, Atlantic City, N. J., Oct. 13-17, 1913.

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The question of the extent to which allowance must be made in the cost of service to cover depreciation is another item of investment charges which has been the subject of much controversy and which must necessarily claim the attention of the bureau and its work. The association has already done much, through its joint committee on life of railway physical property of the Accountants' and Engineering Associations, in assembling data as to the life in service of physical property for which a depreciation allowance must be made.

When the factors affecting operating expenses and investment charges have been determined and the estimates of the magnitude of such charges have the support of actual experience, the practical application of such principles to the problems of the cost of passenger service must be developed. As affecting urban service, such problems include the question of the adequacy of present fares for the areas served and the frequency of service demanded, the increasing cost of peak-hour service and the cost of transfers. As affecting suburban service the reasonableness of extending lines to outlying territory in the extension of single-fare limits or of urban service is a question usually raised to which the bureau will direct its attention. The application of the zone system to both urban and suburban service has been suggested as the solution to the fare problem by the committee and will probably be the matter of further investigation. Interurban service likewise has its problem of inadequate rates and alleged discrimination between various localities, to which a study of the cost of service can be applied.

Aside from these investigations it is also planned that the bureau will assemble, compile in statistical form and distribute important operating and financial data relative to electric railways, to the end that a comprehensive view of the status of the industry represented by the association may be obtained.

This sketches in a brief manner the functions which it is contemplated the Bureau of Fare Research will perform. The problems outlined are not such that they can be readily solved by any single company, no matter how well equipped. It has been felt particularly by those companies which have been made the pioneer subjects for operation in the present movement for rate regulation that no other subject is so well fitted for co-operative action.

In undertaking a work of this description, involving as it does many unsolved problems and others about which there are apparently many honest differences of opinion, it is evident that much detailed study of the various factors affecting the cost of service is required and that immediate results from the bureau cannot be reasonably expected.

In all this work those officers of member companies having charge of the accounting will necessarily play an important part. On them will fall the principal burden of supplying the essential data without which the broad work of this bureau cannot be performed and without which it cannot apply to individual cases such methods of analysis as may be developed from time to time.

The electric railway industry is to-day facing new problems arising out of the growing tendency for the regulation of rates and the expansion of territory within which the passengers shall be hauled for a single fare. Concerted action on the part of member companies is required. It is the purpose of the association that the preparation and study of these facts be done by the Bureau of Fare Research for the industry as a whole.

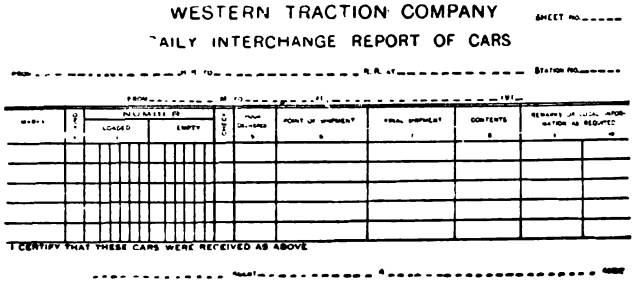
REPORT OF COMMITTEE ON INTERLINE ACCOUNTING*

L. T. HIXSON, CHAIRMAN; IRWIN FULLERTON AND E. L. SCHMOCK

The reports heretofore submitted by the various committees on interline accounting have been revised slightly by this committee, and, in addition, forms and methods for accounting for interchange of equipment are outlined.

INTERCHANGE OF EQUIPMENT

The forms and plans submitted are intended to cover interchange of equipment between electric roads only. Such electric lines as have interchange arrangements with steam roads will no doubt be required to use the standard steam road blanks, which are not entirely applicable to them.


WESTERN TRACTION COMPANY

DAILY INTERCHANGE REPORT OF CARS

I CERTIFY THAT THESE CARS WERE RECEIVED AS ABOVE

Interline Accounting—Form for Daily Interchange Report

These forms are based on the following rate schedule, and other rates would probably require a slight change in some of the forms:

Motor passenger: $4 per twenty-four-hour day, or fraction.

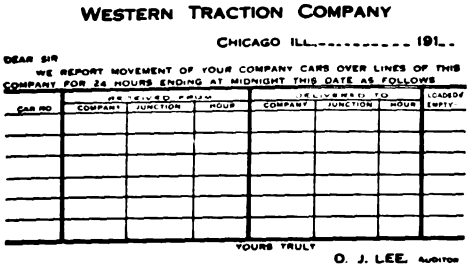
Trailer passenger: $2 per twenty-four-hour day, or fraction.

Motor freight: $3 per twenty-four-hour day, or fraction.

Freight, trailer (box, flat or gondola): $0.50 for first twelve hours, or fraction; 50 cents for second twelve hours, or fraction; $1 for second twenty-four hours, or fraction; $1 for third twenty-four hours, or fraction; $1 for fourth twenty-four hours, or fraction; $2 for fifth twenty-four hours, or fraction, and thereafter.

Inasmuch as no provision is made for keeping a book record of movements on lines of the local company other than delivery to or receipt from foreign lines, the junction agent's daily interchange report is the basis for all other records.

A daily interchange report is made in triplicate by the


WESTERN TRACTION COMPANY

CHICAGO ILL. 191

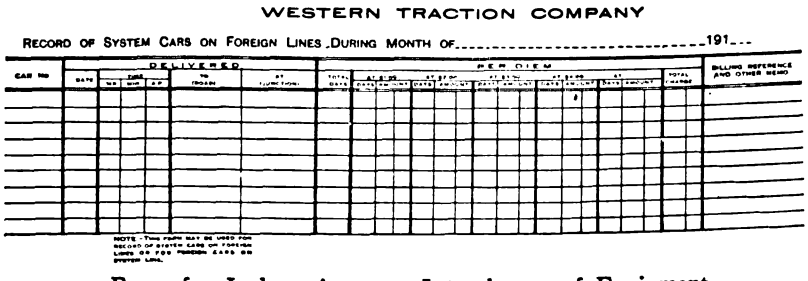
DEAR SIR

WE REPORT MOVEMENT OF YOUR COMPANY CARS OVER LINES OF THIS COMPANY FOR 24 HOURS ENDING AT MIDNIGHT THIS DATE AS FOLLOWS

YOURS TRULY

O. J. LEE, AUDITOR

Interline Accounting—Notice of Movement


WESTERN TRACTION COMPANY

RECORD OF SYSTEM CARS ON FOREIGN LINES DURING MONTH OF 191

Form for Ledger Account, Interchange of Equipment

*Abstract of report read before the American Electric Railway Accountants' Association, Atlantic City, N. J., Oct. 13-17, 1913.

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agent representing the road making delivery in case it is a joint agency. One copy goes to the auditor of each line and the agent retains a copy for his file. In case there are two agents (not a joint agency) four copies will be necessary.

From the daily interchange report an entry is made on the ledger form on a sheet bearing the proper road name for cars belonging to that road which have been received by the home road or delivered by the home line. An entry is also made on this form for cars owned by the local road, showing delivery to or return by some foreign line. Additional entries are made on this form to show the movement of home cars on roads which do not make a physical connection with the home line, and for which a postal card notice is sent.

The postal card notices are used for the purpose of advising a road owning a car when any of its cars have been received or delivered by a road which does not make physical connection with such owning line.

There is not sufficient interchange between electric lines to require a special summary form. Each line should render a bill for use of its cars not later than the fifteenth of the following month.

ACCOUNTING DEPARTMENT CONFERENCES*

BY FRANK B. LASHER, AUDITOR REPUBLIC RAILWAY & LIGHT COMPANY

The question of monthly or more frequent conferences between the auditor and the employees of his department is a matter that should receive favorable consideration, and steps should be taken whereby a representative from every department of the corporation should be present and discussions entered into upon such subjects as will advance knowledge and solidarity, thus automatically upbuilding the organization and creating a spirit of harmony. A complete record of the proceedings of each conference should be kept and a copy sent to the head of each department.

Conferences will prove to be an educational feature and a very valuable asset to the company adopting them, as they tend to uniformity of method and added interest in the company's affairs.

There are arising from time to time questions of importance which, after conference, are handled in a manner entirely different from the way they would have been handled if they had been left to the judgment of only one person.

It is very important that all employees of the accounting department familiarize themselves with the method of gathering the information forming the basis of entries and the statistics compiled for the executive officers.

The accounting department of to-day needs men of trained judgment to cope with the problems that are presenting themselves daily. They are frequently called upon by financial and other interests to compile figures and data relating to the physical condition of properties, to be used for different purposes, such as increase of capital, taxation and rate questions, etc., also to gage earning power and to forecast income returns, and in order to be fully conversant with all the details it is highly important that they be familiar with the methods pursued by every department in order that better and quicker results may be obtained.

This department is not looked upon at the present time as merely a bookkeeping department, but as a department of valuable research; and more—it has become one of the essentials of general management by detecting inefficiencies and pointing out opportunities for increased returns.

It is essential that the classification of accounts have careful thought and study, and in addition the accounting bulletins published by the Interstate Commerce Commission giving decisions upon questions raised under the classifications should be read by every accountant.

A very important subject for conference, which would promote a great deal of discussion, is that of overhead charges. Accountants do not know how soon they will be called upon to show the cost and value in every detail of their properties. Are we ready? Are we prepared to show all the elements of overhead charges? Do our entries describe all charges to capital with sufficient detail fully to identify any particular unit or its component parts?

*Abstract of paper read before the American Electric Railway Accountants' Association, Atlantic City, N. J., Oct. 13 to 17, 1913.

REPORT OF COMMITTEE ON OVERHEAD CHARGES*

BY P. S. YOUNG, CHAIRMAN; EDWIN GRUHL AND A. L. LINN, JR.

The subject of overhead charges on traction appraisals has been discussed before the convention of 1911 and 1912. Its reference to a committee of the Accountants' Association late this year follows a demand which has been made from time to time that accountants furnish authoritative data on overhead charges for appraisers.

Your committee wishes to emphasize the large differences of opinion which exist, not only as to which items overhead charges comprise, but as to the amounts assignable to each individual item.

Your committee has, for this purpose, prepared some tabulations of important street railway appraisals, by courts, commissions, etc., and has endeavored to show, in so far as the information was accessible, the comparative amounts allowed for the various items under the head of overhead charges. The difficulties in the way of such a comparison are considerable because of the various methods of handling the subject under the different appraisals.

APPRAISAL OF CHICAGO SURFACE RAILWAYS, 1906

For legal expenses, interest during construction, brokerage and contingencies 10 per cent was added to the estimated inventory cost of reproduction.

For organization, engineering and incidentals 15 per cent was added to the estimated inventory cost of reproduction of track, electric power distribution system and buildings; 10 per cent to estimated inventory cost of reproduction of power plants, and 5 per cent to estimated inventory cost of reproduction of cars and car equipment.

The total overhead charges were $4,259,190, or 21.7 per cent on the inventory cost in the Chicago City Railway appraisal.

APPRAISAL OF CHICAGO CONSOLIDATED TRACTION COMPANY, 1910

In this valuation 15 per cent was added as provided for by the 1907 ordinances for new capital investment. The other overhead charges remained the same as in the 1906 appraisal, with the exception of an allowance of 5 per cent for legal expense, interest during construction and contingencies, while in the 1906 appraisal there was an allowance of 10 per cent for the same items and brokerage.

The total overhead charges were $1,971,434, or 38.4 per cent on the inventory cost.

CLEVELAND STREET RAILWAY APPRAISAL, 1909

Judge Tayler allowed as specific overhead charge applicable to track, 10 per cent; to pavement, 3 per cent; to cars, land, buildings, overhead construction, return circuit, power stations, storage batteries, miscellaneous rolling stock and equipment, 5 per cent, and, to the other items, nothing specific was applied to them, as, for instance, shop stores, auditors' stores and bookkeeping credits.

For financing, engineering, legal expenses, organization, administration, insurance, including accident insurance, superintendence, interest during construction, delays not covered by the specific allowances, consents, litigation with

*Abstract of report presented before the American Electric Railway Accountants' Association, Atlantic City, N. J., Oct. 13 to 17, 1913.

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property owners, incidentals and contingencies not applicable to specific items, 15 per cent was allowed.

The total overhead charges were $3,178,305, or 22.18 per cent.

The above valuation was less depreciation. In the Chicago cases mentioned the depreciation was also determined and the overhead charges were depreciated to the same degree as the other depreciable property, so that the percentage allowance made for overhead charges remains the same.

APPRAISALS OF MASSACHUSETTS STREET RAILWAYS

This was a report to the joint board on the validation of assets and liabilities of the various street railways owned by the New York, New Haven & Hartford, by George F. Swain, engineer in charge, as follows:

Engineering, 5 per cent of physical cost of reproduction; contingencies, 5 per cent of physical cost of reproduction; legal and general expenses, 3 per cent of physical cost of reproduction; total of the above, 13 per cent of physical cost of reproduction; interest, 6 per cent of physical cost of reproduction plus the above, or about 7 per cent of physical cost of reproduction; commissions for marketing securities, 3 per cent of physical cost of reproduction; total, about 23 per cent of physical cost of reproduction.

APPRAISAL OF PUGET SOUND ELECTRIC RAILWAY BY WASHINGTON RAILROAD COMMISSION

The total overhead charges were $499,517, equal to 15.7 per cent on the inventory cost. In this appraisal the reproduction cost less depreciation was also determined but the overhead charges were not depreciated. The overhead charges amounted to 19 per cent on the inventory reproduction cost less depreciation.

APPRAISAL OF CONEY ISLAND & BROOKLYN RAILROAD BY NEW YORK PUBLIC SERVICE COMMISSION, FIRST DISTRICT

For general contractor's profit 10 per cent was added to estimated inventory cost of reproduction, except those values relating to "miscellaneous stock, fixtures, etc.," and "real estate." In addition 15 per cent was added to cover "engineering, incidentals and organization." The total allowance was $5,676,895, or 24.81 per cent on the inventory cost.

In this appraisal the reproduction cost less depreciation was also determined and the overhead charges were depreciated to the same degree as other depreciable property so that the percentage allowance for overhead charges remains the same.

APPRAISAL OF TRACTION PROPERTIES, RAILROAD COMMISSION OF WISCONSIN

In all instances the amount of overhead charges has been placed at 12 per cent of the detailed valuation of physical property. Commissioner Halford Erickson, in describing the present practice of the Railroad Commission of Wisconsin before the Western Society of Engineers, in May, 1913, said: "As to overhead expenses, that is a matter that is not quite understood. The Wisconsin commission in the case of smaller utilities allows 12 per cent. In the case of larger utilities, where there is a great deal of difficult city work to do, crossing rivers and work of that kind, which often involves considerable risk, we allow 15 per cent. That, however, is the apparent figure, which is visible in determining the unit price upon which to compute the cost of the various elements. We nearly always allow 10 per cent for contractors' profit. That is an element which entered into the unit prices or cost as a whole and is not given separately. However, if that were taken out of the unit prices where it appears and added to the 12 per cent, that figure would be considerably increased. It might not add 10 per cent to that figure but it probably would add 7 per cent to 9 per cent."

Your committee has endeavored to gather some data as to the percentage of overhead charges to the cost of construction of traction properties actually occurring in practice. Close analysis of these cases, however, discloses that the results are not comparable with the estimates cited above, because of omissions, differences in classification and variations in accounting practice.

DIFFICULTIES OF THE ACCOUNTANT

The difficulties confronting the accountant in furnishing authoritative information of service to the appraiser may be summarized as follows:

A. Basis of the appraisal. Many valuations proceed upon the assumption that the property appraised is constructed *de novo* at the time of the appraisal. Books of account, generally speaking, do not disclose so-called present-day values but costs. The construction period in practice is an interrupted process; the appraiser in this instance assumes a continuous period of construction. The overhead charges in either case will be essentially different. Where the valuation is made for the purpose of determining in the absence of record what the investment in the property has aggregated, book records of property built up by piecemeal construction where properly analyzed will supply the desired information. Under the assumption of reproduction in one process, only records of properties constructed as of whole or large extensions would supply the comparable data.

B. Difference in definition of overhead charges as usually understood by appraisers and accountants. In general, as will be noted from the examples cited, the appraiser's overhead charge takes the form of such a percentage addition to the specific or detailed valuations as is believed necessary to represent the complete value of the property. Considerable confusion evidently exists as to the items comprising this percentage, and the size will be gaged by the detail with which the appraisal has been made. The accountant usually defines overhead charges as containing those items of cost of property which cannot be definitely localized to specific construction account and represent rather undistributed charges.

Where the specific valuation of the appraiser consists merely of the pricing of an inventory, overhead charges must contain a larger class of the items of "road and equipment" than those usually recognized by accountants, since a very considerable amount of capital expenditures are specifically charged in accordance with the classification of accounts which the appraiser is certain to overlook.

The official classification of "expenditures for road and equipment of electric railways" is responsible for this restricted definition. Specific construction not only contains labor and material comprising the unit cost of appraiser, but as recently defined by the Interstate Commerce Commission:

"Cost of labor includes not only wages, salaries and fees paid employers, but also the personal expenses of each employer when borne by the company. Cost of material and supplies consumed in construction is the cost at the places where they enter into construction, including cost of transportation and inspection when specifically assignable. If such materials and supplies are passed through storehouses, their cost entered on the account may include a suitable proportion of store expense."

Moreover, such items as law expenses, injuries and damages, taxes, organization expenses, salaries and expenses of executive and general officers of a road under construction and of clerks in general offices engaged in construction accounts or work, rents and repair of general offices, furniture and office expense and other items of a special or incidental nature are only chargeable to the general or overhead charge accounts when they cannot be directly charged to the account for which incurred.

To obtain the sum total of these overhead charges directly classified under the various road and equipment accounts would necessitate a detailed re-analysis of the detailed charges.

C. Interest during construction. The appraiser is inter-

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ested in the total money tied up before operation begins. The classification of accounts recognizes only money cost or interest on loans or notes borrowed for construction purposes, and not interest lost through the use of working capital. It should be pointed out, therefore, that in no instance will the account interest during construction, as appearing in the company's statements, represent the overhead charge sought by the appraiser.

D. Contract work. Construction undertaken by contract comprises items of overhead charges, such as superintendence and engineering, insurance, legal expenses, etc., which are not readily segregated from the sum total of the price paid. In regular practice, therefore, such charges become a part of specific construction.

E. Omissions in inventory. The item of contingencies, comprising omissions made by the appraiser, while a substantial part of the overhead charges as recognized in valuations, is not, of course, a part of the overhead charges appearing upon the books of account.

CLASSIFICATION OF OVERHEAD CHARGES

Your committee believes that because of the obvious danger of omission of numerous incidental items comprising the cost and value of property by appraisers a comprehensive classification is desirable by the elements comprising overhead charges.

Such a classification should comprise the items shown in the accompanying table.

I. Promotion.

A. Initial engineering expense.—Includes expenses incident to preliminary surveys and studies of location and tentative completion of maps, profiles, plans, specifications, estimates, etc.

B. Initial legal expense.—Includes expenses incident to franchises, consents, permits, easements, releases, options, etc.

C. Initial financial expense.—Includes expense incident to prospectuses, subscriptive underwriters' plans, etc.

II. Organization.

A. Incorporation expense.—Includes fees and expenses incident to incorporation, certificate of public necessity and convenience, etc.

B. Underwriting expense.—Includes cost of issues of securities, payments to trustees, discount and expenses incurred in marketing securities, etc.

III. Construction.

A. Engineering.—Includes supervision of work and completion of specifications, etc.

B. Administration.—Includes accounting and general office expense, inspectors, watchmen, timekeepers, paymasters, etc.

C. Stores expense.—Includes expenses incident to receipt, inspection, care and disbursement of material and supplies, adjustment of average and shortage, etc.

D. Utility expenses.—Includes stable, garage and transportation expense.

E. Labor expense.—Includes expenses incident to the employment, transportation, housing and maintenance of employees. Includes lay-off for sickness and weather on pay.

F. Contractors' expense.—Includes profit to contractors and sub-contractors for supervision and completion of specific construction work.

G. Equipment and tools.—Includes expenses of machinery, appliances and tools used in construction and shop expense incident thereto.

H. Preliminary construction.—Includes expense of experimental work and protective construction.

I. Injuries and damages during construction.—Includes costs of employers' liability and public liability.

J. Legal expenses during construction.—Includes legal expenses incident to contingencies of construction.

K. Taxes during construction.—Includes taxes on work in process of construction.

L. Insurance during construction.—Includes cost of fire, flood and emergency protection during construction.

M. Interest during construction.—Includes interest lost upon money expended prior to operation.

N. Unforeseen contingencies during construction.—Includes unexpected difficulties arising during course of construction occasioning a departure of estimated and actual costs.

IV. Appraisers' omissions (estimated additional percentage to detailed appraisal of physical properties).

A. Omissions in inventory.—Includes allowance for items omitted in detailed schedules.

B. Omissions in unit price.—Includes allowance for margin of safety to cover unusual variations in unit prices.

C. Piecemeal construction.—Includes allowance for increased cost of piecemeal over continuous construction.

D. Continuity factor.—Includes allowance upon specific items such as land and right-of-way for increased value due to compact development.

V. Intangible values.

A. Going concern value.—Includes the cost or value of adapting the physical plant to its business and the cost or value of providing an established business.

B. Working capital.—Includes working assets necessary to operating and construction.

C. Franchise value.—Includes cost or value of unexpired franchises, licenses, permits, etc.

D. Sundry.—Includes cost or value of rights, leases, options, contracts, agreements, etc.

Your committee suggests that, in view of the great importance of the question of fair valuation of traction property, memorandum records be prepared by member companies covering overhead charges classified as above upon new construction work, and that where data are available past records be analyzed for similar information. Because of present provisions of the official classification of accounts, such detailed records cannot practically be made a permanent part of the accounting procedure.

We recommend that the compilation of such records be made a matter of further investigation by the association.

REPORT OF THE COMMITTEE TO DEVELOP UNIFORM DEFINITIONS*

M. C. BRUSH, CHAIRMAN; W. C. CALLAGHAN, A. BENHAM, L. C. BRADLEY, W. M. WEATHERWAX, T. C. CHERRY, FREDERIC NICHOLAS.

This committee was appointed in accordance with the belief of the executive committee that there was a distinct need for uniformity in the terms in use in the transportation departments. Under the instructions received from the executive committee it was understood to be the province of the committee, first, to compile a list of the terms in general use or which the committee believes should be in general use to describe simply and clearly certain of the fundamental practices and names having to do with the transportation department.

After the committee compiled a list of terms, it devoted the time which was given to the subject to the completion of the definitions which it submits with this report. A number of meetings have been held by the committee or by some of its members, but in view of the detailed nature of the work required to define the terms no record of these has been kept. At some of the conferences little progress was made because the discussion between the members indicated an absence of uniformity in the general use of terms which made further study of the subject necessary.

The committee found that it would not be possible, with the time that members could give to the work, to define all of the terms in use in the transportation department. In its consideration of the work it endeavored to avoid the study of terms which have been defined by other committees of the association or which are likely to be before other committees of the association or the allied associations in the future.

It will be understood from the statement of the committee that the members do not by any means consider that the work which properly belongs to such a committee is completed when this report is rendered. The work can be carried much further and in the judgment of the committee that should be done. The work before such a committee, if one is appointed to continue the study during the coming year, should proceed along the same general lines that this committee has followed. The members of the new committee could take up any terms which this committee has not attempted to include in the scope of this report, and could also make any revisions that were found necessary in the initial report on this subject.

There can be no room for serious argument against the advantage of uniformity in definitions of this character. Uniformity will promote a better understanding between trainmen and the officials with whom they are in touch in reference to the matters with which they deal. It will tend to do away with the looseness in use of terms which has existed in the past. Where uniformity prevails it will make simpler the task of the employee or official who is transferred from one company to another. That uniform terms may be recognized and adopted by the principal companies is the earnest desire of the members of the committee.

*Abstract of report read before the American Electric Railway Transportation & Traffic Association, Atlantic City, N. J., Oct. 13-17, 1913.

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TRANSPORTATION DEFINITIONS

Station master.—An official or employee of the transportation department in charge of a carhouse and of the trainmen and other transportation employees reporting there.

Reporting time.—Time fixed for trainmen to report at the carhouse in order to be ready to take their car out on schedule time.

Bulletin board.—Used for posting general or special orders issued by officials of the transportation department for the information of trainmen.

Defect report.—Form used by trainmen for report when cars or equipment need repairs.

Miss.—A failure of a trainman to report on time.

Safety stop.—A stop prescribed by rules or ordinance, as before crossing a railroad, drawbridge, etc.

Passenger stop.—A point designated by street intersection or sign as a regular place where the car stops on signal for passengers to board or alight.

Crossover.—Special track over which cars may pass from one track to a parallel track.

Designation sign.—Sign on car indicating route and terminal.

Route sign.—Sign on car indicating route to be followed by car.

Show-up time.—Time fixed for trainmen to report at carhouse.

Tripper.—A car which makes one or a limited number of trips during the rush period to meet emergency demands.

General and special orders.—Notices relating to matters of operation, discipline, etc., issued by officials of the transportation department for the information of trainmen.

Assembly room.—Room in the carhouse where trainmen assemble before going on duty and again after completion of the day's work to prepare themselves, settle up, make reports, or perform other duties that may be required in the preparation for or the completion of the day's work.

Regular trainman.—A motorman or conductor who has a regular run.

Extra trainman.—A motorman or conductor performing extra work or substituting for a regular trainman.

Trip sheet.—A record of fares and transfers collected and transfers issued on each half trip of a day's run. It is turned in with collections at the end of the day's work.

Directory.—A record posted at a carhouse containing numbers of runs and names of regular trainmen assigned thereto, subject to change only when runs are revised or regular men leave the service.

Extra working list.—A record posted at a carhouse containing numbers of runs and names of regular men off duty and names of extra trainmen assigned thereto, also reporting time of extra tranmen not assigned to runs. This record is subject to change daily.

Seniority list.—A list of names of trainmen, graded according to their length of service and indicating the order in which they may pick runs, also basis for wage scale.

Run.—A set of car trips designated by a number on the timetable and assigned to or selected by a crew as a day's work.

Run number.—A distinguishing number given to each set of car trips constituting a run.

Regular car.—Car used by trainmen with a regular run.

Extra car.—The car used as a tripper during rush hours or when some emergency need exists for service, and usually operated by extra trainmen.

Line.—Used with a distinguishing title, as Northwest line or State Street line, to indicate the route and terminal.

Running time.—The time allowed on the timetable for the operation of a car between given points.

Time point.—Place indicated on a timetable which a car should pass at a stated time.

Terminal.—End of a line or the place at which a half trip of a car is completed.

Terminal time.—Surplus or allowed time for trainmen to answer calls of nature and prepare car for next trip. Meal time is not included.

Fall-back time.—The same as terminal time except that an additional time is allowed for meals.

Relief—A trainman who by pre-arrangement or in an emergency relieves a trainman from duty.

Relief point.—The designated point on the line at which a crew is relieved for lunch or upon completion of the day's work.

Turn-back.—A practice, due to pre-arrangement or emergency, by which a car is not operated to its regular terminal.

Headway.—Period of time between cars, allowed on the timetable or fixed by a designated transportation department employee, on a given line or lines operating over the same route.

Leader.—The preceding car on the same line.

Follower.—The following car on the same line.

Platform time.—Actual time spent by trainmen on car during performance of duty.

Allowed time.—Time on which wages of trainmen are based, composed of platform time, terminal time, fall-back and additonal period for reporting, etc.

Accident report.—Form used for trainmen's report of accident or other unusual occurrence, affecting passengers or other persons.

MEMORANDUM FROM THE COMMITTEE ON VARIABLE RATES OF FARE*

M. R. BOYLAN, CHAIRMAN; C. H. ALLEN, W. B. BROCKWAY AND R. J. CLARK

This committee has had several meetings and, as reported to the 1912 convention, attempted to collect data from European operating companies as those most likely to throw light upon the subject in hand because of the prevalence of zone fares as against the flat-rate American standard. The committee found the companies on the other side most ready to co-operate in providing information, much of which, however, is furnished in foreign languages, necessitating considerable translation work. It has not been possible for the committee to get together and devote to the material in hand the time that would be required to study intelligently the plans effective in Europe and to develop from this conclusions that would be useful to our members or to the committee which had in hand for the American Association this question of rates and fares. In the judgment of your committee this work requires so much time and such close attention that it cannot to advantage be handled by a committee which can give only periodical attention at meetings of short duration.

The American Association, which suggested the formation of this committee to work in conjunction with what is now the committee on the cost of passenger transportation service, is now planning to institute what is tentatively described as the Bureau of Fare Research. It is expected that this plan will be approved by the 1913 convention and that it will come into existence immediately thereafter. The association will appoint to have charge of the work of this bureau some one who will give the study of fares in general his whole time, with such assistance as may be required properly to carry on the work. The committee of the American Association will therefore be relieved of performing work of an investigatory or analytical character, all details being turned into the bureau and the committee exercising jurisdiction and general supervision over the same.

Therefore, it is the thought of your committee that the

*Presented before the American Electric Railway Accountants' Association, at Atlantic City, N. J., Oct. 13-17, 1913.

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work assigned to it can with propriety be transferred to the new bureau, and your committee would therefore recommend that the committee on variable rates of fare be discharged, and the executive committee suggests to the American Association the desirability of having the Bureau of Fare Research take up these duties, our committee to transfer to the bureau the material which it has already collected.

The data which the European companies have been good enough to furnish is very interesting and, when carefully studied, analyzed and compiled, would mose likely prove helpful in cases where other than flat rates prevail. Items of interest noted in the material are the very general existence of lap-overs, the restricted use of the free transfer as compared with its general application in America, and the use of what is called double tickets, sold at something less than two fares, which take the place of transfers and the second part of which can be used at any time during the day of purchase. The use of tickets is common to practically all of the electric railroads on the other side, and the information shows that the utmost care is taken in the printing of these, stringent specifications being provided and great accuracy being demanded in numbering. The tickets are safeguarded carefully from the printer to the railroad office and up to the time of transmittal to the conductor. Equal care is displayed in the dealings with the conductors; that is, in the system of receipts taken when the tickets are passed to the trainman and in the record he is required to keep and the checking of unused and returned tickets.

It seems to be the general custom to provide the conductor with a strong-box in which to deposit the tickets, and generally he turns this box back with his unused tickets and receipts securely locked therein, depositing the same in larger safes provided for the purpose when a receiver's system is not in effect. There seems to be a good bit of difference between the terms used in Europe and those used in America, our day or trip card being designated as a waybill, for instance. Also a punch register seems to be the proper thing there, and this serves as a check, of course, on the sale of tickets. Tickets of various colors are used to designate different zones and these are evidently utilized to good purpose in providing the ticket inspectors with an ample opportunity to check the conductor.

These inspectors seem to be clothed in much authority; as, for instance, one company calls attention to the fact that when a ticket inspector gets on the car and suspects that all is not right, he can require the conductor to turn over his register punch, cash, tickets and everything else and a check is made immediately by the ticket inspector.

The prepayment system has been instituted to some extent, but the use of this system has quite naturally not nearly approached that of this country. It should be borne in mind, also, that many of the operating companies are municipally controlled; and one other thing of interest, which probably proves advantageous, is the fact that in some of the cities the law provides a fine for passengers who do not pay their proper fares. This provision holds not only against the passengers who refuse to pay when asked to do so but is invoked against those whom the conductor may overlook. From a perusal of the European data it appears that they have a variable rate of fare for baggage or parcels accompanying a passenger. The fare or charge depends upon the distance traveled and the weight of the parcel.

Correspondence has passed between the Dunfermline Town Council and other local authorities with reference to the construction of a tramway between Dunfermline and Rosyth, the new naval base on the River Forth, Scotland.

SHOP TIME CARD FOR ACCURATE DISTRIBUTION OF LABOR CHARGES

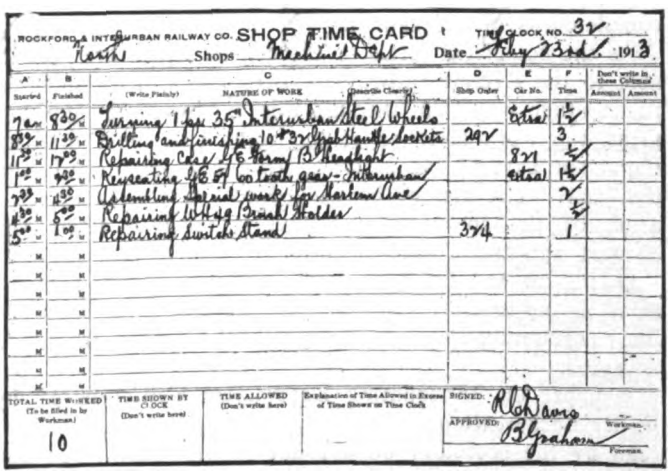
The Rockford (Ill.) & Interurban Railway Company is employing a rather unusual form of shop time card which differs from other methods of auditing labor charges in permitting an accurate distribution of costs. The accompanying cut is a reproduction of one of these time cards except that the original pencil notations have been inked in to make a clear reproduction possible.

Instructions for making out these cards correctly are printed on the back of the card. Among these instructions are the following:

"Write legibly and keep time cards as clean as possible; do not fold time cards; do not wait until the end of the day to make out card, unless you are working on the one job all day; enter each job as soon as completed, showing the time commenced in column 'A,' time finished in column 'B'; describe the nature of work in column 'C.' When describing the work state clearly but briefly what was done. For instance:

Correct	Incorrect
Boring three cast-steel interurban wheels	Not "boring wheels".
Winding two West.-49 fields	Not "winding fields"
Putting two new M-1820 brakeshoes on city car	Not "brakes"
Varnishing window sash on interurban car	Not "varnishing"

"Always show the work on each car separately, giving the car number in column 'E.' When working on a shop order or departmental order show the order number in


ROCKFORD & INTERURBAN RAILWAY CO. SHOP TIME CARD

Keith Shops Machine Dept. Date May 23rd 1913

A Started	B Finished	C (Write Plainly) NATURE OF WORK (Describe Clearly)	D Shop Order	E Car No.	F Time	Don't write in these Columns Amount	Amount
7 a.m.	8 3/4	Turning 1 pr 35" Interurban Steel Wheels		Extra	1 1/2		
8 3/4	11 3/4	Drilling and finishing 10 3/4" Steel Handle Sockets	297		3		
11 3/4	12 3/4	Repairing Cabs / 6 Terry B Headlight		871	1/2		
1 p.m.	2 3/4	Recreating 4 B.F. 60 tooth gears - Interurban		extra	1 1/2		
2 3/4	4 3/4	Assembling Material work for Harlem Car			2		
4 3/4	5 p.m.	Repairing Wiring Brake Holder			1/2		
5 p.m.	1 p.m.	Repairing Switch Stand	374		1		

TOTAL TIME WORKED (To be filled in by Workman) 10 | TIME SHOWN BY CLOCK (Don't write here) | TIME ALLOWED (Don't write here) | Explanation of Time Allowed in Excess of Time Shown on Time Clock | SIGNED: R. L. Davis APPROVED: B. Graham Workman. Foreman.

New Form of Workman's Card

column 'D.' Do not write in the last two columns. When in doubt ask the shop clerk.

"When working on motors, armatures, compressors, controllers, heaters, or parts of same, always state the type. On axles, journal bearings, brakeshoes, painting car signs, wheels, headlights, trucks and heaters, state whether city or interurban, and if any particular car state the car number. Always specify the name of the road on the time card."

Usually the workman makes out his time card at the end of the day when he is in a hurry to leave, and he is not at all particular in giving a detailed description of each job or the time consumed on it. With this card a more reliable distribution is obtained because the workman is required to record the particulars for each job as soon as completed and while the details are still fresh in his mind or easily confirmed. The time cards are checked daily with the time clock record, and at payroll period the time clock cards are turned in to the auditor with the payroll as a voucher for each man shown.

Charles R. Ingle, assistant purchasing agent of the Rockford company, states that he placed this time card in effect some three years ago while with one of the largest interurban systems in Indiana

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Proceedings of Accountants' Association on Friday

The Meeting of the American Electric Railway Accountants' Association at the Atlantic City Convention Terminated on Oct. 17 with Discussions on a Number of Different Papers and the Election of Officers for the Ensuing Year—An Account of the Proceedings Is Published.

The concluding session of the Accountants' Association was called to order at 9:45 o'clock yesterday morning by M. W. Glover, the first vice-president.

M. R. Boylan, the secretary, read the report of the committee on co-operating with the United States Bureau of the Census, of which A. L. Linn, Jr., New York, was chairman. The report said that in accordance with the instructions of the executive committee, the committee appointed to co-operate with the Bureau of the Census in the preliminary work regarding the United States census of 1912 had several meetings. It communicated with W. M. Steuart, chief statistician for manufactures of the Census Bureau, and its members also discussed the work. The committee held several meetings with Mr. Steuart and discussed the form of the questions which were embodied in the blank reports sent to all of the electric railway companies in the country. The committee tried to render what service it could to the end that the forms of report might yield the most satisfactory results in accuracy and completeness of the census.

As the completed totals of the census report are invaluable to the electric railway industry and can be obtained in no other way than through this bureau of the government, the work assigned to the committee constituted an important part of the activities of the association during the year. The committee wished to express its appreciation of the co-operation which it received from Mr. Steuart and the Census Bureau.

Owing to the large amount of business to be transacted at the meeting the report of the committee on interline accounting was read by title. The report was accepted.

A paper on "Accounting Department Conferences," by F. B. Lasher, Republic Railway & Light Company, was read by the secretary on account of the inability of Mr. Lasher to be present.

George G. Whitney, Washington Railway & Electric Company, believed thoroughly in the value of conferences. They produced harmony and straightened out matters that could not be arranged satisfactorily in any other way. In the course of his discussion Mr. Whitney recommended the appointment of a committee to study the use of mechanical devices to promote efficiency in the accounting department.

A vote of thanks to Mr. Lasher was passed.

P. S. Young, Public Service Corporation of New Jersey, chairman of the committee on overhead charges, read the report of that committee. An abstract is published elsewhere in this issue.

Chairman Glover said it was important to remember that the accounting department was the only one that could get the necessary information on overhead charges and present it in the best way.

W. H. Forse, Jr., Union Traction Company of Indiana, said that probably some items from the report on overhead charges could be embodied in the standard classification of accounts, which was under revision.

C. N. Duffy, Milwaukee Electric Railway & Light Company, thought that the amount by which a company failed to earn a sufficient return on the investment was part of the going cost and should not be complicated with overhead charges.

Mr. Young said that the schedule of overhead charges was drawn up primarily to give an outline under which these charges could be separated and the total ascertained for any piece of construction. For the purpose of obtaining data regarding overhead charges accountants could make analyses under the headings recommended by the committee.

W. B. Brockway, Ford, Bacon & Davis, New York, said he wanted to emphasize the recommendation of the committee that accountants should prepare analyses of overhead charges in connection with construction accounts. It had been his duty to take part in appraisals and he had found it exceedingly difficult to get information on overhead charges. That was due to the destruction of old records in some cases and to the incompleteness of records when they were found in other cases. He doubted if many companies could go into old records and produce anything approximating the classification of the committee, but believed that such a system should be followed from this time forward. By the use of sub-accounts and otherwise all of the necessary information could be prepared with the present classification.

Mr. Young said that interest during construction, as defined by the committee, was meant to include both interest paid out and interest on money subscribed upon which no return was made to the investor. The overhead charges should appear in the records, but Mr. Young would not say they should be written up and shown in the general books; they should be carried in memorandum accounts of cost of construction.

Mr. Duffy said that interest during construction was an intangible capital expenditure. "Interest loss," as used in the report of the committee, he understood to mean that which the investor failed to get before operation of the property was started. Interest was composed of the charges on both bonds and stock.

On motion of Mr. Duffy the report was accepted and the committee continued.

Mr. Boylan read the report of the committee on best methods of collecting and accounting for variable rates of fare, of which he was chairman. An abstract of this report is published elsewhere.

On motion of Mr. Forse the committee was thanked for its work and was continued until the Bureau of Fare Research should be established by the American Association.

R. J. Clark, Metropolitan Street Railway of Kansas City, described some of his experiences on a recent trip to Europe.

A paper by Edwin Gruhl, Milwaukee Electric Railway & Light Company, on "The Cost of Carrying a Passenger, and Proposed Work of the Bureau of Fare Research," was read by Mr. Duffy. An abstract of the paper is published elsewhere.

A vote of thanks to Mr. Gruhl for the paper was passed.

W. H. Forse, Jr., Union Traction Company of Indiana, read a paper on "Sinking Funds." An abstract of this paper was published in yesterday's issue.

In opening the discussion Henry J. Davies, Cleveland Railway, said that the bonds of that company had no sinking fund provision. It was required by the mortgage to maintain the property in good condition. It was allowed

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to issue bonds only to 50 per cent of the cost of the property securing them. This was due to the construction of the law and the franchise. The view of some of those who framed the ordinance was that it was desirable that the stock be held in Cleveland and the issue of stock rather than bonds to meet the cost of financing was favored.

C. L. S. Tingley, American Railways Company, said that a bond carrying a sinking fund netted a company more money than one without that feature.

E. D. Gault, Mahoning & Shenango Railway & Light Company, said that some mortgages provided that sinking fund payments should be made out of net earnings.

Mr. Brockway said it seemed clear to him that the sinking fund should not be shown in the income account. His examination of mortgages had shown that those which provided for payments out of net earnings or income were rare.

Mr. Duffy said that the sinking fund charge had nothing to do with the income account. If he built a house costing $5,000 and borrowed that sum, agreeing to pay it back at the rate of $500 a year for ten years, the lender was not interested in the question of where he got the money for the payments. When he made the first payment of $500 it would not be correct to continue to carry the $5,000 liability on his books and then to take on another liability of $500.

Mr. Duffy read a letter on the subject from J. D. Mortimer, president Milwaukee Electric Railway & Light Company. Mr. Mortimer said that sinking funds were only a means of retiring capital obligations evidenced by bonds. Their intended purposes were various but their practical result was the same. Even where a mortgage provided that the sinking fund should be paid from net income, Mr. Mortimer was not of the opinion that it was incumbent upon the corporation or the mortgagor to show by its accounts that such sinking funds have been provided from income.

Sinking funds now had no place in mortgages on public utility properties, Mr. Mortimer thought. They found their way into the provisions of older mortgages on the assumption that the mortgage would soon be closed, permitting the issue of no further bonds, and that the property would depreciate in value. In view of the very rapid growth of all classes of public utility properties it had become evident to conservative bankers that the imposition of a sinking fund was burdensome to the mortgagor and that the maintenance of the physical property should be provided for by some other means. This had led to the development in many recent mortgages of the so-called improvement fund, which was mentioned in the paper read by A. M. Harris before the American Association.

The improvement fund partook of the properties of the sinking fund except that it might be used against the construction of additional property for which no additional bonds might be certified by the trustee of the mortgage. It was calculated in similar manner to the sinking fund and might or might not be a charge against income. It was directly designed to assist in the preservation of property and in this regard was much more specific than the old form of sinking fund.

The personal view of Mr. Mortimer, which was concurred in by many conservative bankers and other people familiar with the finances of public utilities, was to the effect that the preferable way of providing for the maintenance and depreciation of property was to make a specific allotment each year, measured either as percentage of value of physical property or as a percentage of gross earnings, which should be set aside for maintenance and depreciation. The balance remaining in this fund should be used either for making good depreciation or for the construction of new property against which no bonds should be issued. The improvement fund was a compromise between this latter method and the sinking fund method.

Mr. Forse said he felt strongly that the sinking fund was not a charge against income.

Mr. Gault presented the report of the committee on resolutions.

Mr. Boylan read a letter from W. M. Steuart, chief statistician of manufactures, United States Bureau of the Census, as follows:

"The committee appointed at the Chicago convention to confer with the Bureau of the Census in regard to the census of electric railways was of great assistance to us. Its recommendations resulted in simplifying the schedule used to collect the data, and at the same time it recommended the inclusion of some inquiries which I am satisfied have resulted in the collection of statistics that are of interest to all persons engaged in the industry.

"The canvass for this census was started during last April. It covers the operations of all roads for the year 1912. The field work is now approaching completion, and I am pleased to report that returns have been received from practically all railways. I regret very much, however, that such a large percentage of these reports were defective. We found it necessary to return at least 80 per cent of the schedules for some additional information. We have been very active in our correspondence to correct the reports, and I hope to begin the tabulation on Nov. 1. In that event the statistics should be ready for publication during the first part of 1914. This will be considerably in advance of the publication of the statistics for prior censuses, and I feel it is due largely to the recommendations of your committee, and to the greater interest on the part of the railway companies in work of this character.

"I am especially anxious to have the committee appointed at the last convention continued until the census report is printed and distributed. There are many phases of the census reports on railways which I think should be considered by the association, either through its committee or at its conventions. For instance, the reports heretofore published have grouped the statistics for the companies according to their size, the size being determined by the gross annual income from railway service. The statistics have also been grouped according to the kind of system, namely, whether elevated, surface, or subway; according to the character of the service, whether urban or interurban, and according to commercial lighting relations and the period of operation. It is possible that some of these groupings are not necessary, and it may be that the committee would recommend that they be abandoned and some other grouping substituted.

"The office expends a considerable sum for the collection and preparation of this report, and I am very anxious that it contain information which is of greatest interest to the people engaged in the industry. I shall, therefore, be greatly obliged if the association will have the committee extended, and arrangements made to have another meeting with me, for the purpose of discussing the class of statistics that shall be presented in the forthcoming report."

In accordance with the suggestion of Mr. Steuart the committee was continued.

Mr. Tingley presented the report of the committee on nominations, which was adopted, as follows: President, M. W. Glover, Mobile Light & Railroad Company; first vice-president, T. P. Kilfoyle, Cleveland Railway; second vice-president, A. H. Kayser, San Diego Electric Railway; third vice-president, C. S. Mitchell, Pittsburgh Railways; secretary and treasurer, M. R. Boylan, Public Service Railway, Newark, N. J.; executive committee, W. G. Nicholson, Omaha & Council Bluffs Street Railway; Walter Shroyer, Union Traction Company of Indiana; H. D. Vickers, Roanoke Railway & Electric Company; Herbert A. Gidney, Barre & Montpelier Traction Company.

Those of the newly elected officers who were present were called upon and responded briefly.

The association then adjourned.

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THE NEW PRESIDENTS

The elections which were held at the concluding sessions of the four affiliated organizations of the American Electric Railway Association resulted in the selection of four new presidents whose careers have been characterized by their activity in association affairs. However, for the benefit of those who are not familiar with the public

M. W. Glover

J. H. Hanna

lives of the new officers a series of biographical sketches of them are given herewith.

M. W. Glover, the new president of the Accountants' Association, has been during the past year the first vice-president of that body. He began his railroad career on Dec. 1, 1899, in the local freight office of the Southern Carolina Railway, which at that time was in the hands of a receiver. He was subsequently transferred to the auditor's office, where he handled freight, passenger and other accounts. The South Carolina & Georgia Railroad succeeded to the property of the Southern Carolina Railroad, and the receivership was terminated some time prior to July, 1895, when Mr. Glover was appointed traveling auditor of the new company.

In May, 1899, the South Carolina & Georgia Railroad was absorbed by the Southern Railway and Mr. Glover was retained as traveling auditor, continuing in that capacity until June, 1901, when he was advanced to the position of chief traveling auditor of the Southern Railway. In June, 1903, he resigned this position to become chief clerk to the auditor of the Atlanta & West Point Railroad and the Western Railway of Alabama, and he continued in that position until July 1, 1906, when he became auditor of the lines which compose the Ohio Electric Railway system.

Mr. Glover served as auditor of the Ohio Electric Railway until Oct. 31, 1909, and then was appointed assistant to the traffic manager of the Illinois Traction System. He remained in this capacity until Jan. 1, 1910, and then assumed his present position as secretary and auditor of the Mobile Light & Railroad Company. Mr. Glover has been president of the Central Electric Accounting Conference ever since the formation of that organization in 1907.

W. F. Weh, who has been president of the Claims Association, has a history of remarkable brevity notwithstanding the fact that, for more than twenty years he has been engaged in railroad work. He began his railroad career on the Pennsylvania system in the early nineties, when he was still in his "teens," remaining with that company until about 1893, when he entered the service of the Cleveland Electric Railway Company, which was afterward consolidated with other lines to form the present system, the Cleveland Railway Company. Mr. Weh during his entire service with this property has been in the claim department, and for the last fourteen years he has been at its head.

D. A. Hegarty, the new president of the Transportation & Traffic Association, was born in Philadelphia and was educated at the University of Pennsylvania. His first railroad experience was in the engineering department of the Pennsylvania Railroad, by which he was engaged as assistant engineer on construction and maintenance work for six years. After leaving the Pennsylvania Railroad, Mr. Hegarty entered the electric railway field with the late A. Langstaff Johnson as engineer in charge of the Richmond (Va.) Electric Railway, the first commercially successful electric road in America. Continuing his connection with Mr. Johnson, Mr. Hegarty assisted in the construction of numerous railway, light and power companies in different parts of the country, among them the Hestonville, Mantua & Fairmount Passenger Railway, Philadelphia. Subsequently he became general manager and chief engineer of this company, in which capacity he continued until the property was taken over by the Union Traction Company. Mr. Hegarty next became chief engineer of the Norfolk (Va.) Railway, but shortly afterward resigned to accept the position of superintendent of the Railways Company General, a holding and operating company. Mr. Hegarty remained in this position until 1908, when he joined the operating forces of Ford, Bacon & Davis as general manager and treasurer of the Little Rock Railway & Electric Company. While there Mr. Hegarty was elected president of the Arkansas Association of Public Utility Operators. Three years later he resigned from the Little Rock Railway & Electric Company to become general manager of the railway and lighting departments of the New Orleans Railway & Light Company.

J. H. Hanna, who was elected president of the Engineering Association yesterday, had been called from Atlantic City to Washington by important business early in the week, but he was notified of his election by telephone, and a telegram of acceptance was received from him and read at yesterday's meeting.

Mr. Hanna was born in Henderson, Ky., in 1871, where he prepared, in the public schools, for Princeton University. At Princeton he entered the engineering courses, graduating in 1892 with the degree of civil engineer, and immediately took up railroad construction. For two years after leaving college he remained in steam railroad engineering work and then entered the service of the Washington & Georgetown Railroad Company, predecessor of

William F. Weh

D. A. Hegarty

the present Capital Traction Company of Washington, D. C. In the next year he was appointed assistant superintendent, and four years later he became superintendent and assistant engineer of the same company, being appointed to his present position of chief engineer in charge of all construction and maintenance about five years ago.

Mr. Hanna is generally prominent in technical association affairs, being a member of the American Society of Civil Engineers and of the American Institute of Electrical Engineers as well as the American Electric Railway Asso-

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ciation. He also is a past-president of the Washington Society of Engineers. In 1896 he married Miss Jane Soper, of Henderson, Ky., and he is a member of a number of clubs in Washington, including the Cosmos Club and the Columbia Country Club.

On Oct. 16, the new executive committee of the Manufacturers' Association held a meeting, as described in the ELECTRIC RAILWAY JOURNAL for yesterday, and elected Cornell S. Hawley as president.

Mr. Hawley has long been a prominent figure in electric railway manufacturing circles. He originally planned to practise law, and after receiving the degree of LL.B. from the Georgetown University law school and LL.M from Columbian University (now George Washington University), was admitted to the bar of the District of Columbia and also of the State of New York. The opportunities in a commercial career, however, proved more attractive, and some twelve years ago he took the Eastern sales agency of the Consolidated Car Heating Company, with headquarters in New York. After a service there of four years he was appointed manager of sales of the same company, then its vice-president and general manager, and, in 1911, president and treasurer. His wide knowledge of the electric railway business, exemplified by these various advancements, attracted the attention of Eastern capitalists, and in 1912 he was offered and accepted the office of president of the Laconia Car Company, with headquarters in Boston. He is a member of the Engineers' Club of New York and of the Engineers' Club of Boston. Mr. Hawley has always taken an active interest in the work of the American Electric Railway Manufacturers' Association, and it has been the beneficiary of his ability and experience. For two years he was a member of the finance committee and he also served as chairman of that body. For the last five years he has been a member of the executive committee, and durng this time he has served as vice-president in charge of finance and vice-president in charge of entertainment.

Cornell S. Hawley

BIENNIAL MEETING OF THE GERMAN STREET & INTERURBAN RAILWAY ASSOCIATION

The fourteenth meeting of the Deutscher Strassenbahn- und Kleinbahn-Verwaltungen (German Street & Interurban Railway Managements) was held at Cologne on Sept. 3, 4 and 5 under the direction of Dr. Wussow, general director Great Berlin Street Railway. After the delegates had been welcomed by officers of the city, the chairman announced that arrangements had been made for closer co-operation with other German societies.

RAIL CORRUGATION

Messrs. Busse, Berlin, and Petersen, Dortmund, representing committee B, reported on their experiments in rail corrugation. New rails laid under different conditions appeared to show that corrugation was due to non-homogeneity of structure because of chemical and physical differences as well as to temperature variations during rolling. A chemist named Klockemeyer had recently observed that the running surface of rails was decarbonized during the rolling process. In general, their experiments had confirmed the earlier observations that corrugations are formed even in new rails and that high rigid rails are more likely to become corrugated than low elastic rails. The Göteborg system had decreased corrugation by slitting the web to increase the elasticity of the rail. At the request of Messrs. Busse and Petersen, the association voted $6,250 for the continuation of the work.

MISCELLANEOUS MATTERS

Committee C reported favorably on the use of metallic lamps for cars. The law concerning the responsibility for electrolysis, etc., was discussed by Dr. Kappe, of Berlin, the legal representative of the association. He showed that electric railway stations actually cause less trouble than other plants and for that reason alone ought not to be subjected to special penalties.

Mr. Schörling, Hanover, presented a paper on motor cars in which he recommended greater wheelbases than are now customary, trucks in place of the Continental style of axle, metal sills, double springs, mechanical ventilators for vestibuled cars and the installation of automatic couplers. The discussion on cars disclosed a sentiment for the standardization of car signs.

A paper on energy distribution by Mr. Buschbaum placed emphasis upon the advantages of the three-wire system. The author also pointed out the desirability of installing feeders large enough for future needs, especially on routes where feeders must be installed under asphalt.

A report on trackless trolleys was made by Mr. Nier, Dresden, and Dr. Eissig, Chemnitz. Mr. Nier believed that the best field for trackless trolleys would be for suburban and cross-country service if cheap current was available and also for excursion business where higher fares were permissible. Dr. Eissig believed that the trackless trolley would have a still wider field. Mr. Otto, Berlin, said that the great technical improvements in buses had made them an important competitor of trackless trolleys and would probably limit the field of the latter more than ever.

Director Bussebaum, Carlsruhe, reported on the use of stone paving in asphalt streets. The installation of rails on concrete foundation always led to bad results not only because of noise but also through the cracking of the asphalt and consequent bad drainage. It was gradually being realized, especially by municipalities which operated street railways, that the only way to overcome drainage trouble was to place a zone of stone paving between and alongside the rails.

Director Arnold, Herten, presented a report on antifriction bearings for railway motors and journal boxes. Roller bearings, he said, were considered better than ball bearings, but their high price prevented their general introduction.

Mr. Paap, Flensburg, presented a report on automatic couplers. In this he gave special attention to the development of the Janney coupler as used in the United States and the Scharfenberg coupler as used in Germany.

Director Stahl, Düsseldorf, discussed street railway tickets and accounting. In addition to automatic machines which issue a few types of completely printed tickets, other apparatus had been invented whereby the conductor could print any combination required by the passenger. A machine of the latter character, as invented by Traffic Inspector Krüger of the Cologne Tramways, also embodied mechanism for adding the total sales.

ENTERTAINMENT

The afternoons of the convention were devoted to the inspection of the equipment of the Cologne Tramways and of several industrial establishments in and around Cologne. During the evenings the delegates were the guests of the municipality. The next meeting of the association will be held in 1915 at Düsseldorf.

It is reported that work on the Granada-Maracena tramway, Spain, will begin at once.

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News of Electric Railways

Arbitration Proceedings Almost Completed in Detroit

An agreement was reached in the arbitration proceedings between the Detroit United Railway and its men on Oct. 8 to the effect that the remainder of the evidence should be submitted on this and the following day and that arguments should be presented to the board on Oct. 14, this closing the hearings before the board.

The afternoon and evening of Oct. 8 were spent in hearing testimony from the division superintendents of the company. They declared that the men had made no complaints to them of the hours required of them or of the wages they received. W. D. Mahon at one time demanded that the men be brought in, declaring that there is nothing for the board to consider if this is true. Chairman Naylon, however, declared that there must have been complaints or this arbitration hearing would not have been called.

Leo Raynolds, one of the division superintendents, stated that he had talked to a number of the 400 men under his supervision and that not one of them had made a complaint. Mr. Mahon requested the names of the men with whom Mr. Raynolds conversed, but General Manager Brooks refused to furnish them.

General Superintendent Harry Bullen, called to the stand, said that there is an unwritten law under which it is understood that the cardinal principle underlying the success of the company is harmony from the switchboy to the president. The company insists on co-operation among its employees in order that proper service may be furnished the 1,000,000 people depending upon its lines for transportation. Mr. Bullen said that he knew personally two-thirds of the men employed as motormen and conductors and that they come to him for personal and financial advice, but not with complaints.

The guide sheet to a schedule, furnished by the company and revised by Thomas Grant, formerly superintendent of one of the lines before the Detroit United Railway was formed, was criticised by Edward Ives, schedule maker for the company. He said it would be impossible to operate under the schedule as arranged by Mr. Grant. Some of the men would not have the number of hours demanded by the company's agreement with the union, the general average of the runs now being nine hours and twenty-eight minutes, while the agreement calls for at least eight hours. Some of the men would get but seven hours and twenty-one minutes under Mr. Grant's plan.

The afternoon of Oct. 9 opened with an argument between Mr. Brooks and Mr. Mahon as to the manner of presenting evidence. The trouble arose over evidence given by President Hutchins in another case. It was read by Mr. Mahon and Mr. Brooks charged that he did not read it all, but only such parts as would make his contentions in the present instance more plausible.

John Grant, former employee of one of the Detroit lines, was called in to be questioned by Mr. Brooks. He had previously testified that he had made schedules in Indianapolis, St. Louis and other places. Mr. Brooks wished to introduce a telegram from Indianapolis stating that Grant had never made schedules in that city. Mr. Mahon objected on the ground that signatures to telegrams could not be easily identified. Judge Phelan, one of the arbitrators, asked how the board could determine from what city the telegram came. The chairman finally ruled that the telegram should not be admitted. Mr. Brooks cross-examined Mr. Grant on his testimony to the effect that the property could be replaced for between $12,000,000 and $13,000,000. He said he arrived at that conclusion through his knowledge of the railroad business and from appraisals made in the past. As showing the peculiar position assumed by Judge Phelan, he made a motion when Mr. Grant left the stand that a vote of thanks should be given to him. Chairman Naylon finally relieved the embarrassment caused by this motion by suggesting that the board confine itself to the serious matters before it.

On Oct. 9 Mayor Marx signed the Council proceeding authorizing the construction of the Junction Avenue line. A body of citizens had filed a protest with him against the construction of a road through certain stretches of street, but he found that he could not give consideration to all these matters, as they would cause much delay in building the line.

Attorney George W. Moore and Allan Frazer and Corporation Counsel Lawson have suggested a number of changes in the municipal ownership sections of the proposed new city charter. The most important, perhaps, is the separation of the street railway portion from that relating to other public utilities. It is believed that this will simplify the sections and possibly result in avoiding complications later on.

Subway Developments in New York

The Public Service Commission for the First District of New York has advertised for bids for the construction of Section No. 3 of the Seventh Avenue subway in Manhattan. Bids will be opened on Nov. 10 at 12.15 o'clock. The Seventh Avenue subway is to be operated by the Interborough Rapid Transit Company, and Section No. 3 covers that portion of the route in Varick Street and Seventh Avenue Extension between Beach Street and Commerce Street. The cost of this work will be defrayed by money contributed by the Interborough Rapid Transit Company.

The commission has executed the contract awarded a short time ago to the Snare & Triest Company for the construction of Section No. 1 of the elevated railroad in Queens. This contract embraces the junction station at the Queensboro Bridge Plaza, where the Astoria and Corona lines separate. The contract price for this section is $880,000.

The commission has ordered a public hearing for Oct. 24 on the contract for the Livonia Avenue extension of the Eastern Parkway subway, and for Oct. 31 on the form of contract for the first section of the Eastern Parkway line. The Eastern Parkway route is to be operated by the Interborough Rapid Transit Company.

According to the reports of the engineers of the commission, there is now under contract $83,000,000 worth of work on the new subway lines of the dual system of rapid transit and an average daily force of 7000 men employed thereon. Of the $83,000,000 worth of work, about $38,000,000 is on lines to be operated by the Interborough Rapid Transit Company and $45,000,000 on the lines to be operated by the New York Municipal Railway Corporation. Of the latter, however, the Fourth Avenue subway in Brooklyn and the Centre Street Loop subway in Manhattan, costing together about $28,000,000, are practically completed. It is estimated that the construction work on the city-owned lines will cost about $200,000,000. There is, therefore, more than one-third (to be exact about two-fifths) of the value of this work already under contract. Of the remainder, to cost $117,000,000, it is expected that more than one-half will be under contract before the end of the year, so that by that time, nine months after the signing of the dual system operating contracts, actual construction work will be in progress on three-quarters of the city-owned lines.

Toronto Purchase Reports Presented

The reports of the experts appointed to appraise the property of the Toronto Railway and the Toronto Electric Light Company, all letters between Sir William MacKenzie and Mayor Hocken, and all other papers connected with the proposed purchase of the property of the Toronto Railway and the Toronto Electric Light Company were brought before the meeting of the City Council held on Oct. 13. The negotiations may be summed up briefly as follows:

Mayor Hocken, as the result of several conferences with Sir William MacKenzie, wrote on July 21 to Sir William MacKenzie offering, subject to the approval of the ratepayers of Toronto, to purchase the property of the Toronto Railway, the Toronto Electric Light Company and the parts of the Toronto & York Radial Railway within the city limits, the purchase price to be $30,000,000, of which $8,000,000 is for the Toronto Electric Light Company's property and

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franchise. Eight million and ninety thousand dollars is to be paid in cash, and the venders take the balance of $21,910,000 in city debentures, maturing in thirty years and bearing 4½ per cent interest. A portion of the bonds in question is to be deposited with trustees for the redemption of various bond issues of the vender companies totaling $6,300,000.

Bion J. Arnold and J. W. Moyes valued the assets of the Toronto Railway and R. A. Ross, Montreal, the Toronto electric light plant. The reports of these experts show that the Toronto Railway has land, buildings, cars, tracks and other physical assets valued at $9,894,482, and "intangible" assets worth $10,713,553, consisting chiefly of a franchise to operate exclusively surface railways on the streets of Toronto. This franchise has eight years to run.

The experts indorse the proposal to buy the Toronto Railway. Mr. Arnold, in reply to a direct question by the Mayor, says:

"Taking a most unfavorable view of it from the city's standpoint, the city is not paying an excessive amount over and above the real value of the property in order to possess itself of a clear right-of-way, both legal and physical."

The assets of the Toronto Electric Light Company are reported to be worth $6,132,754, and those of the radial railways, including $193,649 for an exclusive franchise on a part of Yonge Street, are placed at $411,447. The total of physical assets for all property to be acquired is $16,245,034. This leaves a balance of about $13,750,000 as the price to be paid for extinguishing the rights of the various companies to do business on the streets of Toronto.

The Council will receive soon a report by John MacKay on the financial outlook under public operation, having especial reference to the operating costs of the street railway under civic management. Mr. Couzens, the manager of the city's hydroelectric service, will report on the value of the Toronto Electric Light Company's plant when amalgamated with the hydroelectric system. If the Council decides to submit the municipal ownership proposal to the people, a formal agreement will then be drafted on which the vote will be taken.

Long Island Railroad Wreck Hearing

A hearing was held before the Public Service Commission of the First District of New York on Sept. 26 in regard to the wreck that cost the lives of three trainmen and a passenger and injured fifty persons on the Whitestone branch of the Long Island Railroad on Sept. 22. The testimony of H. W. Thornton, general superintendent of the company, before the commission, corresponded in its details to the statements made by James McGee, chief train dispatcher of the Long Island Railroad, in an investigation held on Oct. 2 in Jamaica before the coroner. Near the close of the hearing Superintendent Austin was recalled. He stated that since the accident the block signal system had been extended over the Whitestone Landing branch and various improvements had been made for the single track.

A second hearing was held before the commission on Oct. 2, at which time Mr. Freeman, of the engineering department of the commission, described an examination he had made on Sept. 29 of the new tower system installed by the Long Island Railroad after the accident. According to him there is a twenty-four-lever tower with twenty levers installed, three telephones and three sets of telegraphic instruments controlling the Whitestone section. A detailed examination in regard to the train movement past the J. C. tower showed that in an average non-rush hour fourteen trains pass through that block, necessitating, however, not more than five telephonic or telegraphic communications between the operators as a result of the new system.

C. W. Wilder, electrical engineer for the commission, testified that this block signal system introduced by the railroad did not have the merits of an automatic electrical block signal system. According to him the practicability of the new system depends entirely upon the actual transmission of information from one operator to the other and also on the correctness of that information. This, said Mr. Wilder, leaves the human element to be reckoned with, and if there is any slip on the part of either man, a collision is liable to result.

C. L. Addison, assistant to the president of the Long Island Railroad, stated that he was opposed to the installation of an automatic block signal single-track system on the Whitestone branch. Such a system is in use on the Oyster Bay branch of the Long Island Railroad, but he would not advise its use on the Whitestone branch. One particular objection stated by him was that an automatic single-track system might in case of trouble cause serious and prolonged delay to traffic and that to be of any value it would have to be helped out by flagging the train through. In answer to questions from Commissioner Maltbie, Mr. Addison stated that the Long Island Railroad was desirous of adopting any device that would insure the greatest degree of safety to the public, but years of study had convinced him that a manually operated system was more feasible and that the reason various lines in the country depended upon automatic systems for single-track branches was that they could not stand the expense of manning the other kind.

The Dublin Labor Situation

The general labor trouble in Dublin, which had its beginning in the strike of the employees of the tramway system, has again prompted the London *Times* to deal with the labor situation editorially. According to the *Times* there was no sign of any improvement in the condition of affairs in Dublin on Sept. 24. It said that the fact that both the National Transport Workers' Federation and the parliamentary committee of the Trade Union Congress had decided to send assistance to the strikers in Dublin meant that the strike and the consequent misery may be indefinitely prolonged. Referring particularly to the disorder which has marked the strike, the paper said in part:

"Under the guidance of Mr. Larkin, violence has been freely resorted to by the Irish strikers during the present crisis. The riots of the last two days of August, with their 700 casualties, and the renewal of the disturbances on Sept. 21 are a sign not only of the inability of the labor leaders to control the men whom they are supposed to represent but also of the present aggravation of the inherent feverishness of the Irish nature, which might quite easily result in a war of classes. It is this danger that constitutes the seriousness of these processions of strikers, 6000 strong, and these battles with stones, jam pots and porter bottles on the one side and batons and revolvers on the other. The empty streets, the idle quays, the rise in the price of food and coal, the congestion of the pawnshops, the starvation due to the fact that 13,000 men are now unemployed, are suggestive of the horrors of actual warfare. The Irishman is lacking in the reserve fund of stolidity and common sense which, in the case of the rest of the United Kingdom, is the chief safeguard against similar outbreaks, and for that reason their occurrence in his country is of particular danger, and their prevention of particular importance, to the stability and security of the whole British nation."

Traction Company Rewards Non-Strikers.—In making up a new time schedule which has just gone into effect on the line of the Indianapolis, Columbus & Southern Traction Company between Indianapolis and Louisville a reassignment of runs has been made. The men who remained loyal to the company during the recent strike received their choice of the runs, the oldest men in service receiving first choice.

Steinway Tube Transferred to Transit Company.—The formal transfer by August Belmont and others of the Steinway tunnel in New York City to the Interborough Rapid Transit Company was recorded on Oct. 16. The transfer was made in behalf of the creditors, stockholders and members of the New York & Long Island Railroad "to cancel and discharge $9,734,692 and interest, amounting in all to $10,603,692." Under the dual subway contracts the Steinway tunnel falls to the city at an agreed price of $3,000,000.

New Subway Ordinance Introduced in Pittsburgh.—Chairman Wilkins of the public service and surveys committee of the City Council of Pittsburgh has introduced the new subway ordinance drawn for the Pittsburgh Subway Company. The bill, prepared after conference between Assistant City Solicitors Robinson and Bown, Mayor Magee and A. O. Fording of the subway company and Councilmen,

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is agreed upon in its main details. The bill has been ordered printed and referred to committee.

Massachusetts Commission Votes Down More Detailed Corporate Reports.—The Public Service Commission of Massachusetts on Oct. 8, by a vote of four to one, declared against the adoption of an order compelling railroads, street railways and other public service corporations and associations to submit to the commission a sworn statement showing all expenses incurred for publicity, outside legal assistance and work connected with legislation and general expenses from Oct. 1, 1912, to Oct. 1, 1913. This order was proposed so as to obtain from public service corporations other than the New York, New Haven & Hartford Railroad facts regarding expenditure of money during the last year.

Seattle Council Favors Extension of Muncipal Ownership.—The deal which has been pending between the city of Seattle and the receivers of the Seattle, Renton & Southern Railway, Seattle, Wash., whereby the city of Seattle will take over that portion of the railway within the city limits, has been approved by the City Council and the matter is now before the Mayor. The price fixed is $1,200,000, of which $850.000 is to be paid in 5½ per cent bonds. This action was taken with the understanding that the city may buy that portion of the line outside of the corporate limits for $200,000 if legislation can be secured or a court decision rendered that will assure the city's legal right to operate and own a line outside its boundaries.

Electrification Campaign in London, Ont.—On Oct. 10 a meeting was held in London, Ont., in support of the plan to electrify the London & Port Stanley Railway, an issue which is to be voted on on Oct. 22. The speakers included Adam Beck, the originator of the electrification movement; J. McClary, Mayor Graham and others. Mr. McClary stated that so great was his faith in the plan of Mr. Beck that if it was approved by the people his stove manufacturing works would take into consideration the placing of steamships on the lake to ply in conjunction with the city's electrified line. Mr. Beck went over the whole question, linking in with it the Niagara power scheme. He told the citizens present that electrification will tend to reduce the tax burden of the public. The loan of $700,000 necessary to carry out the plan will be a charge against the railway and will not affect the city's borrowing powers.

New Heating Device for Seattle Cars.—The Puget Sound Traction, Light & Power Company, Seattle, Wash., recently installed heating devices in twenty-five of its cars, according to the promise made to the franchise committee of the City Council ten months ago. The company will put ten new cars in operation within six weeks, each equipped with the new heating device, making a total of thirty-five cars in all which will be operated in that city during the winter with the heating systems. The company has selected twenty-five open-end cars and ten of the inclosed type for the experiment. At the time the question arose in regard to the heating of cars on the long lines, including Alki Avenue, Fauntleroy Avenue, Green Lake, Phinney Avenue and other lines, the Health and Sanitation Department questioned the advisability of the move on the ground that heated cars are not so good as unheated cars from the standpoint of public health.

Value of Interurban Roads to the Business of a City.—While speaking at the Municipal Exhibit in Cincinnati on the evening of Oct. 10, Mayor Shank of Indianapolis took occasion to refer to interurban railways and their value to the business interests of the cities which they enter and those in which they terminate. He said that the trade position of Indianapolis was caused solely by the sixteen interurban lines that enter the city. "We have already passed Louisville and Columbus and now we are after Cincinnati," said Mayor Shank, "and unless you get the interurbans into your business section you will find that the trade will go to some other city." Mayor Shank praised the efforts made by Mayor Hunt to secure a rapid transit entrance for the interurban roads and said they can do nothing but add to the wealth of the city. "From 15,000 to 20,000 people are brought into Indianapolis daily over the electric roads," he said, "and there is no reason why a like number should not come to Cincinnati to trade if they have hourly service, as we have."

Financial and Corporate

Stock and Money Markets

Oct. 16, 1913.

Trading on the New York Stock Exchange to-day was fairly active at the opening and fractional gains were shown all through the active list. The sales totaled 314,608 shares. New Haven advanced on the news of the favorable decision of the Massachusetts Public Service Commission in regard to the issue of $67,000,000 of convertible debentures. Rates in the money market to-day were: Call, 3½ per cent; sixty days, 4¼ @ 5 per cent; ninety days and four months, 5¼ per cent; five and six months, 5 per cent.

In the Philadelphia market prices ruled fractionally stronger without any increase in trading. Union Traction opened at 45¼ bid and Philadelphia Rapid Transit at 20 bid. Prices ended weak, with Union Traction at 45¼.

The Chicago market was broad to-day, but the volume of transactions was small. Public Service bonds were in good demand.

The Boston market opened firm and active, but in the afternoon the market became dull.

The sales of stock on the Baltimore exchange to-day totaled only 166 shares. The sales of bonds totaled $43.000. par value.

Quotations of traction and manufacturing securities as compared with last week follow:

	Oct. 8	Oct. 15
American Brake Shoe & Foundry (common)	90¼	88½
American Brake Shoe & Foundry (preferred)	131	130⅞
American Cities Company (common)	36	36
American Cities Company (preferred)	65	64
American Light & Traction Company (common)	353	337
American Light & Traction Company (preferred)	105	103½
American Railways Company	39	39
Aurora, Elgin & Chicago Railroad (common)	41	41½
Aurora, Elgin & Chicago Railroad (preferred)	82½	83
Boston Elevated Railway	86	83¾
Boston Suburban Electric Companies (common)	*7	7
Boston Suburban Electric Companies (preferred)	*56½	59
Boston & Worcester Electric Companies (common)	*10	a10
Boston & Worcester Electric Companies (preferred)	*43	42½
Brooklyn Rapid Transit Company	87	86⅛
Capital Traction Company, Washington	115	115
Chicago City Railway	160	160
Chicago Elevated Railways (common)	25	25
Chicago Elevated Railways (preferred)	75	75
Chicago Railways, ptcptg., ctf. 1	95½	93
Chicago Railways, ptcptg., ctf. 2	28½	28¼
Chicago Railways, ptcptg., ctf. 3	7¾	a7¾
Chicago Railways, ptcptg., ctf. 4	2½	2¼
Cincinnati Street Railway	108	112
Cleveland Railway	103½	103⅝
Cleveland, Southwestern & Columbus Ry. (common)	*5½	5½
Cleveland, Southwestern & Columbus Ry. (preferred)	*28¼	30
Columbus Railway & Light Company	18	18
Columbus Railway (common)	a69½	69½
Columbus Railway (preferred)	88	88
Denver & Northwestern Railway	*104	111
Detroit United Railway	69	69
General Electric Company	143	139½
Georgia Railway & Electric Company (common)	*117	120
Georgia Railway & Electric Company (preferred)	*87	86
Interborough Metropolitan Company (common)	15¼	13½
Interborough Metropolitan Company (preferred)	61⅜	57¼
International Traction Company (common)	*30	40
International Traction Company (preferred)	*95	95
Kansas City Railway & Light Company (common)	*22	*22
Kansas City Railway & Light Company (preferred)	*30	30
Lake Shore Electric Railway (common)	*5	7
Lake Shore Electric Railway (1st preferred)	*89	92
Lake Shore Electric Railway (2d preferred)	*24	25
Manhattan Railway	128	130
Massachusetts Electric Companies (common)	13	13
Massachusetts Electric Companies (preferred)	68	67
Milwaukee Electric Railway & Light Co. (preferred)	*95	100
Norfolk Railway & Light Company	*27½	25¼
North American Company	71	71⅛
Northern Ohio Light & Traction Company (common)	63	63
Northern Ohio Light & Traction Company (preferred)	98	97
Philadelphia Company, Pittsburgh (common)	41	39
Philadelphia Company, Pittsburgh (preferred)	40	40
Philadelphia Rapid Transit Company	22⅜	19⅞
Portland Railway, Light & Power Company	*55	56
Public Service Corporation	111	110
Third Avenue Railway, New York	40¼	38
Toledo Traction, Light & Power Company (common)	a30	30
Toledo Traction, Light & Power Company (preferred)	80	80
Twin City Rapid Transit Co., Minneapolis (common)	104½	104½
Union Traction Company of Indiana (common)	*5	13
Union Traction Company of Indiana (1st preferred)	*80	83
Union Traction Company of Indiana (2d preferred)	*20	25
United Rys. & Electric Company (Baltimore)	25⅜	25⅜
United Rys. Inv. Company (common)	18	17½
United Rys. Inv. Company (preferred)	35	34
Virginia Railway & Power Company (common)	a56	53½
Virginia Railway & Power Company (preferred)	95	93½
Washington Ry. & Electric Company (common)	93	95
Washington Ry. & Electric Company (preferred)	90¼	90⅛
West End Street Railway, Boston (common)	*71	70
West End Street Railway, Boston (preferred)	*89	89
Westinghouse Elec. & Mfg. Company	67	66
Westinghouse Elec. & Mfg. Company (1st preferred)	107	107

*Last sale. a Asked.

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ANNUAL REPORTS

American Railways

The statement of income, profit and loss of the American Railways, Philadelphia, Pa., for the fiscal year ended June 30, 1913, is as follows:

Income from sub-companies		$984,015
Miscellaneous income		9,427
Gross income		$993,442
Deductions from income:		
General expenses	$8,066	
Legal expenses	206	
Depreciation of office furniture and of engineering instruments	1,320	
Taxes	15,000	
Interest on funded debt	442,452	
Interest on preferred stock receipts	1,462	
Total deductions from income		$468,506
Net income		$524,936
Dividends paid and accrued on preferred capital stock	$89,059	
Dividends paid on common capital stock	402,789	
Total dividends paid		491,848
Surplus		$33,088
Surplus, June 30, 1912	$625,198	
Less adjustments during the year	9,850	
		615,348
Surplus, June 30, 1913		$648,436

The balance sheet includes, besides the usual asset and liability headings, a detailed statement of the holdings of the American Railways in the various subsidiaries, giving the total issue, the portion owned by the holding company and the value at which it is carried on this company's books. Further schedules show bonds owned by the American Railways and the insurance and contingencies fund investments, as well as the stocks and bonds owned by the subsidiaries.

J. J. Sullivan, president, says in part:

"The total number of passengers carried was 100,343,051. The gross receipts of the subsidiary companies were $5,164,007, showing a gain of $269,700, or 5.55 per cent. This does not include the gross receipts of the Johnstown Passenger Railway, or the receipts of the Kanawha Valley Traction Company, Charleston, W. Va., for which the company receives a rental. The increase in receipts for lighting and power was 15.18 per cent.

"During March there was an overflow of the rivers in Ohio whereby the company lost about $50,000 in gross receipts.

"The company paid for accidents during the year in all companies $123,127. There is a credit in the accident insurance fund of $42,176, and fewer claims were presented than last year.

"During the year $1,311,785 of new capital was expended for sundry improvements to the subsidiary companies. The company paid all operating expenses, fixed charges, interest and taxes, including the United States government tax, amounting to $9,300, and charged off for depreciation and obsolescence of the underlying companies about $290,000, which included the original cost of two storage batteries, an abandoned carhouse, etc. There was charged off, in addition to the above depreciation, 7.02 per cent of the gross receipts for maintenance of track and roadway and maintenance of equipment. The company made payments to the sinking fund of $26,769. It paid in dividends $401,848, an increase of $99,559, leaving a balance of $33,087 to be added to profit and loss, which, after certain adjustments, representing chiefly the expense in connection with the issuance of the preferred stock, makes that item now stand $648,436.

"All of the company's important franchises in Lynchburg, Va., Springfield, Ohio, and Ashland, Ky., have been extended for the full term allowed by law."

The report also takes up in detail the progress for the year of each one of the principal subsidiaries.

Mr. Sullivan continues in part:

"During the year the gross earnings of the Altoona & Logan Valley Electric Railway increased $27,593, or 4.04 per cent. The company repaired 322 ft. of track and rebuilt 4,235 ft. Besides the poles and wires required for the extensions made during the year, thirty-three new steel poles were erected in the Altoona fire district, and 2400 ft. of underground cable was installed, and 4 miles of return feeder, ½ mile of 500,000-circ. mil. feeder and 1 mile of 400,000-circ. mil. feeder were installed in Tyrone and on the Fostoria cut-off. Ten cars were rebuilt to prepayment type, two work cars were rebuilt and twelve cars were equipped with steel wheels. Two new flat cars were built and placed in service. Eighty-one cars were equipped with new lightning arresters and twenty-eight cars repainted.

"The gross receipts of the Bridgeton & Millville Traction Company increased $8,199, about 6.25 per cent, during the year. Twelve hundred feet of track in Millville was rebuilt, many poles were renewed and regular maintenance was well taken care of. Five single-track cars were bought for city use and new electrical equipment was ordered.

"During the year the gross receipts of the Lynchburg Traction & Light Company increased $21,220, nearly 5 per cent. Two miles of new track was built on Rivermont Avenue and 2870 ft. of new track was built on Eleventh Street, Grace Street, Buchanan Street and McKinley Avenue. A new 40-ft. work car with four Westinghouse motors and carrying an adjustable derrick at each end was added to the equipment. The franchise was extended for the full period of thirty years.

"The gross receipts of the Ohio Valley Electric Railway increased $28,550, or 7.31 per cent. In a fire in the carhouse the company lost nine car bodies. Eight new steel cars were bought and mounted on the trucks of the burned cars. Ten additional new steel cars were bought with trucks and multiple-unit controlled motors to facilitate two-car train operation.

"During the year the property of the People's Railway was visited by a severe flood, which had Dayton as its center. For eighteen days from March 25 no cars were run and for some weeks afterward, until the streets were entirely clear of débris caused by the flood, operations were hampered. Steam railroad flat cars were run through the streets over the tracks of the People's Railway and loaded with loose material, preventing the operation of cars on schedule time. The city being under martial law, nothing could be done to improve the conditions existing. Since May 1 the business has improved. We subscribed $20,000 to a fund of $2,250,000 to be used for flood prevention. The total operating revenue was $405,591, showing a loss of $16,422 in gross receipts. A large amount of money has been expended on this property for power house, machinery, carhouse, cars and new track and 6650 ft. of additional feeder, also a new electric trolley wagon.

"The gross receipts of the Roanoke Railway & Electric Company increased to $549,290, more than 8 per cent, although a large number of men struck on May 1. The company employed local men and the strike has entirely failed. The company bought and put in service six new steel cars of standard type with double trucks and complete electrical equipment. One car was changed from two-motor to four-motor equipment. New signs were placed on all cars. The company is rebuilding all closed cars to the pay-within type.

"During the year the gross receipts of the Scranton Railway were $1,362,461, an increase of $59,095 over the previous years. In November, 1912, the company began operating over the new Mulberry Street viaduct, which cost more than $100,000. The company had a double track and the exclusive use of one side of the bridge. The structure was built to avoid two steam railroad grade crossings. During the year 105,203 ft. of track was rebuilt and all newly paved. All the new work except that on the County Road has been of steel tie and concrete construction, which should give it a much longer life. One work car and two flat cars were built in the shops and five new double-truck steel cars have been ordered. A contract for power was made with the Scranton Electric Company.

"The gross revenue of the Springfield (Ohio) Railway increased $25,527, or 7.5 per cent over the previous year. A new twenty-five-year franchise has been obtained. Considerable track was rebuilt and 5020 ft. of street paving was put down. The company ordered ten new double-truck steel cars, with trucks and motors complete, which, with the present number of cars, should furnish an adequate supply for some time to come. The company has bought a tract of 4 acres on high ground on which to build a new carhouse to take proper care of the equipment."

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Cape Breton Electric Company, Ltd.

The condensed results of operations of the Cape Breton Electric Company, Sydney, N. S., Canada, including leased property, for the twelve months ended Dec. 31, 1912, as compared with the previous year, are shown by the following statement:

	1912	1911
Earnings:		
Railway department	$216,132	$211,370
Light and power department	115,117	98,442
Ferry department	28,927	27,742
Total earnings	$360,176	$337,554
Operating expenses and taxes:		
Operating expenses	$188,405	$175,631
Taxes	6,475	6,132
Total operating expenses and taxes	$194,880	$181,763
Net earnings	$165,296	$155,791
Interest charges	53,825	54,150
Balance	$111,471	$101,641
Sinking and improvement funds	14,280	13,680
Balance	$97,191	$87,961
Dividends paid	70,290	59,040
Balance	$26,901	$28,921
Direct credits to reserves and surplus	.....	114,037
Prior surplus	288,132	156,174
Balance	$315,033	$299,132
Replacement reserve	8,000	11,000
Current surplus	$307,033	$288,132

The Stone & Webster Management Corporation makes the following statement regarding the company:

"The gross earnings of the street railway and ferry departments for 1912 show only a moderate increase over those of the preceding year. In the lighting and power department a special effort to extend the service resulted in an increase in earnings amounting to approximately 17 per cent. Operating expenses for the year 1912 were normal, with the exception of maintenance and removal of snow and ice, both of which were somewhat higher than in any average year.

"During the past year the much-needed subway at McQuarrie's Crossing has been built, allowing continuous operation of cars on the most important city line which the company operates. A new carhouse has been built at Glace Bay for the housing of four cars. Many short extensions to lighting lines have been made for the accommodation of new customers and a high-tension transmission line has been built to the Colonial Mines, to which a large amount of current is now sold each month for operating the mines and for operating two briquetting plants in connection therewith.

"Liberal expenditures for maintenance were made during the year. A special examination of the company's power plant is now in progress and it is expected that certain changes and improvements in the plant will be made during the coming year which will have the effect of leading to increased economy."

Boston & Maine Railroad

The annual report of the Boston & Maine Railroad, Boston, Mass., for the fiscal year ended June 30, 1913, shows an increase of $2,523,143 in operating revenue, an increase of $3,014,129 in operating expenses and a decrease of $1,240,550 in the net corporate income.

The Boston & Maine Railroad owns 18.1 miles of branch lines of electric street railways and 1.14 miles of side tracks; it leases 32.11 miles of branch lines and 2.11 miles of side tracks, making a total of 53.46 miles of electric railway operated. The electric railway equipment of the company is shown by the following inventory as of June 30:

	1913			1912
Description	Owned	Leased	Total	Total
Passenger cars	21	37	58	58
Snow plows on wheels	1	3	4	4
Other cars	2	3	5	5
Total	24	43	67	67

The two electric railways owned and leased by the company are the Portsmouth (N. H.) Electric Railway and the Concord & Manchester Electric Railway, which branch lines have a total mileage of 50.21, exclusive of side tracks. The result of operations of these companies for the fiscal year ended June 30, 1913, as compared with the previous year, is shown by the following statement:

	1913	1912
Gross Revenues:		
Passenger	$254,220	$243,890
Mail	275	284
Station and car privileges	1,568	1,456
Car service	372	374
Total	$256,434	$246,004
Operating Expenses:		
Maintenance of Way and Structures:		
Superintendence	$1,066	$942
Maintenance of way	34,219	33,339
Maintenance of electric lines	5,162	3,587
Maintenance of buildings and structures	2,467	3,348
Total	$42,914	$41,216
Maintenance of Equipment:		
Superintendence	$305	$240
Maintenance of power equipment	765	13,822
Maintenance of cars	11,082	13,126
Maintenance of electric equipment of cars	9,576	10,529
Miscellaneous equipment expenses	89	.....
Total	$21,817	$37,717
Transportation and General Expenses:		
Superintendence and general expenses	$8,075	$7,776
Power plant employees	7,129	7,376
Substation employees	1,979	2,099
Fuel for power	9,191	8,833
Other power supplies and expenses	754	2,414
Power purchased	8,877	8,924
Conductors	27,521	25,715
Motormen	27,279	25,876
Cleaning and lubricating equipment	3,076	3,405
Injuries and damages	6,149	2,875
Stationery and printing	373	445
Insurance	1,760	1,773
Law expenses	478	35
*Advertising	3,892	4,985
Miscellaneous	4,759	5,562
Total	$111,292	$108,093
Total operating expenses	$176,023	$187,026
Net revenue	$80,411	$58,978

* Includes net expense of operating Contoocook River Park.

The number of passengers carried on the Portsmouth Electric Railway and the Concord & Manchester Electric Railway during the year ended June 30, 1913, was 5,087,417, as compared with 4,877,820 during the previous year; the number of car miles advanced from 1,105,089 to 1,117,538.

The annual report of the Boston & Maine Railroad also contains a comparative income, profit and loss statement for the Conway (Mass.) Electric Street Railway, which is controlled by the railroad company, but operated separately. This statement shows a deficit for the year ended June 30, 1913, of $2,601, compared with a deficit of $4,672 the preceding year, as follows:

	1913	1912
Revenue:		
Freight revenue	$5,259	$5,087
Passenger revenue	2,824	2,847
Other transportation revenue	2,117	2,828
Other operating revenue—power sold, etc.	1,430	1,429
Total operating revenue	$11,630	$12,191
Operating Expenses:		
Maintenance of way and structures	$743	$2,263
Maintenance of equipment	720	1,215
Transportation expenses	4,638	5,579
General expenses	1,317	1,032
Total operating expenses	$7,418	$10,089
Net operating revenue	$4,212	$2,102
Taxes accrued	403	433
Operating income	$3,809	$1,669
Interest accrued	6,410	6,341
Deficit	$2,601	$4,672

Laurel Light & Railway Company

The Laurel Light & Railway Company, Laurel, Miss., reports net earnings for the year ended Aug. 31, 1913, as compared with the previous year, as follows:

	1913	1912
Gross earnings	$75,860	$39,347
Operating expense	39,028	19,870
Net earnings	$36,832	$19,477

The Laurel Light & Railway Company was organized in 1911 to take over the property of the Laurel Electric Power & Light Company and to build a railway in Laurel and an interurban railway between Laurel and Ellisville, which are both county seats of Jones County, Mississippi.

The company has $500,000 of capital stock, of which $75,000 is 6 per cent non-cumulative preferred and $425,000 is

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common. The authorized bond issue is $500,000, of which $380,000 is outstanding.

The property of the old light company was taken over on Jan. 1, 1912, and the installation of a new 625-kw Allis-Chalmers turbo-generator was begun. The installation of this new unit was completed in September, 1912. At the same time the construction of the street railway in Laurel was begun. On Nov. 23, 1912, 3½ miles of street railway was placed in operation, and on Aug. 1 operation was begun to a park on the interurban line about 2 miles south of the city. The interurban road, consisting of 8½ miles to and through Ellisville to an agricultural college in the southern end of Ellisville was completed Sept. 1 and is now in operation. The company has taken over the municipal lighting plant in Ellisville and began operation of that piece of property on Sept. 1.

The statement of earnings given above does not include any light or power business in Ellisville or earnings from the completed interurban line. July, 1913, was the first full month of operation of the entire 5 miles of street railway in Laurel, while the August earnings contain figures for 2 miles of interurban track. In each instance the greater population served is indicated by the increased business.

The statement of transportation earnings of the company by months from November, 1912, to August, 1913, inclusive, follows:

1912	Gross Earnings	Operating Expenses	Net Earnings
November	$669	$669	.....
December	2,000	1,287	$713
1913			
January	1,788	1,744	43
February	1,645	1,450	194
March	2,039	1,819	220
April	1,984	1,921	64
May	2,181	1,501	681
June	2,896	1,764	1,132
July	3,379	2,179	1,199
August	4,644	2,806	1,838
Total	$23,225	$17,141	$6,084

Sheffield Corporation Tramways Report

The annual report by A. R. Fearnley, general manager of the Sheffield Corporation Tramways, has been made public. The total increase in the number of passengers is 5,871,391, while the traffic receipts exceed last year's total by £20,770. The policy of the committee in reducing the fares to 1d. all the way on the city routes, the report states, has proved successful. The average fare paid per passenger again shows a slight decrease, 0.893d., compared with 0.896d., and the average journeys per head of population per annum show an increase of eight journeys per head, the total being 206. Under these two items interesting comparisons are made with other tramways. Of the fifteen towns quoted there are only two, namely Hull and Glasgow, where the average fare paid per passenger is lower than in Sheffield. Glasgow is the only city which shows a larger total with reference to the average journeys per head of population.

Electric Railway Valuations in Washington

The following table gives the valuations placed upon electric interurban railroads and city railways by the Board of Equalization of the State of Washington, as compared with the values fixed in 1912:

	1913	1912
Pacific Northwest Traction Co.	$2,387,795	$1,473,109
Puget Sound Electric Railway, Light & Power Co.	4,000,000	4,240,000
Spokane & Inland Empire R. R.	10,000,000	12,500,000
Washington-Oregon Corp.	458,310	*275,000
Washington Water Power Co.	4,000,000	4,000,000
Walla Walla Valley Railway	395,867	395,867
Willapa Harbor Railway	395,867	395,867
Yakima Valley Transportation Co.	362,207	362,207
Total	$21,680,379	$23,246,483

*Vancouver street railway valued separately in 1912.

Cleveland (Ohio) Railway.—President Stanley of the Cleveland Railway intends to demand that the City Council authorize the charging off of $800,000 for the obsolescent power equipment of the company before the end of the ordinance year, March 1, 1914. Indications are that this action, requested by the arbitrators, will cut the interest fund so low as to cause an increase in the rate of fare. Mr. Stanley is quoted as follows: "I shall not be impatient about the arbitrators ordering it charged off immediately, but it must be done before the close of the ordinance year. Meanwhile, we are carrying the interest burden, but the charge is on the car riders ultimately."

Columbia Railway, Gas & Electric Company, Columbia, S. C.—Redmond & Company, New York and Boston, are placing at a price to net 6½ per cent three-year convertible 6 per cent secured gold notes, dated Oct. 1, 1912, and due Oct. 1, 1915, of the Columbia Railway, Gas & Electric Company. These notes are convertible at the option of the holder at any interest date on ten days' notice into an equal par value of the first mortgage bonds deposited as security and $120 in cash per note, making the net cost of the bonds 88, on a 5¾ per cent basis. These notes are also subject to redemption at the company's option on any interest date at 101 and interest on thirty days' notice. If called, the privilege of conversion may be exercised.

Hull (Que.) Electric Company.—At a recent anual meeting of shareholders of the Hull Electric Company W. R. Baker, secretary of the Canadian Pacific Railway, was elected president, and E. W. Beatty, general counsel of the Canadian Pacific Railway, vice-president, for the current year.

Indianapolis (Ind.) Street Railway—At a meeting of the board of directors of the Indianapolis Street Railway on Oct. 9, which was for the purpose of electing officers and filling vacancies in the board of directors, Joseph A. McGowan, secretary and treasurer of the Terre Haute, Indianapolis & Eastern Traction Company, was elected a director of the company. Dr. Henry Jameson was elected president, succeeding the late Admiral George Brown. Other officers elected were: Harry S. New, first vice-president; Harold B. Hibben, second vice-president; Joseph A. McGowan, secretary and treasurer: W. F. Milholland, assistant secretary and treasurer. The following now constitute the board of directors of the Indianapolis Street Railway: Henry Jameson, Harold B. Hibben, Harry S. New, Ferdinand Winter and Joseph A. McGowan, Indianapolis, Ind.; Marshall S. Morgan, Philadelphia, Pa., and C. M. Murdock, Lafayette, Ind.

Montreal (Que.) Tramways.—The New York Stock Exchange has listed $13,335,000 of first and refunding mortgage thirty-year 5 per cent collateral trust notes, Series A, of the Montreal Tramways. These notes fall due in 1941.

New York, New Haven & Hartford Railroad, New Haven, Conn.—The Massachusetts Public Service Commission on Oct. 14 approved the $67,552,000 bond issue proposed by the New York, New Haven & Hartford Railroad. Immediately upon receipt of the news a meeting of the directors adopted resolutions approving the issue. Notice was sent to stockholders on Oct. 15 that 65 per cent of the subscriptions must be paid on Nov. 15, 1913, and the remainder on Jan. 15, 1914. The bonds run for twenty years, interest at 6 per cent.

Northern Ohio Traction & Light Company, Akron, Ohio.—Hayden, Miller & Company of Cleveland have announced that all of the $1,500,000 of the collateral trust 6 per cent bonds of the Northern Ohio Traction & Light Company recently offered by them have been sold.

Portland Railway, Light & Power Company, Portland, Ore.—The Portland Railway, Light & Power Company will be required to pay a rental of 4 cents per lineal foot of track each year for its proposed cross-town car line on the East Side, according to the valuation recently fixed by the city commission. The valuation of 4 cents per foot is the highest ever imposed upon the company for a franchise. Heretofore the highest rental has been $200 a mile.

United Railways, St. Louis, Mo.—The Mississippi Valley Trust Company, the Mercantile Trust Company and Francis Brothers & Company, St. Louis, having sold the greater part of the issue, are offering at 98 and interest, yielding 5¼ per cent, the unsold portion of the $1,000,000 of Compton Heights, Union Depot & Mercantile Terminal Railroad first mortgage extended 5's, due July, 1923, but callable after July 1, 1914, at 102½ and interest on any interest date at sixty days' notice. The principal and interest are guaranteed by indorsement on each bond by the United Railways.

Washington-Oregon Corporation, Vancouver, Wash.—The Washington-Oregon Corporation has filed a $1,000,000 mortgage covering the Centralia-Chehalis line and its water and power plants. It is understood that the proceeds of

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$400,000 of the bonds will be used to retire outstanding bonds, and the remainder for extension of the company's interurban lines.

Windsor, Essex & Lake Shore Rapid Railway, Kingsville, Ont.—At the adjourned annual meeting of the Windsor, Essex & Lake Shore Rapid Railway held on Oct. 10, the following officers were elected: W. C. Crawford, Tilbury, Ont., president; Albert Eastman, first vice-president, resident and general manager; John Piggott, Sr., Chatham, second vice-president; W. R. Philmore, Chatham, secretary. J. W. McCall, Toronto, was re-elected treasurer. A new office, that of assistant secretary-treasurer, will be filled by J. L. Baird, Kingsville, Ont. The directors elected are: Hon. E. G. Stevenson, Detroit; W. C. Crawford, John Piggott, Sr., Walter T. Piggott, W. R. Philmore, J. W. McCall, Albert Eastman.

Dividends Declared

Brooklyn (N. Y.) City Railroad, quarterly, 2 per cent.

Columbus (Ohio) Railway, quarterly, 1¼ per cent, preferred.

Havana Electric Railway, Light & Power Company, 3 per cent, preferred; 2½ per cent, common.

Jacksonville (Fla.) Traction Company, quarterly, 1½ per cent, preferred; quarterly, 1¾ per cent, common.

Milwaukee Electric Railway & Light Company, quarterly, 1½ per cent, preferred.

Public Service Investment Company, Boston, Mass., quarterly, $1.50, preferred.

Puget Sound Traction, Light & Power Company, Seattle, Wash., quarterly, 1½ per cent, preferred; quarterly, 1 per cent, common.

ELECTRIC RAILWAY MONTHLY EARNINGS

BANGOR RAILWAY & ELECTRIC COMPANY, BANGOR, ME.

Period			Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1 mo.	August	'13	$74,248	*$30,832	$43,416	$17,354	$26,062
1 "	"	'12	70,418	*28,769	41,649	16,558	25,091
12 "	"	'13	747,311	*339,598	407,713	206,398	201,315
12 "	"	'12	674,614	*304,888	369,726	185,219	105,000

CHATTANOOGA RAILWAY & LIGHT COMPANY, CHATTANOOGA, TENN.

1 mo.	August	'13	$99,752	*$57,787	$41,965	$25,381	$16,584
1 "	"	'12	94,925	*56,264	38,661	22,566	16,095
12 "	"	'13	1,167,414	*695,613	471,801	286,549	185,252
12 "	"	'12	1,016,891	*605,249	411,642	256,107	155,535

CUMBERLAND COUNTY POWER & LIGHT COMPANY, PORTLAND, MAINE

1 mo.	August	'13	$251,278	*$122,063	$129,215	$58,654	$70,561
1 "	"	'12	232,369	*106,443	125,926	53,012	72,914
12 "	"	'13	2,251,109	*1,243,144	1,007,965	686,218	321,747
12 "	"	'12	2,086,489	*1,221,588	864,801	620,506	244,295

EAST ST. LOUIS & SUBURBAN COMPANY, EAST ST. LOUIS, ILL.

1 mo.	August	'13	$236,699	*$147,446	$89,253	$48,860	$40,393
1 "	"	'12	208,339	*116,525	91,814	48,125	43,689
12 "	"	'13	2,626,253	*1,486,834	1,139,419	586,545	552,874
12 "	"	'12	2,353,499	*1,307,044	1,146,455	568,589	477,866

GRAND RAPIDS (MICH.) RAILWAY

1 mo.	August	'13	$119,738	*$79,691	$40,047	$15,173	$24,874
1 "	"	'12	111,605	*64,084	47,521	14,793	32,728
12 "	"	'13	1,278,452	*759,100	519,352	178,334	341,018
12 "	"	'12	1,218,260	*681,568	536,792	176,074	360,718

LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY, LEWISTON, MAINE

1 mo.	August	'13	$81,046	*$40,396	$40,650	$15,529	$25,121
1 "	"	'12	71,808	*36,150	35,658	14,448	21,210
12 "	"	'13	666,708	*410,694	256,014	176,318	79,696
12 "	"	'12	610,155	*384,535	225,620	173,435	52,185

PORTLAND RAILWAY, LIGHT & POWER COMPANY, PORTLAND, ORE.

1 mo.	August	'13	$556,152	*$280,110	$276,042	$172,166	$103,876
1 "	"	'12	543,189	*276,453	266,736	148,022	118,714
12 "	"	'13	6,683,992	*3,316,515	3,367,477	1,906,293	1,461,184
12 "	"	'12	6,533,288	*3,238,767	3,294,521	1,678,552	1,615,969

PORTLAND (MAINE) RAILROAD

1 mo.	August	'13	$130,854	*$62,282	$68,572	$16,380	$52,192
1 "	"	'12	118,155	*60,592	57,563	10,294	47,269
12 "	"	'13	1,028,607	*712,828	315,779	132,369	183,410
12 "	"	'12	970,278	*687,040	283,238	110,405	172,833

ST. JOSEPH RAILWAY, LIGHT, HEAT & POWER COMPANY, ST. JOSEPH, MO.

1 mo.	August	'13	$105,091	*$61,949	$43,142	$20,199	$22,943
1 "	"	'12	102,859	*58,262	44,597	19,710	24,887
12 "	"	'13	1,226,213	*692,131	535,082	239,685	294,397
12 "	"	'12	1,151,979	*680,261	471,718	234,812	236,906

*Includes taxes.

Traffic and Transportation

Decision in Los Angeles Fare Case

In the complaint before the Railroad Commission of California in which discrimination was alleged in the passenger rates of the Los Angeles (Cal.) Railway Corporation between Los Angeles and Vermont Heights the commission held that the one-way fare of 10 cents is reasonable, but that the price of the thirty-ride family commutation ticket should be reduced from $2.70 to $1.50.

In this case the complainant attacked the passenger fares of the Los Angeles Railway Corporation between the city of Los Angeles and Vermont Heights as excessive, unreasonable and discriminatory and asked that a fare of 5 cents with transfer privileges be established between Vermont Heights and the city of Los Angeles. The rates of the defendant were as follows: One-way fare between Vermont Heights and the city of Los Angeles 10 cents, made up of 5 cents between any point in Los Angeles and Manchester Avenue and 5 cents from Manchester Avenue to Vermont Heights.

The following adult commutation rates were in effect: ten-ride party ticket, 90 cents; thirty-ride family commutation ticket, $2.70; fifty-two-ride individual monthly commutation ticket, $3.75.

The lines of the company serving Vermont Heights are on either side of what is known as the "Shoestring Strip" and do not operate west of Manchester Avenue within the corporate limits of Los Angeles. The complainant based his claim for a fare of 5 cents between Los Angeles and Vermont Heights on the fact that the defendant operates certain of its lines outside of Los Angeles at a fare of 5 cents and that the distances beyond the boundary line of Los Angeles are not at all regular in shape, consequently a line in one direction might reach a considerable distance beyond the city limits and at the same time the terminus thereof be a shorter distance from the center of population in Los Angeles than would a line operating in the other direction wholly within the city. For example, the line to Huntington Park: the distance from the city limits to the end of the Huntington Park line is greater than the distance from Manchester Avenue to Vermont Heights; at the same time, because of the irregular boundary lines of Los Angeles, Huntington Park is much nearer the center of population of Los Angeles.

In his opinion E. O. Edgerton of the commission said in part:

"It must be apparent to anyone who will study the transportation map of the city of Los Angeles that in no case does the defendant maintain a 5-cent fare with transfer privileges to any point which is the same distance from the business center of Los Angeles as Vermont Heights. Because a city annexes adjoining territory, making its boundary lines extremely irregular, it does not follow that a street railway system should be required always to extend its 5-cent fare zone to conform to the new boundary lines.

"Complainant has not sustained his claim for a fare of 5 cents with transfer privileges between Vermont Heights and Los Angeles. Discrimination undoubtedly exists in favor of other sections served by the defendant in the matter of commutation rates, and for the same reasons as were pointed out in our decision in Case No. 337, City of Inglewood vs. Los Angeles Railway Corporation et al., we must hold that passengers from Vermont. Heights are entitled to the same commutation rates as are in effect between Eagle Rock and Los Angeles. Drawing a circle from either the assumed center of population of Sixth and Main Streets or Twelfth and Main Streets, Los Angeles, it will be found that the distances are approximately the same to Eagle Rock, Annandale, Inglewood and Vermont Heights. We know of no just reason why the defendant should grant lower commutation rates to Eagle Rock and one-way fares from Annandale without transfer privileges, which are equivalent to the commutation rates between Eagle Rock and Los Angeles, on any lower basis than are in effect between Vermont Heights and Los Angeles.

"I therefore find as a fact that a just and reasonable

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commutation fare for the transportation of adult passengers between Vermont Heights and Los Angeles is $1.50 for a thirty-ride family commutation ticket without transfer privileges."

Insurance and Pensions in Philadelphia

The statement of the Co-operative Beneficial Association for August, 1913, shows how effectually this association, which is composed of employees of the Philadelphia (Pa.) Rapid Transit Company, is affording protection against want during illness by the payment of $1 per day for one hundred days following the first week's illness and the payment at death of $150 designed to cover funeral expenses.

Since the association was organized in November, 1912, it has paid a total of twenty-nine death benefits and 775 sick benefits. Out of approximately 10,000 employees of the company who are eligible, 7790 are now members of the association. The scope of the association has recently been enlarged by opening the membership to include female as well as male employees, between the ages of eighteen and forty-five years, and the period of service necessary to qualify as a member has been reduced from six to three months.

The number of members of the association who are taking advantage of the 8 per cent saving by the use of cash coupon books under the co-operative buying plan is rapidly increasing. The benefits offered by the Co-operative Beneficial Association are in addition to the general pension and insurance plan of the company, which provides a pension of $20 a month for employees who have reached the age of sixty-five years, who have completed twenty-five years of continuous service and are unable to further perform their duties, and a death benefit of $500 payable to the dependents of the deceased employee. Since the pension and death benefit plan was established in January, 1910, the company has paid 315 death benefits, amounting to $156,880, and has granted pensions to eighty-one employees amounting to $35,901, a total of $192,782. At the suggestion of the co-operative committee the regulations governing the administration of the insurance plan maintained for the benefit of employees of the company have been amended to provide that the death benefit of $500 will be paid only to actual dependents.

As many death benefits under the insurance plan are paid to motormen and conductors and consequently are charged to the 22 per cent fund set aside for the payment of the wages of trainmen, the administration of insurance and pensions has, with the approval of the co-operative committee, been placed directly under the same board of trustees that administers the Co-operative Beneficial Association. These funds will, however, be kept entirely separate and will be in no way associated with the accounts of that association.

Car Capacity Order Stands in Washington

The Public Utilities Commission of the District of Columbia has declined to grant a request by the Capital Traction Company and the Washington Railway & Electric Company that the commission revoke its former order prohibiting the carrying of passengers on front platforms, with the exception of those that are equipped with a dividing rail which isolates the motorman, and on the running boards of open cars, as contained in provisions of Sections 3 and 7 of regulations for the operation and equipment of cars in the District, issued by the commission on June 9, 1912. The matter was considered at a public hearing on Aug. 11, at which the Capital Traction Company was represented by Attorney R. Ross Perry, and the Washington Railway & Electric Company by J. J. Darlington. It was contended that the orders would work a hardship upon the public and that it is impossible for a street railway to prevent overcrowding. In announcing its decision the commission states that it is of the opinion that "the provisions of the said Sections 3 and 10 are necessary for the public safety and convenience, and that the said sections do not impose unreasonable requirements upon the utilities concerned."

The provisions which the commission directs shall be enforced follow:

"Every street railway or corporation shall cause its cars to stop to take on and to let off passengers at street crossings or other regular stopping places: Provided that a car which is loaded to its capacity, having due regard to Section 10 of the regulations for the operation and equipment of street railway cars in the District of Columbia relating to the occupation of platforms and running boards, shall display a sign 'Car full' and shall not stop to take on passengers; provided further that disabled and special cars need not stop for passengers; provided further that, after a blockade on a car line, if two or more cars going in the same direction are within a space of two blocks, and the forward car is behind its schedule or is loaded, such forward car need not stop to take on passengers, but may leave signaling passengers for the next car following.

"Motormen shall pay attention to the operation of the car next ahead and take care that no passenger is passed by more than one car, except in those cases exempted above; provided further that all cars which are permitted by orders of the commission to be operated as express cars shall be required to stop only at railway crossings, fire and safety stops; provided further, that street cars shall stop for passengers at such street crossings as may be indicated by the public utilities commission.

"No street railway shall permit passengers to occupy the front platforms of open cars or of closed cars or the running boards of open cars, provided that on cars equipped with a dividing rail completely isolating the motorman that portion of the platform not so reserved for the motorman may be occupied by passengers, but only to such an extent as not to prevent the rapid and easy ingress and egress of passengers. Each street railway company shall keep the rear platforms of cars sufficiently clear to allow the rapid and easy ingress and egress of passengers. In the case of center entrance cars, the 'well' shall be construed as the rear platform for the purposes of this section."

Appeal to Commission to Require Reduction in Fare in Seattle.—The City Council of Seattle, Wash., has adopted two resolutions which have for their purpose a request to be made by the Council asking the State Public Service Commission to require the Puget Sound Traction, Light & Power Company to sell tickets for 4 cents each good on its cars.

Warning Signs Posted on Indianapolis Line.—The Indianapolis & Cincinnati Traction Company, Indianapolis, Ind., has posted notices on all of its lines citing the laws in regard to the molesting of the cars or property of common carriers and to the placing of obstructions in front of cars. An offer of $100 reward is made for evidence leading to the arrest and conviction of persons violating any of the statutes mentioned.

Interurban Line Seeking Freight Traffic Privilege.—The Chicago, Ottawa & Peoria Railway is making an attempt to secure the privilege of handling freight traffic through Ottawa. Petitions are being circulated among the property owners of the city, and in the event that a majority of the property owners on the streets on which the interurban line is located favor the project, the matter will come before the commissioners for approval. Thereafter it will have to be submitted to the referendum vote of the people for final authorization of the privilege.

Trolley Line Gains a Point in Akron.—On Oct. 9 the Public Utilities Commission of Ohio rendered a decision to the effect that the Northern Ohio Traction & Light Company may operate single-truck cars without air brakes on lines where there are no steep grades. This means that the company may operate six cars on the Grant and Exchange Street lines, four on the Bowery line and twenty on other lines except the North Hill line. The order is effective for six months only and during the hours of heavy traffic morning and evening.

Service Complaint in State of Washington.—An application to the Public Service Commission at Olympia for an order to compel the Puget Sound Electric Railway to give what

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the petitioners designate as a satisfactory interurban service in King County was recently made by Charles H. Ennis, a Seattle attorney representing a number of property owners living in King County. It is charged that the service furnished by the company is inadequate and that during the last three years the company has discontinued running trains at such hours as to provide for the accommodation of the traveling public and that the company has not provided the proper number of cars for the transportation of the passengers between Renton Junction and Seattle.

Report on Traffic in Jersey City.—E. P. Goodrich and George B. Ford, experts engaged by the City Planning Commission of Jersey City, N. J., report that in general the system of the Public Service Railway of that city is good, but that some present routes could be changed, others extended and some cars re-routed through the congested portions of the city with benefit to the service. The problem in Jersey City is involved with that of a number of neighboring and outlying places, and the entire situation should be considered, they say, in making recommendations for changes from existing conditions. They recommend that a single investigator be empowered to make such a study of the entire problem, including the requirements of each of the separate municipalities.

Public Service Railway Contests Bridge Charges.—Upon application of Frank Bergen, counsel for the Public Service Railway, Newark, N. J., Chief Justice Gummere on Oct. 11 granted a writ of certiorari to review the action of the Public Utility Commission fixing compensation for the use of the Clay Street bridge in trolley service. Mr. Bergen questioned the right of the commission to compel the company to pay for the use of the bridge. He declared that it was operated by Hudson and Essex counties as a matter of public convenience, and that there was a question whether any business enterprise should be discriminated against in paying for the use of it.

New Haven Railroad Committees Elect Chairmen.—The various committee of directors of the New York, New Haven & Hartford Railroad appointed to investigate the different phases of the company's business and make a report with recommendations to the full board have selected chairmen as follows: Connecticut electric railway committee, Charles F. Brooker; Rock Island electric railway committee, no selection; steamship committee, A. Heaton Robertson; relations with Boston & Albany, no selection; Massachusetts electric railway committee, Lawrence Minnot; Boston & Maine committee, William Skinner. At a recent meeting of the executive committee of the New York, New Haven & Hartford Railroad Theodore N. Vail and Alexander Cochrane resigned as members of the committee. The matter will be placed before the full board of directors for further action.

Stock Offered to Traction Employees.—In order to foster co-operation and give the employees an interest in making the road safe and efficient, the Scioto Valley Traction Company, Columbus, Ohio, has offered to sell 1000 shares of its stock to its employees. In making this offer President Frank A. Davis and Treasurer E. R. Sharp make the following explanation in a letter sent to employees: "We have purchased from the state banking department the common stock of the Scioto Valley Traction Company, formerly held by the Columbus Savings & Trust Company, at a price of $12.50 per share. We now offer to the employees of the company 1000 shares of this stock at $12.50 per share, its cost price to us, to be paid for either in cash or in monthly instalments extending over a period of one year. We will enter into a contract with the employees purchasing this stock to buy it back from them at any time within two years at $12.50 per share if such employee should, within that time, express a desire to have us purchase the same. This offer is made that the employees may be financially interested in the company for which they are rendering service, with the belief that both the employees and the company will be benefited thereby. Subscriptions will be received for not more than twenty or less than five shares to an employee, and will be accepted and filed in the order in which they are received at the manager's office. Unless the entire amount is subscribed at an earlier date, this offer will remain open until Oct. 15, 1913."

Personal Mention

Dr. Henry Jameson has been elected president of the Indianapolis (Ind.) Street Railway to succeed the late Admiral George Brown.

Mr. I. L. Godfrey has been appointed comptroller of the International Transit Company and the Trans-St. Mary's Traction Company, subsidiary companies of the Lake Superior Corporation, Sault Ste. Marie, Ont.

Mr. J. M. Delaney, who has been chief train dispatcher of the Buffalo, Lockport & Rochester Railway, Rochester, N. Y., has been appointed general superintendent of the company to succeed Mr. John H. Cain, resigned.

Mr. E. B. Barber has been appointed assistant comptroller of the International Transit Company and the Trans-St. Mary's Traction Company, subsidiary companies of the Lake Superior Corporation, Sault Ste. Marie, Ont.

Mr. Walter L. Buckland, for the last five years general agent of the Electric Express Company, operated by the New England Investment & Securities Company, with headquarters at Springfield, Mass., has resigned to devote his entire time to private business interests.

Mr. Edward F. Boyle has been appointed special examiner by the Public Service Commission for the First District of New York. Mr. Boyle is a lawyer and accountant and until recently had been chief of the executive staff in the office of the president of the Board of Aldermen. Prior to that time he had held various positions in the office of the commissioner of accounts for New York City.

Mr. G. L. Langton, who has been appointed auditor of the Kentucky Traction & Terminal Company, Lexington, Ky., was born in Kittery, Me., in 1883. He has been connected with Hodenpyl, Walbridge & Company and Hodenpyl, Hardy & Company, New York, N. Y., since 1906 as statistical clerk, bookkeeper, accountant, assistant traveling auditor, New York office manager and assistant general auditor.

Mr. H. C. Prather has been appointed general manager of the Buffalo, Lockport & Rochester Railway, Buffalo, N. Y., to succeed Mr. William E. Havens, Rochester, who held the title of acting general manager. Mr. Prather has been master mechanic of the company for some time. Mr. Prather has been connected with electric railway work for more than thirteen years. His first work was with the Union Traction Company of Indiana on overhead lines. He served subsequently with the United Railways, St. Louis, the Brooklyn (N. Y.) Rapid Transit Company, the Public Service Railway, Newark, N. J., and the Roanoke Railway & Electric Company. He was also connected with I. R. Nelson & Company, Newark, for which company he equipped seventeen cars of the Buffalo, Lockport & Rochester Railway with electric apparatus.

OBITUARY

T. Frame Thomson, a British electrical engineer and financier and largely interested in South American enterprises, died suddenly at his home near London on Oct. 2. Among his other offices Mr. Thomson was deputy chairman of the Anglo-Argentine Tramways Company of Buenos Aires, and chairman of the Cordova Light, Power & Traction Company, Ltd., of Cordova, Spain. Three years ago Mr. Thomson endowed a series of lectures on the relations between engineering and commerce to be delivered before the British Institution of Civil Engineers. Editorial reference in regard to these lectures appeared on page 366 of the issue of this paper for Sept. 6, 1913.

Ralph D. Gillett, prominent in the development of electric railways in the western portion of Massachusetts, died suddenly at his home in Westfield on Oct. 14 at the age of forty-seven years. Mr. Gillett was widely known in the field of electric railway construction and was one of the promoters of the Berkshire Street Railway, Western Massachusetts Street Railway and other enterprises in the region between Springfield and Pittsfield. Besides being president of the recently completed Hampden Railroad, in Massachusetts, he was at the head of the Western Massachusetts Construction Company, which is building a high-speed electric railway for the Berkshire Street Railway between Lee and Huntington.

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Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Owingsville & Olympian Railroad, Owingsville, Ky.**—Application for a charter has been made by this company in Kentucky to build an electric railway between Olympian Springs and Owingsville. Capital stock, $25,000. Incorporators: W. S. Gudgell, H. C. Gudgell and A. T. Brown.

***Gallipolis & Northern Traction Company, Gallipolis, Ohio.**—Chartered in Ohio to build an electric railway in Gallipolis. Capital stock, $50,000. T. W. Jackson, incorporator.

***North Canadian Valley Railway, Oklahoma City, Okla.**—Chartered in Oklahoma to build an electric railway from Oklahoma City to Shawnee, 40 miles. Capital stock, $100,000. Incorporators: J. Kenneth Wright, W. A. Lybrand, F. B. Owen, Norman H. Wright and Henry G. Snyder, all of Oklahoma City.

***London, Grand Bend & Stratford Railway, London, Ont.**—Application for a charter has been made by this company to the Ontario Legislature to build an electric railway from London, northwesterly through London, Lobo, East Williams, West Williams, McGillivray, Stephens, Parkhill and Grand Bend, thence easterly to Exeter and Stratford, and then westerly to London, and branch lines. Offices have been opened at Parkhill. Incorporators: A. E. Beer and C. T. McAllister.

***Niobrara Water Power Railway, Pierre, S. D.**—Application for a charter has been made by this company in South Dakota to develop power from the Niobrara River and construct an electric railway in the county of Yankton, S. D., and the counties of Holt, Knox, Cedar, Dixon, Dakota, Thirston, Burt, Cuming, Stanton, Antelope, Pierce, Madison, Colfax, Dodge, Washington and Douglas in Nebraska. The company proposes to build a bridge across the Missouri River at Yankton and to enter Sioux City over the combination bridge. Capital stock, $16,500,000. Incorporators: Charles W. Baker, Omaha; Herman P. Buhmn, Leigh, Neb.; O. S. Christian, Madison, Neb.; Peter A. Mangold, Bennington, Neb., and Glen W. Martens, Pierre, S. D.

***Nueces Valley, Rio Grande & Gulf Railroad, Belleville, Tex.**—Chartered in Texas to build a 25-mile electric or steam railway from Kitty along the Nueces River through Simmons and Live Oak to a point near the center of McMullen County. Capital stock, $25,000. Headquarters. Belleville. Incorporators: W. A. Matthaei, H. F. Granau, Sr., C. R. Johnson, J. R. Brooks, H. F. Granau, Jr., H. T. von Rosenberg and R. E. Zeiske, Belleville; Leonard Tillotson, Sealy, Tex.; J. H. Shary, Omaha, Neb., and J. W. Atkinson, Tilden, Tex.

FRANCHISES

Tilare, Cal.—The Big Four Electric Railway has received a franchise over certain streets in Tulare. This 45-mile line will connect Tulare, Visalia, Lindsay and Porterville. [E. R. J., Sept. 27, '13.]

Peoria, Ill.—The Peoria, Canton & Galesburg Railway has received a franchise from the Council in Peoria. This 52-mile line will connect Peoria, Canton and Galesburg. [E. R. J., Oct. 4, '13.]

Watertown, Ill.—The Moline, East Moline & Watertown Railway, Moline, will again ask the Board of Trustees for a franchise in Watertown. This company plans to extend its line to Port Byron in the near future.

Waukegan, Ill.—At a special meeting the voters of Waukegan have accepted the thirty-year franchise granted the Chicago & Milwaukee Electric Railway in Waukegan.

Cedar Rapids, Ia.—The United Light & Railways Company has received a twenty-five-year franchise from the Council in Cedar Rapids. The company has also received a forty-year franchise from the Council in Chattanooga, Tenn.

Topeka, Kan.—The Topeka Railway has received a twenty-year franchise from the County Commissioners over the Eighth Street line from the city limits of Topeka on the west to Gage Park.

Middlesboro, Ky.—W. Godfrey Hunter, Middlesboro, will ask the Council for a franchise in Middlesboro. This is part of a plan to build an electric railway to connect Middlesboro with other coal centers of that section. [E. R. J., Sept. 20, 1913.]

Springfield, Mass.—The Springfield Street Railway has asked the Council for a franchise to double-track its line from Woodlawn turnout to the Westfield line in Springfield.

St. Louis, Mo.—The United Railways has asked for a franchise along Florissant Avenue from Calvary Avenue to Robin Avenue in St. Louis.

Orange, N. J.—The Public Service Railway, Newark, has asked the Common Council for a franchise to extend its line in Central Avenue, Orange, from the East Orange line to the West Orange line.

Orange, N. J.—The Orange Mountain Traction Company has asked the Common Council for a franchise on Central Avenue in Orange.

York, Pa.—The directors of the York Railways have accepted the franchise recently granted by the Council authorizing the Jackson Street extension in York.

Providence, R. I.—The Rhode Island Company has asked the Council for a franchise to double-track a certain portion of Maryland Avenue and New York Avenue and for an extension of its tracks on Manton Avenue in Providence.

Sutherland, Sask.—The Saskatoon Municipal Railway has received a twenty-year franchise from the Council to extend its lines in Sutherland.

Jackson, Tenn.—The Jackson Railway & Light Company has received a fifty-year franchise from the Council in Jackson, in return for which the company will extend its line into West Jackson.

Everett, Wash.—The Seattle, Snohomish & Everett Railway, Seattle, has received a two-year extension of time on its franchise from the Council in which to begin the construction of its line in Seattle. This line will connect Seattle, Everett, Bothell and Snohomish and connect in Seattle with the Ravena line of the Puget Sound Traction, Light & Power Company.

TRACK AND ROADWAY

Birmingham (Ala.) Rapid Transit Company.—Contracts will be awarded by this company in about thirty days to build its 19-mile line over certain streets in Birmingham. Plans and specifications have been approved by the city engineer and accepted officially by the city officials. This line will eventually be extended through Jefferson County. George B. Kelley, Birmingham, president. [E. R. J., Oct. 11, '13.]

Pine Bluff & Sulphur Springs Interurban Railway, Pine Bluff, Ark.—Surveys have been completed by this company and right-of-way obtained for 3 miles of its line from Pine Bluff to Sulphur Springs. Contracts have been let for grading and for ties. A. G. Russell, Pine Bluff, president. [E. R. J., Aug. 30, '13.]

British Columbia Electric Railway, Vancouver, B. C.—Negotiations are reported to be in progress by this company with the Great Northern Railway for the purchase of the abandoned right-of-way of the Cloverdale-Blaine line between Hazelmere and the International Boundary at Blaine, Wash. The proposed electric line will connect with the line projected by the Stone & Webster Corporation to Bellingham, and an extension may be built to the mouth of the Campbell River.

Northern Electric Railway, Chico, Cal.—Tracks are being laid by this company on its extension between Cement and Vacaville.

Fresno (Cal.) Traction Company.—Work will be begun at once by this company on its new line from the city limits of Fresno to the San Joaquin River, near the Riverside Country Club. Grading has been completed by this company on its 8½-mile extension between Muscatel and the new townsite of Biola.

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Fresno, Hanford & Summit Lake Railroad, Fresno, Cal.—Plans are being considered by this company for an extension from Fresno to Selma.

Pacific Electric Railway, Los Angeles, Cal.—Grading has been begun by this company for its extension from the city limits of Santa Ana to Orange.

San Rafael & San Anselmo Valley Railway, San Rafael, Cal.—This company has asked permission of the Railroad Commission to issue $100,000 in stock and $100,000 in bonds, the proceeds of the sale of which the company plans to use to build its 6-mile line between San Rafael, San Anselmo and along the county roads in Fairfax. The company will use storage battery cars. Plans are being made by this company to take over the franchises granted in September to S. J. Norton by the Councils of San Anselmo and San Rafael and by the supervisors of Marin County. E. S. Raker, president, and C. S. Whitaker, secretary. [E. R. J., Oct. 4, '13.]

Connecticut Railway & Lighting Company, New Haven, Conn.—Plans are being considered by this company to extend its lines in Norwalk, Bridgeport, New Haven and in the adjacent territory of New Haven. It also plans an extension from Cherry Street and North Street in Milford, thence northerly through Orange to connect with the tracks of the company on Derby Avenue.

Okeechobee Interurban Railway, Arcadia, Fla.—This company has been organized to build an interurban railway from Arcadia southeast, crossing Joshua Creek and Kissimmee River to the eastern coast of Florida. Also a branch southeast via Bigler, Hall City, Palmdale and Mayport to mouth of Fisheating Creek. An extension is also planned to Fort Myers via La Belle and a separate line via Lake Childs to Sebring. Capital stock, $1,000,000. E. Prouty, Arcadia, manager. [E. R. J., Sept. 6, '13.]

Jacksonville (Fla.) Traction Company.—Construction will be begun at once by this company on the Main Street extension from Seventeenth Stree. in Jacksonville to Long Branch, a distance of 1 mile.

Rome Railway & Light Company, Rome, Ga.—This company has placed in operation its 2-mile extension to East Rome.

Kankakee & Urbana Traction Company, Urbana, Ill.—During the next few weeks this company plans to extend its line northward from Rantoul to Ludlow.

New Albany & French Lick Valley Traction Company, New Albany, Ind.—Following the announcement by the Indiana Public Service Commission that this company, recently incorporated at New Albany, would be permitted to issue $300,000 of common stock, officers of the company have begun the work of securing right-of-way and disposing of the stock. It is proposed that as soon as the initial issue of stock is sold the company will be permitted to market an additional $200,000, after which a bond issue will be authorized. C. S. Hernley, Newcastle, secretary. [E. R. J., Sept. 20, '13.]

Waterloo, Cedar Falls & Northern Railroad, Waterloo, Ia.—This company has awarded a contract to R. A. Elzy, Marshalltown, Ia., for grading a 5½-mile extension from Urbana to Center Point. The contract for the bridging and culverts has been awarded to the Gould Construction Company, Davenport.

Independence, Neodesha & Topeka Traction Company, Independence, Kan.—Grading has been begun by this company between Neodesha and Independence. T. Blarksley, Neodesha, president. [E. R. J., Oct. 4, '13.]

North Beach Railway, Baltimore, Md.—This company has applied to the Public Service Commission for authority to issue $15,000 of common stock. Work has been begun by this company on its 3-mile line between Chesapeake Beach and North Beach. John C. Shaw is interested. [E. R. J., June 28, '13.]

Boston & Northern Street Railway, Boston, Mass.—This company is asked to double-track its line from Hall's Corner to Broadway in Revere.

Meridian Light & Railway Company, Meridian, Miss.—This company has placed in operation its new Eighth Street line in Meridian to Oakland Heights, a distance of 2 miles.

Metropolitan Street Railway, Kansas City, Mo.—An extension of this company's lines into the Blue Valley is under consideration.

United Traction Company, Albany, N. Y.—Plans are being considered by this company for an extension over New Scotland Avenue in Albany.

Blue Ridge & Interurban Railway, Hendersonville, N. C.—At a meeting of the Chamber of Commerce in Anderson it was decided to secure all of the right-of-way and raise a bonus of $10,000 to be presented to this company if it would consent to build a 2-mile extension from Cherry's crossing to Clemson College, in Anderson.

Stark Electric Railroad, Alliance, Ohio.—Arrangements are being made by this company to build its line between Alliance and Akron, via Malboa, Nevada, Baltimore and Lake.

Cleveland (Ohio) Railway.—Work has been begun by this company on its new Denison-Harvard line.

Bartlesville (Okla.) Interurban Railway.—This company is asked to consider plans to extend its lines in Bartlesville south on Keeler Avenue to Tenth Street, east on Tenth Street to Wyandotte Avenue and Fourth Street.

Henryetta (Okla.) Interurban Railway.—Financial backing has been secured and final surveys will be begun at once by this company for its 100-mile line to connect Henryetta with various coal mines and oil fields within a radius of 10 miles. Two preliminary surveys have been made to Dewar and the permanent one will be extended to Coalton. This section of the line will be built first. The company then plans to build east and west extensions with Shawnee and Muskogee as the proposed ultimate terminals. C. H. Kellogg, Henryetta, is interested. [E. R. J., Sept. 6, '13.]

Tulsa (Okla.) Street Railway.—Improvements which will include some additional trackage are contemplated by this company for its lines in Tulsa.

Hamilton (Ont.) Railway.—This company has received the approval of the Ontario Railway & Municipal Board for its extension into the Kerr Milling Company's premises at Dundas.

Toronto Suburban Railway, Toronto Junction, Ont.—This company has been asked by the Municipal Board to build its Annette Street line in Toronto at once.

Pacific Power & Light Company, Astoria, Ore.—Construction will be begun at once by this company on an extension from the business section of Walla Walla to the Fair Grounds.

Portland Railway, Light & Power Company, Portland, Ore.—This company is asked to consider plans to build an extension between Rose City Park and the Montavilla line out to the city limits of Portland.

Butler (Pa.) Passenger Railway.—Work will be begun at once by this company on its 1½-mile extension of the Main Street line to the Boulevard in Butler.

***Pittsburgh, Pa.**—A company of Pittsburgh promoters are considering plans to build an electric railway between Pittsburgh and Erie. No names are yet given of those interested in the project.

Montreal (Que.) Tramways.—A large amount of work is being done by this company on improvements of its lines in Montreal. Among the improvements are the laying of new intersections on many of its lines.

Montreal & Southern Counties Railway, Montreal, Que.—Reports state that much of the work on the roadbed for the extension to St. Cesaire, Que., has been completed by this company, and that it is contemplated to extend the recently completed electrification of the Central Vermont Railway from Richelieu to Marieville, Que., a distance of 4 miles.

Spartanburg Railway, Gas & Electric Company, Spartanburg, S. C.—A 25-mile extension from Spartanburg to Cross Anchor is being planned by this company.

Dallas, Corsicana & Palestine Railway, Dallas, Tex.—Plans are being considered by this company to build its 150-mile line from Dallas to Palestine and Corsicana. No definite plans have yet been made as to the awarding of contracts for the construction of the line. C. Roe Hall, Palestine, secretary. [E. R. J., Dec. 14, '12.]

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Dallas Southwestern Traction Company, Dallas, Tex.—Right-of-way has been secured and contracts will be awarded by this company about Jan. 1 for its 80-mile line between Dallas, Glen Rose, Grand Prairie, Mansfield, Alvarado and Cleburne. The following officers have been elected: E. P. Turner, president; C. A. Dunn, vice-president; B. B. Cain, treasurer; George Williams, secretary; E. M. Gleason, general manager; H. John T. Witt, 606 Praetorian Building, Dallas, chief engineer. [E. R. J., Oct. 4, '13.]

Southern Traction Company, Dallas, Tex.—This company has placed in operation its 98-mile line from Dallas to Waco. A branch to Corsicana, 35 miles, is now being built. Power is supplied by the Fort Worth Light & Power Company.

Northern Texas Traction Company, Fort Worth, Tex.—In compliance with a petition filed several weeks ago this company has agreed to extend its Summit Avenue line in Fort Worth 1 mile beyond the present terminus as soon as financial arrangements are made by the petitioners.

Blue Ridge Interurban Railway, Greenville, Tex.—An extension from Blue Ridge to Bonham is being contemplated by this company.

Houston (Tex.) Electric Company.—Announcement has been made by this company that it will spend $70,000 on improvements of its lines in Houston Heights. The improvements will include heavier rails.

Charleston-Dunbar Traction Company, Charleston, W. Va.—This company has placed in operation its 4½-mile line from Charleston to Dunbar.

Monongahela Valley Traction Company, Fairmont, W. Va.—This company has placed in operation its 25-mile line between Clarksburg and Weston.

Morgantown (W. Va.) Interurban Railway.—It is reported that bonds have been voted by the citizens at Morgantown and vicinity to aid this company to build its 10-mile line between Morgantown, Star City and Point Marion. S. D. Brady, chief engineer. [E. R. J., June 7, '13.]

Wheeling (W. Va.) Traction Company.—Work has been begun by this company laying new rails on its lines in Glendale.

Minneapolis, Merrill & Marinette Railway, Merrill, Wis.—Surveys have been completed by this company from Merrill to Athens. This line will connect Minneapolis and Merrill, via Abbotsford and Athens. F. W. Kubasta, Marinette, secretary. [E. R. J., June 7, '13.]

SHOPS AND BUILDINGS

British Columbia Electric Railway, Vancouver, B. C.—Plans are being made by this company for the construction of extensions to its Mount Pleasant carhouses on the block between Main and Quebec Streets and Thirteenth and Fourteenth Avenues in Vancouver. The structure will extend 132 ft. on Main Street and Quebec Street and 300 ft. along Fourteenth Avenue. It will be of reinforced concrete construction. On Main Street the height of the building will be 40 ft. and on Quebec Street about 20 ft.

San Diego (Cal.) Electric Railway.—This company has awarded a contract to John Campbell, San Diego, to build its new carhouse on Adams Avenue in San Diego. The cost is estimated to be about $92,000.

Springfield (Ill.) Consolidated Railway.—Work has been begun by this company on its new carhouse at Sixth Street and Ash Street in Springfield. The building will be erected by the Clinton Bridge Works and is to be of steel construction, with concrete foundation. The cost is estimated to be about $5,800.

Kankakee & Urbana Traction Company, Urbana, Ill.—Plans have been completed by this company for a new carhouse on North Market Street in Champaign. It will contain three tracks and a pit.

Kentucky Traction & Terminal Company, Lexington, Ky.—This company plans to build soon a new passenger station on Main Street between Limestone Street and Upper Street in Lexington.

Washington, Baltimore & Annapolis Electric Railway, Baltimore, Md.—This company will soon build a new freight station in Baltimore. The structure will be 30 ft. x 150 ft.

Bay State Street Railway, Boston, Mass.—Plans are being made by this company to establish a waiting room at Main Street and Centre Street in Brockton.

Cleveland (Ohio) Railway.—Plans are being made by this company to begin work soon on its new repair shops at Washington Boulevard and Harvard Avenue in Cleveland. The shops will replace the present repair plant at Lakeview.

Niagara, St. Catharines & Toronto Railway, St. Catharines, Ont.—A passenger station and terminal freight houses will be built by this company at Niagara-on-the-Lake as soon as the company's new St. Catharines-Niagara line is completed. The company is considering plans to purchase the property now occupied by the Armstrong-Addison, LeFaugh and Greene buildings at Niagara-on-the Lake.

Toronto (Ont.) Railway.—This company has plans to build an addition to its carhouses on Connaught Avenue in Toronto in the near future. The cost is estimated to be about $9,000.

Greenville, Spartanburg & Anderson Railway, Greenville, S. C.—Plans are being made by this company to build new passenger stations in Duncan and in Taylor, S. C. A. C. Lee, Greenville, chief engineer.

Dallas (Tex.) Electric Corporation.—Preliminary arrangements have been completed by this company to build soon new repair shops in Dallas. The structure is estimated to cost about $120,000.

Eastern Texas Traction Company, Dallas, Tex.—This company plans to build a new office building on the corner of King Street, Lee Street and Washington Street in Dallas in the near future. The company has recently opened offices in the Teague Building on West Lee Street in Dallas.

Tyler Traction Company, Clarksburg, W. Va.—This company has awarded a contract to Dayton & Francis to build a new carhouse in Sistersville. The structure will be of brick, stone and cement construction.

POWER HOUSES AND SUBSTATIONS

Oakland, Antioch & Eastern Railway, Oakland, Cal.—This company will install in its power plant in Oakland one 750-kw synchronous motor generator set consisting of two 650-volt, d.c. generators connected in series, and 11,000-volt, three-phase, 60-cycle, 514 r.p.m. motor with direct-connected exciter. This apparatus has been ordered from the Westinghouse Electric & Manufacturing Company.

United Railways & Electric Company, Baltimore, Md.—An order has been placed by this company with the Westinghouse Electric & Manufacturing Company for one 2000-kw, 600-volt, six-phase, 25-cycle, commutating pole rotary converter, three 750-kw, 13,200-volt, air blast transformers and switchboard for the control of same for its power plant in Baltimore.

Pittsburgh (Pa.) Railways.—This company has placed an order with the Westinghouse Electric & Manufacturing Company for three 500-kw, 600-volt, six-phase, 60-cycle rotary converters with three 550-kva, 22,000-volt, three-phase O. I. S. C. transformers, and one fourteen-panel switchboard for the control of same for its power plant in Pittsburgh.

Greenville, Spartanburg & Anderson Railway, Spartanburg, S. C.—An order has been placed by this company for one complete portable substation consisting of the following: One steel car equipped with Burke switches, lightning arresters and choke coils; one 500-kva, O. I. S. C., three-phase, 60-cycle, 44,000/2400-volt transformers, and one 500-kw motor-generator set consisting of two 250-kw, 750-volt, 900-r.p.m., direct-current generators, and one 750-hp, three-phase, 60-cycle, 2400-volt, single-phase motor and one 6½-kw direct-connected exciter. This apparatus has been ordered from the Westinghouse Electric & Manufacturing Company.

Puget Sound Traction, Light & Power Company, Bellingham, Wash.—It is reported that this company plans to build a new power house on the Baker River and Skagit River sites in Bellingham.

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Manufactures and Supplies

ROLLING STOCK

Dominion Power & Transmission Company, Ltd., Hamilton, Ont., has received one freight car from the Preston Car & Coach Company.

Nipissing Central Railway, North Cobalt, Ont., which is operated by the Temiskaming & Northern Ontario Railway Company, Toronto, Ont., is considering the purchase of additional cars.

Cape Breton Electric Company, Sydney, N. S., has ordered the three double-truck, double-end closed cars which it is having built to be equipped with Baldwin trucks, four 40-hp Canadian Westinghouse motors for each car, and Canadian Westinghouse air brakes.

Edmonton (Alta.) Radial Railway has received ten steel underframe, double-truck, single-end pay-as-you-enter cars from the Preston Car & Coach Company, making twenty-eight delivered out of an order of thirty-five. The remainder will not be built until 1914.

Guelph (Ont.) Radial Railway has received one double-end, double-truck, pay-as-you-enter city car from the Preston Car & Coach Company. It is mounted on standard truck with rolled steel wheels, Westinghouse 101-B2 quadruple motor equipment, Westinghouse SM-1 air brake, and the body is finished in natural cherry inside and out. Crouse-Hinds imperial arc headlight, Providence fenders and Root scrapers are used.

London (Ont.) Street Railway, noted in the ELECTRIC RAILWAY JOURNAL of Oct. 11, 1913, as having ordered six single-truck, single-end, pay-as-you-enter city cars from the Preston Car & Coach Company, has specified that these cars are to be mounted on Brill 21-E trucks, with 8-ft. base. The doors on the rear platform will be operated in conjunction with the folding steps by a system of leverage under the control of the conductor. The front vestibule door is to be operated in a like manner. The bodies are to be finished inside and outside in natural cherry. There will be ten cross seats, two longitudinal and three stationary seats in each car, giving a total seating capacity of thirty-two passengers. There will be no bulkheads. The roof will be turtleback.

New York State Railways, Rochester, N. Y., noted in the ELECTRIC RAILWAY JOURNAL of April 19, 1913, as having ordered twenty-five pay-as-you-enter cars from the G. C. Kuhlman Car Company, has issued the following specifications concerning these cars:

Seating capacity.....46	Cables .....West.
Weight (car body only), 17,500 lb.	Curtain fixtures.Cur. Sup. Co.
Bolster centers, length, 22 ft. 3 in.	Curtain material...Pantasote
Length of body..30 ft. 11 in.	Designation signs....Hunter
Length over vestibule, 43 ft. 6 in.	Fare boxes.....New Haven
Width over sills...8 ft. 3 in.	Fenders .....Eclipse
Width over all..8 ft. 5¼ in.	Gears and pinions.....West.
Height, rail to sills...31¼ in.	Heaters .....Cooper
Height, sill to trolley base, 8 ft. 8 in.	Headlight .....Dayton
Body....steel sides to window rail; posts and framing wood	Journal boxes....Symington
Interior trim.....cherry	Motors..two West. No. 307, outside-hung.
Headlining .....Galco	Paint .....Devoe
Roof.....plain arch	Registers .....International
Underframe .....steel	Sash fixtures.....Kuhlman
Air brakes.....West.	Seats .....Brill rattan
Axles .....Brill	Springs .....Brill
Conduits and junction boxes .....West.	Step treads.....Feralum
	Trolley catchers.....Wilson
	Trolley base.....Nutall
	Trucks.....Brill 39-E
	Varnish..Beckwith & Chandler, Valentine.
	Wheels .....National

TRADE NOTES

Newman Clock Company, Ltd., London, England, has opened a branch office at 55 Station Street, Birmingham, England.

National Insulator Company, Pittsburgh, Pa., has sold through its sales agent, C. H. Davis, at Atlantic City, a two-carload order of insulators to the Georgia Railway & Power Company.

Allis-Chalmers Manufacturing Company, Milwaukee, Wis., has placed A. J. Cooper, recently of the engineering department of the Milwaukee main office, in charge of the air-brake and equipment sales of its New England section.

Taylor-Wharton Iron & Steel Company, Philadelphia, Pa., has elected A. E. Borie chairman of the board of directors. Mr. Borie was formerly vice-president of the company. J. W. Jones and W. L. Wright were chosen vice-presidents.

Thomas A. Edison, Inc., Orange, N. J., announces the election of E. Hudson to the office of fourth vice-president of the company. Mr. Hudson will continue as heretofore in charge of the sales of the primary and battery department and will make his headquarters in Orange, N. J.

ADVERTISING LITERATURE

Sprague Electric Works of General Electric Company, New York, N. Y., have issued a folder listing their flexible-steel armored conductors and Greenfield flexible-steel conduit.

Hydrex Felt & Engineering Company, New York, N. Y., has issued a catalog explaining its membrane method of waterproofing concrete and insulating it from the effects of electrolysis, especially if below grade, by means of its felt and compound.

Siemens & Halske and the Siemens-Schuckert Works, Berlin, Germany, began in July to publish a house monthly entitled "Mitteilungen" (reports). The August issue, which has just come to hand, describes their automatic track switches for potentials up to 800 volts and also contains the first instalment of an article on automatic railway signaling.

National Tube Company, Pittsburgh, Pa., has issued a folder describing its spring plug cock, which is made in different metals for varying service. It has an inverted plug with a spring at the bottom, which constantly presses the plug firmly against the seat. While the plug usually turns easily, should it stick occasionally, it may be loosened by a blow on the top, after which it is immediately reseated by the spring. The cap at the bottom is screwed securely into the body and cannot be tampered with by the workman.

NEW PUBLICATION

Steam, Its Generation and Use. Published for distribution by the Babcock & Wilcox Company, New York. Cloth, 335 pages.

The thirty-fifth edition of this volume, which is without doubt the best known publication on steam boilers in existence, has been completely rewritten and expanded in many respects. It begins with a brief history of the utilization of steam, and this is followed by chapters on the early forms of water-tube boilers, the evolution of the present type and a description of its constructional details, circulation and other features of desirability. A new chapter on the measurement of heat has been added, including discussions of thermometric scales, specific heats, melting points and expansion of different substances and pyrometers, and new chapters on boiler-feed water have been inserted with discussions on the action of chemicals and the amounts of soda ash and lime required per grain per gallon for the elimination of scale-forming impurities. The usual tables on the properties of steam appear in the chapters on this subject, one of these supplying the much-needed demand, caused by the general use of the turbine, for figures on the properties of steam at high vacuums, and another showing the properties of superheated steam. The original chapters on properties of air, combustion analysis of flue gas and chimney losses have been completely rewritten, and the chapters on steam fuels have been expanded to cover the subject in the most thorough manner, including an unusually complete table of analyses of steam coals of the United States. To the chapter on efficiency and capacity of steam boilers has been added a chart showing the approximate relation between these two factors in steam production together with a new list of boiler tests. New chapters on boiler operation, boiler settings and boiler room piping have also been included in the volume.

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SCHEMATIC DIAGRAMS ON WIRING PLANS

The value of single-line wiring diagrams in the interpretation of detailed connection drawings has become widely realized within the past few years, and the development of high-tension transmission systems and apparatus of the polyphase type has been largely responsible for this. Of late the usefulness of the schematic diagram has been still further increased by placing it on the same tracing as the important detailed drawing necessary to the construction man's work, and when the convenience of this practice is more generally recognized, there is little doubt that it will become a standard procedure. An interurban railway company in the East which is developing its power system along comprehensive lines applied the schematic idea in one corner of a number of complex wiring plans, with the result that its officials saved much valuable time in working with the latter. There was no "lost effort" in trying to grasp quickly the relations of different details. On many wiring plans such condensation is, of course, unnecessary, but whether the space available is large or small, the usefulness of single-line or skeleton diagrams is of the utmost value, not only to the busy executive but to the new man in the plant who in the company's best interests needs to be taught the apparatus relations in the shortest feasible time.

COURTS AND THE SMOKE NUISANCE

Engineers and boards of directors may hold back, but the courts are ready for the electrification of steam lines, in cities at least. Judges do not have to raise capital; they simply decide what we must do and leave the financing to others. Nevertheless, much significance is to be attached to the decision just rendered by the Supreme Court of Pennsylvania to the effect that the Reading Railroad must pay for locomotive smoke damage to property along the line of its new elevation through Philadelphia. For the court reaches its decision on reasoning to the effect that as electrical operation is feasible, the railroad company may be penalized for failure to adopt this method of conducting transportation through closely built-up areas. This is a complete reversal of precedents that have been maintained by the Pennsylvania courts ever since the "Filbert Street cases" of a generation ago were decided in favor of the Pennsylvania Railroad. In those cases the courts held that the company was not liable for smoke damages, because the creation of a certain amount of smoke was an unavoidable incident of the lawful business of conducting a railroad. Now the Supreme Court of the State where this precedent was laid down declares that the old rule should no longer prevail, since electrification is a demonstrated means of avoiding smoke damage. Smoke, the court says, in effect, is not now, as it was formerly, unavoidable, and, this being so, property owners now have grounds for the recovery of damages sustained as a result of steam locomotive operation. The pressure from all quarters for urban electrification at least has been bearing heavily on the railroads in many quarters. The Pennsylvania decision, if generally followed, would make it all the more necessary that the money for electrifying steam lines should be found with the least possible delay.

TWO-CAR TRAIN TESTS IN NEWARK

It is very satisfactory to learn that the Public Service Railway, of New Jersey, is planning to conduct another series of tests of two-car train operation to determine more definitely the relative advantages of this method of operation and of single cars. We do not know of any matter of more vital importance than this to operators of properties in large cities, and the interest which this subject naturally excites as a possible means of reducing rush-hour congestion has been enhanced by the able reports presented during the past two years by the joint committees of the Transportation and Engineering Associations on city and interurban train operation. These reports analyzed the situation thoroughly from a technical and financial standpoint and gave the fundamental data which every company needs in its consideration of the subject. As stated elsewhere in this issue, the new tests which the Public Service Railway will conduct are planned so as to overcome the main condition which was found, in the original tests, to introduce confusion in the final results. This was the lack of familiarity with train operation on the part of the crews and the public. The result was that the greater elapsed time for stops required by the two-car train so reduced the advantage gained by its use as to leave very

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much in doubt the final question of superiority between the two methods. Undoubtedly a point exists where a slower schedule on the part of a two-car train will just balance in cost of operation its gain from a reduction in platform expenses. Under the conditions existing in Newark the percentage of reduction in speed of the train to bring this about has been estimated by the engineers of the Public Service Railway to be about 4 per cent. With a reduction less than this, the two-car train, other conditions being equal, would be superior, and it is the question of the extent, if any, to which train operation will reduce the schedule speed under Newark conditions that is to be determined. The industry is to be congratulated upon the enterprise of the Public Service Railway in thus continuing these tests, and we are sure that all of our readers who are engaged in transportation service in large cities will be greatly interested in the outcome of these trials.

THE CLEVELAND FRANCHISE IS NOT A SOLUTION

Disregarding the loss in capital value inflicted on stockholders by the Cleveland Railway franchise, the main question of concern about that ordinance is: Has it satisfactorily solved the street railway problem? Mr. Duffy, whose membership on the recent board of arbitration gave him an excellent opportunity to study the actual workings of the ordinance, told the American Electric Railway Association in his paper at Atlantic City last week in effect that it had not solved the problem satisfactorily for either the public or the company.

It is natural that stockholders who suffered heavy loss through the ordinance provisions should feel that the agreement is woefully lacking in justice and fairness. It is natural also that city officials of Cleveland should do what they have done in rushing to the defense of the agreement as soon as the conclusions reached by Mr. Duffy came to their attention.

The reasons given by Mr. Duffy for his conclusions may be summarized as follows: The service is inadequate and unsatisfactory. The cost of operation is greater than the revenue, provided proper allowances are made for reserves for those elements of cost which are not represented by current outlays. The capital value is reduced. The rate of return and margin of safety are insufficient. There is no assurance that the capital value allowed will be unimpaired. The apparent provision for depreciation is open to the same criticism as the thoroughly discredited rate methods of assessment life insurance organizations. The difficulties and political conditions hampering the practical administration of the ordinance will be appreciated at some time by junior security holders, with resultant effect on credit sources.

The criticism of the service made by Mr. Duffy is more than a mere observation based on the number of cars on the streets; he calls attention to the limited trackage operated from the standpoint of population and territory served. No doubt two factors are responsible for the comparative deficiency of Cleveland in the respect thus outlined. One is that during the long period of bitter contest which preceded the adoption of the present franchise the property was in such peril from the attacks of city officials that the normal increase in trackage was not built. Certainly there was no encouragement to build it; there was enough discouragement in the outlook to make the company fearful for what it had and to keep it from risking more. Another factor is the necessity which the city officials are under of avoiding the construction of any material amount of mileage that will not pay its way from the start. If the low fare is to be retained, the returns cannot be diluted by the construction of outlying extensions which would involve a long haul and light density of traffic.

The reserves which Mr. Duffy mentioned as being excluded from the cost of operation were considered in part by the board of arbitration, whose decision was published in the Electric Railway Journal for June 28, 1913. The clear intent of the ordinance was to safeguard the capital investment at the point to which it had been reduced, and that purpose is not carried out if definite provisions are not made for proper reserves. The Cleveland ordinance was meant to be singularly purposeful in providing for street railway fares at cost consistent with the security of the property and the certainty of a fixed return thereon. Unfortunately, some public utility companies have been at fault in contending in one case that no depreciation existed when it should have been taken into account and in arguing in another case, where their interests were affected in an opposite way, that depreciation existed though invisible to the naked eye, and therefore that provision should be made for it. But the fact that mistakes have been made in many cases in the past is no reason why the city of Cleveland should insist upon a wrong principle at this time. The ordinance explicitly provides for a maintenance, depreciation and renewal account, and even if a provision for the care of depreciation which is not made good through current expenses would increase the rate of fare in Cleveland, the provision ought to be made.

Another point which Mr. Duffy mentioned is the insufficiency of the present rate of return. If there were ever reasons why the company should be protected amply with a wide margin of earnings above the necessary interest and dividend requirements, these reasons have gained twofold in importance through the changes in the money market since the passage of the ordinance. By reason of these changes the company and its security holders are the victims of circumstances for which, of course, the city cannot be held responsible in any degree. Six per cent was a more inviting rate a few years ago than it is now. Perhaps the pendulum will swing backward again, but if it does not, the company will be hampered in its financing in the future by comparison with other companies which can meet shifting conditions by changing the rates of return which they have to pay for capital as the necessities of the moment require. Hence the city should allow a safe margin above the ordinance rates.

The most serious indictment made by Mr. Duffy is that the ordinance fails to convey any assurance that the capital value will be unimpaired at the expiration of the grant. We believe that the clear purpose of the city was that there should be no question of the complete integrity of the principal value of the securities left to the company after the scaling process was finished. The city is morally bound to protect the company in this manner; it ought to want to be legally bound to do so.

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The real difficulty with the Cleveland situation is that in the changing political conditions of the times some of the basic elements of the intent of the ordinance have been lost to sight. The intent was that fares should be at cost, that the capital value should be protected and that a fair return should be afforded. In the shifting kaleidoscope of time the city officials of Cleveland appear to think that the one definite motive of the ordinance was to provide 3-cent fares and that all other provisions must be interpreted, distorted, shaped or changed to secure that end. As a matter of fact, flexibility was made possible in the rate of fare just as much as in the maintenance and other operating expense charges, because by that means only could the virtue of the arrangement be assured.

MR. DALRYMPLE'S INTERVIEW

It was a Scotchman named Burns who wished for the gift "to see ourselves as others see us," and now another Scot, yielding to our request to let us enjoy the same privilege, has consented to give his impressions of American street railways. We feel that all of our readers will be interested to read what Mr. Dalrymple says in another column about our track, shops and cars, about our methods of prepayment operation, about our problems of congestion and overcrowding, and on the subject of public relations. In making his comparisons, Mr. Dalrymple freely admits the influence of local conditions in a great many features in which there is a difference in British and American operating practice. Thus, in discussing overcrowding, he says that while overcrowding is less abroad during the rush hours than here, the riding at other times is better distributed. For this reason, in Europe, much of the traffic is taken out of the way before the rush hour begins. We assume, also, that still another reason for the higher traffic peak here is the difference, in characteristic design, of the American city as compared with that in Great Britain. In all European countries, as a rule, the business district of a city is spread out, owing to the restrictions on the erection of high buildings and the smaller number of very large shops or department stores. On the other hand, the residential area, compared with that in the average American city, is much more compact, owing, undoubtedly, in part to the zone system of street railway fares in force and the restricted development of suburban lines. In consequence, the rush-hour traffic in the average American city is largely in the form of long riding from a single center, and in Great Britain in the form of short riding from a number of local centers.

The portion of Mr. Dalrymple's remarks which will attract the greatest interest, however, will be that relating to municipal ownership. The critical situation in several prominent cities in this country has evidently made a deep impression upon him, and he said that in the end, in his opinion, the municipalities will take over the railway properties. Such a step, we assume, Mr. Dalrymple would regard as involving very great dangers to the public unless there should be a radical change in the methods employed in carrying on municipal work in the United States. We are led to this conclusion because Mr. Dalrymple in continuation said that unless the executive officials of the railway properties have security in office and changes of administration have no effect on the operation or the personnel of the street railway, the result will be confusion—and, he might have added, financial disaster as well. Testimony of this kind and from this source is of the highest value. In other words, unless the American methods of municipal politics can be made over and the spoils system be banished, a municipality should not assume the great responsibility involved in the direction and operation of its local transportation systems.

It is a common principle of business that unless a man shows himself capable of administering with some degree of efficiency the simple undertakings which may be assigned to him, he should not be placed in charge of larger enterprises. This principle underlies the reasons of thoughtful citizens against the municipal operation of electric railways in this country.

ENFORCEMENT OF INTERURBAN RULES

In its verdict on the late disaster on the San Francisco, Napa & Calistoga Railway the California Railroad Commission said: "Only slight changes in rules are ordinarily necessary, but much improvement is necessary in the manner in which the established rules and regulations are complied with. In the case of the wreck in question, the real cause was not the failure to adopt rules but the failure to require compliance with the existing rules." This latter condition the commission lays directly at the door of the officials of the company. Whatever may be the facts in this particular case, the criticism that commendable rules are found to be in print but are accompanied by lax conditions of enforcement has been made before in regard to both steam and electric lines, and many disasters have been attributed to this cause. The basic trouble is that a great many people believe in the discharge or punishment of employees where the violation of rules results in disaster but in individual cases will criticise a management as unnecessarily severe unless it retains in the service those whose violations result in no loss of property or life. It is often true that a gradation of punishment is advisable according to the circumstances, but where rules exist and are broken officials should undoubtedly see that the violators suffer the consequences.

In the case in point the California Railroad Commission states that most of the interurban lines in that State should be protected by block signals. This is important not only from the standpoint of the safety of the public but also from that of the accompanying assurance given the companies that the commission realizes the expense which such an order entails. Then this definite statement is made: "If the installation of the necessary safety devices requires an increase in the rates of the utilities, such an increase will be allowed. The traveling public has a right to be protected and should be willing to pay for such protection." In case any utility exists in California whose failure to provide properly for the safety of the public is based on inadequate rates, it now has no reason for a failure to install proper devices. The decision of the commission as regards the installation of safety devices and the enforcement of existing rules certainly puts the matter up to officials of electric interurban railways in that State.

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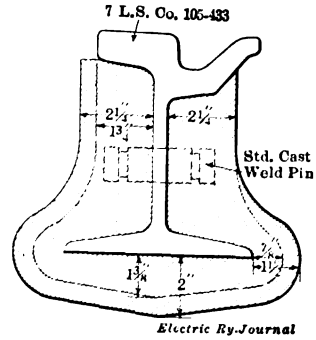
Cast-Weld Joints and Steel Ties in Brooklyn

The Following Paragraphs Describe the Latest Cast-Weld Rail Joint Practice for Curves and Tangents and Some Experimental Steel Tie Construction of the Brooklyn Rapid Transit System

During the years 1908 to 1911 the Brooklyn Rapid Transit System installed several thousand riveted joints with eight rivets per side in ⅞-in. x 3½-in. x 29½-in. inside plates and ⅞-in. x 4½-in. x 29½-in. outside plates for 7-in. rail; also in ⅝-in. x 5¾-in. x 30½-in. inside and outside plates for 9-in. rail. This form of joint was installed on both new and old track, but after it had been under traffic for about two years it was found that many rivets had loosened through tendency to shear under impact. After careful consideration the company decided, in 1911, to install in new construction the cast-weld joint hereinafter described. By Sept. 30, 1913, 2600 of these new joints had been put in place. These are in use on fourteen important lines in various parts of Brooklyn and hence are subject to a great variety of conditions. The new joint has given very little trouble, as will be noted from the following record of installations and the constantly decreasing proportion of failures:

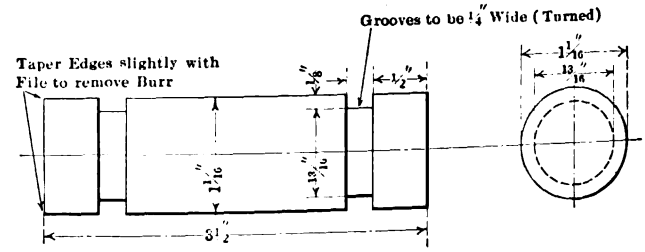


Brooklyn Joints and Ties—Cross-Section at Weld

instead of a wagon, a plan which secures better positive and negative contacts for the cupola blower and also permits the car to be located so close to the work that the molten metal loses little heat before it is poured.

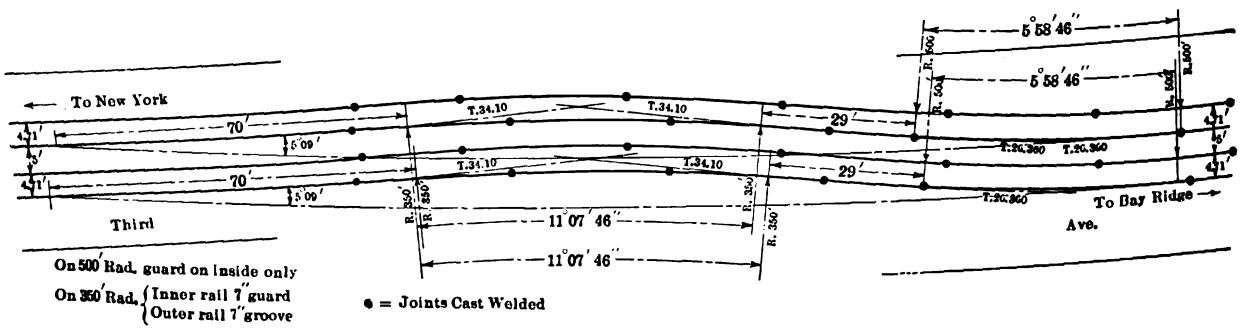
PROCESS OF INSTALLATION

The Brooklyn method of installing the cast-weld joint is well shown in the accompanying series of halftone engravings. First two holes are drilled in the end of each abutting rail to the standard single row spacing of 2½ in. and 4 in.,

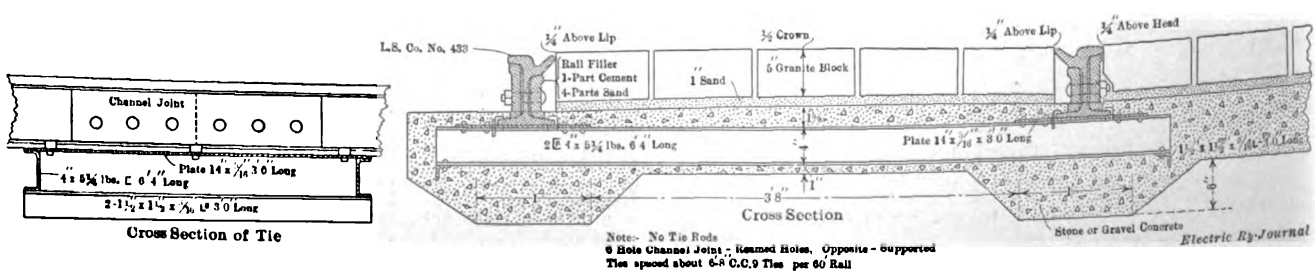


Brooklyn Joints and Ties—Steel Pin Used in Weld as Mechanical Tie and for Distributing Tension Strains

after which the track is lined through by the temporary application of standard joint plates with two bolts per joint. The next step is to remove the plates and apply a sand blast until a satisfactory surface has been obtained.



Brooklyn Joints and Ties—Distribution of Cast-Weld Joints on Inner and Outer Arcs of Reverse Curve



Brooklyn Joints and Ties—Cross-Section of Track Construction Using Steel Ties with Intermediate Plates for Rail Connection

CAST-WELD JOINT INSTALLATIONS AND FAILURES

Joints installed 1911	388
Failures 1911-1912	23
Failures 1912-1913	8
Net number of good joints	357
Joints installed 1912	1084
Failures 1912-1913	9
Net number of good joints	1075
Joints installed to Sept. 30, 1913	1500
Failures	0

The reduction and practical elimination of joint failures are ascribed to two causes. One is experience in the casting of these joints. The other is the use of a cupola car

Steel pins are then inserted in the two holes nearest the ends of the rails. These pins are made of cold-rolled steel and are about 3½ in. long by 1 1/16 in. diameter with a ¼-in. groove near either end, as shown in one of the accompanying drawings. They are used to assist in distributing tension strains throughout the metal of the weld, the groove having been added in the Brooklyn design to give a better bond with the metal. They also serve to unite mechanically the two halves of the joint casting. The molds which are now put in place consist of a right-hand

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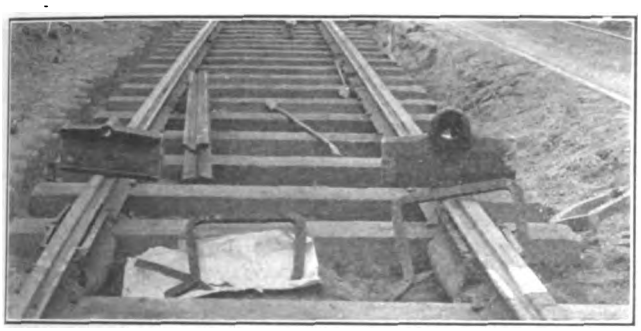
and left-hand piece, for the sides of the rail, and a top piece which fits the head of the rail. First the molds are thoroughly dried, and their inner surface is oiled before setting. The side pieces are then secured by means of an inverted C-shaped clamp. This type of clamp has replaced the scissors design illustrated in one detail view on this page because the latter extended over the head of the rail and so prevented car operation.



Brooklyn Joints and Ties—Side Pieces of Mold Free and Set; Temporary Clamps of Scissors Type

Brooklyn Joints and Ties—The Mold Complete and Ready for Pouring; Inverted C Clamps Used

As soon as the side pieces have been clamped in position, all cracks and seams are filled with fire clay. The mold is completed by setting the top piece and keeping it in position by means of the clamp bar and screw illustrated on this page. This bar is provided with clamps which hook under the rail from opposite sides, while the screw is turned by means of a hole in its head. The top piece contains the riser hole. Its principal functions are to hold the head of the rail in surface, to prevent the cambering of the joint and help to dissipate heat. The mold is made ready for pouring by having sand or earth banked around it, as shown on this page. To prevent foreign substances from getting into the mold before the pouring, properly weighted pieces of paper are put over the riser hole until the metal is brought to it. When more than twenty-four joints are to be poured the top pieces of the molds on the middle section of the work are omitted to permit the movement of the cupola car.

The pouring of the ladle and a filled riser hole are illustrated on page 922. It will be noted that a pair of special

Brooklyn Joints and Ties—Sand Blasting the Rail Before Placing the Mold

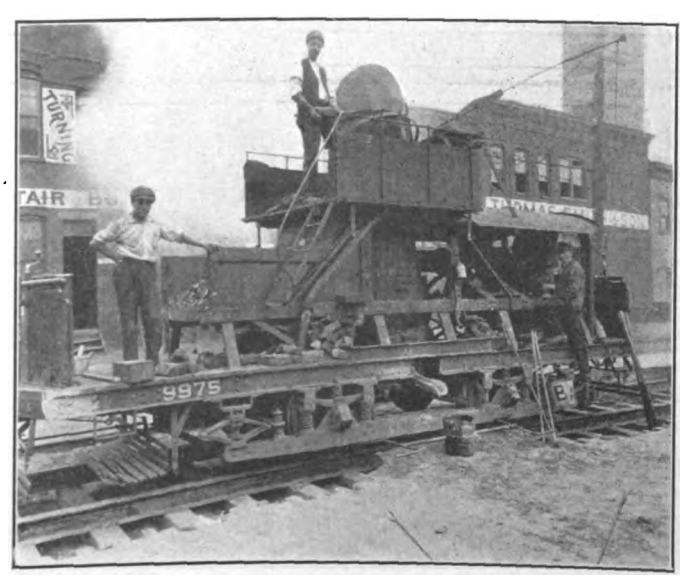
posts with lugs to support the ladle handles are used so that the metal can be poured gradually and correctly. The top clamps are allowed to remain in place for about two hours to permit proper cooling. The joint is completed by being filed with a hand-operated reciprocating file.

When cast welding was inaugurated the cupola equipment was mounted on a wagon. This wagon usually had to remain in a side street, so that some trouble was experienced from the chilling of the metal when carried for an appreciable distance. These difficulties have been overcome by placing the equipment on a car which is moved up to the work as closely as possible. Under these conditions the maximum distance of carrying the ladle is usually not more than 300 ft. The fire is prepared at the yard of the way department in the morning so that when work begins at the job the metal will be ready to pour in about ten minutes after the blast has been started. In another ten minutes the color of the metal changes from yellow to the desired whiteness.

All welding is done during the day, and the average number of joints made varies from twenty-four to thirty, with a maximum of thirty-eight. As many as twenty-six joints have been poured in one hour. The work of setting the molds begins at 9 a.m., and the last pour is made about 1 o'clock, so that the tracks are ready for rush-hour service by 4 p.m. The gang trained for cast welding is composed of full-time employees who are available for other work at other hours.

CONDUCTIVITY, PREVENTION OF HUMPING, ETC.

Tests of the new joint have shown that its conductivity is equal to 3.37 ft. of rail, so that it is practically the equivalent of the 7-in. rail section. The cast-weld joints are now



Brooklyn Joints and Ties—The Cupola Car Ready for Service

placed opposite instead of staggered. Hence if any humping does occur it will be confined to fewer spots. However, this humping has been practically eliminated since closer attention has been given to weather conditions during welding and the top clamps have been tightened to the limit. As regards weather conditions, it was observed that in cool weather, with the joint between the old and new rail open, the welding of the first joints in a section of track closed

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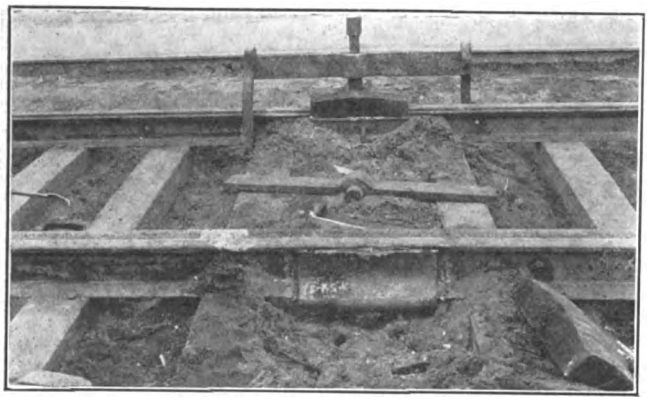
up the gap at the ends only temporarily, for as soon as the earlier welds had cooled the rail would contract again. Consequently, the last joint poured was not likely to induce enough expansion to fill permanently the gap between the old and new rail. In uniformly cool weather, therefore, the wedges which are placed between the old and new rail remain in position throughout the operations, but in hot weather, with rising temperatures, the end joints are permitted to stay open and so allow the rail to be free. Objection has been raised on theoretical grounds to the tightening of the top clamp because of the assumed extra strain upon the casting. Practical experience has demonstrated, however, that the top clamp does not throw the joint out of level.



Brooklyn Joints and Ties—Poured Molds With and Without the Clamping Outfit

Brooklyn Joints and Ties—Filing Down the Poured Joint for the Finish

While no attempt is made to pour welds in heavy showers, it has been found that if the molds are well prepared and kept dry and also if water is prevented from filling the groove of the rail, welds can be poured in light rains without any damage to the casting or injury to the operators because of blowing. The use of a cupola car instead of a wagon, as previously noted, has made it possible to cut down the carrying distance of ladles from 800 ft. to a maximum of say 300 ft. After the company's experience with cold metal in 1911, it was intended to use thermit for reheating the metal in the ladles just before pouring, but the introduction of the car made this precaution unnecessary.

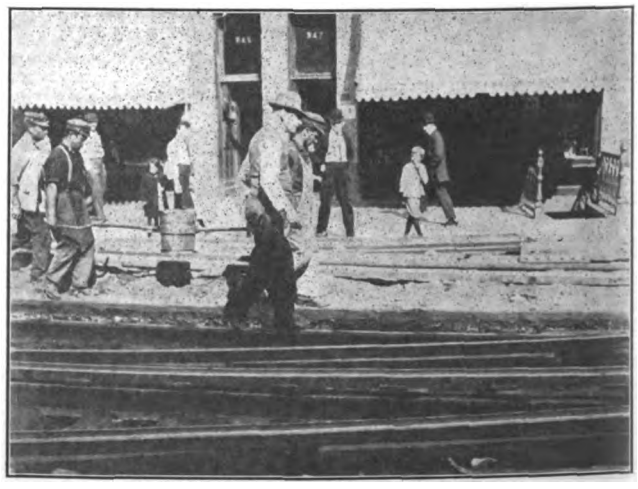
Brooklyn Joints and Ties—Pouring Cast-Weld Joint Alongside the Cupola Car

CAST-WELD JOINTS ON CURVES

A most striking application of the cast-weld joint has been made this year to curves of any radius from 125 ft. upward. The early experiments showed that if the welds were made in serial order from either end of the curve each weld in turn would cause a kinking of the portion of rail ahead. This difficulty has been overcome by welding the first joint at that part of the curve which is most liable to kink, namely, the center. The following joints are then poured alternately on opposite sides of the first weld. In this manner the kinking effect on opposite sides is neutralized. The welding is always begun on the inner arcs, inasmuch as the shorter pieces are those most likely to give trouble. The plan on page 920 illustrates how such joints were installed on a reverse curve. The joints on the guard rail were 30 ft. apart and on the outer rail 60 ft. apart. Where joints are made in open track on tangents, expansion joints 1000 ft. apart are used, but they are not installed on curves, as the curves themselves tend to act like expansion joints. The total number of cast-weld joints on curves installed this year by the Brooklyn Rapid Transit Company was approximately 200.

RECORDS

One of the most important features of the cast-weld joint installation is that a record is kept of the conditions under which each joint is poured, of the interval which elapses between the pouring of the last joint and the resumption of car service and of any special phenomena at the pouring of the joint, such as boiling or blowing. Thus, if a joint should break, the record is available so that a correct diagnosis can be made of the cause. A typical report on a joint which had been found broken follows: Joint No. 28, location Fifth Avenue and Sixty-third Street; inner rail, eastbound track; poured 12.20 noon Aug. 6, 1912; weather,



Brooklyn Joints and Ties—Carrying the Ladle to Cast-Weld on Curves

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clear; temperature, 70 deg. Fahr.; first cars operated over this joint at 2:30 p.m.; no special phenomena at pouring; joint inspected Aug. 7; found open 1/32 in. at the gage line and ⅛ in. at the lip, otherwise looked perfect. In this instance no cause was assigned for the break other than contraction. All broken joints of the first year's welding were found to have been made with a double and sometimes a triple pouring. Consequently, a proper segregation of the metal and a good junction with the rail had not been obtained.

COST OF CAST-WELD JOINT

The cost of the riveted joint approximated $5 each, whereas the cast-weld joint, including repairs of equipment,

COSTS FOR METAL—CAST-WELD JOINTS—SEASON 1912

Number of joints welded			1084
Pig iron used, total lb.			151,303
Scrap iron used, total lb.			63,041
Total amount metal, lb.			214,344
Pig iron per joint (61.3 per cent) lb.			121.2
Scrap iron per joint (38.7 per cent) lb.			76.6
Total metal per joint, lb.			197.8
Estimated weight metal per joint, lb.			176.0
Excess loss to slag and in pouring, lb.			21.8
Pig iron, total cost	$977.73	Cost per joint	$0.902
Scrap iron, total cost	652.12	Cost per joint	0.602
Total cost metal	$1629.85	Total cost per joint	$1.504

Excess of 21.8¾ lb. = 11 per cent of actual metal used.
Excess of 21.8¾ lb. = 12.3 per cent of estimated weight of metal in one joint.

costs a total of but $3.60. This cost would be still lower were it not for the fact that transportation conditions permit the opening of short sections only for cast-welding. The

Brooklyn Joints and Ties—Detail Showing Wedge Tie Clips Between Plates and Rail; Also Concrete Base for Paving

first element which enters into the cost of the cast-weld joint is the cupola outfit. The cost of this item, exclusive of the car on which it is mounted, was about $2700. From the accompanying table of metal costs and quantities for the welding of 1084 joints it will be seen that the proportions of pig iron and soft scrap iron tend to be respectively 60 per cent and 40 per cent.

The net weight of metal used in a joint for 7-in. rail is about 176 lb. The distribution of metal around the joint is shown in a drawing on page 920.

The pig iron referred to in the table is new and is bought to the following specifications: silicon, between 2.75 and 3.5 per cent; sulphur, not to exceed 0.03 per cent; manganese, not to exceed 0.5 per cent; phosphorus, between 0.6 and 0.8 per cent. The scrap iron consists chiefly of pieces of broken machinery. In addition to these metals, titanium alloy is used. This is purchased in 100-lb. bags at 12½ cents per pound. Three joints require 1 lb. of alloy.

The cost of sand is not an important item when used in connection with joint welding, but it is charged against the way department at 20 cents per cubic yard.

The cupola burns coke, the approximate quantity being 40 lb. per joint. As the company pays $33.75 for 5-ton lots, the cost of coke is 13.5 cents per joint. This fuel is known as seventy-two-hour coke and must satisfy the following specifications: Fixed carbon, not less than 89 per cent; ashes, not more than 8 per cent; sulphur, not more than 0.75 per cent, and volatile matter, not in excess of 25 per cent.

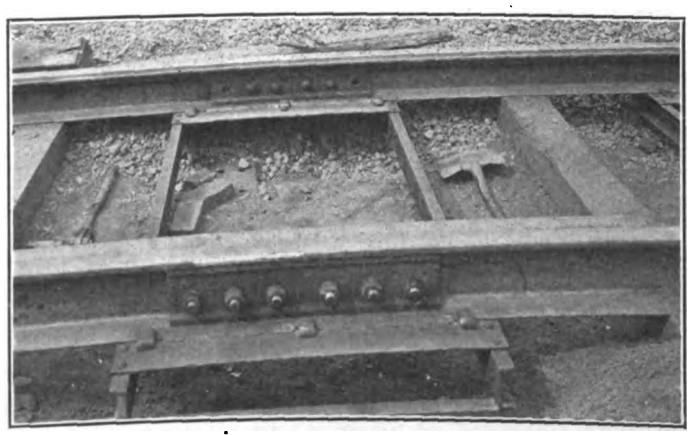
Additional materials used in connection with the joints comprise the molds, clamps and other mechanical parts at $19 per set. The other charges are: labor, $1.05 per joint, and freight charges, as made by the subsidiary South Brooklyn Railway, 30 cents per joint.

STEEL TIE CONSTRUCTION

Steel tie construction of the usual type was installed as

Brooklyn Joints and Ties—Steel Ties with Intermediate Plates

early as 1907 by the Brooklyn Rapid Transit System, but it has recently placed 300 steel ties which are novel in the manner of attachment to the rail. Various stages of installation of the new ties are shown in the accompanying views. The experiment is being carried out on a portion of Flushing Avenue, Brooklyn, where 1200 cars are operated in each direction every day. The ties are of 4-in. channel section, supplied by the International Steel Tie Company, Cleveland, Ohio. They are set 6 ft. 8 in. centers. The wooden ties shown between the steel ties were retained because the tracks are placed on a fill which averages 12 in. and also because it was necessary to interrupt the traffic as little as possible. Therefore, it was impracticable to comply with the suggestions of the manufacturer that these ties should be placed in a concrete foundation and that the concrete should be permitted to set about ten days before the operation of the cars. As a matter of fact, only a layer of 6-in. concrete is used as a foundation for the granite



Brooklyn Joints and Ties—Experimental Abolition of Bonds by Arc-Welding Tie Connection Plates and Rail

block pavement, except that the concrete is increased to a depth of 8 in. under the intermediate plates.

The most important feature of this steel tie construction is the use of plates which are installed between pairs of ties to form a skeleton box section. These plates are riveted to the top flanges of the ties and are fastened to the base of the rail by three malleable-iron wedge tie clips. As this ¼-in. plate is quite flexible, the rail fastening has a slight

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chance for play, thereby tending to prevent the breakage of clips which occurs when they are fastened rigidly to the steel ties themselves. The plates, of course, make the actual gage spacing, and trackmen have found that they help greatly in the work of lining up the track. No tie rods are required with this construction. Ordinary joint plates were employed, as they were thought sufficient since a steel tie and plate come directly under each joint.

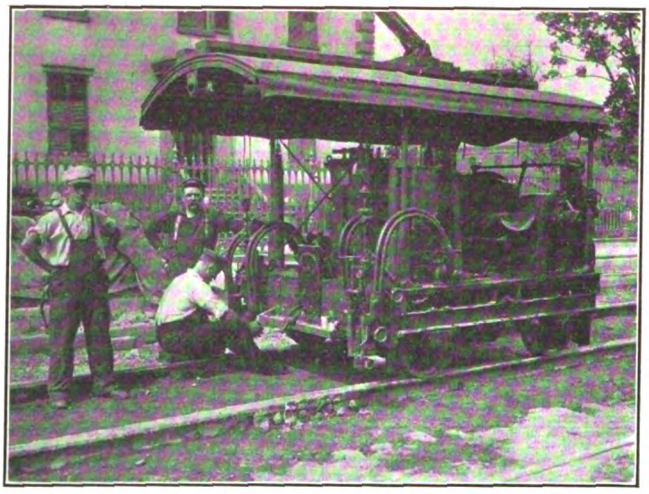
The following instructions issued by the maker of this tie were carried out on this job under its direction:

"Place the ties as nearly in line and with as nearly the desired spacing as you can, working rapidly.

"String the rails across the top of the ties in approximate position and bolt up the splices.

"Place the malleable tie clip in all the short holes in each tie before attempting to fasten the tie to the rails.

"At each rail splice pinch the rails over tight against the tie clips which have been put in place in all the short holes in the tie; then insert the clips in the wedge-shaped holes and secure them by driving the wedges in the spaces left behind the tie clips. Be sure the ties are squared up with the rail so that the clips and wedges will go into place without



Brooklyn Joints and Ties—Outfit for Brazing Bonds

undue forcing. With these ties in place at the rail splices your rails are accurately spaced to gage, and no gage spacer need be used in the entire installation.

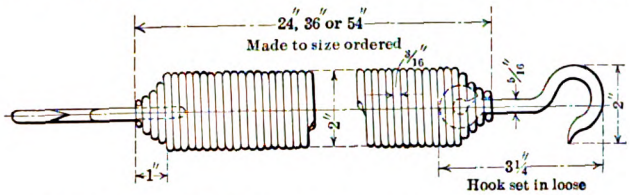
"The remaining ties are rapidly and easily fastened by having two men lift each tie up against the bottom of the rail in such position that the tie clips in the short holes in the tie do not interfere with the rail base. Then move the tie crosswise until the opening in the tie clips partly engages the bases of both rails at the same time. Force the rail base tight into the opening in the tie clips by putting a point bar into the wedge-shaped hole on the other side of the rail and prying the tie into final position. The tie clips should now be placed in the wedge-shaped holes and the wedges be driven home, finally securing the tie in place."

The cost of these ties covering a set of two channels and two plates is $4, in addition to which 3600 miscellaneous fittings were bought for 3½ cents each, making the total cost for each of the 300 ties $4.42.

All but one pair of opposite joints were furnished with the brazed bonds of the Electric Railway Improvement Company. On this pair the railway tried the experiment of arc-welding the tie plates directly to the base of the rail on each side, as shown on page 923. One of the two Indianapolis welding outfits which the company is now using for patching special work was employed for this purpose. The connection received a severe test when an effort was made to smash it with a 12-lb. sledge hammer, but even under this treatment the union refused to break.

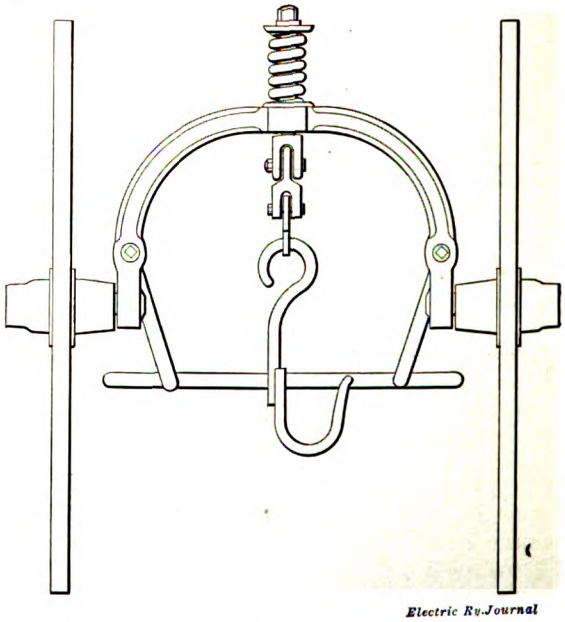
ORIGINAL DEVICES USED BY THE INTERNATIONAL RAILWAY COMPANY

Among the labor-saving devices at the Cold Springs shops of the International Railway Company is the armature wagon which is shown in detail in the accompanying



New Buffalo Devices—Springs for Train Platforms

drawing. The wagon proper consists of a cast-iron arched trunnion supported on two carriage wheels. A shaft with a cross-handle bar is bolted to the trunnion. The chief novelty is the use of the compression spring to aid in picking up and carrying armatures. Two steel hooks are carried from the two ends of a cross bar flexibly hung from a bolt which passes up through the top of the arch and through the compression spring. This bolt is threaded at the top for a nut. In use the arch is tilted first one way and then the other, thus allowing the hooks to pick up an armature from the floor. The device is very light, easy to manipulate and durable. The spring support produces such a good cushioning effect that the wagon can be run rapidly on an uneven floor without risk of injury to the armature. This armature wagon was designed by W. H. Evans when he was master mechanic of the railway.



New Buffalo Devices—Front View of Armature Wagon

The upper drawing shows a spring which is installed between the dashboards to prevent passengers from getting in between cars that are operated in trains. The spring is wound up from 3/16-in. steel wire, and the ends are coned to form a socket for the eyes of the hooks. This arrangement produces a simple and effective swivel connection between the hooks and the spring. The springs are made of such lengths as to bring them nearly taut in the normal position of the cars.

A project is now being considered to construct an underground electric railway in Barcelona, Spain. The plan includes the use of electric locomotives of 3000 hp and the erection of two stations.

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Statistics of Electric Railway Properties

This Article Contains a Series of Tables in Which the Statistics from a Number of Electric Railway Companies Are Grouped in Different Ways to Show Interesting Comparisons

As there is widespread interest in the statistics of electric railways, the accompanying tables have been prepared, based on the reports of sixty-nine prominent companies. The sources of information have been the *McGraw Electric Railway Manual* for 1913 and *Poor's Manual* for 1913. Pains have been taken to insure accuracy in the statistics, but in view of the complexity of the figures the correctness of the data in all details is not guaranteed. In several cases, such as the New York Railways, the Seattle Electric Company and the Mexico Tramways Company, it was necessary to use 1911 figures. Most of the reports are for the calendar year 1912, but a number of companies reported for the fiscal year ended June 30, 1912, and several reports are for the year ended in January, 1913. The period covered is twelve months in each case.

Net earnings are defined in the compilation as the gross earnings from operation less operating expenses, but some companies include taxes in operating expenses and so these are not fairly comparable with the operating ratios of the majority of companies, which follow strictly the classification of the American Electric Railway Accountants' Association. The United Railways Company of St. Louis has included an allowance for depreciation in the amount which it reports for operating expenses.

The interest and rental column, Table I, gives the figures reported for the year as interest on funded and floating debt and rentals of leased lines, and where these were not reported the amount was computed as closely as possible from the data given concerning funded debt.

TABLE II, SHOWING OPERATING RATIOS

Railway Only

1. Hudson-Manhattan Railroad, New York	36.04
2. Interborough Rapid Transit, New York	41.76
3. United Railways & Electric, Baltimore	45.14
4. South Side Elevated, Chicago	45.26
5. Metropolitan West Side Elevated, Chicago	46.93
6. Capital Traction, Washington, D. C.	48.50
7. Mexico Tramways, City of Mexico (includes taxes) (1911)	48.57
8. Denver City Tramway	50.08
9. Twin City Rapid Transit, Minneapolis	51.13
10. Northwestern Elevated, Chicago	51.76
11. Omaha & Council Bluffs Street Railway	52.40
12. Toronto Railway	52.62
13. Winnipeg Electric Railway (includes taxes)	53.22
14. Brooklyn Rapid Transit	54.51
15. Indianapolis Traction & Terminal	56.18
16. Louisville Railway (includes taxes)	57.18
17. United Railroads, San Francisco (includes taxes)	57.59
18. Third Avenue Railway, New York City	61.27
19. United Traction, Albany	61.33
20. New York State Railways, Rochester	61.88
21. Rhode Island Company, Providence	62.24
22. Memphis Street Railway (includes taxes)	63.24
23. Connecticut Company	63.87
24. United Railways, St. Louis (includes depreciation)	63.91
25. Philadelphia Rapid Transit (includes taxes)	64.20
26. Chicago City Railway (includes taxes)	64.65
27. Bay State Street Railway, Boston	64.76
28. New York Railways (1911) (New York City)	64.87
29. Chicago Railways (includes taxes)	64.89
30. International Traction, Buffalo (includes taxes)	65.95
31. Detroit United Railway	66.10
32. Pacific Electric Railway, Los Angeles	66.52
33. Spokane & Inland Empire Railroad	66.83
34. Montreal Tramways (includes taxes)	67.21
35. Pittsburgh Railways	67.43
36. Puget Sound Electric Railway, Tacoma (1911)	68.14
37. Boston Elevated Railway	69.02
38. Los Angeles Railway Corporation (includes taxes)	69.53
39. Cleveland Railway	74.24
40. British Columbia Electric Railway	75.03
Average	59.09

Railway, Electric Light and Power

1. Milwaukee, Light, Heat & Traction	44.50
2. Portland (Ore.) Railway, Light & Power (also gas) (includes taxes)	50.12
3. Washington Water Power, Spokane (includes taxes)	50.54
4. Milwaukee Electric Railway & Light	51.47
5. New Orleans Railway & Light (also gas)	51.61
6. St. Joseph Railway, Light, Heat & Power	52.00
7. Northern Texas Electric (includes taxes)	52.60
8. Virginia Railway & Power, Richmond, Va.	53.14
9. Utah Light & Railway (includes taxes)	53.17
10. West Penn Traction & W. P. (includes taxes)	53.67
11. Tri-City Railway & Light (also gas)	53.94
12. Georgia Railway & Electric, Atlanta (also gas) (includes taxes)	54.31
13. Public Service Corporation of New Jersey (also gas) (includes taxes)	54.44
14. Columbus Railway & Light	54.44
15. Washington Railway & Electric (includes taxes)	54.77
16. Ohio Electric Railway	55.37
17. Seattle Electric (1911)	56.00
18. Northern Ohio Traction & Light (includes taxes)	56.83
19. Kansas City Railway & Light	57.17
20. Nashville Railway & Light (includes taxes)	57.29
21. Union Traction Company of Indiana	57.87
22. Galveston-Houston Electric (includes taxes)	58.34
23. Terre Haute, Indianapolis & Eastern	58.62
24. Illinois Traction (also gas) (includes taxes)	58.71
25. Birmingham Railway, Light & Power (also gas) (includes taxes)	59.63
26. Dallas Electric Corporation (includes taxes)	60.01
27. Republic Railway & Light, Youngstown, Ohio (also gas) (includes taxes)	60.23
28. Toledo Railways & Light (also gas) (includes taxes)	70.10
Average	55.28

TABLE III, SHOWING PER CENT SURPLUS OF GROSS REVENUE

Railways Only

1. Capital Traction (Washington)	33.8
2. Winnipeg Electric Railway	31.7
3. Twin City Rapid Transit (Minneapolis and St. Paul)	30.2
4. Louisville Railway	26.6
5. Toronto Railway	26.4
6. South Side Elevated, Chicago	21.2
7. British Columbia Electric Railway (Vancouver)	20.9
8. Interborough Rapid Transit (New York City)	20.8
9. New York State Railways, Rochester	20.4
10. Montreal Tramways	19.2
11. Omaha & Council Bluffs Street Railway	19.0
12. Connecticut Company (New Haven-Hartford et al.)	18.8
13. Chicago City Railway	17.6
14. Detroit United Railway	16.6
15. Bay State Street Railway (Boston)	16.5
16. Metropolitan West Side Elevated, Chicago	16.4
17. United Traction, Albany	16.0
18. Brooklyn Rapid Transit	15.9
19. Denver City Tramway	15.5
20. Los Angeles Railway	14.3
21. Third Avenue Railway (New York City)	13.8
22. Cleveland Railway	13.0
23. Memphis Street Railway	11.9
24. International Traction, Buffalo	11.2
25. United Railways of St. Louis	9.3
26. New York Railways (1911) (New York City)	8.3
27. United Railways & Electric, Baltimore	7.8
28. Rhode Island Company (Providence)	7.5
29. United Railroads of San Francisco	7.4
30. Pacific Electric Railway, Los Angeles	5.5
31. Northwestern Elevated, Chicago	4.6
32. Indianapolis Traction & Terminal	4.2
33. Boston Elevated Railway	4.2
34. Chicago Railways	2.6
Average	15.9

Railway, Electric Light and Power

1. Milwaukee Light, Heat & Traction	55.2
2. Washington Water Power	41.1
3. Georgia Railway & Electric (also gas)	32.9
4. Northern Texas Electric	32.5
5. Milwaukee Electric Railway & Light	28.9
6. Northern Ohio Traction & Light	25.7
7. Terre Haute, Indianapolis & Eastern	25.4
8. Utah Light & Railway	24.9
9. Dallas Electric Corporation	24.0
10. Portland Railway, Light & Power (also gas)	23.3
11. St. Joseph Railway, Light, Heat & Power	23.3
12. West Penn Traction & Water Power	23.0
13. Washington Railway & Electric	22.2
14. Nashville Railway & Light	21.7
15. Galveston-Houston Electric	21.6
16. Tri-City Railway & Light (also gas)	20.6
17. Birmingham Railway, Light & Power (also gas)	20.0
18. Republic Railway & Light (also gas)	19.8
19. Seattle Electric (1911)	18.7
20. Virginia Railway & Power	16.0
21. New Orleans Railway & Light (also gas)	15.0
22. Kansas City Railway & Light	14.9
23. Illinois Traction (also gas)	14.6
24. Public Service Corporation of New Jersey (also gas)	6.3
25. Union Traction Company of Indiana	5.4
26. Columbus Railway & Light Company	2.2
Average	22.2

The surplus is the balance remaining after deduction for operating expenses, taxes, interest, sinking fund and other charges, and it therefore represents the amount applicable to the stock, although charges for depreciation are made by some companies against the surplus so determined. Dividends are not always paid from the surplus of the current year's operations, as in the case of the Boston Elevated Railway, which suffered from a strike in 1912, but are paid in part from the accumulated surplus of previous years.

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TABLE I, SHOWING STATISTICS OF SIXTY-NINE ELECTRIC RAILWAY PROPERTIES IN THE UNITED STATES, CANADA AND MEXICO

	Year Ended	Gross Reven	Net Earnings	Operating Ratio	Interest and Rentals	Surplus Before Dividend	Per Cent Surplus to Gross	Preferred Stock	Common Stock	Dividend on Common	Funded Debt	Population, Census 1910	Gross Revenue per Capita	Gross Revenue per $1 Int. and Rentals, Dollars	Miles of Track	Gross Revenue per Mile of Track	Funded Debt per Mile of Track	Population per Mile of Track	Funded Debt per $1 Gross Earnings, Dollars	Ratio of Net Earnings to Interest	Total Capitalization per $1 Gross	Total Capitalization per Capita
ALABAMA																						
Birm'h'm Ry., Lt. & Pr. Co..	Dec. 1912	$3,005,888	$1,213,772	59.63†	$597,385	$616,387	20	$3,500,000	$3,500,000	8%	$12,484,000	132,685	$ 22.65	5.03	138	$21,781	$90,469	961	4.15	2.03	$6.48	$146
CALIFORNIA																						
United RRs. of San Francisco	Dec. 1912	8,471,676	3,593,094	57.59†	2,071,100	627,951	7.4	25,000,000	17,948,600	*b*	41,450,000	416,912	20.32	4.09	267	31,729	155,243	1561	4.89	1.73	9.96	202
Los Angeles Rwy. Corp.....	June 1912	6,206,294	1,891,105	69.53†	1,102,500	888,605	14.3	*b*	20,000,000	2%	20,000,000	319,198	19.44	5.63	365	17,003	54,794	874	3.22	1.71	6.44	125
Pac. Elec. Ry., Los Angeles..	June 1912	8,645,504	2,895,216	66.52	2,195,944	477,815	5.5	*b*	74,000,000	*b*	52,580,000	.....	.....	3.93	882	9,801	59,614	....	6.08	1.31	14.98	.....
COLORADO																						
Denver City Tramway Co....	Dec. 1912	3,422,372	1,708,472	50.08	*f*898,400	531,432	15.5	*b*	6,000,000	8%	17,893,000	213,381	16.03	3.80	229	14,944	78,135	931	5.19	1.90	6.98	112
CONNECTICUT																						
The Connecticut Co.....	June 1912	8,075,542	2,918,321	63.87	1,012,539	1,519,076	18.8	8,142,900	49,057,200	3½%	33,026,000*f*	.....	.....	7.92	796	10,145	41,490	....	4.08	2.88	11.17	.....
DISTRICT OF COLUMBIA																						
Capital Traction Co.....	Dec. 1912	2,265,214	1,166,557	48.50	281,781	767,126	33.8	*b*	12,000,000	6%	5,639,500	331,069	20.78 com.	8.03	58	39,055	97,232	1518	2.49	4.13	7.78	174
Washington Ry. & Elec. Co..	Dec. 1912	4,618,328	2,090,104	54.77†	1,107,607	1,026,937	22.2	8,500,000	6,702,900	3%	24,870,869		earnings	4.13	160	28,864	155,443		5.38	1.88	8.67	com-b'n'd
GEORGIA																						
Georgia Rwy. & Elec. Co.....	Dec. 1912	4,968,790	2,270,289	54.31†	633,101	1,637,688	32.9	2,400,000	8,514,600	8%	12,648,000	154,839	32.09	7.84	199	24,717	63,558	778	2.54	3.58	4.74	152
ILLINOIS																						
Chicago City Ry. Co.....	Jan. 1913	11,243,981	*m*3,975,424	64.65†	1,286,102	1,982,507	17.6	*b*	18,000,000	11%	27,200,000	2,185,283	17.44	8.74	314	35,808	86,624		2.42	3.09	4.02	.....
Chicago Rwys. Co.....	Jan. 1913	18,076,777	6,348,275	64.89†	4,115,669	475,077	2.6	*b*	*p*100,000	*p*	90,086,591	2,185,283	combined	4.39	417	37,897	188,860	Chicago	4.98	1.54	4.98	.....
Met. W. Side Elev., Chicago..	June 1912	2,976,998	1,580,017	46.93	914,694	488,376	16.4	8,707,800	7,464,100	3%	15,140,000	2,185,283	gross earn.	3.25	58	51,327	261,034	combin'd	5.08	1.72	10.51	.....
Northwestern Elev., Chicago.	June 1912	2,539,705	1,225,311	51.76	1,455,691	117,755	4.6	4,944,400	4,947,100	*b*	25,000,000	2,185,283	Chicago	1.74	60	42,328	416,666	976 miles	9.84	.84	13.56	108
South Side Elev., Chicago....	June 1912	2,443,589	1,338,020	45.26	686,763	518,111	21.2	*b*	10,231,400	6¾%	8,000,000	2,185,283	*r*38,127,891	3.55	47	51,991	170,213	2239 pop	3.27	1.94	7.46	com-b'n'd
Illinois Traction Co.....	Dec. 1912	7,415,647	3,062,433	58.71†	1,975,969	1,086,464	14.6	6,988,400	10,984,900	*b*	34,517,000	.....	.....	3.75	609	12,176	56,668	.....	4.65	1.54	7.08	.....
INDIANA																						
Indianapolis Tr. & Ter. Co...	Dec. 1912	3,343,640	1,465,477	56.18	1,013,250	139,296	4.2	*b*	5,000,000	4%	15,460,000	233,650	14.31	3.30	140	23,883	110,428	1597	4.62	1.44	5.94	87
T're H'te, Ind'p'l's & E.T.Co.	June 1912	2,410,769	997,362	58.62	952,296	614,305	25.4	9,100,000	9,100,000	*b*	7,479,000	.....	.....	2.53	446	5,405	48,565	.....	3.10	1.05	10.65	.....
T're H'te, Ind'p'l's & E.T.Co., including controlled lines..	Dec. 1912	6,432,060	2,617,632	59.30†	2,085,803	531,729	8.3	.....	.....	....	.....	.....	.....	3.08	446	14,421	.....	.....	.....	1.30	.....	.....
Union Trac. Co. of Indiana...	Dec. 1912	2,308,649	972,808	57.87	765,711	126,592	5.4	4,000,000	5,000,000	*b*	13,238,500	.....	.....	3.01	423	5,458	31,297	.....	5.73	1.27	9.63	.....
IOWA																						
Tri-City Ry. & Lt. Co., Dav'p't	Dec. 1912	3,090,209	1,423,356	53.94	584,077	631,682	20.6	3,000,000	9,000,000	2%	12,305,000	100,000*f*	30.90	5.28	87	35,519	141,437	1149	3.97	2.29	7.86	243
KENTUCKY																						
Louisville Railway Co.....	Dec. 1912	3,130,492	1,340,455	57.18†	535,833	789,213	26.6	2,500,000	5,456,500	4%	10,999,000	223,928	13.97	5.84	167	18,745	65,682	1340	3.51	2.50	6.30	84
LOUISIANA																						
New Orleans Ry. & Lt. Co....	Dec. 1912	6,628,147	3,207,791	51.61	1,614,021	995,032	15.	10,000,000	20,000,000	1½%	32,934,900	339,075	19.54	4.10	207	32,020	159,106	1638	4.95	1.98	9.49	185
MARYLAND																						
Unit. Rys. & El. Co., Balti...	Dec. 1912	8,571,489	4,702,613	45.14	2,208,338	677,082	7.8	24,000	15,870,000	3%	54,244,000	558,485	15.35	3.88	403	21,269	134,600	1385	6.32	2.13	8.18	125
MASSACHUSETTS																						
Bay State St. Ry. Co., Boston	June 1912	8,877,943	3,127,891	64.76	1,317,042	1,469,463	16.5	2,088,600	20,841,000	5%	23,386,500	.....	.....	6.74	957	9,276	24,437	.....	2.63	2.37	5.21	.....
Boston Elev. Rwy. Co.....	June 1912	15,904,047	4,927,412	69.02	3,618,782	705,368	4.2	6,400,000	32,613,150	6%	36,571,000	670,585	23.73	4.39	507	31,368	72,132	1322	2.29	1.36	4.74	112
MICHIGAN																						
Detroit United Railway.....	Dec. 1912	11,695,530	3,965,121	66.10	2,123,513	1,950,465	16.6	*b*	12,525,000	5%	37,148,000	*f*600,000	19.49	5.50	793	14,749	46,845	*f*756	3.18	1.86	4.25	83
MINNESOTA																						
Twin City Rapid Transit Co..	Dec. 1912	8,208,967	4,010,966	51.13	1,137,490	2,481,736	30.2	3,000,000	20,100,000	6%	19,503,000	526,350	15.59	7.21	402	20,420	48,514	1309	2.37	3.52	5.19	81
MISSOURI																						
Kansas City Ry. & Lt. Co....	May 1912	8,350,623	3,576,361	57.17	1,464,580	1,245,263	14.9	9,407,500	9,615,430	*b*	28,531,100	248,831	33.20	5.70	261	31,995	109,314	915	3.41	2.44	5.69	191
United Rys. of St. Louis.....	Dec. 1912	12,251,090	4,422,589	63.91*	2,696,197	1,139,088	9.3	19,986,500	24,913,800	*b*	59,480,000	687,029	17.82	4.54	461	26,575	129,024	1490	4.85	1.64	8.52	152
St. Joseph Ry., Lt., Ht. & Pr..	Dec. 1912	1,179,839	566,345	52.00	236,060	274,756	23.3	1,560,000	3,500,000	2%	4,716,000	77,403	15.24	4.99	47	25,103	100,340	1648	3.99	2.39	8.28	126
NEW JERSEY																						
Public Service Corporation..	Dec. 1912	32,654,469	14,875,035	54.44†	14,039,073	2,053,224	6.3	.....	84,389,350	6%	178,467,298	2,028,947	8.07*s*	2.32	844	18,320*s*	76,255*s*	2240	5.46	1.06	8.04	129

*Includes depreciation. †Includes taxes. *b* None. *f* Estimated *m* Expenses include operating expenses, taxes and renewals, of combined systems, interest on capital investment of Chicago City R'y Co. and net earnings of Southern Street Ry. Co. *p* Subject of trust agreement under which four series of participation certificates have been issued representing 265,100 equal parts. $12 was paid during fiscal year on Series I. *r* Earnings for five Chicago roads in table and the 1911 earnings for Chicago & Oak Park Elevated figured on Chicago's population proper. *s* Railway only. Debt per mile is for Public Service Railway and controlled companies.

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TABLE I, SHOWING STATISTICS OF SIXTY-NINE ELECTRIC RAILWAY PROPERTIES IN THE UNITED STATES, CANADA AND MEXICO (*Continued*)

	Year Ended	Gross Revenue	Net Earnings	Operating Ratio	Interest and Rentals	Surplus Before Dividend	Per Cent Surplus to Gross	Preferred Stock	Common Stock	Dividend on Common	Funded Debt	Population, Census 1910	Gross Revenue per Capita	Gross Revenue per $1 Int. and Rentals, Dollars	Miles of Track	Gross Revenue per Mile of Track	Funded Debt per Mile of Track	Population per Mile of Track	Funded Debt per $1 Gross Earnings, Dollars	Ratio of Net Earnings to Interest	Total Capitalization per $1 Gross	Total Capitalization per Capita
NEBRASKA																						
Omaha & Coun. Bluffs St. Ry	Dec. 1912	$2,846,053	$1,354,748	52.40	$531,940	$541,337	19.0	$5,500,000	$6,500,000	5%	$12,090,000	153,388	$18.55	5.35	159	$17,899	$76,037	965	4.24	2.54	$8.46	157
NEW YORK																						
Brooklyn Rapid Transit	June 1912	23,226,550	10,614,491	54.51	5,446,219	3,711,222	15.9	*b*	44,837,218	5%	84,362,500	Brooklyn:	15.07	4.26	614	37,828	137,403	2561	3.63	1.94	5.56	84
Hudson & Manhattan R.R.	Dec. 1912	3,630,061	2,321,956	36.04	2,879,081	*a*74,532	....	5,242,151	39,994,890	*b*	*e*73,524,000	1,634,351	Gr. N.Y.	*e*1.59	19	191,056	*e*3869,473	....	*e*1692	....	32.71	.....
Interborough Rapid Transit	June 1912	31,246,392	18,198,590	41.76	11,000,593	6,523,766	20.8	*b*	*k*95,000,000	*d*	*f*99,749,000	4,766,883	Combined	2.84	203	153,923	*g*575,988	Gt. N.Y.	2.87	1.65	5.91	.....
												Greater	Earnings				*h*345,678	3138				Com-
New York Rwys. Co.	June 1911	13,600,317	4,778,401	64.87	2,597,385	1,138,155	8.3	*b*	24,508,000	*b*	67,924,344	New York	82,894,364	5.23	165	82,426	411,662	....	4.99	1.83	6.79	bined
Third Ave. Rwy., N. Y.	Dec. 1912	9,547,529	3,698,386	61.27	1,325,346	1,318,909	13.8	*b*	20,736,000	*b*	70,316,365		==17.39	7.20	317	30,118	231,936		7.70	2.79	9.53	N.Y.
													per cap.									III
U. Y. State Rwys., Rochester	Dec. 1912	7,542,195	2,875,356	61.88	1,145,928	1,541,055	20.4	3,862,500	20,277,700	6%	18,672,500	*f*700,000	10.77	6.58	359	21,009	52,012	*f*2000	2.47	2.50	5.67	Cos.
Nnited Trac. Co., Albany	June 1912	2,592,638	1,002,823	61.33	372,630	415,713	16 0	*b*	12,500,000	4%	6,500,000	*f*225,000	11.52	6.95	101	25,669	65,000	*f*2227	2.50	2.68	7.32	61
International Trac., Buffalo	Dec. 1912	6,393,796	2,177,625	65.95†	1,841,600	719,419	11.2	5,000,000	10,000,000	2%	40,303,000	*f*500,000	12.79	3.47	269	23,768	149,825	*f*2000	6.30	1.18	8.64	84
OHIO																						110
Cincinnati Traction Co.	June 1912	5,183,123	2,466,945	52.40	1,134,337	664,709	12.8	.....	20,511,950	5%	907,000	364,463	14.22	4.57	442	11,726	.....	825	....	2.17	4.13	58
Cleveland Rwy.	Dec. 1912	6,648,755	1,713,181	74.24	512,211	865,397	13.0	*b*	15,074,600	6%	10,000,000	560,653	11.85	12.98	265	25,089	37,735	2113	1.50	3.31	3.77	45
Columbus Rwy. & Lt.	Dec. 1912	2,932,653	1,336,418	54.44	920,638	75,014	2.2	4,766,300	9,460,500	*b*	9,482,000	210,000	13.96	3.18	132	22,209	71,833	1590	3.23	1.44	8.08	112
Republic Rwy. & Lt.	Dec. 1912	2,663,762	1,058,271	30.23†	527,252	528,746	19.8	5,187,800	6,204,000	*b*	11,950,000	*f*215,000	12.38	5.05	156	17,075	76,602	1378	4.48	2.00	8.76	108
Northern Ohio Trac. & Lt.	Dec. 1912	2,996,036	1,293,271	56.83†	523,067	770,203	25.7	1,943,960	9,000,000	5%	10,635,000	*f*300,000	9.98	5.72	216	12,378	49,236	1388	3.55	2.47	7.20	72
Ohio Electric Railway	June 1912	3,351,543	1,496,266	55.37	1,528,662	*a*6,910	....	11,100,000	13,672,500	*b*	19,952,000	.....	.....	2.19	670	5,002	29,779	....	5.95	....	13.34	....
Toledo Railways & Light	Dec. 1912	3,979,275	1,189,848	70.10†	.....	.....	....	.....	.....	*b*	.....	.....	.....	.....	243	16,333	.....	.....	.....	.....	.....	.....
OREGON																						
Portland Rwy., Lt. & Power.	Dec. 1912	6,642,308	3,313,397	50.12†	1,760,991	1,552,406	23.3	*b*	25,000,000	4%	34,000,000	.....	.....	3.77	294	22,592	115,646	....	5.12	1.88	8.98	....
PENNSYLVANIA																						
Phila. Rapid Transit	June 1912	21,727,468	7,778,637	64.20†	8,902,350	*a*150,489	....	*b*	29,977,120	*b*	81,489,421	1,549,008	14.02	2.44	643	33,790	126,733	2409	3.75	0	5.13	72
Pittsburgh Rwys.	June 1912	10,666,931	3,474,551	67.43	5,357,756	*a*2,534,564	....	17,500,000	58,003,860	*b*	36,830,500	*f*700,000	15.24	1.98	592	18,019	62,213	*f*1180	3.45	0	10.53	160
W. Penn. Trac. & W. Pwr. Co.	Dec. 1912	3,408,586	1,579,127	53.67†	794,748	784,379	23.0	10,872,400	20,497,400	4%	18,714,000	*f*500,000	6.81	4.28	302	11,286	61,966	*f*1653	5.48	1.98	14.69	100
RHODE ISLAND																						
Rhode Island Co., Providence	June 1912	5,139,940	1,941,190	62.24	1,175,003	387,599	7.5	*b*	19,519,500	3%	16,937,200	.....	.....	4.37	347	14,812	48,810	.....	3.29	1.65	7.09	....
TENNESSEE																						
Memphis Street Rwy. Co.	Dec. 1912	1,937,308	712,175	63.24†	481,298	230,877	11.9	2,500,000	2,500,000	1%	9,343,000	131,105	14.77	4.02	125	15,498	74,744	1048	4.82	1.47	7.40	169
Nashville Rwy. & Light Co.	Dec. 1912	2,074,990	886,046	57.29†	434,812	451,234	21.7	2,500,000	4,000,000	4%	8,950,000	110,364	18.80	4.77	82	25,304	109,146	1345	4.31	2.03	7.44	140
TEXAS																						
Dallas Elec. Corp.	Dec. 1912	1,821,562	728,768	60.01†	227,745	438,511	24.0	4,210,000	4,418,000	5%	5,699,000	92,104	19.77	7.99	64	28,465	89,047	1439	3.12	3.19	7.86	155
Galveston-Houston Elec. Co.	Dec. 1912	2,027,656	844,974	58.34†	348,521	439,319	21.6	2,972,700	3,000,000	3½%	6,774,000	147,300	13.76	5.81	144	14,080	47,041	1023	3.34	2.42	6.28	86
Northern Texas Elec. Co.	Dec. 1912	1,790,762	849,073	52.60†	246,391	583,000	32.5	4,000,000	2,500,000	6%	5,584,000	208,000	8.61	7.27	168	10,659	33,238	1238	3.11	3.44	6.74	53
UTAH																						
Utah Light & Rwy. Co.	June 1912	2,604,722	1,220,042	53.17†	*f*229,900	649,041	24.9	3,863,175	1,942,500	*b*	4,821,000	92,777	28.07	11.32	125	20,837	38,568	742	1.85	5.30	4.07	114
VIRGINIA																						
Virginia Rwy. & Power Co.	June 1912	4,558,194	2,135,290	53.14	1,116,950	729,769	16.0	7,698,400	13,595,100	2%	22,027,500	.....	.....	3.89	273	16,696	80,686	.....	4.83	1.91	9.50	....
WASHINGTON																						
Puget Sound Elec. Ry., Tac.	Dec. 1911	1,766,742	563,084	68.14	*f*418,100	*a*44,494	....	1,125,000	3,500,000	*b*	5,604,000	*f*100,000	17.67	4.22	216	8,179	25,963	*f*460	3.17	1.34	5.73	102
Seattle Electric Company	Dec. 1911	5,440,955	2,394,102	56.00	1,208,811	1,020,766	18.7	5,000,000	8,433,500	7%	20,740,000	*f*275,000	19.42	4.50	245	22,208	84,653	1122	3.81	1.98	6.28	124
Spokane & Inland Emp. R.R.	June 1912	1,632,509	541,706	66 83	440,707	*a*70,168	....	6,409,100	10,000,000	*b*	4,816,500	.....	.....	3.70	290	5,629	16,508	....	2.95	1.23	13.00	....
Washington Wtr. Pr., Spok'e	Dec. 1912	3,170,245	1,567,892	50 54†	264,438	1,303,454	41.1	*b*	14,081,900	8%	5,628,000	104,402	30.36	11.98	112	28,305	50,250	932	1.77	5.93	6.21	188
WISCONSIN																						
Mil. Elec. Ry. & Lt. Co.	Dec. 1912	5,682,356	2,757,775	51.47	715,206	1,643,803	28.9	4,500,000	9,850,000	6%	16,849,000	373,857	15.19	7.94	142	40,016	118,655	} 2632‡	2.96	3.85	5.49	83
Mil. Lt., Ht. & Trac. Co.	Dec. 1912	1,237,384	686,758	44.50	665,706	683,329	55.2	*b*	10,000,000	*b*	11,189,000	.....	.....	1.86	224	5,524	49,950	}	9.04	1.03	17.12	....
CANADA																						
Brit. Columbia Elec. Rwy.	June 1912	5,974,524	1,492,302	75.03	492,082	1,249,701	20.9	*b*	14,550,000	8%	11,469,547	.....	.....	12.14	286	20,889	40,103	....	1.92	3.03	4.35	....
Montreal Tramways	Jan. 1913	6,378,212	2,091,695	67.21†	865,560	1,226,135	19.2	*l*16,000,000	2,000,700	10%	14,871,863	500,000	12.75	7.36	237	26,912	62,750	2109	2.33	2.41	5.15	66
Toronto Railway	Dec. 1912	5,448,050	2,581,500	52.62	190,992	1,448,458	26.4	*b*	11,000,000	8%	3,658,940	370,000	14.72	28.52	119	45,781	30,747	3109	.67	13 50	2.69	39
Winnipeg Elec. Rwy.	Dec. 1912	3,765,384	1,761,236	53 22†	359,557	1,194,463	31.7	*l*2,434,602	9,000,000	12%	5,000,000	175,000	21.51	10.47	129	29,189	38,759	1357	1.32	4.89	4.36	94
MEXICO																						
Mexico Tramways Co.	Dec. 1911	6,176,971	3,176,619	48.57†	*f*815,000	.....	....	*b*	20,000,000	7%	15,083,333	329,774	18.73	7.57	195	31,676	77,350	1691	2.44	....	5.68	106

*Includes depreciation. †Includes taxes. *a* Deficit. *b* None. *d* 7 Manhattan and 9 Inter. Includes Terminal Building. *f* Estimated. *g* Subway. *h* Elevated. *k* Includes Manhattan Ry. *l* Debentures.
‡Population of Milwaukee and mileage of Milwaukee Ry. & Lt. Co., only considered.

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Table IV, Showing Gross Revenue per Capita

Railway Only

1.	Boston (Boston Elevated)	$23.73
2.	Winnipeg	21.51
3.	San Francisco (United Railroads)	20.32
4.	Detroit (Detroit United Railway) (estimated)	19.49
5.	Los Angeles (Los Angeles Railway)	19.44
6.	Mexico City (1911)	18.73
7.	Omaha and Council Bluffs	18.55
8.	St. Louis	17.82
9.	Chicago, combined companies. (See text)	17.44
10.	New York City, combined companies. (See text)	17.39
11.	Denver	16.03
12.	Minneapolis and St. Paul	15.59
13.	Baltimore (United Railway & Electric)	15.35
14.	Pittsburgh (Pittsburgh Railways) (estimated)	15.24
15.	Brooklyn (Brooklyn Rapid Transit, Coney Island & Brooklyn)	15.07
16.	Memphis	14.77
17.	Toronto	14.72
18.	Indianapolis (Indianapolis Traction & Terminal)	14.31
19.	Cincinnati (Cincinnati Traction)	14.22
20.	Philadelphia	14.02
21.	Louisville	13.92
22.	Buffalo (estimated)	12.79
23.	Montreal	12.75
24.	Cleveland	11.85
25.	Albany et al. (United Traction) (estimated)	11.52
26.	Rochester, Syracuse et al. (New York State Railways) (estimated)	10.77
27.	Milwaukee (Milwaukee Railway & Lighting)	10.60
28.	Public Service Railway of New Jersey	8.07
	Average	15.85

Railway, Electric Light and Power

1.	Kansas City	$33.20
2.	Atlanta (Georgia Railway & Electric)	32.09
3.	Davenport, Rock Island and Moline (estimated)	30.90
4.	Spokane (Washington Water Power)	30.36
5.	Salt Lake City	28.07
6.	Seattle (Seattle Electric) (1911)	22.93
7.	Birmingham	22.65
8.	Washington, D. C. (combined companies)	20.78
9.	Dallas	19.77
10.	New Orleans	19.54
11.	Nashville	18.80
12.	Tacoma	17.67
13.	St. Joseph	15.24
14.	Columbus	13.96
15.	Youngstown et al. (Republic Railway & Light)	12.38
16.	Akron and Barberton (Northern Ohio Traction & Light) (estimated)	9.98
	Average	21.77

Table V, Showing Gross Revenue per $1 Interest

Railway Only

1.	Toronto Railway	$28.52
2.	Cleveland Railway	12.98
3.	British Columbia Electric Railway	12.14
4.	Winnipeg Electric Railway	10.47
5.	Chicago City Railway	8.74
6.	Capital Traction, Washington, D. C.	8.03
7.	Connecticut Company	7.92
8.	Mexico Tramways (1911)	7.57
9.	Montreal Tramways	7.36
10.	Twin City Rapid Transit, Minneapolis	7.21
11.	Third Avenue, New York	7.20
12.	United Traction, Albany	6.95
13.	Bay State Street Railway, Boston	6.74
14.	New York State Railways, Rochester	6.58
15.	Louisville Railway	5.84
16.	Los Angeles Railway Corporation	5.63
17.	Detroit United Railway	5.50
18.	Omaha & Council Bluffs Street Railway	5.35
19.	New York Railways (1911)	5.23
20.	Cincinnati Traction	4.57
21.	United Railways of St. Louis	4.54
22.	Chicago Railways	4.39
23.	Boston Elevated Railway	4.39
24.	Rhode Island Company	4.37
25.	Brooklyn Rapid Transit	4.26
26.	Puget Sound Electric Railway (1911)	4.22
27.	United Railroads of San Francisco	4.09
28.	Memphis Street Railway	4.02
29.	Pacific Electric Railway, Los Angeles	3.93
30.	United Railways & Electric, Baltimore	3.88
31.	Denver City Tramway	3.80
32.	Spokane & Inland Empire	3.70
33.	South Side Elevated, Chicago	3.55
34.	International Traction, Buffalo	3.47
35.	Indianapolis Traction & Terminal	3.30
36.	Metropolitan West Side Elevated, Chicago	3.25

Railway, Electric Light and Power

1.	Washington Water Power, Spokane	$11.98
2.	Utah Light & Railway	11.32
3.	Dallas Electric Corporation	7.99
4.	Milwaukee Electric Railway & Light	7.94
5.	Georgia Railways & Electric (also gas)	7.84
6.	Northern Texas Electric	7.27
7.	Galveston-Houston Electric	5.81
8.	Northern Ohio Traction & Light	5.72
9.	Kansas City Railway & Light	5.70
10.	Tri-City Railway & Light (also gas)	5.28
11.	Republic Railway & Light (also gas)	5.05
12.	Birmingham Railway, Light & Power (also gas)	5.03
13.	St. Joseph Railway, Light & Power	4.99
14.	Nashville Railway & Light	4.77
15.	Seattle Electric (1911)	4.50
16.	West Penn Traction & Water Power	4.28
17.	Washington Railway & Electric, Washington, D. C.	4.13
18.	New Orleans Railway & Light (also gas)	4.10
19.	Virginia Railway & Power	3.89
20.	Portland Railway, Light & Power (also gas)	3.77
21.	Illinois Traction (also gas)	3.75

It has been particularly difficult to make the statistics of capitalization accurate. The reports of the numerous holding companies are incomplete with respect to the outstanding securities of their subsidiary companies. On account of the pending reorganization of the Toledo Railways & Light Company property the capitalization of this system is omitted.

Table I gives the details for all of the companies, arranged according to the states in which they mainly operate. Tables II to XII inclusive contain practically the same information but with the companies arranged according to their rank under each heading.

Table II gives the operating ratios in accordance with the total figures reported. The companies doing business in both railway and lighting service are not fairly comparable with those which confine their operations mainly to the railway, and they are therefore grouped by themselves. The low operating ratios of the subway and elevated companies are noticeable in comparison with the surface lines. They are not subject to the expensive blockades to traffic, removal of snow, etc., that hamper the surface roads. The Mexico Tramways Company had a low operating ratio of 48.57 per cent, due probably in part to a low rate of wages. Some Western cities, like Minneapolis and St. Paul, Denver and Omaha, also show low operating ratios. The average ratio for forty railways was 59.09 and for twenty-eight combination properties was 55.28.

Table VI, Showing Gross Revenue per Mile of Track

Railway Only

1.	Hudson & Manhattan Railroad, New York	$191,056
2.	Interborough Rapid Transit, New York	153,923
3.	New York Railways, New York (1911)	82,426
4.	South Side Elevated, Chicago	51,991
5.	Metropolitan West Side Elevated, Chicago	51,327
6.	Toronto Railway	45,781
7.	Northwestern Elevated, Chicago	42,328
8.	Capital Traction, Washington	39,055
9.	Chicago Railways	37,897
10.	Brooklyn Rapid Transit	37,828
11.	Chicago City Railway	35,808
12.	Philadelphia Rapid Transit	33,790
13.	United Railroads of San Francisco	31,729
14.	Mexico Tramways (1911)	31,676
15.	Boston Elevated Railway	31,368
16.	Third Avenue Railway, New York	30,118
17.	Winnipeg Electric Railway	29,189
18.	Montreal Tramways	26,912
19.	United Railways of St. Louis	26,575
20.	United Traction, Albany	25,669
21.	Cleveland Railway	25,089
22.	Indianapolis Traction & Terminal	23,883
23.	International Traction, Buffalo	23,768
24.	United Railways & Electric Co., Baltimore	21,269
25.	New York State Railways, Rochester	21,009
26.	British Columbia Electric Railway	20,889
27.	Twin City Rapid Transit	20,420
28.	Louisville Railway	18,745
29.	Public Service Corporation of New Jersey	18,320
30.	Pittsburgh Railways	18,019
31.	Omaha & Council Bluffs Street Railway	17,899
32.	Los Angeles Railway Corporation	17,003
33.	Memphis Street Railway	15,498
34.	Denver City Tramway	14,994
35.	Detroit United Railway	14,749
36.	Rhode Island Company, Providence	14,812
37.	Northern Ohio Traction & Light	12,378
38.	Republic Railway & Light	12,249
39.	Cincinnati Traction, Cincinnati	11,726
40.	Connecticut Co.	10,145

Table III, giving the ratio of surplus to gross revenue, is especially interesting to the banker and to the stockholder. It appears from the figures that thirty-four companies operating railways only had an average surplus of 15.9 per cent of the gross revenue and that twenty-six companies with both railway and lighting had an average surplus of 22 per cent. This means that for each $1 taken in there was left respectively 16 cents or 22 cents for dividends and for depreciation in cases where depreciation is treated as a deduction from surplus. Low operating ratios are often counterbalanced by heavy fixed charges so that the surplus account is affected seriously, as in the case of the United Railroads of San Francisco.

Table IV shows the gross revenue per capita. The census of 1910 was used for the populations in the preparation of Tables IV, VIII and XII. Where there is more than one transportation company in a city the names of

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the one or more whose gross revenues were used in this compilation appear in parentheses after the name of the city. In most cases the per capita figures cannot be given exactly because the population served is part urban and part interurban. For example, in Washington, D. C., and Atlanta, Ga., it is difficult to calculate the suburban population. Some prominent cities are omitted from this table because the gross earnings of the companies operating in those cities cover both railway and lighting receipts. The figures for Chicago include the two large surface properties and the four elevated lines. The New York figures embrace all the companies doing a local service in New York City except the Hudson & Manhattan Railroad. The average gross revenue for twenty-seven companies—railway only—was $15.85 per capita and for sixteen combination properties was $21.77, an average for the forty-three companies of $18.04.

Table V gives the relation between gross earnings and interest, the latter including rentals of leased lines. Toronto shows a relatively small bonded indebtedness ($3,658,940) and interest charge ($190,992). Cleveland has a low interest charge but a high operating ratio. The average of the other thirty-three companies on the list for railway only was $5.70, and the average for twenty-one railway and lighting companies $5.95, gross revenue per $1 of interest and rentals.

Tables VI and VII are calculated on the basis of total trackage owned and operated. There may be some errors due to the omission of leased lines. That large earnings per mile of track are not a fair criterion of the net value of a property is shown in the cases of the Hudson & Manhattan Railroad and the New York Railways. The amount of net earnings after the payment of interest charges determines the equity of the stock in the profits of the enterprise. Large revenues per mile, with low bond capitalization and interest, are shown by Toronto, Winnipeg and Albany. Some cities have a fair revenue, a rather large funded debt and a small population per mile of track, but they make creditable showings because the revenue per capita is large, owing to the riding habits of the population or to tourist traffic.

Table VII affords some interesting figures on funded debt per mile of track. The Hudson & Manhattan Railroad, as would be expected, shows the enormous cost of the undertaking, but the figure is increased because the cost of the Hudson Terminal Buildings is also included in the capitalization. The great cost of construction of the subway and elevated roads is also apparent from this table. Other factors which have affected the figures of some roads in this table are cost of changing cable traction to electricity.

TABLE VII, SHOWING FUNDED DEBT PER MILE OF TRACK

Railway Only

1.	Hudson & Manhattan Railroad, New York	$3,869,473
2.	Interborough Rapid Transit, New York (subway)	575,988
	Interborough Rapid Transit, New York (elevated)	345,678
3.	Northwestern Elevated, Chicago	416,666
4.	New York Railways, New York (1911)	411,662
5.	Metropolitan West Side Elevated, Chicago	261,034
6.	Third Avenue Railway, New York	231,936
7.	Chicago Railways	188,860
8.	South Side Elevated, Chicago	170,213
9.	United Railroads of San Francisco	155,243
10.	International Traction, Buffalo	149,825
11.	Brooklyn Rapid Transit	137,403
12.	United Railways & Electric Co., Baltimore	134,600
13.	United Railways of St. Louis	129,024
14.	Philadelphia Rapid Transit	126,733
15.	Indianapolis Traction & Terminal	110,428
16.	Capital Traction, Washington, D. C.	97,232
17.	Chicago City Railway	86,624
18.	Denver City Tramway	78,135
19.	Mexico Tramways (1911)	77,350
20.	Omaha & Council Bluffs Street Railway	76,037
21.	Memphis Street Railway	74,744
22.	Boston Elevated (including West End St. Ry.)	72,132
23.	Louisville Railway	65,682
24.	United Traction, Albany	65,000
25.	Montreal Tramways	62,750
26.	Pittsburgh Railways	62,213
27.	Pacific Electric Railway, Los Angeles	59,614
28.	Los Angeles Railway Corporation	54,794
29.	Rhode Island Company	48,810
30.	Twin City Rapid Transit, Minneapolis	48,514
31.	Detroit United Railway	46,845
32.	Connecticut Company	41,490
32.	British Columbia Electric Railway	40,103
34.	Winnipeg Electric Railway	38,759
35.	Cleveland Railway	37,735
36.	Toronto Railway	30,747

TABLE VIII, SHOWING POPULATION PER MILE OF TRACK (APPROXIMATE)

1.	Greater New York City (surface, elevated and subway)	3138
2.	Toronto	3109
3.	Milwaukee	2632
4.	Brooklyn	2561
5.	Philadelphia (Phila. R. T. Co.)	2409
6.	Public Service Corporation of New Jersey	2240
7.	Chicago (surface and elevated)	2239
8.	Albany, Troy et al	2227
9.	Cleveland	2113
10.	Montreal	2109
11.	Rochester, Syracuse et al	2000
12.	Buffalo	2000
13.	Mexico City	1691
14.	St. Joseph	1648
15.	New Orleans	1638
16.	Indianapolis	1597
17.	Columbus, Ohio	1590
18.	San Francisco	1561
19.	Washington, D. C.	1518
20.	St. Louis	1490
21.	Dallas	1439
22.	Baltimore	1385
23.	Winnipeg	1357
24.	Nashville	1345
25.	Louisville	1340
26.	Boston	1322
27.	Minneapolis and St. Paul	1309
28.	Northern Texas Electric, Fort Worth	1238
29.	Pittsburgh	1180
30.	Davenport, Rock Island and Moline	1149
31.	Seattle	1122
32.	Memphis	1048
33.	Omaha	965
34.	Birmingham	961
35.	Spokane	932
36.	Denver	931
37.	Kansas City	915
38.	Los Angeles	874
39.	Atlanta	778
40.	Salt Lake City	742
41.	Tacoma	460

TABLE IX, SHOWING FUNDED DEBT PER $1 OF GROSS EARNINGS

Railway Only

1.	Hudson & Manhattan Railroad (including Terminal Bldg.)	$16.92
2.	Northwestern Elevated, Chicago	9.84
3.	Third Avenue Railway, New York	7.70
4.	United Railways & Electric, Baltimore	6.32
5.	International Traction, Buffalo	6.30
6.	Pacific Electric Railway, Los Angeles	6.08
7.	Denver City Tramway	5.19
8.	Metropolitan West Side Elevated, Chicago	5.08
9.	New York Railways, New York (1911)	4.99
10.	Chicago Railways	4.98
11.	United Railroads of San Francisco	4.89
12.	United Railways of St. Louis	4.85
13.	Memphis Street Railway	4.82
14.	Indianapolis Traction & Terminal	4.62
15.	Omaha & Council Bluffs Street Railway	4.24
16.	Connecticut Company	4.08
17.	Philadelphia Rapid Transit	3.75
18.	Brooklyn Rapid Transit	3.63
19.	Louisville Railway	3.51
20.	Pittsburgh Railways	3.45
21.	Rhode Island Co.	3.29
22.	South Side Elevated, Chicago	3.27
23.	Los Angeles Railway Corporation	3.22
24.	Detroit United Railway	3.18
25.	Puget Sound Electric Railway (1911)	3.17
26.	Spokane & Inland Empire	2.95
27.	Interborough Rapid Transit, New York	2.87
28.	Bay State Street Railway	2.63
29.	United Traction, Albany	2.50
30.	Capital Traction, Washington, D. C.	2.49
31.	New York State Railways	2.47
32.	Mexico Tramways (1911)	2.44
33.	Chicago City Railway	2.42
34.	Twin City Rapid Transit	2.37
35.	Montreal Tramways	2.33

Railway, Electric Light and Power

1.	Milwaukee Light, Heat & Traction	$9.04
2.	Ohio Electric Railway	5.95
3.	Union Traction Company of Indiana	5.73
4.	West Penn Traction and Water Power	5.48
5.	Public Service Corporation of New Jersey (also gas)	5.46
6.	Washington Railway & Electric Co., Washington, D. C.	5.38
7.	Portland Railway, Light & Power (also gas)	5.12
8.	New Orleans Railway & Light (also gas)	4.95
9.	Virginia Railway & Power	4.83
10.	Illinois Traction (also gas)	4.65
11.	Republic Railway & Light (also gas)	4.48
12.	Nashville Railway & Light	4.31
13.	Birmingham Railway, Light & Power (also gas)	4.15
14.	St. Joseph Railway, Light & Power	3.99
15.	Tri-City Railway & Light (also gas)	3.97
16.	Seattle Electric (1911)	3.81
17.	Public Service Corporation of New Jersey (also gas)	3.64
18.	Northern Ohio Traction & Light	3.55
19.	Kansas City Railway & Light	3.41
20.	Galveston-Houston Electric	3.34
21.	Columbus Railway & Light	3.23
22.	Dallas Electric Corporation	3.12
23.	Northern Texas Electric	3.11
24.	Terre Haute, Indianapolis & Eastern	3.10
25.	Milwaukee Electric Railway & Light Co.	2.96
26.	Georgia Railway & Electric (also gas)	2.54

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Thus the Denver City Tramway Company spent between 1887 and 1890 over $10,000,000 in cable roads that were superseded by electricity partly after five years and wholly within eight years. San Francisco, Los Angeles, Kansas City and Cincinnati also changed from cable to electricity.

Table VIII shows how some of the Western roads are handicapped with a proportionately large amount of track. Omaha, Spokane, Denver, Kansas City, Los Angeles and Salt Lake City each have less than 1000 population per mile of track and, of course, are at a great disadvantage in this table when compared with New York, Chicago, Toronto, Philadelphia and other large cities.

In this table, as in all tables involving population, comparisons are not very satisfactory because it was found impracticable to adopt any consistent method of calculating population. In the case of most of the city systems the population taken was that included within the city limits, as reported by the Census Bureau, although in many, if not most, cases the railway lines extend beyond the city limits. In the case of the interurban companies the population in most instances was obtained by adding the populations of the principal secondary cities traversed by the railway and the population of the main terminal was not included, but exceptions were made when circumstances appeared to warrant them. Hence another compiler might reach conclusions quite different from those shown in all of the accompanying tables which involve population.

Table X, Showing Ratio of Net Earnings to Interest Better Than 1.50

Railway Only	
1. Toronto Railway	13.50
2 Winnipeg Electric Railway	4.89
3. Capital Traction, Washington, D. C.	4.13
4. Twin City Rapid Transit, Minneapolis	3.52
5. Cleveland Railway	3.31
6. Chicago City Railway	3.09
7. British Columbia Electric Railway	3.03
8. Connecticut Company	2.88
9. Third Avenue Railway, New York	2.79
10. United Traction, Albany	2.68
11. Omaha & Council Bluffs Street Railway	2.54
12. New York State Railways, Rochester	2.50
13. Louisville Railway	2.50
14. Montreal Tramways	2.41
15. Bay State Street Railway, Boston	2.37
16. Cincinnati Traction	2.17
17. United Railways & Electric, Baltimore	2.13
18. South Side Elevated, Chicago	1.94
19. Brooklyn Rapid Transit	1.94
20. Denver City Tramway	1.90
21. Detroit United Railway	1.86
22. New York Railways, New York (1911)	1.83
23. United Railroads of San Francisco	1.73
24. Metropolitan Elevated, Chicago	1.72
25. Los Angeles Railway Corporation	1.71
26. Rhode Island Company, Providence, R. I.	1.65
27. Interborough Rapid Transit, New York	1.65
28. United Railways of St. Louis	1.64
29. Chicago Railways	1.54
Railway, Electric Light and Power	
1. Washington Water Power, Spokane	5.93
2. Utah Light & Railway	5.30
3. Milwaukee Electric Railway & Light	3.85
4. Georgia Railway & Electric (also gas)	3.58
5. Northern Texas Electric, Fort Worth-Dallas	3.44
6. Dallas Electric Corporation	3.19
7. Northern Ohio Traction & Light	2.47
8. Kansas City Railway & Light	2.44
9. Galveston-Houston Electric	2.42
10. St. Joseph Railway, Light, Heat & Power	2.39
11. Tri-City Railway & Light (also gas)	2.29
12. Nashville Railway & Light	2.03
13. Birmingham Railway, Light & Power (also gas)	2.03
14. Republic Railway & Light (also gas)	2.00
15. Seattle Electric (1911)	1.98
16. West Penn Traction & Water Power	1.98
17. New Orleans Railway & Electric (also gas)	1.98
18. Virginia Railway & Power	1.91
19. Washington Railway & Electric, Washington, D. C.	1.88
20. Portland Railway, Light & Power, Portland, Ore. (also gas)	1.88
21. Terre Haute, Indianapolis & Eastern	1.73
22. Illinois Traction (also gas)	1.54

Table IX shows that, exclusive of the Hudson & Manhattan Railroad, thirty-four railway companies averaged $4.12 funded debt for every $1 of gross earnings and that twenty-six railway and lighting companies similarly averaged $4.34. In other words, it required more than $4 of funded debt to take in $1, and out of the $1 must first be paid interest of 20 cents to 25 cents, depending upon the marketability of the bonds.

Table X gives for twenty-eight railways, exclusive of Toronto, an average of $2.43 net revenue for every $1 of interest and rentals and an average similarly of $2.64 for twenty-two railway and lighting companies.

Table XI contains interesting data on total capitalization. The difference between the figures in Table XI and Table IX gives the stock outstanding per $1 of gross revenue. The average total capitalization per $1 of gross was for forty-one railways $7.64 and for twenty-seven railway and lighting companies $8.24. Deducting the figures obtained from Table IX of $4.12 and $4.34 for funded debt for $1 gross, there remain for the outstanding stock, per $1 of gross, $3.52 for railways and $3.90 for combined properties. For sixteen railways and nineteen railway and lighting companies the preferred stock averages $1.17 and $1.32 respectively per $1 of gross earnings. If the above averages hold good for the companies considered, the common stock would average per $1 of gross about $2.35 for railways and $2.58 for combination properties. If the preferred stock be added to the funded debt and dividends on it be figured at 5 per cent, there is a total interest and preferred dividend charge of from 26 to 28 cents for each $1 earned.

Table XI, Showing Total Capitalization per $1 of Gross Revenue

Railway Only	
1. Hudson & Manhattan Railroad, New York (inc. Terminal Bldg.)	$32.71
2. Pacific Electric Railway, Los Angeles	14.98
3. Northwestern Elevated, Chicago	13.56
4. Spokane & Inland Empire	13.00
5. Connecticut Company	11.17
6. Pittsburgh Railways	10.53
7. Metropolitan Elevated, Chicago	10.51
8. United Railroads of San Francisco	9.96
9. Third Avenue Railway, New York	9.53
10. International Traction, Buffalo	8.64
11. United Railways of St. Louis	8.52
12. Omaha & Council Bluffs Street Railway	8.46
13. United Railways & Electric, Baltimore	8.18
14. Capital Traction, Washington, D. C.	7.78
15. South Side Elevated, Chicago	7.46
16. Memphis Street Railway	7.40
17. United Traction, Albany	7.32
18. Rhode Island Company	7.09
19. Denver City Tramway	6.98
20. New York Railways, New York (1911)	6.79
21. Los Angeles Railway Corporation	6.44
22. Louisville Railway	6.30
23. Indianapolis Traction & Terminal	5.94
24. Interborough Rapid Transit	5.91
25. Puget Sound Electric Railway (1911)	5.73
26. Mexico Tramways (1911)	5.68
27. New York State Railways, Rochester	5.67
28. Brooklyn Rapid Transit	5.56
29. Bay State Street Railway	5.21
30. Twin City Rapid Transit	5.19
31. Montreal Tramways	5.15
32. Philadelphia Rapid Transit	5.13
33. Chicago Railways	4.98
34. Boston Elevated Railway	4.74
35. Winnipeg Electric Railway	4.36
36. British Columbia Electric Railway	4.35
37. Detroit United Railway	4.25
38. Cincinnati Traction	4.13
39. Chicago City Railway	4.02
40. Cleveland Railway	3.77
41. Toronto Railway	2.69
Average	7.64
Railway, Electric Light and Power	
1. Milwaukee Light, Heat & Traction	$17.12
2. West Penn Traction & Water Power	14.69
3. Ohio Electric Railway	13.34
4. Terre Haute, Indianapolis & Eastern	10.65
5. Union Traction Company of Indiana	9.63
6. Virginia Railway & Power	9.50
7. New Orleans Railway & Light (also gas)	9.49
8. Portland Railway, Light & Power (also gas)	8.86
9. Republic Railway & Light, Youngstown, Ohio (also gas)	8.76
10. Washington Railway & Electric	8.67
11. St. Joseph Railway & Light	8.28
12. Columbus Railway & Light	8.08
13. Public Service Corporation of New Jersey (also gas)	8.04
14. Tri-City Railway & Light (also gas)	7.86
15. Dallas Electric Corporation	7.86
16. Nashville Railway & Light	7.44
17. Northern Ohio Traction & Light	7.20
18. Illinois Traction Company (also gas)	7.08
19. Northern Texas Electric	6.74
20. Birmingham Railway, Light & Power (also gas)	6.48
21. Galveston-Houston Electric	6.28
22. Seattle Electric (1911)	6.28
23. Washington Water Power, Spokane	6.21
24. Kansas City Railway & Light	5.67
25. Milwaukee Electric Railway & Light	5.49
26. Georgia Railway & Electric (also gas)	4.74
27 Utah Light & Railway	4.07
Average	8.24

Table XII has figures of the total capitalization per capita. For sixteen railway companies selected where preferred stock is reported and population known approximately, the figures shown in Table XIII appear.

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TABLE XII, SHOWING TOTAL CAPITALIZATION PER CAPITA
Railway Only

	(Approximate)
1. United Railroads of San Francisco	$202
2. Washington, D. C., combined companies	174
3. Pittsburgh Railways	161
4. Omaha & Council Bluffs Street Railway	157
5. United Railways of St. Louis	152
6. United Railways & Electric, Baltimore	125
7. Los Angeles Railway Corporation	125
8. Denver City Tramway	112
9. Boston Elevated Railway	112
10. New York City, combined companies. (See text)	111
11. International Traction, Buffalo	110
12. Memphis Street Railway	109
13. Chicago, combined companies. (See text)	108
14. Mexico Tramways (1911)	106
15. Puget Sound Electric Railway (1911)	102
16. Winnipeg Electric Railway	94
17. Indianapolis Traction & Terminal	87
18. United Traction, Albany	84
19. Louisville Railway	84
20. Detroit United Railway	83
21. Twin City Rapid Transit	81
22. Brooklyn Rapid Transit	79
23. Philadelphia Rapid Transit	72
24. Montreal Tramways	66
25. New York State Railways	61
25. Cincinnati Traction	58
27. Cleveland Railway	45
28. Toronto Railway	39

Railway, Electric Light and Power

1. Tri-City Railway & Light (also gas)	$243
2. Kansas City Railway & Light	191
3. Washington Water Power, Spokane	188
4. New Orleans Railway & Light (also gas)	185
5. Dallas Electric Corporation	155
6. Georgia Railway & Electric (also gas)	152
7. Birmingham Railway, Light & Power (also gas)	146
8. Nashville Railway & Light	140
9. Public Service Corporation of New Jersey	129
10. St. Joseph Railway, Light, Heat & Power	126
11. Seattle Electric (1911)	124
12. Utah Light & Railway	114
13. Columbus Railway & Light	112
14. Republic Railway & Light (also gas)	108
15. West Penn Traction & Water Power	100
16. Galveston-Houston Electric	86
17. Milwaukee Electric Railway & Light	83
18. Northern Ohio Traction & Light	72
19. Northern Texas Electric	53

TABLE XIII—SHOWING CAPITALIZATION, EARNINGS, ETC., FOR SIXTEEN RAILWAY COMPANIES.

		Per Cent	Per Capita	Per $1 Gross
Approximate population served	3,760,498	..	.....	.....
Capitalization	$757,785,703	100	$79.40	$7.07
Funded debt	369,447,363	48	38.71	3.45
Preferred stock	125,223,880	17	13.12	1.17
Common stock	263,114,460	35	27.57	2.45
Gross earnings	107,142,195	..	11.22	.....
Net	40,513,091	..	4.24	0.38

Operating ratio, 62.19.

The following are the companies taken for Table XIII: United Railroads of San Francisco; Metropolitan Elevated, Chicago; Northwestern Elevated, Chicago; Louisville Railway; Bay State Street Railway, Boston; Boston Elevated Railway; Twin City Rapid Transit; United Railways of St. Louis; Omaha & Council Bluffs Street Railway; New York State Railways, Rochester; International Traction of Buffalo; Cincinnati Traction; Pittsburgh Railways; Memphis Street Railway; Montreal Tramways, and Winnipeg Electric Railway.

The corresponding statistics for eighteen combined railway and lighting companies are shown in Table XIV. The following companies were included in Table XIV: Birmingham Railway & Light; Washington Railway & Electric; Georgia Railway & Electric; Tri-City Railway & Light, of Davenport, Rock Island and Moline; New Orleans Railway & Light; Kansas City Railway & Light; St. Joseph Railway, Light, Heat & Power; Republic Railway & Light, of Youngstown, Ohio; Northern Ohio Traction & Light; West Penn Traction & Water Power; Nashville Railway & Light; Dallas Electric Corporation; Galveston-Houston Electric; Northern Texas Electric; Utah Light & Railway; Puget Sound Electric Railway; Seattle Electric, and Milwaukee Electric Railway & Light.

TABLE XIV—SHOWING CAPITALIZATION, EARNINGS, ETC., FOR EIGHTEEN COMBINED RAILWAY AND LIGHTING COMPANIES.

		Per Cent	Per Capita	Per $1 Gross
Approximate population served	3,760,498	...	.....	.....
Capitalization	$463,531,134	100	$123.27	$7.22
Funded debt	244,809,669	53	65.10	3.81
Preferred stock	84,543,135	19	22.49	1.32
Common stock	134,178,330	28	35.68	2.09
Gross earnings	64,115,954	..	17.95	.....
Net	28,543,052	..	7.59	0.44

Operating ratio, 55.41.

If 5 per cent should be allowed as the interest on the funded debt and 6 per cent on preferred stock, the annual per capita tax or "readiness to serve" was $2.72 in the case of the sixteen railways and $4.60 for the eighteen combination properties, leaving an annual per capita contribution toward sinking fund, depreciation and dividends on common stock of $1.52 and $2.99 respectively, equivalent to 5.5 per cent and 8.3 per cent on common stock respectively. The gross contribution per day per capita was about 3 cents and 4.9 cents respectively.

CONCLUSION

Table XV shows certain approximate averages, derived from the tables made upon the basis of each $1 gross revenue.

TABLE XV—SHOWING AVERAGES BASED UPON EACH $1 GROSS REVENUE

Railways		Per Cent of Gross	Per Cent of Net
Gross revenue	$1.00	..	..
Operating expenses	0.59	59	..
Net earnings	0.41	41	..
Taxes and interest	0.25	25	60
Surplus	0.16	16	40
Railway and Electric Lighting			
Gross earnings	$1.00	..	..
Operating expense	0.55	55	..
Net earnings	0.45	45	..
Taxes and interest	0.23	23	51
Surplus	0.22	22	49

JOINT RUBBER INSULATION COMMITTEE

A conference of manufacturers and users of rubber insulation was held in New York on Oct. 15 to consider a standard set of specifications for rubber insulated wire and cables and an analytical procedure for rubber insulating pounds, and a report embodying these specifications and such a procedure was adopted. The following interests participated: United States Signal Corps, United States Bureau of Standards, American Chemical Society, New York Central Lines, Pennsylvania Railroad, General Electric Company, Hazard Manufacturing Company, Lederle Laboratories, Simplex Wire & Cable Company, Standard Underground Cable Company.

The meeting was the result of a previous conference, held Dec. 7, 1911, upon invitation of E. B. Katté, of the New York Central & Hudson River Railroad, at which a committee was appointed to draw up specifications and procedure of the kind mentioned. At this earlier meeting Major S. Reber, United States Signal Corps, was elected chairman and a committee to prepare the specifications was appointed.

This committee has been at work for about two years and has just completed a preliminary report containing a specification for 30 per cent Para compound and an analytical procedure which is to be put in use for one year, at the end of which period a final report will be issued. It was this preliminary reort which was presented at the conference on Oct. 15. Major S. Reber again presiding, and it was accepted. Major Reber, Mr. Katté and other speakers paid high tribute to the excellence of the committee's work and said that they would recommend that the specification and analytical procedure should be put into use by their respective organizations. The committee was authorized to make arrangements for the publication of its report.

It is of interest to note that the committees of the American Electric Railway Engineering Association and the Association of Railway Electrical Engineers have accepted the recommendations of this report as standard and have so reported to their respective associations. It is the intention of the joint rubber insulation committee to urge the acceptance of the report by other national societies, to the end that the manufacturers shall have to work to only one specification for 30 per cent Para compounds, a result that would bring considerable economies to the manufacturers and corresponding gain to the consumers.

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Mr. Dalrymple's Impressions of His Visit

After a Tour of the Country, Concluding with the Atlantic City Convention, the Manager of the Glasgow Corporation Tramways Returns to His Home—His Views on Our Conditions

James Dalrymple, manager Glasgow Corporation Tramways, sailed from New York for home on the steamship *Caronia* on Oct. 18, after a general tour of the country lasting a little more than two months.

Mr. Dalrymple arrived in New York on Aug. 16 and during his stay in this country visited Boston, Buffalo, Cleveland, Detroit, Chicago, Milwaukee, Minneapolis and St. Paul, Duluth, Seattle, Tacoma, Portland, San Francisco, Los Angeles, Oakland, Berkeley, Denver, Kansas City, St. Louis, Pittsburgh, Washington, Philadelphia and Atlantic City, where he attended the convention of the American Electric Railway Association. On his trip westward he also stopped at Winnipeg and Vancouver. He was accompanied by Thomas Nisbet, master of works of the city of Glasgow. The main object of their trip was to see various types of lift bridges in use throughout the United States, but the trip also offered opportunities for the inspection of street railway systems. Glasgow is considering the question of building a number of bridges over the River Clyde, and it was desired to obtain definite information regarding the operation of different types of bridges in this country. The visitors improved the opportunity for inspecting a number of different styles of bridges in service, so that the main object of the trip was successful.

Before he sailed Mr. Dalrymple gave some impressions of his visit to a representative of the Electric Railway Journal. He said that in every city he visited he was put in touch with the officials of the street railway system. Wherever possible he also got into contact with the municipal authorities. He had not been in this country for eight years previous to this visit and had never been so far west before. So far as the cities which he visited on his previous trip were concerned, he said there was no doubt that in many respects there had been a great advance in street railway operation. When he was here before the first thing that struck him was the general untidiness of the cars in comparison with those operated in Glasgow. He said that in Glasgow every endeavor was made to keep the cars in as nearly perfect condition as possible, in respect both to maintenance and to cleanliness. He believes now that the condition in respect to untidiness which he noted on his previous visit has very much changed here. The rolling stock, he found, was well maintained and in very much better condition than before. Generally speaking, however, the cars were not so bright in appearance in this country as on the other side of the ocean. On account of the prevailing fogs, there is a good deal of gloominess about the appearance of the city of Glasgow, and to overcome this as far as possible an effort is made to keep the cars bright in appearance. For instance, the cars are painted bright blues, greens, reds, etc. No one standard color is followed for all cars, but those of different lines are painted identifying colors.

Mr. Dalrymple said there is no doubt that the prepayment system is the ideal one for conditions existing here with the uniform fare. He would like very much to be able to see a way whereby it would be possible to keep conductors on the platforms in his own city, because of the advantage that it would carry in the reduction and prevention of accidents. A way to do this, however, has not yet been discovered owing to the difference in conditions of operation in Glasgow. So far as his experience went, he thought that the trainmen seemed to be all right here, but he did not know that they were so anxious to accommodate as those on the lines in Glasgow. The conductors here have very much easier jobs than those employed on the Glasgow lines, because of the simplicity of the collection of fares here.

Mr. Dalrymple said he thought that the street railways would not be in proper shape here until they could reduce overcrowding. He noticed overcrowding in almost every city he visited. He said that in Glasgow the lines were carrying as many people, and no person was allowed to stand, yet there was practically no waiting for cars.

When questioned as to the acuteness of the rush-hour traffic in Glasgow, as compared with the normal traffic throughout the day, Mr. Dalrymple said that the difference was not so great as in this country. This lessens the problem of caring for the rush-hour travel there.

"Of course," he said, "we have rush-hour traffic as every other city has, but the fact that there is not such a great difference between the rush-hour and the slack hours as in the cities of the United States is due mainly to our very low fare and the circumstance that our cars are pretty well filled continually, so that part of the traffic is taken out of the way before the rush hour begins." Mr. Dalrymple said that he had seen cars in some of the cities here carrying very few passengers during the middle of the day and that such a condition did not exist in Glasgow.

The Glasgow lines recently doubled the distance of possible travel for 1 cent, and they give now a ride of 1¼ miles for this rate of fare. The object of this change was to induce people to ride during the slack hours, and it has been effective in inducing a great many to ride who would have walked under previous conditions. The total number of passengers carried yearly before this change was made was 230,000,000. Immediately after the change was made the traffic increased to the rate of 320,000,000 passengers annually, and this has continued without diminution. The additional traffic was carried with very few extra cars, yet there was no overcrowding, Mr. Dalrymple said.

The visitor added that, generally speaking, the condition of track was not so good here as on the other side. Tracks in the Far West, however, were, generally speaking, better than in the East. The condition of the track was good in almost every city that he visited in the West. In some cities in the country, however, he found that the cars were being operated on very bad tracks, which must have a bad effect on the rolling stock. Throughout the country the overhead seemed to be in good condition. He mentioned specially the fine shops in Minneapolis and several other cities and a good carhouse in Philadelphia. A great many of the companies were still using old shops, he noticed, but there seemed to be a general movement in all sections of the country to improve both shops and carhouses.

One matter on which Mr. Dalrymple commented was the size of cars. He said that the Glasgow cars require less room on the streets. It is important in that city for the cars to take up as little room as possible. The standard cars are not much over one-half as long as the larger types of cars here. He noted that the fenders here project from the cars and that adds to the street space required by the cars.

The visitor said that he would like to see the double-deck cars adopted more generally. He liked those he saw both in Pittsburgh and New York. He believes in a light type of construction for cars, taking into account stability at the same time. He rode on the near-side cars in Philadelphia, but happened to do so at the non-rush hours and had no opportunity to see the effect of their operation during the rush-hour period.

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A one-man car is operated on one short route in Glasgow where there is a small revenue, and it has worked satisfactorily for that purpose. Mr. Dalrymple favors the use of such a car for conditions like those that exist on that route, where the traffic is light and there is no need whatever for the presence of a conductor. In cases like that, he said, the service must be rendered as cheaply as possible if it is to be furnished at all.

Commenting on the state of public relations in this country, Mr. Dalrymple observed that there seemed to be a general feeling of unrest over the questions at issue between the companies and the public. "On account of this unrest, the companies do not seem to know what is before them," he added, "and that is a very unsatisfactory condition of affairs."

Continuing, the Glasgow manager said he had no doubt that where the conditions of co-operation and relations between the company and the people were not as they should be the people were apt to demand unreasonable things. If that condition grew, the companies could not operate with success, and the only thing to do was to let the city take the underakings over. He thought that it would come to that in the end, anyway.

In speaking of the question of wages, Mr. Dalrymple said that he had gone into it to a very limited extent, but that the wages here generally were very much higher than on the other side of the ocean. He was especially impressed by the difference as he went farther west in his travels. He found that the wages in Glasgow were about one-half of what they were in the Western cities in this country. However, conditions as to wages were not comparable, because, he said, the wages of employees in Glasgow compared with the scale of wages prevailing in that country were high.

Mr. Dalrymple was very much interested in the exhibit presented by the manufacturers in connection with the annual meeting of the American Electric Railway Association at Atlantic City. He said that he had never seen one of the kind before. He was surprised to note that the supply men did not seem to spare any work and expense in getting up the exhibit. It was far better than anything he had anticipated.

Mr. Dalrymple was asked about the graded fare system, and he expressed himself as believing that that is the fairest system in existence. He declared that it would be exceedingly interesting if some company in this country should be bold enough to make an experiment with graded fares on a city line. Speaking further about the recent change whereby the ride available for the small fare in Glasgow was doubled, he said that it had been calculated that some revenue would be dropped provided there was no additional traffic to be handled. The result of the change, however, was that the system carried an additional number of passengers that made up the deficit due to the reduction in fare, and within two years the gross revenue was greater than before the change was made. At the same time the change was absorbed in the finances without any serious effect on the net revenue. The net profit was less after the change was made and established, but that was not the result of the lower fare. It was due to other causes not related to that change.

In reference to his visit in Chicago, Mr. Dalrymple said he was perfectly satisfied that the opinion he formed eight years ago in regard to the Chicago situation was correct. [The opinion to which Mr. Dalrymple refers was written to Mayor Dunne of Chicago and was published in the STREET RAILWAY JOURNAL of March 17, 1906. It was in part as follows: "There would undoubtedly be grave danger in your [city] attempting to operate what would be the largest street railway undertaking in the world without making a very radical change in the methods usually employed in carrying on municipal work by the cities of the United States. I should be very sorry were you forced to take such a step, as, speaking generally, I should say, from my knowledge and experience of what it means to operate a municipal street railway system, that the municipalities of the United States are not yet quite ready to successfully undertake this work."—EDS.]

Mr. Dalrymple added that, so far as he could see, the systems in Chicago were operated with perfect smoothness now and there was no doubt that there had been an enormous improvement in their condition during the last eight years.

In reference to the subject of municipal ownership, Mr. Dalrymple said that if the municipalities were going to take over street railway systems here, they must run such properties according to the methods followed on the other side of the ocean. The executive officials must have security in office, and changes of administration must have no effect on the operation or the personnel of the street railway system. Otherwise, the result would be that the municipalities would land themselves in confusion.

In concluding his statement, Mr. Dalrymple said he wanted to make it plain that both Mr. Nisbet and himself were very well received, got all the information they could possibly expect to get and enjoyed their sojourn in the United States very much. All the people with whom they came in contact seemed anxious to give them all the information that could be desired on the subjects they had in mind.

NIAGARA POWER ON THE BEEBE LINES

Since last December the Rochester, Syracuse & Eastern, the Syracuse, Lake Shore & Northern, the Syracuse & South Bay, the Auburn & Syracuse, the Auburn & Northern and the Syracuse, Watertown & St. Lawrence River Railways have been supplied with power by the Niagara Falls, Lockport & Ontario Power Company. The power company's lines connect with those of the railway companies at the Lyons steam station and at the Solvay substation near Syracuse. Power is transformed at sixteen substations distributed over the lines of the railway companies.

The power company's load now taxes its maximum capacity from Niagara, and during 1913 its source of supply will be augmented by a new hydroelectric station which is under construction near Altmar on the Salmon River, 40 miles west of Syracuse.

The power company has purchased the steam plants of the railway companies at Lyons and Auburn and is operating them as supplementary plants. The Auburn plant is a 2000-hp Corliss-engine plant, not modern, and it is operated for but a few hours per day to help out at times of peak load. The building, however, houses rotary converters for the supply of local railway current. The Lyons plant is modern, having been built in 1906. The plant has a capacity of 6500 kw in three units, two of 1500 kw each and one of 3500 kw. These units are Westinghouse turbo-alternators, two-phase, 3300 volts, twenty-five cycles. The two-phase current was originally selected with the possibility of using single-phase motors, for which it is more suitable than three-phase.

The transformers are eight in number, of 650 kw capacity each, and all are T-connected to transform from two-phase to three-phase and to raise the voltage to 33,000, three-phase. In the plant are rotary converters from which the local railway lines are supplied. These rotaries are owned and maintained by the railway companies, but the power company's employees operate them.

In taking over the steam plants the power company gains a reserve and is able to carry the peak loads originating within a considerable range. This reserve it has not had heretofore. The company also gains the ability to operate the steam plant as a synchronous condenser plant if it desires to increase the line power factor.

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Pennsylvania Railroad "Safety First" Exhibit

More Than Four Thousand Employees Visit Exhibition Held in Pennsylvania Terminal, New York, Under Auspices of the Manhattan Division Safety Committee

To reduce the number of accidents to its employees, the Pennsylvania Railroad recently made a "Safety First" exhibition at its New York station. Most of the exhibits related to the company's Manhattan Division and hence were of an electric railway character. During part of the time of its continuance the exhibit was open in the evening to allow the day employees to attend. It is estimated that between 2000 and 2500 employees and officers, representing almost every department of the railroad service, studied the exhibit on the opening day, Sept. 26. So many others desired to attend, however, that it was necessary to continue for a week, during which time there were 4000 visitors, mostly employees.

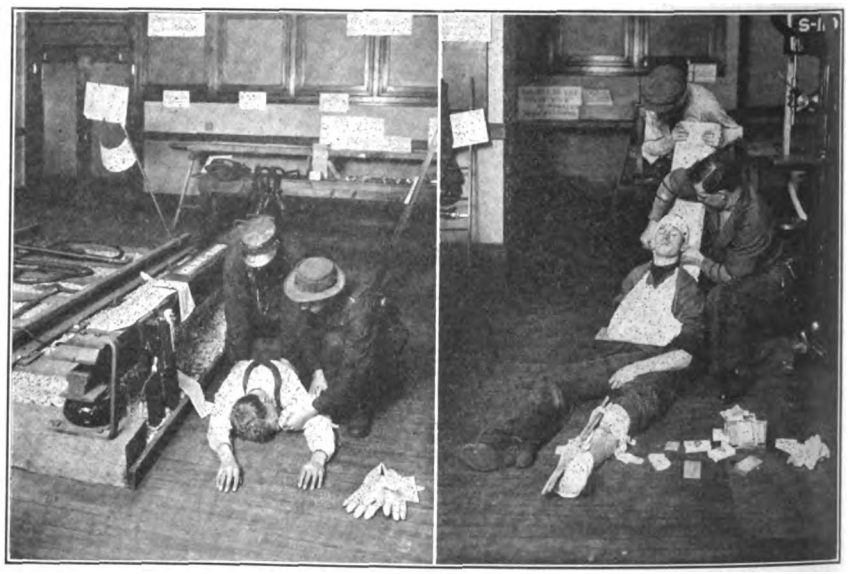
The articles shown, which occupied three large rooms, were numerous, varying from a rusty nail to a whole section of track. Of more than sixty exhibits the most interesting were the following: a section of track; a miniature telegraph line; various machine tools guarded and unguarded; an old-style set screw and a hollow set screw which has taken its place; boards showing protruding nails; good and bad jumpers; unprotected and protected station platforms; ropes and chains, perfect and defective; marker lamps in good and bad condition; barrels and boxes of freight properly and improperly piled on floor and on hand trucks; a fire alarm apparatus for station and tunnels; safe and unsafe heavy lamp shade supports; a switch and rheostat with live parts protected; safe and unsafe devices for operating baggage elevators; brake hose, perfect and imperfect; a miniature power plant for demonstrating different electrical devices, and hundreds of photographs illustrating safe and unsafe methods of working on cars, tracks, etc.

Not only were the various safety appliances attached to the different kinds of equipment exhibited open to the thorough inspection of those who attended, but there were demonstrators present to show and to explain the right and wrong methods of handling machinery, tools, etc. At the evening sessions practical demonstrations by employees of first aid to the injured were the most interesting features. For example, there was an exhibition in resuscitation from electric shock. The increasing use of electricity about the shops, stations and all other property of the Pennsylvania Railroad makes it necessary that employees be qualified to render intelligent assistance in case of electrical accident. To this end employees are instructed, first, in the safe removal of the victim from contact with live wires and third-rails; second, in the approved method of resuscitating persons apparently dead from electric shock, and third, in the care of the victim when natural respiration has been restored.

The demonstration of electric shock, as given in the company's auditorium during the exhibition, was quite realistic, as may be judged by the accompanying illustrations. The scene showed a laborer walking along the tracks. Observing a tool on one of the ties, he stooped down to remove it. Losing his balance, he fell, accidentally touching the third-rail with his hand, with the result that he was apparently electrocuted. On hearing his cry two fellow workmen hastened to his side and after procuring rubber gloves pulled him away from the rail.

Immediately one of the rescuers opened the victim's mouth to remove therefrom a set of false teeth. Then, quickly laying the apparently dead man on his stomach, with arms extended forward and face turned to one side so as to permit free breathing, one of the men proceeded to apply what is known as the Shaefer method of artificial respiration. The other ran to an emergency telephone located near the tracks to summon the railroad surgeon, who, upon arrival, took charge of the operations. After the victim regained consciousness the physician administered stimulants—which employees are forbidden to do—and the man was carried out on a stretcher.

Another interesting and educational exhibition was that in which employees illustrated the treatment for hemorrhage, fracture, burns, shock, unconsciousness, fits, heat exhaustion and sunstroke. The Pennsylvania standard "first aid packet," which may be found in stations, telegraph towers, yard buildings, tool houses and on trains, played an important part in these demonstrations. The "first aid packet" is a sanitary tin box containing two aseptic compresses wrapped in oiled paper, one cambric bandage, one triangular bandage and two safety pins.



Pennsylvania "Safety First" Exhibit—Victim Being Resuscitated from Electric Shock—Employees Demonstrating Treatment for Burns, Bruises, Etc.

Several booklets issued by the Pennsylvania Railroad for the benefit of the employees were distributed. Some of them were: "Safety Hints and Suggestions for the Prevention of Personal Injury Accidents"; "Precautionary Measures for the Prevention of Accidents at Freight Stations"; "Instructions for the Guidance and Protection of Employees" (in English, Italian and Polish); "Hints on First Aid to the Injured," and "Courtesy."

The pamphlet entitled "Safety Hints and Suggestions for the Prevention of Personal Injury Accidents" contains valuable information in regard to general road and yard conditions, including right-of-way and structures, operation, electricity, transportation, sanitation, hygiene, first aid and trespassing, and also in regard to shop conditions

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and safety precautions. The booklet regarding precautionary measures at freight stations contains a chapter on resuscitation from electric shock, a reprint by permission of the National Electric Light Association, together with pictures showing the proper positions taken to induce inspiration and expiration.

The walls of the exhibition room were well covered with placards, some of the most striking of which read as follows:

"The path of duty is the path of safety."

"What are you going to do to cut down the number of accident reports?"

"After going home to-night read over your book of rules and special instructions."

"Your failure to examine the bulletin board and understand orders posted thereon before going on duty may result in an accident."

Pennsylvania "Safety First" Exhibit—Employees Removing Victim from Contact with Third-Rail

"The mere installation of safeguards will not necessarily prevent accidents; see to it that the machinery is never operated without the safeguards being in place."

"On May 8, 1913, a man was severely injured owing to using a file without a handle."

The Manhattan Division safety committee, under whose direction the exhibit was given, is composed as follows: L. J. Griffith, foreman of substations and transportation, chairman; O. E. Proud, chief operator; P. C. Bauman, assistant medical examiner; A. W. Reynolds, general foreman of carpenters and painters; E. T. Otis, station electrician; F. C. Rutledge, inspector, and W. F. Dolan, assistant foreman of transportation.

In commemoration of the fourteenth biennial meeting of the German Street & Interurban Railway Association, which was held at Cologne on Sept. 3, 4 and 5, a handsome railway souvenir of that city was presented to the delegates by the municipality. The book, which embraces 235 pages, with many illustrations and maps, was prepared by Dr. Kaiser, director of the Cologne municipal street railways. It gives a complete historical review from horse car days and describes the present system in every department. The comparison of the first year of municipal operation, 1901, with 1912 shows the following results: Miles of track, 34.7 and 49.2; car miles, 4,138,626 and 16,049,078; passengers carried, 30,970,673 and 115,875,360; gross earnings, $801,351 and $2,499,000; earnings per car mile, 19.2 cents and 15.2 cents; gross earnings per passenger carried, 2.57 cents and 2.15 cents; operating expenses per car mile, 11.8 cents and 9.76 cents.

TESTS OF TWO-CAR TRAINS IN CITY SERVICE

R. E. Danforth, general manager Public Service Railway, of New Jersey, has announced that that company has arranged for a new series of tests of two-car train operation in Newark and Jersey City. These are to be carried out as an amplification of the tests which were conducted during the last winter and were reported in abstract in the ELECTRIC RAILWAY JOURNAL for June 5, 1913. The method of conducting the tests will be based upon the experience gained at the time of the previous tests as well as the facts which were brought to light by the results of these tests.

One of the tests will be run on the Greenville line between Jersey City and Bayonne. Tests will also be conducted in Newark on the Broad Street line, one of the most important lines in that city, and probably on one of the other lines. These tests will be so arranged as to overcome the two main conditions which were found, in the original tests, to introduce elements of confusion in the final results. The first and most important of these elements is the lack of familiarity with train operation which existed during the original tests, not only on the part of the train crews but also on the part of the public. This, it is believed, constituted a serious handicap to rapid operation of the two-car units, as the conductors were not accustomed to the double transmission of signals and the boarding passengers were found to hesitate in selecting between the two entrances offered to them. These opportunities for delay to the trains will not exist on the Greenville line as trains have been in daily use there since 1911.

The other indeterminate factor which it is planned to eliminate in the new tests is that of mixed service. In the original tests the trains had to be sandwiched in between the single cars which constituted the normal service, and as a consequence any conclusions regarding schedule speed or the number of trains required to do the work of transportation had to be based upon calculations instead of showing directly in the results. In the new tests it is planned to operate the whole line in each case exclusively with two-car trains for one week, keeping track of the number of cars, the number of platform men, the total power consumption, the rush-hour round-trip time, the time consumed in stops, the number of stops, the number of standing passengers and the like. During the following week the trains will be replaced by single cars for which the same observations will be taken, the number of cars being adjusted to give similar rush-hour loading conditions, so that when the tests are completed a direct comparison between the costs of the two methods of operation will show directly from the results. Possibly instead of running the entire service all day in this way for an entire week, certain weekdays of each week will be selected for operation with single cars during the non-rush hours and the other days of the week for operation with trains throughout the day.

The Greenville line on which the first test will be conducted is typical of city traffic conditions, as the line is of moderate length and picks up or discharges passengers along the entire route. The round trip at present on this line, including lay-overs at both ends, now requires 110 minutes, and the length is 16.45 miles. Exclusive of lay-overs the schedule speed is 9.31 m.p.h.

The fact that two-car trains have been in use on the Greenville line since 1911 makes it a particularly appropriate one for the tests, because the patrons on this line have been used to that class of service. At present the trains are used only in the rush hours, the rest of the service being with single motor cars. The present schedule (that in October) calls for twenty-eight motor cars during the middle of the day and thirty-seven single motor cars and fourteen two-car trains during the rush hours. This corresponds to a headway of one and two-thirds minutes at

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night, two minutes in the morning and four minutes in the middle of the day. The winter schedule calls for ten more units. The trains are made up of two former single-unit motor cars, each with a 25-ft. body. Each of these cars is equipped with two motors. The cars are permanently coupled together and are operated by means of a four-motor controller. The front car has a forward exit and a rear entrance and exit. The rear car has an entrance and exit at the rear but the front platform is closed up. The single-motor cars used on this line have a 32-ft. body so that the two-car train has 100 ft. of seats as compared with 64 ft. of seats in the single car. All of the single cars used on this line are four-motor cars, as a considerable part of the line is in a trucking district and it was impracticable to get sufficient adhesion for good acceleration with a single two-motor car. The two-car train with four motors seems to have better traction than the single two-motor cars. Of course, during the hours when the service will be supplied by single cars only enough additional cars will be run to make the service in each case the same.

To make the loading conditions as nearly equal as possible, the company in the tests in Newark will change the entrance arrangements of the second car in the train so as to have the entrance at the front end of the car and will close up the rear end of the car. As the entrance to the first car of the train is at the rear of the car, this arrangement will bring both entrances together and will reduce any time lost by passengers going first to one entrance and then the length of the car to the other. In other words, the train will be a center-entrance train but with no connection between the cars. It is expected that in the tests in the city of Newark on Broad Street and on the other line selected the arrangements in regard to the running of trains, etc., will be similar to those described in the Greenville tests.

The company hopes by means of these new tests to settle satisfactorily the question of the economy of train operation as applied to conditions such as exist in the city of Newark and its vicinity. The tests are to be made under winter conditions, if that is found necessary, but it is expected that a series of preliminary tests will be run off on the Greenville line early in November.

INTERLOCKING RULES ADOPTED IN WISCONSIN

For several years past the Railroad Commission of Wisconsin has been working in conjunction with the Railroad and Warehouse Commission of Illinois, the Railroad and Warehouse Commission of Minnesota and the Public Service Commission of Indiana for a uniform set of rules governing the construction, maintenance and operation of interlocking plants on steam and electric railways. Several conferences have been held at various times at which have been present the signal engineers of practically all the railroads interested in signaling in these four states and at which the representation has been estimated to include one-third of the total mileage of steam railroads as well as a large share of the mileage of electric railways in the United States. The engineers of the commissions have held several conferences independently of those held with the signal engineers of the railroads, and as a result a set of rules has been prepared which the engineers of these four state commissions have agreed upon for submission to their respective commissions for adoption. Accordingly these rules were submitted to the Wisconsin commission and, after a public hearing, were adopted on Oct. 8, to become effective Dec. 1, 1913. A brief abstract of the rules is submitted herewith.

Prior to the construction, reconstruction or rehabilitation of any interlocking plant, there shall be filed with the commission as a basis for approval a station map or other plat drawn to scale showing all physical surroundings located on the right-of-way of each company, profiles showing the grade of each railroad company's main tracks for a distance of not less than 2 miles in each direction from the crossing or junction, and a track plan in duplicate showing the location of all interlocking units, the tower and its general dimensions, and any other appurtenances necessary to show a complete layout of the proposed interlocking plant. All plans must be of light-weight paper when in the form of blueprints. In the preparation of plans the symbols approved by the Railway Signal Association shall be used to indicate essential parts of the interlocking plant.

The interlocking limits are defined by the home or dwarf signals situate on any specified track and located farthest from the point to be protected. Any appliances operated in conjunction with the interlocking plant and situated beyond the limits designated are considered as auxiliaries.

The commission's approval on such plans will stand for a period of one year. If the work is not commenced within that period, a new approval must be obtained. No interlocking plant shall be reconstructed or rehabilitated, nor shall any change be made in the locking or in the location of any unit until plans have first been submitted to and approved by the commission.

Upon the completion of any work on an interlocking plant which involves changes in the locking, the units must be connected and adjusted and the plant placed in conditional service for not less than twenty-four hours, remaining so until relieved by order of the commission, except when permission to omit this precaution is received from the commission in advance. Conditional service is interpreted to mean that all units and other apparatus involved be connected and operated from the interlocking machine in the tower. However, all trains shall come to a stop at the governing home or dwarf signal regardless of its position and such signal shall not be operated to give a proceed indication until after the train has made the prescribed stop.

Prior to or accompanying a petition for the inspection and approval of a completed interlocking plant there will be required a track plan, a locking sheet and dog chart showing the arrangement of locking in the machine as installed, wiring plans showing in detail all circuits, and a manipulation sheet with or without track diagrams as required by the commission showing in tabulated form the numbers of all levers manipulated for any given route designated on the track plan.

A suitably framed manipulation chart and track diagram shall be properly placed in the interlocking tower. The terminal ends of each track on this chart shall be numbered or lettered to correspond with the above track plans.

The petition for inspection of any interlocking plant, when possible, shall give three days' notice in advance of the time when the plant will be ready for inspection. If the interlocking plant is found to be installed in accordance with the approved plans, a temporary permit will be issued to the railroad company in charge, pending the issuance of formal permits.

Except when approved by the commission, all interlocking signals must be of the semaphore type. Semaphore arms must display indications to the right of the signal post, except where the physical conditions on a road require the display of signal indications to the left.

When required by the commission, all home signals must be equipped with not less than two arms. Unless operated by power all home signals in mechanical plants must be pipe-connected, except when otherwise approved by the commission. When used in connection with automatic train-stopping devices, the home signal may be located immediately opposite the means for controlling the apparatus of the train-stopping device. When used in connection with derails and other units the home signal must be located as far in the rear of such units as is necessary to secure full protection, but in no case shall it be less than 5 ft. in the rear. When home signals are semi-automatic

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or form a part of an automatic block signal system, calling-on arms or some other means may be used for advancing trains. All high-speed signals located in automatic block signal territory shall be semi-automatic and form a part of the block signal system.

Dwarf signals, when used, must be located and connected in the same manner as home signals. Advance signals may be used when necessary and must be installed in the same manner as home signals.

On level and ascending grades distant signals shall be located not less than 2500 ft. in advance of their respective home signals. On descending grades the minimum distance of 2500 ft. shall be increased at the rate of 100 ft. for each 0.1 per cent of gradient. All high-speed tracks must be equipped with power-operated distant signals having electric locks or other suitable apparatus to prevent changing of the route until such signals have indicated their normal position.

In placing derails in the tracks of electric roads consideration will be given to speed and character of traffic. Derails must be of an approved pattern, suitable for the purposes intended, and so placed with reference to grades, curvature, bridges and other tracks as to secure a maximum of efficiency and safety. Where physical conditions require their use guard rails shall be placed between the track rails, parallel to and not less than 10 in. distant in the clear therefrom.

Automatic train-stopping devices which are a part of a system of automatic train control approved by the commission may be used in lieu of derails. In such devices the means for automatically applying the train brakes shall be located a sufficient distance in the rear of the fouling point to insure a safe braking distance.

In mechanical plants all facing switches, split-point derails in main tracks and all slip switches and movable point frogs must be locked with facing point locks. All other derails, switches and other units must be locked either with facing point locks or with switch and lock movements. In plants equipped with mechanical signals all derails must be provided with bolt locks, as must also all switches, movable point frogs and other units where conditions require them.

Unless otherwise provided, all derails, switches, movable point frogs and other units shall be equipped with detector bars of approved design not less than 53 ft. in length, and all crossings shall be equipped with detector bars of suitable length except where electric locking is installed and at outlying crossings of simple character where no switching is performed when the plant is equipped with time locks.

Unless equipped with electric locking, time locks must be installed to prevent the changing of high-speed routes until after the home signal has displayed the stop indication for a predetermined time. Electric locking may be provided in place of time locks and crossing bars. When a railway company is equipped with sufficient maintenance forces for properly maintaining electric detector circuits, such circuits may be used in place of mechanical detector bars.

All mechanical interlocking machines shall have the locking so arranged as to be effective before the operating conditions of any circuit directly controlling a unit can be changed. All interlocking machines must, when practicable, be provided with means for locking or sealing the mechanical locking and indication apparatus in such a manner as to prevent access to any except authorized employees.

Signal towers shall be so placed and be of such height and size as best to serve the purpose for which they are intended. The use of interlocking towers for purposes other than interlocking, dispatching and block work is undesirable. If work other than interlocking is carried on in the tower, a suitable partition or railing must be provided to prevent outsiders from having access to interlocking apparatus and interfering with the duties of the operator or towerman.

When an interlocking plant is taken out of service the commission must be notified immediately. Under such circumstances train movements must not be governed by interlocking signals but by the usual precautions prescribed by statute governing train movements over and across railroad grade crossings, junctions and drawbridges.

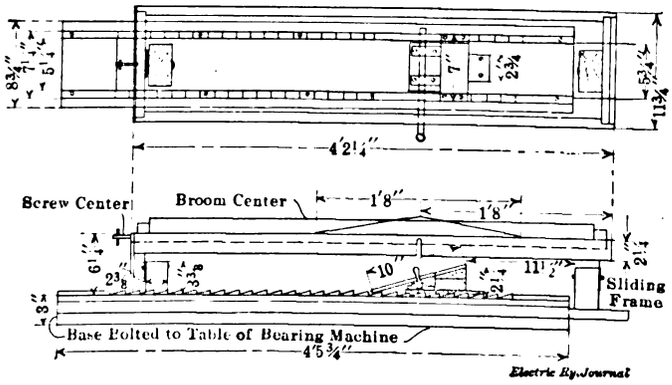
Reports for each interlocking plant shall be filed with the commission by each railroad company concerned, which reports must be filed in manner and form prescribed by the commission.

The rules were formally adopted on Oct. 8, and are to become effective on Dec. 1, 1913, in the State of Wisconsin, the order establishing them being signed by David Harlowe, John H. Roemer and Halford Erickson of the Railroad Commission of Wisconsin.

JIG FOR BORING SWEEPER BROOM CENTERS

A simple jig for use in boring holes in broom centers for rattan broom snow sweepers has been used effectively this season in the Wolf Street shops of the New York State Railways at Syracuse. It is made up with a base fastened on the table of the boring machine and a sliding carriage in which the broom center is clamped. The base consists of a 1-in. board on the sides of which two 1-in. strips 1⅜ in. wide are screwed, leaving a guide-way for the 1-in. carriage base. On top of the side strips and projecting over the carriage base are two saw-tooth racks.

A frame is mounted above the carriage base on heavy wood blocks. Iron plates project downward from the ends of the frame and rock on bolts which extend through the blocks. The frame is shown in plan with the broom center removed in the upper view of the illustration. The lower



Jig for Boring Holes in Center Boards for Rattan Sweeper Brooms

view shows the broom center in position in the frame. The broom center is carried on screw center points which, when set up against the ends of the broom center, clamp it in the frame and the frame in one position at the same time.

On the sliding base is a ratchet block carrying two ratchet springs, one on each side, their ends bearing on the saw-tooth racks. The teeth of these racks are spaced apart a distance equal to that desired between holes in each row in the board. The springs may be raised by means of a cam operated by a rod and handle. One side of the frame is notched out to clear this cam rod.

The operation of the jig consists in clamping the broom center in the frame. The carriage is then pushed to the extreme position at the right and the springs are released. The carriage is then pulled back to the left notch by notch. After a row of holes has been bored the broom center is rotated through an angle corresponding to the desired distance between rows and the operation is repeated. The jig has reduced what was formerly a very tedious operation to a very simple one.

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COMMUNICATION

SATISFACTORY EXPERIENCE WITH ELECTRIC OPERATION

BUTTE, ANACONDA & PACIFIC RAILWAY COMPANY
ANACONDA, MONT., Oct. 7, 1913.

To the Editors:

In reply to your inquiry I would say that on Oct. 1, 1913, the Butte, Anaconda & Pacific Railway established regular electric passenger service between Butte and Anaconda. For approximately four months previous to this the freight service between East Anaconda yards and the smelter had been handled electrically. During this period electric locomotives have made approximately 55,000 miles and have delivered to the smelter about 1,500,000 tons of ore. Since starting the electric service there has been no failure of any of the electric apparatus and no delay in any way attributable to electric operation.

The substation at Anaconda has been in continual service twenty-four hours a day with no more than ordinary care and without replacement of any parts. The locomotives have been operated by the steam locomotive enginemen and have been maintained by the regular shop force with the addition of one man experienced in electric operation. They have met every requirement and there has been no failure or replacement of locomotive parts.

The overhead contact system has been highly successful, and there have been no failures and no accidents. The wear of the contact wire is inappreciable. The original pantograph rollers on the locomotives are still in use and show very slight wear notwithstanding the severe conditions imposed by the smoke and soot deposited on the wire from the steam locomotives during the several months of construction. Our experience up to the present time indicates the complete success of our electrification and justifies the existing optimism and enthusiasm for heavy railroad electrification.

H. A. GALLWEY,
General Manager.

CHANGES IN BROOKLYN DISCIPLINE CODE

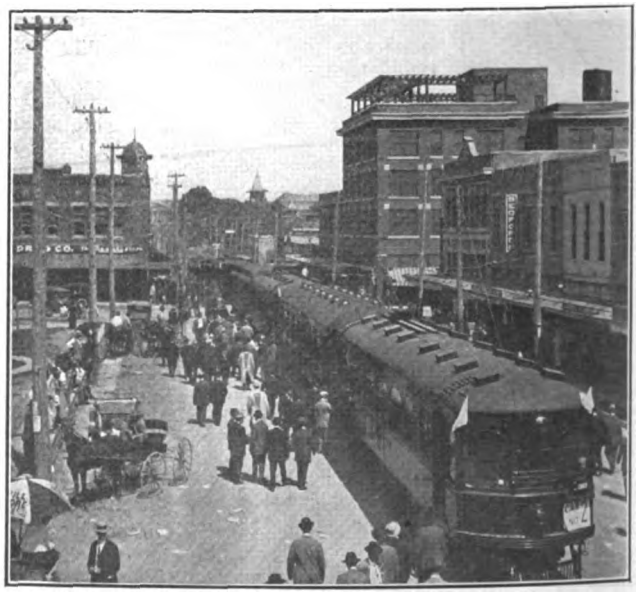
Under date of Oct. 16, 1913, the Brooklyn Rapid Transit System has issued a new edition of its violation code covering the surface lines. The original code was published in full in the ELECTRIC RAILWAY JOURNAL for April 13, 1913, as part of an article entitled "The Merit and Demerit System of Discipline in Brooklyn." The changes are few in number and were made partly to embody violations which were not thought of when the first code was prepared and partly to change some ratings. The changes follow:

Violations, under "Duties of Position," 4 (a) "Permitting others to perform one's duty" and (b) "Performing another's duty without authority," have been changed to "L," or "limits," which means a number of demerits recommended by the local assistant superintendent and approved by the superintendent of surface lines; and an addition has been made: (c) "Allowing passengers to pull bell," with one or two demerits for same. Under "Signals," 13 (a) "Failing to flag follower when cars stop on bridges" has been added, with a charge of one to three demerits. Under "Intemperate Habits," violation C-8, covering the use of tobacco on duty, has been changed from a fixed number of demerits to discretion of superintendents. Under "Passenger Protection," violation F-1, "Failing to protect passengers boarding and alighting," has been extended by adding "or while riding on cars." Violation F-2, "Allowing passengers to ride in forbidden places," has been changed from fixed demerits to discretion of superintendents. Violation F-3, relating to "Safety Appliances," has been widened to include (a) "Running boards, side doors, steps and gates not properly secured," with fixed demerits. Under "Accidents," violation G-3 (g) has been changed from "Failing to make prompt call for wrecker (when necessary after accident)" to "Failing to make prompt call for wrecker when necessary." Under "Equipment," violation I-16 (a) has been changed from "Inspection of equipment neglected before leaving depot" to "Failing to trim car properly when laying up same." Under "Rules for Passengers," J-7, "Failing to enforce smoking regulations," has been changed from fixed demerits to discretion of superintendents. Under K-2, "Inattention to Routine," violation, "Windows and door curtains improperly adjusted," has been changed to read: "Windows and curtains improperly adjusted." The penalty for violation K-8 (c), "Failing to lock registers," has been reduced from five to two or three points.

SOUTHERN TRACTION OPENS NEW 120-MILE INTERURBAN LINE

On Sept. 30 the management of the Southern Traction Company, Dallas, Tex., formally opened its new 151-mile interurban line between Dallas and Waco and between Dallas and Corsicana. The opening of this new line was fittingly celebrated by the citizens of Waco, Hillsboro and Waxahachie, the programs beginning upon the arrival of the first train over the line, which in all cases consisted of a number of two-car trains bearing the inspection parties.

In a folder announcing the schedule it is stated that



Part of Eight Two-Car Trains Loaded and Ready to Start from Waxahachie, Tex.

hourly service will be maintained between Waco and Dallas and similar service between Corsicana and Dallas. Two classes of service will be furnished, local and limited, and in the present arrangement of schedules the two classes are alternated. The run between Dallas and Waco, 97 miles, will be made in four hours by limited trains.

Twenty-two motor cars have been purchased for service on the new line. They are of semi-steel construction with arched roof and have a seating for fifty-six passengers each.

The track is laid with 80-lb. A. S. C. E. rail except through paved streets, where 7-in. high T-rail is employed. Power is supplied from the Texas Power & Light Company's plant at Fort Worth, which supplies six substations. The propulsion current is supplied at 1200 volts d.c., and the rolling stock is designed for both 1200-volt and 600-volt operation.

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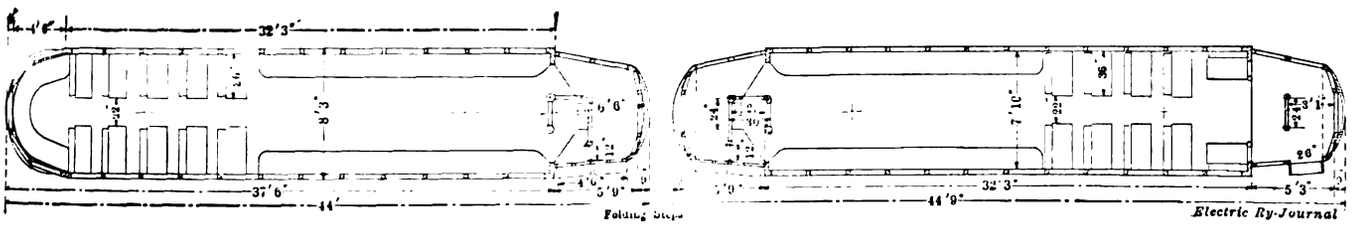
FORTHCOMING TRAIN OPERATION ON MONTREAL STREET RAILWAY SYSTEM

As noted recently in these columns, the Montreal Street Railway has ordered from The J. G. Brill Company twenty-five motor cars and twenty-five trail cars for train operation on St. Catherine Street, Montreal. The street in question is the trunk line of the Montreal system and is one on which the limit of efficient one-car operation has been reached as the normal headway is one and a half minutes. In one respect the conditions for train operation are unusually favorable because the traffic is heavy enough to permit two-car operation throughout the day. Hence neither the time lost in making up trains nor low trailer mileage enters into account. An important operating feature of the train service will be the arrangement for all loading and most unloading at the center of the train, thereby avoiding the delays which arise when the entrances are a car length or even half a car length apart. This end will be attained by constructing the trailer with entrance and exit at the front end. This plan practically provides an articulated unit with two entrances and two exits at the center of the train and one exit at the front end of the unit.

The framing and other construction materials of the new cars will not differ much from the present standards of the Montreal company, but several changes will be made in the platforms, doors and steps. The new motor car will have longitudinal seats in that half which is nearest the loading platform, but, unlike the present motor car, a vestibule closed with folding doors will make it possible to omit all body doors and end bulkheads. Another innovation will be the use of steps to fold in connection with doors. The seating plan and the door and step arrangement of the trail car are similar to those of the motor car except that the trailer is provided with circular seating at the rear end. The rear platform of the motor car and the front platform of the trailer are practically duplicates in the arrangement of the dividing rail, conductor's stand, aisle widths, etc. These platforms are but 5 ft. 9 in. long instead of the 7-ft. length common on the earlier cars. It will be observed that means for exit and entrance are provided on both loading platforms in addition to the customary sliding door exit on the motorman's platform. An important safety feature will be the wiring of all doors in series so that the motorman will not receive the light signal for starting until every door in the car is closed. The resistance for the door circuit will be carried on the motor car and consequently the safety door signals may be used with or without trailer operation.

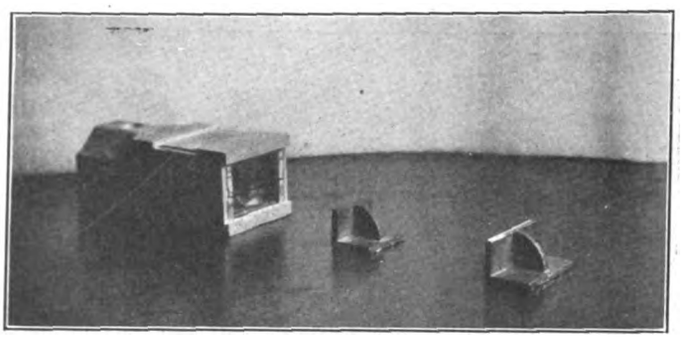
Each motor car will be equipped with four 50-hp W-533-T-4 ventilated commutating-pole motors and a K-356 controller. The Consolidated Car Heating Company's three-point connection plug electric couplers will provide quick connection for the heating, lighting and door signal circuits, while a Tomlinson automatic coupler will carry the air line. The principal dimensions, clearances, etc., of these cars are shown on the plans. It may be added, however, that the trucks will be equipped with 30-in. diameter wheels and that the step heights will be as follows: from ground to first tread, 16 in.; from tread to platform, 12 in., and from platform to car floor, 8½ in.



Plan of Proposed Montreal Car and Trailer

FOREMAN'S POCKET LEVEL

Devised at the request of foremen on the Florida East Coast Railway to enable track leveling to be accomplished without lying on the ground to sight along the rail, a trackman's pocket level has been developed from a cigar box with an inclined piece of looking glass to the form illustrated. It comprises an aluminum box, 6 in. long, 2⅜ in. wide and 2¼ in. high, with a level bubble in the rear end. Inside is a mirror inclined to a 45-deg. angle, while across the front and top are removable pieces of ordinary glass scratched so that when level one may stand erect and direct the line of sight in a horizontal level line by superimposing the image of the scratch on the vertical glass under the line on the horizontal glass.

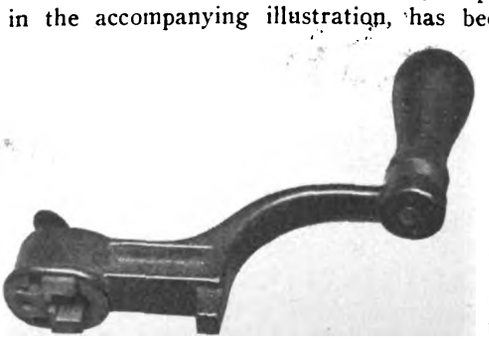


Home-made Pocket Level

As the scratch on the vertical glass is 1 in. above the base, two small targets 1 in. high are provided so that a parallel line of sight on railroad grades may be obtained by setting the large white target not more than 300 ft. away and wedging the level until the two scratches and the top of the target coincide. Intermediate points may then be adjustable by sighting on the smaller target. The opening enables a middle-sized man to stand erect and see small targets about 300 ft. away. J. G. Home, Florida East Coast Railway, St. Augustine, Fla., manufactures the level.

NEW CONTROLLER CRANK

A new controller crank, called the "Griptite," and shown in the accompanying illustration, has been assigned for manufacture by the Traction Appliance Company, Inc., Vincennes, Ind., to the Lord Manufacturing Company, Brooklyn, N. Y. This crank clamps the controller post firmly on all four sides, thereby holding the handle thoroughly rigid. The obvious result is that wear on the controller post or on the parts of the crank is eliminated. The clamping is accomplished by a thumb screw or, where specified, with a cap screw.



New Controller Crank

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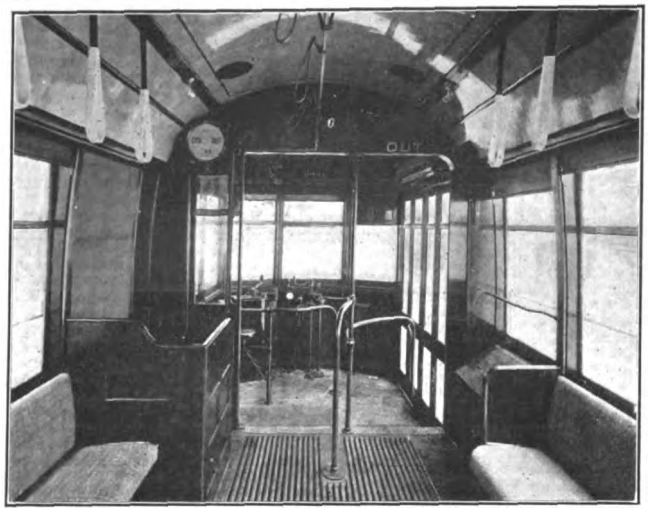
NEAR-SIDE CARS FOR ATLANTIC CITY

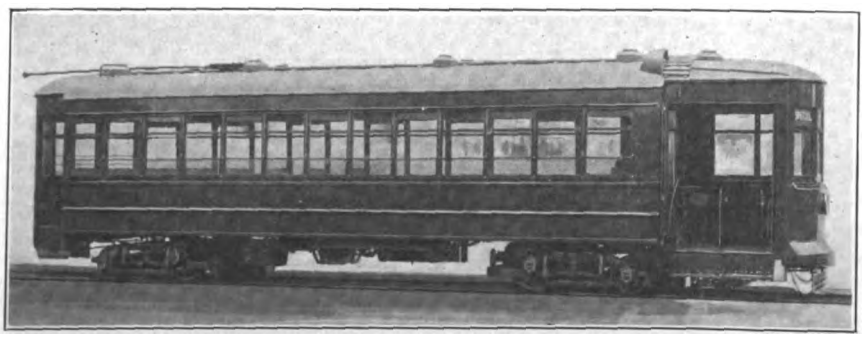
The delegates at last week's convention of the American Electric Railway Association had ample opportunity to see in operation the twenty-six near-side cars which were recently completed for the Atlantic City & Shore Railway by The J. G. Brill Company. The near-side car has proved



Interior View Showing Conductor's Stand Inside of Car

a complete success in Atlantic City from the start, this result being aided by the fact that the company had previously been operating with near-side stops. The cars embody the very latest features of near-side design, including the use of fully glazed doors and placing the conductor's station within the body of the car as illustrated.

The design comprises all-steel bottom framing with side sills of 5/16-in. plate with a maximum width of 18 in. These plates are reinforced top and bottom and vertically by light angles. An upper truss rod at the front end of the car prevents deflection of the overhang of the main frame. The cast-steel bolsters have ends which are lipped down under the side sills and are designed to carry 10,500 lb. at each end when supported at the center. The framing between the bolsters includes eight crossings built up of angles with diagonal cross members. The side posts are tenoned into a yellow-pine sill and are bolted to the lower angle of the sill plate and also bolted through the vertical



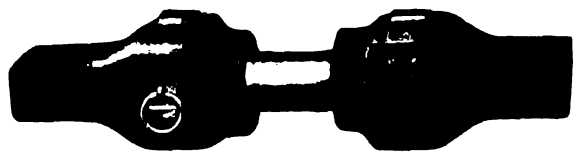
General View of Near-Side Car for Atlantic City Showing Doors Opened

angles riveted to the sill plates. The wooden side panels are covered with cold-rolled sheet steel, and at the bottom is a 2-in. x 3/16-in. steel molding beveled on the top edge. The plain arch roof is supported by compound carlines with 1½-in. x ⅜-in. steel members at each post and wooden carlines between. The bodies are mounted on 39-E single motor trucks. The door arrangement consists of entrance and exit doors on the front platform which may be operated independently or together by mechanism under the control of the motorman, and an emergency exit at the rear which is operated from the conductor's position.

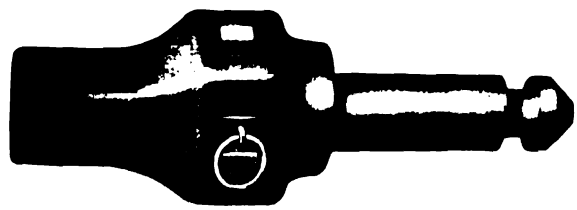
The car seats fifty-one passengers on fourteen transverse seats, a circular seat at the rear end and longitudinal seats at the front.

A NEW AUTOMATIC COUPLER

A new form of automatic coupler for surface cars has been placed upon the market by George H. Putnam, Boston, Mass. It has been named "Simplex," owing to the fact that it is designed with the idea of effecting the greatest degree of simplicity and using the smallest number of parts. The device consists of a "coupler box," or drawbar, which is set into the drawbar pocket on or below the bumper



New Automatic Coupler—Coupler Boxes Locked Together



New Automatic Coupler—Coupler Box with Long Coupling Bar in Place

beam of the car. Into this pocket is inserted, when two cars are coupled, a round bar with a shoulder at each end, as shown in one of the accompanying illustrations. The coupler box is held in the drawbar pocket or attached to the radius bar by a pivot pin in the same manner as the ordinary flat drawbar.

The action of locking is effected by a block which drops behind the shoulder on the coupling bar when the latter is inserted in the end of the coupler box, the conical end of the bar wedging up the block until it can drop behind the shoulder. The lock is held in place by a flat spring on the outside of the coupler box, and it may be raised, when the cars are to be uncoupled, by means of an arm attached to the ring shown on the side of the box in the illustrations.

A combination coupling bar with one slotted end may be used if it is desired to couple cars to foreign equipment, and an extra long bar may be used if it is desired to separate the coupled cars so that it is not necessary to have the coupler faces extend beyond the edge of the bumper.

The Mexican government has granted a ten-year concession to the Mexico Tramways for operating a freight and express service on all lines of the system in the federal district. The tramway is permitted to carry freight from the smallest package to a carload. There are six classifications, the rates ranging from 3 to 7½ cents (U. S. currency) per kilometer (0.62 mile), per 1000 kilos (2204.6 lb.). Coal will be charged at the rate of 25 cents per ton without regard to distance. The company will store freight in warehouses pending its receipt by the owner, with no charge for the first two days.

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News of Electric Railways

The Boston Arbitration Hearings

The recent hearings before the Boston Elevated Railway arbitration board have been occupied mainly with the presentation of testimony in regard to working conditions and wages of employees in shops and carhouses. John Lindall, superintendent of rolling stock and shops; Clark Doty, general foreman of shops, rapid transit lines, and F. W. Garrett, superintendent of the Albany Street shops for surface car repairs, testified that advances in pay must be approved successively by foremen, superintendents, heads of departments and the executive officers of the company.

Mr. Lindall said that the pay of pitmen, of whom there are from 225 to 250 in the road's service, ranges according to length of service from 19.5 cents to 28.5 cents an hour. Night pit foremen receive 30.5 cents an hour. Mr. Lindall said that his recommendation urging the adoption of a nine-hour day in the department of rolling stock and shops had been adopted. The classification of pitmen according to experience was necessary in dealing with the complex equipment of modern cars. Repairs had to be specialized and certain classes of work could not safely be intrusted to men without experience along special lines of inspection and light repairing. A man starting work as a pit apprentice received 19 cents an hour, and if of average intelligence he attained the maximum pay and responsibilities of the work in three to four years.

Mr. Doty explained the organization of the maintenance force on the rapid transit lines. The repair shops were located at Sullivan Square, Guild Street and Eliot Square, Cambridge. The pay of elevated car cleaners was raised in the last five years from 15 cents to 20 cents an hour. The last increase was secured by giving the former pay for one hour's less work a day. He considered this a fair wage in view of the company's practice of advancing men from the grade of car cleaner to pit helpers at the rate of 21.5 cents an hour. So far as possible the repair work on the rapid transit lines was conducted to reduce the amount of Sunday work to the minimum. Of 129 men in this service about thirty-five were required in the carhouses on Sundays, including one or two for emergency work at each machine shop. The men were allowed to rotate on Sunday work. At Sullivan Square, the principal repair shop center of the rapid transit lines, the shop force worked fifty-four hours a week. On Sundays the day's work was eight hours. In connection with surface car cleaning it was brought out that one man devoted his entire time to visiting the various carhouses with a vacuum cleaner. His compensation was $2.07 per day.

Mr. Garrett said that in his opinion multiplied classifications of shopmen should be greatly reduced, to enable employees to attain higher rates of pay more quickly when duly qualified. He contended that any policy of holding men down to low wages when higher wages were warranted was not economy but extravagance. Last summer he had recommended an extensive change in the classification of employees, with some modifications in the way of higher wages. These recommendations were being held in abeyance.

In the testimony of individual employees the following ratings were presented: air-brake inspector, rapid transit lines, covering forty-one cars twice a week, at the rate of thirteen to fourteen per night of five hours, rate, helper classification, 21.5 cents an hour; truck gang, removing wheels and repairing trucks, rates from 21 cents to 28.5 cents an hour; air-compressor stripper, repairer and assembler, $11.40 a week; wheel grinder, Sullivan Square shops, rapid transit lines, 21.5 cents an hour; inspector of drawbars, trucks, draft rigging and hangers, surface lines, handling twenty-six cars a day, 21.5 cents an hour.

Evidence on behalf of the employees of the Boston Elevated Railway was closed on Oct. 17. The board then adjourned until Oct. 29, at which time the company's side of the case will be presented. Several days were occupied prior to the last session by the presentation of testimony emphasizing the increase in union wages in various lines of trade in the past fifteen years at Boston. The piecework system in the company's shops was criticised by representatives of the employees' organization. In answer to criticisms of the classification of employees at the Bartlett Street shops, Harry L. Libby, superintendent, stated that in his opinion six classes of woodworkers and four grades of painters were necessary. The point was brought out that these shops submitted competitive bids to the management of the road for building articulated cars and performed the work at about 8 per cent less cost than was provided in the estimates. The costs as determined contained no superintendence or other overhead charges. Mr. Libby had made no recent recommendations for wage increases.

Proposed Sale of Toronto Utilities to the City

Owing to franchise stipulations which are considered restrictive by the city, the municipal authorities of Toronto, and particularly Mayor H. C. Hocken, are desirous of purchasing the street railways within the city limits. These railways are nearly all the property of the Toronto Railway, although portions of the lines of the Toronto & York Radial Railway and the Toronto Suburban Railway are within the city limits. Sir William MacKenzie is the president of the Toronto Railway, and he and his associates also own or control the Toronto Electric Light Company. The Mayor desired to secure only the street railways originally, but Sir William MacKenzie refused to sell the railway properties without the lighting property, so that the purchase of both is under consideration.

Mayor Hocken retained consulting engineers to report on the value of the properties. The report on street railways was made by Bion J. Arnold, Chicago, and John W. Moyes, Toronto, and was made public on Oct. 13. The report on the electric light property was made by R. A. Ross, Montreal. It fixed the total value of the property of the Toronto Electric Light Company at $6,132,754. The price asked is $8,000,000, which leaves $1,867,246 as the amount to be paid for the franchise and the business. The total amount asked for the street railways within the limits of Toronto is $22,242,405. The report of Messrs. Arnold and Moyes fixes the total value of the railways at $20,944,478. The difference in the case of the railways is caused by adding other items, such as estimated increment in the value of real estate during the eight years that the franchises have still to run.

The report of Messrs. Arnold and Moyes includes an investigation of the cost new and the present value of the railway properties, as of July 1, 1913, together with a study of the operation of the properties. The investigation was made to determine the value of the properties, including rights under franchises expiring in general on Sept. 1, 1921, in order to determine a fair price in case the city decides to purchase. The valuation includes both physical values and intangible values, the latter being the estimated present monetary value of the net profits, after all deductions for operation, taxes and interest. It has been assumed in the Arnold-Moyes report that such rights as the suburban railways now have to distribute electrical energy for light, heat and power in a limited area in Toronto shall be delivered to the city if the properties are purchased.

In a letter to Mayor Hocken supplementing the report, Bion J. Arnold says that if suggested conditions are complied with he believes that it will be well for the city of Toronto to enter into the proposed arrangement for purchasing the railways. This conclusion applies, however, to the local conditions only. Mr. Arnold says:

"In thus advising I do not wish to be understood as taking any position whatever upon the broad question of municipal ownership and operation versus private ownership and operation, but am simply advising what I believe would be best for the city of Toronto, as a city, to do under the conditions that surround it at present."

In the Arnold-Moyes report the total value of the Toronto Railway is fixed at $20,608,036, of which $9,894,483 is the present value of the physical property as of July 1,

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1913, and $10,713,553 is the intangible value of the property as of the same date. The total value of the portions of the property of the Toronto & York Radial Railway within the city is placed at $285,298, of which $91,604 is for physical property and $193,644 is for intangible value. The total value of that portion of the property of the Toronto Suburban Railway within the city is placed at $51,154. Thus the grand total value of all the railway properties, as fixed by the Arnold-Moyes report, is $20,944,478.

In arriving at the cost to reproduce the railways new, Messrs. Arnold and Moyes applied unit prices to inventory and added certain percentages. These percentages, varying from 5 to 15 per cent, were for "organization," "engineering," and "incidentals." The average percentage was 6.4 per cent. There were also added 5 per cent for the cost of securing money and 5 per cent for carrying charges during construction work and general legal expense.

Depreciation percentages taken in the Arnold-Moyes report may be of interest. Some of them are as follows: coal-handling apparatus, 6 per cent; grates and stokers, 50 per cent (that is, 10 per cent a year for five years, no further depreciation being figured after that if the apparatus is still in use); horizontal tubular boilers, 8 per cent; water-tube boilers, 3.5 per cent; steel smoke breeching, 10 per cent; brick and concrete stacks, 3 per cent; heaters, 3 per cent to 6 per cent; pumps, 5 per cent; air compressors, 5 per cent; Corliss slow-speed engines, 3 per cent; automatic high-speed engines, 5 per cent to 8 per cent; piping, 3.5 per cent; generators, 4 and 5 per cent; transformers, 5 per cent; rotary converters, 5 per cent; switchboards and interior wiring, 3 per cent; iron poles, 2.5 per cent to 3 per cent; cedar poles, 5 per cent; pole brackets, 4 per cent; wooden cross-arms, 5 per cent; iron cross-arms, 3.33 per cent; weatherproof cables, 3.33 per cent; lead cables, 3 per cent; transmission-line material, 5 per cent.

The Detroit Wage Arbitration

F. W. Brooks, general manager of the Detroit (Mich.) United Railway, presented his argument on the questions of increased wages and a readjustment of schedules and hours to the board of arbitration on Oct. 16. He said that it would be impossible to carry out the demands of the union leaders and satisfy the men. If the schedules for runs were arranged as suggested by the union 791 crews would have to be added to the present force, and of this number 748 crews would work nine hours a day and 1203 crews would work from one to eight hours. Under the proposed schedule 2406 members of the union would work from one to seven hours, or an average of a little less than three hours and forty-five minutes a day, and receive eight hours' pay a day, while the minority, or 1596 men, would work nine hours and receive nine hours' pay.

Mr. Brooks said that the question for the arbitration board to decide was whether the new men should for a short period of time work a longer day than men who have been in the service for eighteen months, in order to earn a fair day's wages, or whether the company should be obliged to add more than 1500 men to its payroll and pay them for an average day's work, when in reality they work not much more than three hours a day. In this connection Mr. Brooks said in part:

"Those having charge of the case for the labor union knew at the beginning that the demands of the public require a heavier service for a couple of hours in the morning and a like period in the afternoon than is required at other hours of the day, and that as a consequence the crews operating cars in the morning for a couple of hours which are not required again until the afternoon could not receive a full day's pay unless their work in the morning was pieced out by the assignment of additional working hours at a later period of the day. They knew that this fluctuation in the demands of the public was the sole cause of the condition of which they complained. They knew that the alternative was to require the company, on a decreased income due to lower rate of fare, to increase its payroll more than 50 per cent a year, or approximately $1,400,000, without getting a single hour's additional service from its conductors and motormen.

"Those having charge of the union case sought to establish the impression that the hours of labor might be more equitably distributed but that the company had declined to do so. They sought to give the impression that, while many of the men performed a day's work over unnecessarily long hours, there were also a great number of the men who worked only one to two hours a day. Emphasis was laid on the unwarranted claim that 112 men on the schedules submitted received only one hour's pay a day, a claim shown to be baseless. Equally baseless is the assertion that 2500 men must work under conditions requiring an elapsed time of eighteen and nineteen hours in which to perform a day's work.

"Much stress is laid upon the clause in the Detroit United Railway ordinance which says that the work-day shall be ten hours, to be performed in twelve. This provision has been disregarded by both men and the company in their written agreements in the past. The present proposal of the union disregards it. The union here demands a nine-hour day, to be performed within eleven hours. The claim then is that it binds the company but does not bind the men. The members thus unconsciously and unintentionally disprove its validity."

Mr. Brooks objected to the demand of the union for unlimited transportation for employees. He said that this would result in the distribution of thousands of tickets among the men. Because of the obligation of the company to furnish its service to the public at greatly reduced rates, he said that strict economy must be practised. He asked that the agreement be changed to provide for a limited concession to the men in this connection. The question of hours of labor had been held over the company as a club to force other concessions.

In discussing the question of wage increases Mr. Brooks said in part:

"The company has many thousand employees. In the conduct of its business throughout the years of its existence from 1901 it has from time to time increased the rates of pay to them all as it was able to do so, and at the same time has assumed the burden of increased cost of doing business, an increase in greater proportion than its increase in income. As is known, it has recently agreed to an arrangement with the public under which its income has been enormously decreased, and it is now contending with the serious problem of bare existence. It desires in good faith to continue under this arrangement until the actual results demonstrate whether it will be possible to exist under such terms. I am mindful that in this connection the exigencies of politics and the interests of self-seeking individuals have prompted newspapers and irresponsible persons to attack the company and its management viciously and maliciously and to give utterance to unfounded, unwarranted and scandalous statements, doubtless intended to intimidate those upon whom the responsibility for the conduct of the business rests, and to coerce them into submission to demands that are shamefully unfair and unwarranted by any condition that would be tolerated by honorable men."

W. D. Mahon will have until Oct. 20 to prepare argument in rebuttal.

The Menace of the Automobile in Cleveland

John J. Stanley, president of the Cleveland Railway, and Peter Witt, street railway commissioner, met on Oct. 13 to discuss the increasing number of claims for damages filed as the result of collisions between cars and automobiles. The law in Ohio throws the burden of proof on the company. Mr. Stanley stated that two-thirds of the accident claims which are settled by the company are for injuries in connection with collisions between cars and automobiles. He said that drivers of automobiles were very careless and took all kinds of chances in passing in front of moving cars.

Mr. Stanley said further that congestion in the downtown streets is becoming very serious and that eventually certain streets would have to be designated for automobile traffic. Mr. Witt said there were 15,000 automobiles in Cleveland and estimated that within two years the number of machines would increase to 30,000. He said there should be an ordinance requiring pedestrians to halt at the curb and see if the streets are clear and that they should be required to cross the street only at regular street intersections. He also suggested that automobiles should be required to stop before crossing car tracks.

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The company has posted notices in all the carhouses asking the men not to talk politics. This was done on the assumption that the street railway question has been taken out of politics and that the rate of fare will be settled on an economic basis. It is said that the men are working against the re-election of Mayor Baker, because of his attitude in connection with the readjustment of schedules and working hours. Many of the men are said to consider that they were snubbed by the City Council when they asked for a hearing of their grievances before that body.

An agreement has been reached between the city and county authorities for changes in the plan of the new Superior Avenue bridge over the Cuyahoga River so as to allow the construction of a subway to be used in connection with the routing of the surface cars. Arrangements have been made to give the railway the exclusive use of a lower deck of the bridge.

At a recent conference between Mr. Stanley and Mr. Witt it was decided to instruct Terrance Scullin, master mechanic of the Cleveland Railway, to prepare plans for fifty new motor cars.

Bids Called for Construction of Two More Sections of New York Transit Lines

The Public Service Commission for the First District of New York will receive bids on Nov. 12 for the construction of Section No. 5 of the Seventh Avenue subway in Manhattan, and on Nov. 18 for the construction of the extension of the Steinway tunnel in Queens, from the present terminus of the tunnel in Long Island City to the Queensboro Bridge. Section No. 5 of the Seventh Avenue line covers that portion of the proposed subway lying in Seventh Avenue between Sixteenth and Thirtieth Streets. The letting of the contract for the extension of the Steinway tunnel will be the last construction contract to be made under the dual system for the borough of Queens, as all other parts of the new rapid transit system in that borough are now under contract. It will not be long, however, until steps for the construction of the extension of the Corona line from Sycamore Avenue, Corona, to Main Street, Flushing, will be taken. The commission has authorized the immediate construction of this extension, and has sent a letter to the Board of Estimate and Apportionment asking that board whether it can find the money to pay for it as the first extension of the dual system.

The commission held public hearings recently on the forms of contract for the construction of the proposed tunnels under the East River to Brooklyn for operation by the Interborough Rapid Transit Company and the New York Municipal Railway Corporation under the dual system contracts. The consent of the United States government to the construction of these two tunnels has been obtained, and the engineers of the commission will have the working plans completed by the end of the year, so that construction should be undertaken early in the new year. The tunnel for operation by the Interborough company will run from Old Slip, Manhattan, to Clark Street, Brooklyn, and that for the New York Municipal Railway Corporation will run from Whitehall Street, Manhattan, to Montague Street, Brooklyn.

New York Traction Suits Appealed

A brief on behalf of the government has been filed with the United States Supreme Court in the suits against Frederick W. Whitridge, as receiver of the Third Avenue Railroad, and Adrian H. Joline and Douglas Robinson, as receivers of the Metropolitan Street Railway. The questions which the Supreme Court is asked to pass upon in these cases are:

When a corporation is brought into a court of equity at the suit of a creditor or mortgagee, and that court appoints a receiver of all its assets including its franchise and authorizes the receiver to carry on all its business, is the corporation thus situated doing business with the advantages which inhere in the peculiarities of corporate or joint stock organizations, and is the receiver obliged to make certain fiscal returns?

Lower courts held that the Third Avenue Railroad and the Metropolitan Street Railway were not engaged in or doing business, and that the receivers did not have to make any returns under the corporation tax law. But the government takes the opposite viewpoint, that the companies still retained legal title to their properties and the court merely assumed supervision of their business for the benefit of their creditors, and ultimately of themselves and their stockholders, by putting a receiver in charge.

Terms of Tentative Des Moines Franchise Considered Onerous

Emil G. Schmidt, president of the Des Moines (Ia.) City Railway, in a recent letter to the City Council said that the company could not meet the terms of the ordinance which has been proposed by the city for extending the franchise of the company. This ordinance provided among other things that the city should have the right to order new cars, improved service and all equipment for safety and convenience of passengers; designate where street cars shall stop; order extensions when conditions are found to warrant them; fix schedules and routes of street cars; name the kind of street cars to be placed in service; increase or diminish service; require the company to pave, repave or improve any pavement between tracks and for 1 ft. on either side of said tracks; deal with motive power and use of poles for trolley wires; superintend all rehabilitation, and order any tracks removed.

Mr. Schmidt said the company cannot accept the franchise, as it would be impossible to operate under its terms without raising the fare above 5 cents. He declared that the $5,300,000 should be considered as the valuation of the system.

Following the meeting of the Council at which his letter was read, Mr. Schmidt is reported to have said:

"You can assure the people that we are not going to sit down and say 'we won't play any more' because the Council has drawn a franchise that we cannot accept. We are going ahead with our improvements regardless of the attitude of the Council. As I understand it, good service is the thing of first concern with the people of Des Moines, and that is what we want to give. We are not demanding anything unreasonable in the way of a franchise, but would be willing to operate under conditions obtained in other cities of the class of Des Moines in the Middle West."

Pittsburgh Subway Matters

The Council of Pittsburgh discussed the subway problem recently in connection with a revised ordinance from the law department. It is said that the bill does not meet the views of all the councilmen and that final action will not be taken upon it until reports have been received from the rapid transit committee of the Chamber of Commerce and the engineers' society. Attorney A. E. Anderson, of the Pittsburgh District Railroad, said in a recent communication to Council:

"In relation to the action of the committee on public service and surveys at its meeting of Oct. 1, 1913, providing for a public hearing upon the construction and maintenance of a subway in the city of Pittsburgh, we will be prepared to present, if desired, preliminary plans supplementing our ordinance now pending, and to meet all comers upon the legal, engineering, financial and operating phases of the terminal subway problem as proposed by this company, to the end that the members of the committee and the public generally may become fully advised as to the scope of our intentions and purposes, benefits and possibilities of success and all data and information which can at present be safely made public."

Mayor Magee of Pittsburgh has expressed himself as follows in regard to the subway ordinance which is now before the committee on public service and surveys of the City Council:

"The passage of a subways ordinance is not especially my concern. I was asked to prepare an ordinance which would meet my views and I have done so. I do not know where the impression came from that I had reached an agreement with Council. The ordinance, as it stands, is that which I would sign if it were passed, but I am not urging its passage. That is the concern of Council. I have

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made it plain, repeatedly, that I favor a municipally owned subway. Unfortunately, the Legislature adjourned without making provision for a constitutional convention. This leaves things in such shape that the city cannot hope for a subway unless it is built by private capital. Under these conditions I am willing to sign an ordinance granting a franchise to a private company upon proper terms. If the delay continues until there is a campaign for members of the Legislature, so that the amendment of the constitution may again become an issue, I shall probably then oppose the passage of any franchise ordinance."

Detroit's New Charter Adopted by Commission

By a vote of eleven to five the charter commission of the city of Detroit on Oct. 17 adopted the charter as it is to be presented to the people for approval. Three members were absent and one left before the ballot was cast. The provisions relating to the municipal ownership of public utilities have been collected into a chapter. Only two important changes were made in them by the four attorneys to whom they were submitted. The authority of the street railway commission to employ attorneys was taken away and that work will be done by the corporation counsel. The commission must pay for any extra expense incurred by the city. The commission was made subject to the civil service and minimum wage provisions of the charter.

The question of the constitutionality of the Verdier home rule act was argued before the Supreme Court at Lansing on Oct. 17. This is the case of George H. Barbour, Fred T. Moran and Charles A. Ducharme against City Clerk Richard Lindsey and the election commissioners of Detroit to prevent them from submitting to the people a proposed bond issue to provide funds for municipal railway purposes. The case was tried originally in the Wayne Circuit Court and was appealed to the Supreme Court.

Politics and Transit in New York

Reference has been made previously in the Electric Railway Journal to the claims made by the candidates for Mayor of Greater New York in regard to their activities in connection with the dual rapid transit system contracts. Edward E. McCall, chairman of the Public Service Commission of the First District, who is the Democratic nominee, spoke with particular reference to rapid transit matters before the New York University Forum on Oct. 12. Among other things he said:

"Among the opponents of the dual subway system was the gentleman who is my opponent in this election. He waged a stubborn and relentless warfare against the adoption of the contracts and in favor of municipal construction and operation. The vital issue to the people of this city was that they called for a single 5-cent fare and made possible one continuous ride of 34 miles for a nickel. Mr. Mitchel objected to the interposition of private capital in the construction and operation. The question as presented was academic because the contracts called for $375,000,000 capital and the city was practically bankrupt."

On the other hand, Mr. Mitchel, the fusion candidate, accuses Mr. McCall of favoring the Interborough Rapid Transit Company, particularly with reference to the contract involving the Steinway tunnel to Long Island City.

Frederick W. Whitridge, president of the Third Avenue Railway, in a long communication to the editor of the New York *Times*, which appeared as a paid advertisement, declared himself for Mr. McCall, of whom he said:

"Now, Tammany has this year, speaking in the name of the democratic party, nominated for Mayor Judge McCall. I know that gentleman to be an honest man, of some executive experience and capacity, and a person of resolution and common sense, and notwithstanding the character of much of the support behind him, I intend to vote for him, and urge my friends to do likewise, because I believe, first, that he is a man better fitted to be Mayor than Mr. Mitchel, and, second, because the manner of opposing Tammany which has come to prevail does not seem to me to be worth while, as it never can be wholly effective, and I think it should be smashed for good."

Of Mr. Mitchel Mr. Whitridge said in part:

"Mr. Mitchel, I understand, is an amiable, forceful, earnest and, considering his thirty-three years, rather an accomplished young demagogue. At all events, he is an avowed advocate of municipal ownership of all public utilities. There are honorable men who hold the same view. Some of them even swallow the whole Bellamy program, but my mind does not enable me to comprehend how a man can suppose that what succeeds in this line at Birmingham and Glasgow, and many German cities, can or must necessarily succeed in New York. To advocate that doctrine it seems to me is impossible without shutting one's eyes to plain facts, and the injunction of St. Matthew and St. Paul to the effect that he who calleth his brother a fool is in danger of hell fire alone restrains me from endeavoring accurately to characterize them."

As an aftermath to this communication the story was printed in the newspapers that McCall buttons had been distributed among the employees of the Third Avenue Railway. Mr. Whitridge promptly repudiated this in a communication to the employees as follows, sending a copy of his letter to the editor of the *Times:*

"The *Times* of this morning publishes a silly story which seeks to convey the impression that I or some officers of this corporation are seeking to influence your vote in the coming election. I think every one of you knows that any such story is untrue. This corporation has no politics and no religion, though it differs from a newspaper corporation in that it does have morals. So far as I am concerned I have never distributed McCall buttons nor authorized it, nor do I believe it has been done by any officers of this company. I am too old to undertake to impose my personal opinions upon anybody, though I confess I have once or twice, out of sheer kindness of heart, tried to influence an editor in the hope of lessening or diverting the apparent peril to which he was exposing his own soul."

Brakeshoe Hearing in New York

On Oct. 22 a hearing was held before Commissioner Eustis of the Public Service Commission for the First District of New York in regard to the use of special brakeshoes on street railway cars for the mitigation of noise.

C. L. Wilder, electrical engineer for the commission, testified that an investigation had been begun in 1909 as to the cause of "squealing" on the Metropolitan Street Railway and other city lines. It was thought at first that this noise was due to friction between the brakeshoe and the wheel, resulting in vibrations being set up in the wheel. Further investigation showed, however, according to Mr. Wilder, that the "squealing" was caused by friction between the wheel flange and the rail when the brakes were set, the wheel running free and seeking the path of least resistance in the gage line when the brakes were not set. It was further evident that steel wheels gave the greatest amount of noise, for these vibrated more rapidly and gave forth a sound of higher pitch and greater volume.

As a means of reducing this noise, Mr. Wilder testified that a certain brakeshoe manufactured by the American Brake Shoe & Foundry Company has been used experimentally on the Madison Avenue line of the Metropolitan Street Railway and upon the Montague Street line of the Brooklyn Rapid Transit Company, but that no extensive demand has yet led to a large manufacture. The shoe has holes cut in its flange, filled with an asphalt or graphite composition, the object being to get a lubricant on the flange of the wheel but not to lessen the coefficient of friction between the shoe and the wheel. In this connection Mr. Wilder mentioned a lead compound referred to in a report of the committee on equipment of the American Electric Railway Association in 1912. In Mr. Wilder's opinion this sort of brakeshoe would cost originally about 20 per cent more than the shoes now used and they might be more expensive in maintenance charges.

Attorneys for the Brooklyn Rapid Transit Company, the Long Island Railroad and the New York Railways, who were present at the hearing, stated that as yet these lubricating brakeshoes have not been developed sufficiently to warrant an order compelling a wholesale adoption. The hearing was postponed until Nov. 5, at which time the street railway companies are expected to lay bare any plans they may have made for the reduction or elimination of "squealing."

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First Electric Train Over the Butte, Anaconda & Pacific Railway.—A train of five cars drawn by an electric locomotive was operated over the Butte, Anaconda & Pacific Railway recently, marking the opening of the line between Butte and Anaconda for electric passenger service.

Co-operative Stores Being Considered in San Francisco.—Jesse W. Lilienthal, president of the United Railroads, San Francisco, Cal., has announced that plans are being considered for establishing co-operative stores in the interest of the employees of the company.

Track Laying Completed on Municipal Line in Seattle.—Track laying has been completed on the municipal electric railway which extends from Third Avenue and Pine Street, Seattle, Wash., to Ballard, and it is expected that the new line will be placed in operation before Jan. 1, 1914.

Strike on Ohio Roads.—A strike of motormen and conductors on the lines of the Cincinnati, Milford & Loveland Traction Company, Milford, Ohio, tied up operations for a day or two recently. The men claimed that members of the union had been discharged without cause.

New York Immune from Income Tax on Rapid Transit Lines.—Corporation Counsel Watson of the city of New York has announced that the city, under the provisions of the income tax section of the new tariff bill, will be immune from the payment of any tax on the income which it will derive from its investments in rapid transit construction.

Long Island Railroad Submits New Signal Plan.—C. L. Addison, assistant to the president of the Long Island Railroad, appeared before the Public Service Commission of the First District of New York on Oct. 22 in connection with the investigation of the collision on the electrified Whitestone branch on Sept. 22. He submitted a plan for the operation of the road in the future, and the commission adjourned in order to have the details worked out.

Expenditures for Track Repairs in Toronto.—A by-law is to be prepared by the City Treasurer of Toronto, Ont., to provide for the issuance of debentures covering expenditures on repairs to track allowances during 1910, 1911 and 1912. The amount of such expenditures follows: 1910, $235,942; 1911, $201,359; 1912, $422,963; total, $860,265. The debentures will mature with the expiration of the Toronto Railway's franchise in 1921. They will bear interest at the rate of 4½ per cent.

Nominees for New York Railroad Club.—The regular nominating committee of the New York Railroad Club has announced the following official nominees for officers of the club: George W. Wildin, for president; C. W. Huntington, for first vice-president; Burton P. Flory, for second vice-president; Frederick C. Syze, for third vice-president; R. M. Dixon, for treasurer; Miles Bronson, for executive member for three years; Charles Shults, for member of the finance committee for three years.

Boiler Explosion on Staten Island.—A boiler explosion on Oct. 21 wrecked the plant of the Richmond Light & Railroad Company at Livingston, Staten Island, N. Y., killed six men, stopped trolley cars and extinguished the electric lights on the island. The supplementary power plant of the company at Grasmere was insufficient to restore normal conditions and it was decided to install a cable across the Kill von Kull to bring power from the plants of the Public Service Corporation of New Jersey and another cable across to Brooklyn to bring current from the plants of the Brooklyn Edison Company.

Ceremonies Mark Passing of Cable in Kansas City.—Fitting ceremony marked the passing of the last cable line of the Metropolitan Street Railway, Kansas City, on Oct. 13. At 1.21 a. m. the cable was stopped. A party of veterans was formed to make the last ride from Twelfth and Washington Streets to the top of the hill in the western section of Kansas City. The cable car was loaded with pioneers. Charles Fairchild, aged seventy, said to be the first gripman in Kansas City, made the trip. George L. Starkey, vice-president of the Eagles, secured the last transfer issued on the cable line and will retain it as a souvenir. As the car made its last trip across the railroad yards, engine whistles tooted salutes and the crowd cheered and waved red fire.

Inquiry Into Standards.—William C. Redfield, Secretary of the United States Department of Commerce, has announced that the department will inquire into the standards of public service corporations. The inquiry will be made by the Bureau of Standards and it will be conducted in a spirit of entire friendliness and with the object in view of aiding both the corporations themselves and the public utilities commissions of the states and cities. Congress is to be asked to appropriate $100,000 to begin the work. Mr. Redfield is quoted as follows: "This fund will be used to enable the Bureau of Standards to carry on such investigations as would fix standards of service for public utility companies that would assist the public service commissioners of the states and cities and other authorities to regulate and control these utilities."

Order in Regard to Joint Use of Tracks in Milwaukee.—The Railroad Commission of Wisconsin has decided that it is necessary for The Milwaukee Electric Railway & Light Company to run cars down Wells Street not only during the rush hours but during all hours of the day to relieve conditions on Grand Avenue. Officers of the Chicago & Milwaukee Electric Railroad and the Milwaukee Northern Railway contended that there was no necessity for laying tracks on Wells Street, hence no necessity for determining reciprocal rights in tracks already in the street. In its order the commission directs The Milwaukee Electric Railway & Light Company to pay the owners of the tracks in the street one-twelfth the cost of maintenance and operation of the tracks, together with 8 per cent interest on the total sum invested in the tracks.

Richmond Society of Engineers Organized.—The Richmond Society of Engineers has been organized at Richmond, Va., to afford opportunities for engineers in that city to meet one another, discuss topics of general interest and maintain an engineering library. The present membership list is composed entirely of active members, but provision is made for three other grades—honorary members, associates and juniors. The membership, as it now stands, numbers about fifty-three. The officers chosen to serve until the next annual meeting are as follows: President, Arthur Scrivenor; vice-president, James Bolton; treasurer, P. Parsons Pilcher; secretary, Edwin Wortham. These, with the following members, compose the council, by which the business of the society will be handled: Joseph E. LePrade, Allen J. Saville, John B. Price and Herman C. Schmidt. Meetings to discuss subjects of interest to the members will be held once a month.

Adam Beck on the London & Port Stanley Railway Electrification.—Adam Beck, chairman of the Hydroelectric Power Commission of Ontario, addressed a meeting of the ratepapers of London, Ont., on Oct. 11, on the question of the electrification of the London & Port Stanley Railway. Subsequently he issued a statement that on Oct. 11 a number of English capitalists had waited upon him, together with several Stratford and Brantford men, in regard to a new radial line which it is proposed to run from Brantford to Stratford, London and St. Thomas, and which would then seek to use the new radial line from St. Thomas to Windsor. Mr. Beck assured the deputation that the proposition would be considered by the Hydroelectric Commission. The English syndicate would also want running rights over the London & Port Stanley Railway to enter London and to reach St. Thomas, and this, Mr. Beck thought, could be arranged with the city of London when the road is electrified.

Days of Horse Car Recalled in Kansas City.—The old days of horse and mule-drawn cars are recalled by a column which is being run in one of the Kansas City daily newspapers in which the news of forty years ago is reproduced as it appeared in 1873. A couple of the items which appeared recently as excerpts from the old paper are as follows: "Deservedly popular is the Kansas City & Westport Horse Railroad, because it is one of the best conducted. In a ride from the square to Westport and back yesterday less than two minutes' delay was occasioned, although there are no less than five switches and one change of cars each way. The track is smooth and it is a real pleasure to ride over the road." "Naughty boys persist in placing stones upon the street car track just to hear the women squeal and the drivers swear when the car runs off the track." The note indicates a remarkable change of sentiment in forty years on the part of the paper. The second item is of interest for various reasons, providing a marked contrast between the operating methods of 1873 and 1913.

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New Line Opened in Shanghai, China.—Amos P. Wilder, United States Consul-General at Shanghai, China, reports the opening on Aug. 16, 1913, of a 2½-mile electric tramway, the first in any Chinese city as contrasted with foreign settlements. The enterprise is essentially a native one. No foreigner has been allowed to subscribe to the capital, about $130,000, and the installation was carried out entirely by Chinese contractors. The management and working staff are all Chinese. The new line runs along the Chinese Bund from the Marche de l'Est to the Shanghai terminus of the Hangchow Railway. A half mile will be added on completion of an extension to the Arsenal Road. The line is double-track between the Marche de l'Est and Tungkadoo and single-track from Tungkadoo to the railway station. Six cars are now in operation, and twelve cars, with six trailers, are in course of completion. The cars carry eight first-class and sixteen second-class passengers. Power is taken from the Shanghai Inland Electric Works, which formerly supplied the city's light and power. E. Kocher, who made the survey for the new line, is working on the plans for a tramway to be constructed on the boulevard which is to encircle the native city, on the ground formerly occupied by the ancient city wall.

Charles A. Prouty to Direct Railway Valuation.—Charles A. Prouty is expected to retire in the near future as a member of the Interstate Commerce Commission, to become director of the physical valuation of railways. Commissioner Prouty has been a member of the commission since December, 1896, when he was appointed by President Cleveland, and has served continuously since that time, being successively reappointed at the expiration of each term. His present term would expire in 1915. Commissioner Prouty's retirement will make two vacancies on the commission for President Wilson to fill this year. The term of Commissioner Judson C. Clements of Georgia will expire in December. The Interstate Commerce Commission has announced the following division of the country into five districts, each district embracing approximately 50,000 sq. miles of railroad, for the purpose of physical valuation, with headquarters at the city designated: Eastern—Washington, D. C.; Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, North Carolina, Pennsylvania, Rhode Island, Vermont, Virginia and West Virginia. Southern—Chattanooga, Tenn.; Alabama, Florida, Georgia, Indiana, Kentucky, Mississippi, Ohio, Panama, Porto Rico, South Carolina and Tennessee. Central—Chicago; Arkansas, Illinois, Iowa, Louisiana, Michigan, Minnesota and Wisconsin. Western—Kansas City; Colorado, Indian Territory, Kansas, Missouri, Nebraska, North Dakota, Oklahoma, South Dakota and Texas. Pacific—San Francisco; Alaska, Arizona, California, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington and Wyoming.

PROGRAM OF ASSOCIATION MEETING

National Association of Railway Commissioners

The twenty-fifth annual convention of the National Association of Railway Commissioners will convene in the hearing room of the Interstate Commerce Commission, Washington, at 11 a. m. on Oct. 28. The call for the meeting, issued by William H. Connolly, the secretary, says that there are many matters of great public interest which may with propriety and great benefit be brought to the attention of and be considered by the convention. O. P. Gothlin, of Ohio, president of the association, has invited members to present topics in which they are interested for discussion and has also arranged to have certain authorities address the convention on special subjects affecting the regulation of public utilities. Among the reports to be presented by committees are those from the following: amendment of act to regulate commerce, delays attendant upon enforcing orders of railway commissioners, grade crossings and trespassing on railroads, legislation, powers, duties and work of railway commissioners, railroad taxes and plans for ascertaining fair valuation of railroad property, rates and rate-making, railway capitalization, railway service and railway accommodation, safety appliances, statistics and accounts, shippers' claims, statistics and accounts of electric railways, and rails and equipment.

Financial and Corporate

Stock and Money Markets

Oct. 22, 1913.

Many stocks traded in on the New York Stock Exchange ended the day with small gains over their previous closing prices. The list as a whole, however, was heavy and the volume of sales was very small. About noon the market showed signs of decided strength, but in the afternoon dealings declined and quotations sagged off. The sales for the day totaled 278,263 shares. Rates in the money market to-day were: Call, 3@3¼ per cent; sixty days, 4½@4¾ per cent; ninety days, 4¾@5¼ per cent; four, five and six months, 4¾@5 per cent.

Trading on the Philadelphia exchange was weak to-day and transactions were small in number.

The Chicago market was broad to-day, but the volume of transactions was small. Declines were more numerous than advances. Bonds were dull but steady.

Changes in the tone of the Boston market were frequent to-day, but strength was displayed toward the close of the trading.

The Baltimore market was firm to-day, but trading continued dull.

Quotations of traction and manufacturing securities as compared with last week follow:

	Oct. 15	Oct. 22
American Brake Shoe & Foundry (common)	88½	88½
American Brake Shoe & Foundry (preferred)	130⅞	128
American Cities Company (common)	36	36
American Cities Company (preferred)	64	63
American Light & Traction Company (common)	337	336
American Light & Traction Company (preferred)	103½	103½
American Railways Company	39	38¾
Aurora, Elgin & Chicago Railroad (common)	41½	40
Aurora, Elgin & Chicago Railroad (preferred)	83	82
Boston Elevated Railway	83¾	85
Boston Suburban Electric Companies (common)	7	7
Boston Suburban Electric Companies (preferred)	59	59
Boston & Worcester Electric Companies (common)	a10	a10
Boston & Worcester Electric Companies (preferred)	42½	42½
Brooklyn Rapid Transit Company	86⅛	87
Capital Traction Company, Washington	115	115
Chicago City Railway	160	160
Chicago Elevated Railways (common)	25	25
Chicago Elevated Railways (preferred)	75	75
Chicago Railways, ptcptg., ctf. 1	93	93
Chicago Railways, ptcptg., ctf. 2	28¼	29
Chicago Railways, ptcptg., ctf. 3	a7¾	7½
Chicago Railways, ptcptg., ctf. 4	2¼	2½
Cincinnati Street Railway	112	107½
Cleveland Railway	103⅝	103½
Cleveland, Southwestern & Columbus Ry. (common)	5½	5½
Cleveland, Southwestern & Columbus Ry. (preferred)	30	30
Columbus Railway & Light Company	18	18
Columbus Railway (common)	69½	69½
Columbus Railway (preferred)	88	88
Denver & Northwestern Railway	111	*111
Detroit United Railway	69	69
General Electric Company	139½	141½
Georgia Railway & Electric Company (common)	120	119½
Georgia Railway & Electric Company (preferred)	86	85¾
Interborough Metropolitan Company (common)	13½	14
Interborough Metropolitan Company (preferred)	57¼	57⅜
International Traction Company (common)	40	*40
International Traction Company (preferred)	95	95
Kansas City Railway & Light Company (common)	*22	*22
Kansas City Railway & Light Company (preferred)	30	*30
Lake Shore Electric Railway (common)	7	7
Lake Shore Electric Railway (1st preferred)	92	92
Lake Shore Electric Railway (2d preferred)	25	25
Manhattan Railway	136	128
Massachusetts Electric Companies (common)	13	11½
Massachusetts Electric Companies (preferred)	67	67
Milwaukee Electric Railway & Light Co. (preferred)	100	*100
Nofolk Railway & Light Company	25¼	25¼
North American Company	71⅛	72½
Northern Ohio Light & Traction Company (common)	63	63½
Northern Ohio Light & Traction Company (preferred)	97	97
Philadelphia Company, Pittsburgh (common)	39	40
Philadelphia Company, Pittsburgh (preferred)	46	40
Philadelphia Rapid Transit Company	19⅞	20
Portland Railway, Light & Power Company	56	56
Public Service Corporation	110	111
Third Avenue Railway, New York	38	37½
Toledo Traction, Light & Power Company (common)	30	30
Toledo Traction, Light & Power Company (preferred)	80	80
Twin City Rapid Transit Co., Minneapolis (common)	104½	105
Union Traction Company of Indiana (common)	13	*13
Union Traction Company of Indiana (1st preferred)	83	*83
Union Traction Company of Indiana (2d preferred)	25	*25
United Rys. & Electric Company (Baltimore)	25⅜	25½
United Rys. Inv. Company (common)	17½	18
United Rys. Inv. Company (preferred)	34	35½
Virginia Railway & Power Company (common)	53½	a53½
Virginia Railway & Power Company (preferred)	93½	93½
Washington Ry. & Electric Company (common)	95	95
Washington Ry. & Electric Company (preferred)	90⅛	89
West End Street Railway, Boston (common)	70	70
West End Street Railway, Boston (preferred)	89	89
Westinghouse Elec. & Mfg. Company	66	67
Westinghouse Elec. & Mfg. Company (1st preferred)	107	110

*Last sale. a Asked.

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ANNUAL REPORTS

Spokane & Inland Empire Railroad

The seventh annual report of the Spokane & Inland Empire Railroad, Spokane, Wash., shows that during the fiscal year ended June 30, 1913, the total operating revenue was $1,616,781, an increase of $15,727 over the previous year, or 0.96 per cent. The charges for operation increased $9,711, or 0.89 per cent. The average operating revenue per mile in 1912 was $7,782, in 1913 $7,619; the average operating expense per mile in 1912 was $5,200, in 1913 $5,186; the net operating revenue per mile in 1912 was $2,582, in 1913 $2,432; the taxes per mile in 1912 were $710, in 1913 $692, and the operating income per mile in 1912 was $1,872, in 1913 $1,740. The ratio of operating expenses to the total operating revenue was 66.82 per cent in 1912, as compared to 68.07 per cent in 1913, and the ratio of taxes to the total operating revenue decreased from 9.12 per cent in 1912 to 9.09 per cent in 1913.

The complete comparative statement of income, profit and loss of the company for the fiscal years ended June 30, 1912 and 1913, follows:

	1912	1913
Operating revenue:		
Freight	$313,012	$336,813
Passenger	638,621	565,703
Street railway system	545,529	550,046
Other revenue	135,347	164,219
Total	$1,632,509	$1,616,781
Operating expenses:		
Maintenance—way and structures	$223,561	$226,161
Maintenance—equipment	166,979	179,958
Traffic expenses	27,197	24,935
Conducting transportation	505,654	512,139
General expenses	167,412	157,322
Total	$1,090,803	$1,100,515
Net operating revenue	$541,706	$516,266
Taxes accrued	149,000	147,000
Operating income	$392,706	$369,266
Other income	.....	4,936
Total income	$392,706	$374,202
Deductions:		
Interest on funded debt	$245,168	$241,542
Interest on unfunded debt	195,538	210,190
Miscellaneous	22,167	999
Total	$462,873	$452,731
Deficit	$70,167	$78,529

I. H. Young, president of the company, says in part: "The total mileage of the system as of June 30, 1913, is: main line track, 215.58 miles; second track, 30.31 miles, and yard tracks and sidings, 48.04 miles. During the year 2.46 miles of extensions were made.

"The interurban freight business during the past year shows an increase of $23,801, or 7.6 per cent over the freight revenues of last year.

"The interurban passenger business shows a decrease of $72,917, or 11.41 per cent as compared with last year. This decrease was nearly all on the Cœur d'Alene division, owing partly to a late spring and the poor attendance at the Alan races. The revenue received from other sources, mainly from the sale of power, shows a substantial increase over last year's figures.

"The taxes of the company in the State of Washington were increased from $65,847 in the year 1910 to $123,813 in 1911 and to $126,441 in 1912. This increase was based on a higher assessed valuation of the company's property, which the attorneys believed to be unjustified. Litigation with respect to these taxes is in progress.

"The power plant of the company at Nine Mile on the Spokane River has a maximum capacity of 20,000 hp, with a continuous capacity of 15,000 hp, and is furnishing for the operation of the Inland division from 4000 to 5500 hp. The power contract with the Washington Water Power Company, entered into when our line was constructed, has yet three years to run. The company is using under this contract 3800 hp, the minimum amount permitted by the contract. This power is used on the Cœur d'Alene and Traction divisions. The Traction division is using from 2500 hp to 3000 hp, and the Cœur d'Alene division about 1200 hp, furnished by the Nine Mile plant.

"The company is selling about 4500 hp for commercial and irrigation purposes, for which it is receiving an average of $4 per hp per month. The revenue from the sale of commercial power shows an increase of about 50 per cent over last year.

"Recently the company entered into a contract for the delivery of 3000 hp, which will produce a revenue of $35,000 per year. This contract is for secondary power, which will be delivered during the eight or nine months of the year when the flow of water in the river is above the minimum upon which the continuous output of the plant is based.

"The company has two high-tension lines from Nine Mile to Spokane, constructed over its private right-of-way, either of which is capable of carrying the entire output of the plant, insuring continuity of service in case of damage or accident to one of the lines.

"No extensions have been made to the 66,000-volt high-tension power line during the past year, the 68 miles now in operation being capable of supplying the present and prospective business for several years.

"The total expenditure for additions and betterments during the fiscal year ended June 30, 1913, amounts to $150,416. This includes the purchase of additional right-of-way adjoining the freight terminals in Spokane, necessary in order to secure an advantageous trade with the city, and also the vacation of certain streets, $26,509; traction line extension and paving in Spokane, $64,665; installing a motor generator set in the Greenacres substation, $27,742; filling Inland bridge and building new culverts, $13,000, and miscellaneous, $18,497.

Eastern Pennsylvania Railways

The Eastern Pennsylvania Railways, Pottsville, Pa., reports gross earnings for its fiscal year ended June 30, 1913, of $769,680, which is an increase of 10 per cent over the previous year. The operating expenses, including taxes, amounted to $436,000, which is a slight decrease over the operating expenses of the previous year, leaving net earnings of $333,676, or an increase of approximately 28 per cent. The total surplus after all fixed charges and available for dividends on preferred and common stock amounted to $118,373. The company is now earning approximately one and three-quarter times its bond interest.

The complete comparative statement of income, profit and loss for the years ended June 30, 1912 and 1913, follows:

	1913	1912
Gross earnings	$769,680	$699,306
Operating expenses (including taxes)	436,004	438,593
Net earnings	$333,676	$260,713
Interest on bonds and notes, and rentals	215,303	214,246
Surplus	$118,373	$46,467

Another Modified Buffalo & Lake Erie Traction Company Reorganization Plan

Another modified plan for the reorganization of the Buffalo & Lake Erie Traction Company, Buffalo, N. Y., and the acquirement by the organized company of the capital stock of the proposed Canadian-American Power Corporation was submitted to the minority bondholders at a recent hearing in Albany before the Public Service Commission of the Second District of New York. Under the new plan, the reorganized Buffalo & Lake Erie Traction Company will not acquire the capital stock of the Buffalo, Lockport & Rochester Railway. The minority bondholders are also opposing the acquirement by the reorganized company of the capital stock of the Canadian-American Power Corportation, which proposed to import 46,000 hp energy from Niagara Falls, Ont., for car operation and for distribution to individual customers. The minority bondholders declare that this corporation merely has a contract from year to year to import this electrical energy and that it has been overcapitalized at $3,000,000.

The minority bondholders have decided to draw up a plan to present to the commission when the next hearing is called. Among those who appeared for the reorganization plan at this hearing were Thomas Penney, former president of the International Railway, and Edward G. Connette, the present president of the Buffalo traction lines, and auditors, engineers and lawyers from Buffalo and New York.

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Reduction of Dividend by Denver & Northwestern Railway

The directors of the Denver & Northwestern Railway on Oct. 6 reduced the quarterly dividend from 2 per cent to 1 per cent. The following statement was issued by the company:

"The reduction in dividends from 2 per cent to 1 per cent has been deemed prudent and advisable after a thorough consideration of existing conditions. The tax assessment on the property of the Denver City Tramway and its subsidiary companies has been increasing constantly for several years past, until from an assessment of $4,080,000 in 1911 an attempt has been made to tax the company on $18,809,700 in 1913, although the acquisitions of the company are less than they were in 1910. The sinking fund requirements under the first refunding mortgage become operative in the coming year and ample and timely provision must be made for setting aside reserves beginning on Nov. 1, 1913. Owing to the unsatisfactory condition of the bond and money market during the last two years, bonds which have been accumulating on account of improvements and additions and which are now in the treasury could not be sold except at a price much less than their intrinsic value. This has caused temporary financing and an increase of floating debt secured by such bonds and other property. The net earnings for the twelve months ending Jan. 31, 1913, have been sufficient to deduct interest charges, taxes and other fixed charges and to continue the old dividend rate, but it has seemed best to reduce the dividend rate until the floating debt shall be materially reduced by the sale of treasury bonds and other free assets of the tramway and its subsidiary companies."

William G. Evans has resigned as president of the Denver City Tramway and C. K. Boettcher has been elected chairman of the board of directors of the company.

Buffalo & Lake Erie Traction Company, Buffalo, N. Y.—Three applications have been received by the Public Service Commission for the Second District of New York from the Canadian-American Power Corporation, of which Edward G. Connette, president of the International Railway, Buffalo, is a director. The company was organized some time ago to be taken over by the Buffalo & Lake Erie Traction Company, after that company is reorganized under the plan now before the commission. The first application is for permission to issue $035,000, par value, of its 8 per cent cumulative preferred stock and $2,099,500, par value, of its common stock. The corporation has a total authorized capital stock of $4,000,000, consisting of 40,000 shares of the par value of $100 each, of which 10,000 shares is preferred stock and the remainder common stock. Secondly, the corporation desires to issue an amount of its authorized preferred stock of the aggregate par value of $435,000 to acquire $100,000 par value of the stock of the Niagara Falls Electrical Transmission Company, $59,700 of the funded indebtedness of the transmission company and $510,766.79 of its other obligations, being all the stock and indebtedness of the transmission company. These applications are designed to dissociate the Buffalo & Lake Erie Traction Company reorganization plan from any substantial relation to the electrical contract. A public hearing on these applications will be held by the commission in Buffalo on Oct. 24.

Fresno, Hanford & Summit Lake Interurban Railway, Fresno, Cal.—The Railroad Commission of California has granted authority to the Fresno, Hanford & Summit Lake Interurban Railway to issue $225,000 of preferred stock. Of this $100,000 is to be used to retire a previous issue of bonds, $50,000 is to be used for work on the railroad between Fresno and Selma, and the balance is to be used to defray indebtedness.

Galveston-Houston Electric Company, Galveston, Tex.—At a special meeting of the stockholders of the Galveston-Houston Electric Company on Oct. 6 at Portland, Me., the authorized capital stock was increased from $7,000,000 to $9,000,000 by the addition of $1,000,000 each of common and preferred. There was formerly outstanding $3,000,000 preferred and $4,000,000 common, as noted in the Electric Railway Journal of Oct. 4, 1913. The new stock will be sold from time to time to provide funds for various extensions and improvements to the street railway system in Galveston and Houston, as well as to the interurban line between the two cities.

Idaho-Oregon Light & Power Company, Boise, Idaho.—The New York protective committee of the first and refunding bonds of the Idaho-Oregon Light & Power Company, of which Samuel L. Fuller is chairman, has issued a statement to the bondholders, calling attention to what the committee states are "false and misleading reports" put forth by the Chicago protective committee in regard to the compensation and non-activity of the officers of the company, the compensation of counsel employed, and the sufficiency of the earnings of the Idaho Railway Company with reference to the payment of its interest charges. In connection with the reorganization of the property, it is stated that more than 75 per cent of the first and refunding bonds have been deposited with the New York committee, and the court has set Dec. 1 as the date for the foreclosure sale, which is the result of a suit brought by the State Bank, Chicago, Ill., as trustee for the bondholders, as noted in the Electric Railway Journal of July 19, 1913.

Interborough Rapid Transit Company, New York, N. Y.—The stockholders of the Manhattan Elevated Railway will vote on Nov. 12 on making a second mortgage to secure not exceeding $5,409,000 of second mortgage 4 per cent bonds. These, in compliance with the provisions of the lease of 1903, will be turned over to the Interborough Rapid Transit Company on expenditures for improvements and additions made and to be made. The new mortgage will cover the greater part of the property and franchises now owned and hereafter acquired.

Ithaca (N. Y.) Street Railway.—Edward N. Jackson, referee, will sell at foreclosure at Ithaca, N. Y., on Dec. 2 the mortgaged premises and property, rights, interests and franchises of the Ithaca Street Railway, as the result of a decree entered in an action brought by the Columbia-Knickerbocker Trust Company, New York. The property includes 250 shares of the capital stock of the Cayuga Lake Electric Railway and 500 shares, the entire capital stock, of the Ithaca & Cayuga Heights Railway.

Jamestown, Chautauqua & Lake Erie Railway, Jamestown, N. Y.—A. N. Broadhead and S. A. Broadhead, Jamestown, N. Y., who have acquired the Jamestown, Chautauqua Lake & Lake Erie Railroad, will change the name of the company to the Jamestown, Westfield & Northwestern Railway. Electric locomotives will be used for motive power. The Broadhead interests own and control the Jamestown Street Railway and the Chautauqua Traction Company.

Lake Erie & Youngstown Railway, Youngstown, Ohio.—It is said that London and Paris interests have arranged to take $4,500,000 of the bonds of the Lake Erie & Youngstown Railway. The company has asked the Public Utilities Commission of Ohio for permission to sell the bonds at not less than 75. They bear 5 per cent interest at par. Under a previous order, the bonds were not to be sold but were to be turned over to the Caldwell Construction Company, Cleveland, in payment for the construction of the road.

Monongahela Valley Traction Company, Fairmont, W. Va.—A dividend of 1½ per cent has been declared on the $5,000,000 of common stock of the Monongahela Valley Traction Company, payable on Nov. 1 to holders of record of Oct. 27. This compares with an initial dividend of 2 per cent paid in January, 1913, and a second dividend of 1½ per cent paid in July last.

New York (N. Y.) Railways.—An attempt to reopen the reorganization of the Metropolitan Street Railway and its subsidiaries into the New York Railways was made on Oct. 10, when a suit in equity was brought against the companies and the Central Trust Company, New York, in the Federal District Court by the bondholders of the Twenty-eighth & Twenty-ninth Streets Crosstown Railroad. The purpose of the suit is to protect the $1,500,000 of bonds of the crosstown company which were guaranteed by the Metropolitan Street Railway when the latter took the road over in 1896. On the basis of the guarantee the bondholders in February, 1910, obtained a deficiency judgment for $1,745,344. In the suit of equity now brought they ask that the transfer of property, assets, etc., of the old

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Metropolitan Street Railway made at the time of its reorganization in 1911 be declared void and that the property thus returned to the Metropolitan Street Railway be sold under the direction of the court to satisfy the deficiency judgment.

Northern Ohio Traction & Light Company, Akron, Ohio.—Borton & Borton, Cleveland, are offering 6 per cent cumulative preferred stock of the Northern Ohio Traction & Light Company, of which $3,000,000 in all has been approved by the Ohio Public Utility Commission and $2,640,000 has been sold. The company reports the sale of $300,000 of 4's and $35,000 of Canton-Akron consolidated guaranteed 5's.

Oakland (Cal.) Railways.—On Sept. 29 R. G. Hanford withdrew his suit to enjoin the renewal of the $2,500,000 note of the San Francisco-Oakland Terminal Railways, dated Aug. 12, 1912, to Aug. 12, 1913. Arrangements are under way to borrow $500,000 for betterments and new construction work and to extend until Sept. 12, 1914, this $2,500,000 note and to continue the guarantee on the $1,100,000 of Oakland Terminal notes which matured on Aug. 20, 1913. The shareholders of the Oakland Railways will vote on Dec. 11 on the following propositions: (1) Confirming an indebtedness of $2,500,000 of 6 per cent notes dated Aug. 12, 1912, and the liability under its matured guarantee of the $1,100,000 notes on the Oakland Terminal Company. (2) Increasing such indebtedness to the sum of $14,100,000. (3) Ratifying the payment of $2,500,000 notes on Sept. 12, 1914.

Public Service Company of Northern Illinois, Streator, Ill.—The Public Service Company of Northern Illinois has declared a quarterly dividend of 1¼ per cent on the common stock, an increase of three-quarters of 1 per cent from previous declarations. It has also declared a regular quarterly dividend of 1½ per cent on the preferred stock. Both dividends are payable on Nov. 1 to stock of record Oct. 18.

Puget Sound Traction, Light & Power Company, Seattle, Wash.—A special meeting of the stockholders of the Puget Sound Traction, Light & Power Company will be held in Boston, Nov. 3, to vote on the proposition of authorizing the issue and sale of $2,686,000 of the already authorized but unissued preferred stock. To provide for financing extensions, additions and improvements necessitated by demands of growing business, and for refinancing the two-year 5 per cent mortgage notes at maturity on Feb. 1, 1914, the directors believe that at least a portion of the necessary funds should be obtained through the sale of preferred stock. If the issue is authorized at the meeting, holders of each eleven shares of stock, whether preferred or common, will consequently be entitled to subscribe at par for one share of additional preferred.

San Francisco-Oakland Terminal Railways, Oakland, Cal.—The shareholders of the San Francisco-Oakland Terminal Railways will vote on Dec. 10 on the following matters: (1) Increasing the bonded debt which now consists wholly of bonds issued by other corporations whose properties the said corporation has acquired from the amount now existing, about $20,184,000, to $21,184,000. (2) Ratifying the indebtedness of the corporation represented by a promisory note of $25,000,000 heretofore issued by it and payable to the Oakland Railways and also represented by a promisory note of $128,814, heretofore issued by the Oakland Traction Company and for the payment of which note the San Francisco-Oakland Terminal Railways has become liable and which note is payable to the United Properties Company. (3) To increase the indebtedness of the corporation so represented by the said $2,628,814 of promissory notes payable to the Oakland Railways and to the United Properties Company to the sum of $3,128,814, i. e., by $500,000. (4) To renew or extend the time of payment for all or any of such promissory notes. The new bonds and notes presumably are to be used as a collateral in connection with the renewal of $3,600,000 of notes of the United Properties Company system and the issuance of $500,000 of additional notes.

Southwestern Traction & Power Company, New Orleans, La.—A mortgage for $5,000,000 has been filed to secure an issue of bonds of the Southwestern Traction & Power Company providing for the construction of an electric railway between Berwick and Lafayette. The mortgage is a prior lien on all holdings of the traction company and is executed to the Whitney-Central Trust & Savings Bank, New Orleans, and the Continental and Commercial Trust and Savings Bank, Chicago, as trustees.

Third Avenue Railway, New York, N. Y.—The annual meeting of the stockholders and registered owners of adjustment income mortgage bonds of the Third Avenue Railway will be held on Nov. 12, at which action will be taken upon a joint agreement made by the directors of the company and the directors of the Kingsbridge Railway for the consolidation of the two corporations. On Nov. 12 the stockholders of the Kingsbridge Railway will hold their annual meeting and vote upon the proposed agreement for the consolidation of the company with the Third Avenue Railway.

Titusville (Pa.) Electric Traction Company.—On the application of Charles Pfizer, a creditor and stockholder, Judge Prather has named William J. Smith as receiver of the Titusville Electric Traction Company, with bond fixed at $10,000.

Twin City Traction Company, Dennison, Ohio.—The Twin City Traction Company has been authorized to sell to the Ohio Service Company all its assets and physical property, real, personal and mixed, and also all franchises, contracts and rights owned and used by the Twin City Traction Company in the cities of Dennison and Uhrichsville. The Ohio Service Company is to pay therefore the agreed sum of $100,000. The application made to the commission regarding this purchase was noted in the ELECTRIC RAILWAY JOURNAL of Oct. 11, 1913.

ELECTRIC RAILWAY MONTHLY EARNINGS

AMERICAN RAILWAYS, PHILADELPHIA, PA.

Period			Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1 mo.	Sept.	'13	$457,683	.....	.....	.....	.....
1 "	"	'12	428,771	.....	.....	.....	.....
3 "	"	'13	1,476,610	.....	.....	.....	.....
3 "	"	'12	1,552,432	.....	.....	.....	.....

AURORA, ELGIN & CHICAGO RAILROAD, WHEATON, ILL.

1 mo.	Aug.	'13	$210,926	*$113,899	$97,028	$34,096	$62,932
1 "	"	'12	198,145	*102,935	95,211	32,106	63,105
2 "	"	'13	419,677	*229 689	189,988	67,558	122,430
2 "	"	'12	390,899	*205,231	185,668	64,143	121,525

CLEVELAND, PAINESVILLE & EASTERN RAILROAD

1 mo.	Aug.	'13	$48,985	*$23,382	$25,603	$10,415	$15,188
1 "	"	'12	44,928	*21,497	23,431	9,852	13,579
8 "	"	'13	283,526	*153,718	129,809	83,356	46,452
8 "	"	'12	265,362	*152,332	113,031	79,233	33,798

JOPLIN & PITTSBURG RAILWAY, PITTSBURG, KAN.

1 mo.	Sept.	'13	$48,428	*$29,200	$19,228	$12,542	$6,686
1 "	"	'12	43,914	*24,924	18,990	12,542	6,448
12 "	"	'13	569,755	*340,761	228,994	150,500	78,494
12 "	"	'12	515,908	*303,272	212,636	153,885	58,751

KENTUCKY TRACTION & TERMINAL COMPANY, LEXINGTON, KY.

1 mo.	Aug.	'13	$79,458	$41,613	$37,846	$20,504	$17,342
1 "	"	'12	70,233	40,033	30,199	16,594	13,605
2 "	"	'13	145,439	75,045	70,394	40,918	29,476
2 "	"	'12	136,005	79,719	56,286	32,738	23,548

LAKE SHORE ELECTRIC RAILWAY, CLEVELAND, OHIO

1 mo.	Aug.	'13	$163,244	*$76,218	$87,027	$35,312	$51,715
1 "	"	'12	147,888	*72,780	75,108	35,188	39,920
8 "	"	'13	942,468	*558,764	383,704	280,993	102,711
8 "	"	'12	872,778	*500,215	372,563	279,249	93,314

LEHIGH VALLEY TRANSIT COMPANY, ALLENTOWN, PA.

1 mo.	Sept.	'13	$164,620	$59,599	$105,022	$47,224	$57,798
1 "	"	'12	136,192	52,784	83,408	43,161	40,247
12 "	"	'13	1,739,737	730,670	1,009,068	547,638	461,430
12 "	"	'12	1,461,503	636,048	825,456	495,581	329,875

PHILADELPHIA (PA.) RAPID TRANSIT COMPANY

1 mo.	Sept.	'13	$1,999,344	$1,154,067	$845,277	$801,002	$44,275
1 "	"	'12	1,926,044	1,127,154	798,890	762,039	36,851
3 "	"	'13	5,965,989	3,502,557	2,463,432	2,398,647	64,785
3 "	"	'12	5,758,079	3,429,346	2,328,733	2,277,322	51,412

REPUBLIC RAILWAY & LIGHT COMPANY, YOUNGSTOWN, OHIO

1 mo.	Aug.	'13	$261,522	*$156,650	$104,872	$43,774	$61,098
1 "	"	'12	227,514	*137,504	90,010	43,912	46,098
8 "	"	'13	1,941,363	*1,191,472	749,891	361,786	388,105
8 "	"	'12	1,702,158	*1,039,395	662,764	353,469	309,295

VIRGINIA RAILWAY & POWER COMPANY, RICHMOND, VA.

1 mo.	Aug.	'13	$446,924	$224,521	$222,402	$132,555	$89,847
1 "	"	'12	416,857	207,513	209,344	123,864	85,480
2 "	"	'13	894,400	442,443	451,957	265,206	186,751
2 "	"	'12	832,585	419,228	413,357	246,852	166,505

*Includes taxes.

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Traffic and Transportation

Fare Changes in British Columbia

The following statement has been issued by R. H. Sperling, general manager British Columbia Electric Railway, Vancouver, B. C., in regard to the fare changes which went into effect on Sept. 18:

"As it is well known, there has been a steady increase in the cost of labor and supplies for some years past. Everything the company buys—labor, electrical equipment, rails, rolling stock and material of every kind—has grown in value until a proper relation no longer exists between the cost of a street-car ride and the price paid for it. To the people at large the cost of practically every necessary commodity has also advanced, excepting only the street-car ride, which has remained the same. On the other hand, the wages of all classes of labor, skilled and unskilled, have increased step by step with the cost of living. No such compensating advantage has come to the company; consequently the margin between operating cost and revenue earned has gradually decreased until the profit earned by the company on its investment is no longer adequate to induce the investor to put fresh capital, so necessary for the development of the territory served by the company, into the concern. Apart, however, from the viewpoint of obtaining additional capital, the company has not earned a reasonable profit on its operations during the past eighteen months, certainly no such return as would induce local people to invest their savings in the enterprise.

"The company's investment in British Columbia amounts to approximately $45,000,000, consisting entirely of cash received from its stockholders, which is at present earning about 4½ per cent per year. If the necessary further capital required for the adequate development of the territory served by the company is to be raised on reasonable terms, it is absolutely essential that the company's railway revenue should be increased.

"Although the necessity of abolishing commutation rates has been apparent for some time, we have repeatedly postponed action, hoping for an adjustment in economical conditions that would render any change unnecessary. No such adjustment has come and none is in sight. Therefore to further delay setting the company's affairs in line with conditions as they now exist, and are certainly to continue for some time, would be not only unfair to those who have furnished money for our development, but dangerous and unsound from a financial standpoint.

"The situation which confronts us in British Columbia has been experienced generally along the Pacific coast and in a number of cases elsewhere has been met by a return to the straight 5-cent fare. Our company, however, does not intend to go to this extreme unless a still further increase in operating costs compels us. We propose, therefore, to continue a low-rate ticket for workingmen, which will be sold in strips of ten—five white and five green—at 40 cents a strip, or 4 cents a ride. The white tickets will be good only up to 8 a. m. The other half will be good at any time up to midnight, when the 'owl' rates will come into effect, where 'owl' cars are run. Apart from these tickets the fare will be 5 cents, but for the convenience of the public blocks of tickets will be sold, five for 25 cents. School children's rates will remain as before."

Accident Lecture and Moving Pictures in Brooklyn

On Oct. 21 a special meeting of representatives of the transportation department of the Brooklyn Rapid Transit System was held at the company's offices to attend a display of the material which has been gathered to warn the public against accidents and to hear Mrs. J. P. McCall, who has been lecturing in the public schools to children in the interests of the Brooklyn Rapid Transit children's safety crusade. Mrs. McCall gave a typical lecture, showing how the interest of the children was aroused and maintained by stories and apt illustrations, by accounts of the duties of the motorman and conductor and by direct questions. Mrs. McCall also showed a set of posters covering different kinds of accidents. These posters she displayed on an easle. Her lectures are usually thirty to forty minutes in length. Mrs. McCall's talk was followed by a display of a moving picture entitled "The Price of Thoughtlessness," the story for which was prepared by E. C. Clark, supervisor of inspection in charge of accident work, Brooklyn Rapid Transit System, and Roy T. Hanaford, of the Vitagraph Company. The latter company will place this film on its regular circuit and is prepared also to rent it to electric railways either direct or through the medium of the General Film Company. The film begins with a reproduction of an accident prevention lecture in a schoolroom in which the car models and posters are displayed. The next scene shows how one of the boys of the class on seeing a broken trolley wire informs a policeman, who calls up the line department of the railway. The following scenes show the emergency wagon leaving headquarters, the linemen making the repairs and the boy receiving the praise of the bystanders. Other scenes show how children are injured while playing in the streets and the unhappiness that comes to crippled youngsters who can no longer indulge in games with their friends. This reel has made such an excellent impression that it is planned to prepare others of similar character. One way that the company's lectures are being used to maintain the interest of the children in the accident question is to have the pupils write compositions on some form of accident which has come within their experience. In line with this idea Public School 147, Brooklyn, recently made an issue of its paper a "Safety" number.

Changes in Schedule Ordered in Madison.—The Railroad Commission of Wisconsin has issued an order directing the Southern Wisconsin Railway to reduce the headway of its cars on the principal lines of its system in Madison and to extend its schedule to a later hour at night.

Fare Boxes to Be Tested in Columbus.—Fare boxes will be tested on cars of the Oak Street and the High Street lines of the Columbus Railway & Light Company, Columbus, Ohio. So far fares have been collected by the conductors, who stand at the entrance of the pay-as-you-enter cars.

City Cars to Have Right-of-Way Over Interurbans at Detroit.—A resolution was adopted by the Common Council of Detroit, Mich., on the evening of Oct. 7, instructing the Detroit United Railway to give the city cars the right-of-way over interurban cars and to cease switching city cars out of the way for interurban cars.

Inquiry Into Height of Car Steps.—The Public Service Commission of New Hampshire has concluded the taking of testimony in connection with the hearings which it has conducted to inquire into the question of the height of the steps of the cars operated on the Concord and Manchester electric branch of the Boston & Maine Railroad.

Service Order in Phoenix.—The Corporation Commission of Arizona has issued an order to the Phoenix Railway for additional service upon all lines except the Glendale line. The order is in the form of a judgment to a complaint, the complaint being made by the commission of its own motion, as is allowed under the corporation code of the State.

Newspaper Publicity Campaign in Springfield, Ill.—The Springfield (Ill.) Consolidated Railway is conducting a newspaper publicity campaign designed to create a good feeling upon the part of the public. Reminiscent advertisements relate the rapid development of the system and the large amounts paid out in the city for help, fuel and other necessities.

A Suggestion to City Officials of Elgin.—Edwin C. Faber, vice-president and general manager of the Aurora, Elgin & Chicago Railway, has notified the City Council of Elgin, Ill., that the present system of a central transfer station for street cars appears more satisfactory than through routing or a short loop in the business district. An opinion is asked from the city officials.

Order in Regard to Drinking Cups in California.—The Railroad Commission of California has issued a general order directing all steam and electric railways of the State to provide sanitary individual drinking cups for passengers at a cost not to exceed 1 cent a cup. These cups must be provided on all trains whose schedule between terminals exceeds one hour and thirty minutes.

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I. C. C. Refuses to Open Commuters' Case.—The Interstate Commerce Commission has refused to reopen the Connecticut commuters' fare case as asked by Connecticut Commuters' League. The commission three months ago fixed commutation rates between New York City and Connecticut at approximately 8 per cent less than former rates, and the commission believes these rates are reasonable.

Railway Permitted to Operate Bus Line.—The Public Service Commission of the Second District of New York has issued an order permitting Nathan A. Bundy, receiver for the Buffalo Southern Railway, which operates an electric railway between Buffalo, Hamburg, East Aurora and Armor in western New York, to operate a stage route or bus line from the terminus of the tracks of the Buffalo Southern Railway at East Seneca to East Aurora.

Street Car Ticket Hearing Closed.—The State Public Service Commission of Washington has closed its hearing in reference to the selling of tickets on the cars of the Puget Sound Traction, Light & Power Company. The privilege has been granted to James B. Howe, attorney for the company, to introduce later additional testimony of H. L. Gray, formerly chief engineer of the commission, into the records. The commission has reserved its decision.

Near-Side Stops in Rochester.—The number of street corners at which the Rochester street cars stop on the near side is to be greatly increased under a new order which will go into effect immediately. Elmer E. Strong, superintendent of transportation of the New York State Railways, Rochester Lines, announces that he believes the near-side stop not only operates to secure better service in the down-town business district, but makes for greater safety.

Ordinance Passed Requiring Two Men on Near-Side Cars.—The Common Council of Lockport, N. Y., has voted to compel the International Railway, Buffalo, to place two men instead of one in charge of its new near-side cars on the local lines of Lockport. The chief of police has been directed by the board to enforce an ordinance covering this matter or to collect a penalty of $25 from the International Railway for every twenty-four hours the cars are operated by one man.

Clerks and Conductors in Ticket Fraud.—Two clerks and six conductors employed by the International Railway, Buffalo, N. Y., have been arrested by central office detectives charged with stealing books of street car tickets and selling them at reduced prices. In the arrest of the employees the officers of the company believe they have the parties who have been conducting a systematic business in street car tickets for some time. The prisoners have been held for the grand jury.

Decision Reserved in Complaint Against Chautauqua Traction Company.—Commissioner Hodson of the Public Service Commission for the Second District of New York has reserved decision on the complaint against the Chautauqua Traction Company, brought by Buffalo and Jamestown members of the Order of United Commercial Travelers of America, in which it is alleged the company does not provide proper toilet conveniences on its cars for the accommodation of the traveling public.

Improved Service for South Boston.—The Boston (Mass.) Elevated Railway inaugurated a new service between the down-town district and the South Boston peninsula on Oct. 18 by establishing a rush-hour schedule at morning and night over the Summer Street extension, and providing an air-line route through L Street and First Street to City Point. The company has provided an outbound morning service of twenty-three trips and an inbound service of twenty-six trips in the afternoon between Dewey Square and South Boston. The new facilities greatly improve the transit conditions in the wholesale and marine district east of the South Station, besides cutting down the time of transit between City Point and the business center of Boston. The service relieves congestion in the Broadway lines of the company.

Exhaust Fans in Philadelphia Cars.—To insure adequate ventilation when the car is at a standstill, particularly in sultry and muggy weather, the near-side cars of the Philadelphia Rapid Transit Company are being equipped with an electrically driven exhaust fan which the conductor can, when conditions require, start in motion and draw air out through an opening in the rear of the car. A large number of the near-side cars in Philadelphia now have the air intake located in the roof instead of in the floor, and the remainder are being changed as rapidly as service conditions will permit. Every car of the company is thoroughly cleaned and disinfected at the carhouse at least once a day, and in addition a broom is provided on each car for sweeping the floor and steps.

Through Routes and Joint Rates Between Louisville and Indianapolis.—In a circular issued to its members the Board of Trade of Louisville, Ky., declares that electric railways affected by the recent order of the Interstate Commerce Commission requiring them to adopt joint routes and through rates between Louisville and Indianapolis have not complied fully with the order. The chief complaint which the board of trade makes is in regard to insufficient facilities for handling freight offered at the Louisville terminals of the Louisville & Northern Railway & Lighting Company and the Louisville & Southern Indiana Traction Company. Shippers have been urged to report cases of delays or refusal to accept shipments in order that appeal may be made to the commission. It is expected that the new through rates will be filed Dec. 1, effective on Jan. 1, 1914.

"Safety First" Results in Rochester.—Since the inception of the "safety first" movement by the New York State Railways, Rochester Lines, there has been a notable decrease in the number of accidents. A detailed record started six months ago shows that although the number of employees has increased the number of accidents has decreased. Victor T. Noonan has prepared an interesting chart which shows the comparative number of employees and accidents. This record is more remarkable because of the large amount of construction work which has been carried on. Certain kinds of minor accidents have been eliminated altogether. During April, May and June 1369 men were employed, and in twelve departments there were ninety-five accidents. During July, August and September 1439 men were employed, or an increase of seventy, but during that time there were only eighty-two accidents, a decrease of thirten.

Answer to Fare Complaint Filed.—The Washington & Old Dominion Railroad, Washington, D. C., has filed with the Interstate Commerce Commission its brief in answer to the complaint made by S. T. J. Price and others attacking commutation rates on the Great Falls branch. The railway, through its attorney, asserts that at no time has it been able to earn from its tariffs what "under the law it is entitled to earn—that is to say, that operating expenses are scarcely met, allowing nothing for depreciation, maintenance, betterments and interest on investment; that nothing had been paid by way of dividend or earned for it by way of dividend, even with the most economical management of the property, and that the rates charged by the increased tariff were in every instance such as were authorized and justified under the laws in force in the State of Virginia, where all but about 1500 ft. of the 14 miles of the Great Falls branch is located." The company has asked that the complaint be dismissed.

The Denver Skip-Stop Explained.—John A. Beeler, vice-president and general manager of the Denver (Col.) City Tramway, has sent a letter to Commissioner Otto Thum explaining the express and skip-stop service on Colfax Avenue. Mr. Beeler says that the company has been commended for inaugurating the new service, which has proved a great time-saver for many who use the line. He says further: "The plan cannot have proved a serious detriment to anyone, for the reason that if persons are obliged to walk one block to board the car, on the return trip they are discharged at their own particular street. Even with the skip-stop method in effect on Colfax Avenue the stops average about eight to the mile, which is the average number of stops in effect on Broadway and parallel streets, on account of the difference in the size of the blocks. All who work desire to save time in going to and from work. It is our desire to do everything we can to make street car travel more convenient, more popular, safer and better in every way, but if this skip-stop plan is not approved by the majority we will abandon it."

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Personal Mention

Mr. S. Anderson, manager of the New London division of the Shore Line Electric Railway, Norwich, Conn., has been appointed general manager of the Norwich & Westerly Traction Company.

Mr. Alba H. Warren, who has been the general manager of the Pensacola (Fla.) Electric Company for the last five years, has been transferred to the Galveston (Tex.) Electric Company as manager.

Mr. J. A. Coe, formerly superintendent of the Muscatine North & South Railway, Muscatine, Ia., has been appointed superintendent of transportation of the Inter Urban Railway, Des Moines, Ia., to succeed Mr. G. T. Gadsby, resigned.

Mr. Dwight H. Peck, freight agent for the Norwich & New York Property Company for the last eight years, has been made general freight agent of the Norwich & Westerly Traction Company and the Shore Line Electric Railway, Norwich, Conn., effective on Nov. 1, 1913.

Mr. T. J. Hanlon, Jr., has been appointed general manager of the Pensacola (Fla.) Electric Company, to succeed Mr. Alba H. Warren, who has been appointed manager of the Galveston (Tex.) Electric Company. Mr. Hanlon has been with Stone & Webster for six years, serving part of that time at Dallas, Tex. He was superintendent of the railway department of the Pensacola Electric Company under Mr. Warren.

Mr. J. Walter Gillette has resigned as treasurer, general manager and purchasing agent of the Fort Smith Light & Traction Company, Fort Smith, Ark., effective on Nov. 1. Mr. Gillette has been connected with the company at Fort Smith for a number of years. He was elected president of the Arkansas Association of Public Utility Operators in the spring of 1913 and is a full member of the American Institute of Electrical Engineers.

Mr. Claude K. Boettcher of the firm of Boettcher, Porter & Company, Denver, Col., has been elected chairman of the board of directors of the Denver (Col.) City Tramway. Mr. Boettcher has been a director of the company since June, 1913. He was a member of the syndicate which early in 1913 purchased the holdings of Marsden J. Perry, Providence, R. I., in the Denver & Northwestern Railway, which owns the capital stock of the Denver City Tramway.

Mr. Charles C. Marshall, Sidney, Ohio, has been appointed a member of the Ohio Public Utilities Commission by Governor Cox to succeed Judge William L. Dechant, deceased. Mr. Marshall served as special counsel for the Public Service Commission under the appointment of Attorney-General Hogan and aided in formulating the bill creating the Public Utilities Commission. There years ago he was defeated for the congressional nomination in the Fourth District.

Mr. C. Peter Clark has been appointed chief of the rate and tariff bureau of the Massachusetts Public Service Commission, with headquarters at Boston. Mr. Clark is a son of the late Charles P. Clark, former president of the New York, New Haven & Hartford Railroad, and is a native of Jamaica Plain, Mass. He has had a varied railroad experience, including service as general freight agent of the Old Colony Railroad and Fall River Line, general manager of the New York & New England Railroad and superintendent of the eastern division of the New York, New Haven & Hartford Railroad. Ten years ago he was appointed second vice-president and general manager of the Buffalo & Susquehanna Railroad and has since made his headquarters in Buffalo.

Mr. William G. Evans has resigned as president of the Denver (Col.) City Tramway. Mr. Evans is the son of the John Evans who founded Northwestern University at Evanston, which is named after him, and who was appointed Governor of Colorado by President Lincoln. John Evans founded the street railway system of Denver and his traits and character were inherited by his son, William, whom Isaac F. Marcosson, writing in *Munsey* for May, 1912, characterized as "the most dominating personality in Denver life." He is head of the local republican organization at Denver and is interested in the First National Bank, the International Trust Company and numerous other enterprises.

Mr. Allen F. Edwards has been elected vice-president of the Detroit (Mich.) United Railway in charge of purchases. Mr. Edwards was born in Oglethorpe County, Georgia, in 1876. He began his railroad career as cashier of the Yonkers (N. Y.) Railroad in 1897 and later served as superintendent. In 1898, after the property came into the control of the Union Railway and the Third Avenue Railroad, New York, he was appointed general superintendent. In 1899 Mr. Edwards assisted in building the electric railways at Petersburg, Va., and acted as general manager of the electric railway, electric lighting and water power companies there. In 1901 he was appointed general manager of the Toledo & Monroe Railway, then under construction between Toledo and Detroit. The same year he was made general manager of the Detroit & Toledo Shore Line Railroad of the Everett-Moore syndicate, also building from Toledo to Detroit. In 1902 the Detroit & Toledo Shore Line Railroad was placed in the hands of Mr. Edwards as receiver by the United States court. As receiver he completed the construction of the road to Detroit, when it was sold to the Grand Trunk and Clover Leaf Railroads. He then became connected with the Detroit United Railway as purchasing agent and has served that company continuously since. Mr. Edwards is also a director of the Union Trust Company, Detroit.

A. F. Edwards

Talk on Schedules

The following is an extract from an article, "Schedules Are Altered to Meet Conditions of Travel," which appeared in *Electric Railway Service* for Oct. 17, 1913, which is published in the interest of the Detroit (Mich.) United Railway:

"Street railway schedules are made to suit the conditions of travel. The schedules on one line to-day may not be sufficient for the needs of the patrons of that line a month from to-day, and it is just as true that business conditions may have changed so that the service rendered from to-day's schedules may be too great a month hence.

"Practically every city line has three schedules in operation at all times—week-day, Saturday and Sunday. These three schedules are necessary because the volume of travel and the hours of travel differ in these three periods. For example, on week-days (in street railway work this means Monday, Tuesday, Wednesday, Thursday and Friday) there is the early factory rush and the late afternoon rush. On Saturdays there is the early morning rush, but many factories close down at noon, thereby lessening the late afternoon rush. On Sundays travel is pretty well equalized.

"The summer travel in Detroit, with all the resorts in full blast and the children out of school every day, is vastly different from the winter travel, and hence summer schedules must of necessity supply a greater service than in the fall when the school bells ring daily.

"So that in changing schedules from time to time because of the seasons and because of changing business conditions the Detroit United Railway is proceeding upon proper lines.

"As our readers know, car miles mean the number of miles all the cars travel in performing their service. As schedules increase the number and frequency of cars the number of car miles increases. Here are comparisons as to the number of car miles within the city service zone:

"From Sept. 1 to 15, in 1912, the car mileage within the city service zone amounted to 1,221,248 car miles.

"From Sept. 1 to 15, in 1913, this car mileage amounted to 1,346,899 car miles.

"This is an increase of nearly 12 per cent."

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Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Washington-Virginia Railway, Washington, D. C.**—Chartered in Virginia to succeed the Washington Utilities Company, in accordance with the plan mentioned in the ELECTRIC RAILWAY JOURNAL for Oct. 11, 1913, page 707. Officers: Frederick H. Treat, Wayne, Pa., president, and J. B. Hoellman, Washington, D. C., secretary.

***Minneapolis Northwestern Electric Railway, Minneapolis, Minn.**—Incorporated in Minnesota to build an electric railway in Thief River Falls and the surrounding territory.

***Sultan (Wash.) Valley Railway.**—Incorporated in Washington to build an interurban railway from Sultan to the junction of the Sultan River and Williamson Creek. Capital stock, $500,000. Incorporators: J. C. Davis, J. Wigren and F. C. Thayer, Chicago, and Nate Jones, Sultan.

FRANCHISES

Globe, Ariz.—The franchise for an electric railway in Globe granted by the City Council to N. L. Amster and associates some time ago is to be revoked by the city according to the plans of the Mayor and Councilmen. Time for beginning of construction of the proposed line between Globe and Miami expired on Sept. 13.

Clovis, Cal.—F. S. Granger, Clovis, has received a franchise from the Council through Fifth Street, ending on the eastern city limits line in Clovis. This is part of a plan to build an electric railway from Fresno to Clovis and extending 8 miles beyond Clovis to the foothills of the Sierra Nevada Mountains. [E. R. J., Oct. 11, '13.]

Muscatine, Ia.—The Davenport-Muscatine Railway, Davenport, has asked the Council for a franchise for an extension to the site of a proposed freight depot in Muscatine.

New Orleans, La.—An ordinance providing for the sale of electric railway franchises in Broadway and South Claiborne Avenue in New Orleans will be presented at the next meeting of the City Council in New Orleans.

Hannibal, Mo.—The Hannibal Railway & Electric Company has asked the Council for a franchise on West Broadway between the east line of Hueston Street and the east line of Hawkins Avenue in Hannibal.

Albany, N. Y.—The Frontier & Western Railway has asked the Public Service Commission, Second District, for a certificate of public convenience and necessity. The proposed new line is to operate through Black Rock.

Hamilton, Ont.—The City Council has instructed City Engineer Macallum to prepare plans and specifications for a municipal inclined railway at Wentworth Street in Hamilton.

Gladstone, Ore.—Stephen Carver, Gladstone, has received a twenty-five-year franchise from the Council in Gladstone. This is part of a plan to build an electric railway through Gladstone. [E. R. J., Oct. 11, '13.]

Portland, Ore.—The Portland & Oregon City Electric Railway has received a franchise from the Council for a new line in Portland.

Chattanooga, Tenn.—The Eastern Tennessee Traction Company has received a franchise from the County Court for a system of interurban railroads radiating from Chattanooga. L. M. Coleman is interested. [E. R. J., June 14, '13.]

Tacoma, Wash.—C. E. Muckler and E. K. Murray, of the Tacoma-Seattle Electric Short Line Railway, have received a franchise from the Council for an extension of time on their franchise in which to enter Tacoma. [E. R. J., Oct. 11, '13.]

***Wenatchee, Wash.**—Hyman Harris, Wenatchee, has asked the Council for a franchise in Wenatchee.

TRACK AND ROADWAY

Medicine Hat (Alta.) Railway.—This company states that surveys have been completed and construction will be begun April 1, 1914, on its electric railway in Medicine Hat. The Montreal Engineering Company, Ltd., Montreal, has the contract to build the line. R. O. Sweezey, chief engineer. [E. R. J., Sept. 20, '13.]

Salt River Valley Electric Railway, Phoenix, Ariz.—Surveys have been made and preliminary arrangements are still under way by this company for its 20-mile line between Phoenix and Mesa. C. C. Lewis, Box 53, Phoenix, president. [E. R. J., Jan. 5, '13.]

Little Rock Railway & Electric Company, Little Rock, Ark.—Work has been begun by this company on the 2-mile extension of the Highland Park line to the Niemeyer Mills in Little Rock.

Fresno, Hanford & Summit Lake Interurban Railway, Fresno, Cal.—It is announced that bonds aggregating more than $200,000 have been voluntarily pledged by supporters of this company and that construction on the first unit from Fresno to Selma will be begun as soon as material can be secured. L. H. Jones, the engineer who has charge of the construction of this railway, is securing prices on poles and ties for the line.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—Grading and trestle work have been completed and rails have been laid to Alamo by this company on its Danville branch. The viaduct over the Southern Pacific Railroad tracks about 1 mile from Walnut Creek has been completed.

***San Bernardino, Cal.**—Plans for a municipal railway are being planned by Mayor Catick with the naming of City Engineer F. A. Smith as engineer in charge of the preparation of plans for the proposed new electric line along Seventh Street and Mount Vernon Avenue and thence northward in San Bernardino. The estimates will be secured and the Council announces that a bond election will be called as soon as possible.

Sacramento Valley West Side Electric Railway, Willows, Cal.—The Railroad Commission has issued a supplemental order upon the application of this company, giving it authority to spend $1,000 per month in organization work. C. L. Donohoe, Willows, president. [E. R. J., Oct. 11, '13.]

Connecticut Company, New Haven, Conn.—This company will soon lay new rails through Fairfield.

Okeechobee Interurban Railway, Arcadia, Fla.—This company has completed arrangements for a regular boat line from Lakeshore, the new town which will likely be the terminus of the line on Fisheating Creek near the lake, to the East Coast via the canals, thus giving a direct line across the State. E. Prouty, Arcadia, manager. [E. R. J., Oct. 18, '13.]

***Panama City, Fla.**—A. G. Chandlee, secretary of the Gulf View Land Company, states that a company is being formed to build a gasoline railway through East Millville to Panama City, 5 miles.

Atlanta & Carolina Railway, Atlanta, Ga.—The second suit for a receiver for this company, which was chartered to build a line from Atlanta to Augusta, has been filed in the Superior Court in Atlanta. The company has begun work on its line. [E. R. J., Sept. 27, '13.]

Idaho Falls (Idaho) Electric Railway.—Plans are being made by this company to begin soon the construction of its line through Idaho Falls and the adjacent country. J. L. Milner, Idaho Falls, president. [E. R. J., Oct. 11, '13.]

Chicago (Ill.) Railways.—The local transportation committee has granted this company till Jan. 1, 1915, to build extensions ordered for this year amounting to about 19 miles of single track.

Kankakee & Urbana Traction Company, Urbana, Ill.—Arrangements for extending this company's line from Urbana to Champaign and Mattoon are reported completed.

St. Joseph Valley Traction Company, Elkhart, Ind.—Right-of-way has been purchased and construction will soon be begun by this company on a 3½-mile extension between its present terminus and Columbus.

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Indianapolis, Linton & Vincennes Traction Company, Indianapolis, Ind.—This company states that surveyors began the preliminary work on the line Oct. 9, starting from the Union Stock Yards, Indianapolis, to work out a feasible route from the city limits to Mooresville. It is the intention to have the survey completed by Dec. 1, so that all plans and profiles can be prepared by the first of the year. A meeting of the citizens of Linton, Ind., will soon be held to discuss with Gilmer Bray and W. C. Thompson, the president and secretary of the company, the question of their subscribing to $50,000 of the issue of $200,000 of stock which is being offered for sale to cover the cost of the survey and preliminary work. [E. R. J., Oct. 11, '13.]

Hutchinson (Kan.) Interurban Railway.—Work will be begun by this company on a new line to the Country Club and the soda ash plant as the result of the settlement of a lawsuit in its favor. The company will tear up a section of the old track, and this will be used in part in the construction of the new line.

Kansas Central Traction Company, Topeka, Kan.—A contract has been awarded by this company to Mayo & Luff, New York, N. Y., to build its line from Coffeyville to Parsons, through Edna, Oswego and Altamont. Philip Strack, Parsons, president. [E. R. J., Aug. 9, '13.]

***Wichita, Kan.**—Commercial organizations of Wichita are urging the construction of an electric line from Wichita to Pratt, Kan., via Kingman. Plans looking toward the financing of the work are now being considered. No names of those interested are yet given.

New Orleans Railway & Light Company, New Orleans, La.—The double-tracking of its lines on South Claiborne Street and Broadway in New Orleans is being contemplated by this company.

Orleans-Kenner Electric Railway, New Orleans, La.—Plans are being considered by this company to enter New Orleans via Banks Street and extend the line to Baton Rouge. This 110-mile line will connect New Orleans, Kenner, Hanson City, Harrihan and Shrewsbury. A. S. Bowman, president. [E. R. J., Aug. 16, '13.]

Winnipeg, Selkirk & Lake Winnipeg Railway, Winnipeg, Man.—The Board of Railway Commissioners has passed an order giving this company permission to operate its cars for construction purposes on the line to Stonewall, Man., across the Selkirk branch of the Canadian Pacific Railway. This will enable construction to be proceeded with, and it is reported that track will be laid into Stonewall by Nov. 1. Application has been filed with the board for the construction of a subway, the Canadian Pacific Railway consenting, under the tracks of that railroad at the point where the above crossing has been made.

Muskegon & Manistee Interurban Railway, Muskegon, Mich.—About $150,000 of the $280,000 bonus needed to begin the construction of the proposed 90-mile electric line between Muskegon and Manistee, via North Muskegon, Whitehall, Montague, Shelby, Hart, Pentwater and Ludington, has been pledged. S. M. Weil, 3733 Wilton Avenue, Chicago, Ill., is interested. [E. R. J., Oct. 12, '13.]

St. Joseph Railway, Light & Power Company, St. Joseph, Mo.—It is reported that this company has made arrangements to build an electric line from St. Joseph to De Kalb, Mo., and will operate electric trains from St. Joseph to Atchison and from St. Joseph to Edgerton. Electric lines to Sugar and Bean Lake also are proposed. The company will buy the Rock Island branch from Atchison to Edgerton by way of completing its lines.

***Helena, Mont.**—John D. Ryan, Helena, states that he will contribute $50,000 toward the construction of an electric railway from Helena to the Prickly Pear Valley. The Commercial Club of Helena is also interested in this project, and preliminary arrangements are being made to launch the enterprise.

Fallon (Nev.) Electric Railway.—Grading has been completed by this company on its 18-mile line to connect Fallon, Stillwater and Harrigan. The line to Stillwater is 13 miles to the east of Fallon and the line to Harrigan is 5 miles to the south. Storage battery cars will be used.

Federal Light & Traction Company, New York, N. Y.—It is stated that this company, owner of the Gray's Harbor Railway & Light Company, contemplates the construction of interurban railways in the Gray's Harbor country through Montesano, Cosmopolis, Aberdeen and Hoquiam. It is probable that surveys will be made shortly.

Buffalo & Williamsville Electric Railway, Williamsville, N. Y.—This company has filed a petition with the Public Service Commission requesting permission to abandon its line in Batavia.

Public Service Railway, Newark, N. J.—At a session of the Montclair Heights Community Club it was decided to ask the State Board of Public Utility Commissioners to request this company to build an extension of the Valley Road line from the State Normal School at the Montclair line to Paterson.

Cape Breton Electric Company, Sydney, N. S.—During the coming year this company plans to spend $250,000 in betterments for its lines.

Cleveland, Alliance & Mahoning Valley Railroad, Cleveland, Ohio.—This company has completed its Ravenna-Warren division as far east as Newton Falls and will begin running cars by Nov. 1. A new line is nearly completed east of the junction with the Ravenna-Alliance division to the old Baltimore & Ohio Railroad right-of-way which the company purchased several years ago. Work of completing the line to Warren will be commenced in the spring. [E. R. J., March 22, '13.]

Bartlesville (Okla.) Interurban Railway.—This company has decided to build a 2-mile extension in Bartlesville.

Lake Erie & Northern Railway Brantford, Ont.—At the meeting of the Dominion Board of Railway Commissioners which was recently held in Hamilton this company obtained the right to operate temporarily over the tracks of the Grand Valley Railway, over a recently installed diamond, the latter's prior rights being protected. It also obtained permission to divert the rails of the Grand Valley Railway in North Dumfries, Ont., the work to be done under the supervision of the engineer of the Grand Valley Railway. The company also secured approval of the crossing at grade of the tracks of the Grand Valley Railway near Paris, Ont., but its route was not approved between Brantford and Port Dover. Its engineers will therefore secure options on lands for a different route.

Forest Hill Electric Railway, Toronto, Ont.—This company has asked the government for permission to proceed with the construction of its line in Toronto, and it is expected that work will be begun shortly. This is part of a plan to build a line from the northern limits of the city of Toronto at Dunvegan Road north to Forest Hill, and thence out through Eglinton Avenue and Dufferin Street district in Toronto. [E. R. J., Sept. 13, '13.]

Toronto Suburban Railway, Toronto Junction, Ont.—The Ontario Railway & Municipal Board has issued orders for this company to proceed with its extensions on Pacific Avenue in Toronto.

Portland Railway, Light & Power Company, Portland, Ore.—This company has agreed to build an extension on East Halsey Street and Barr Road from East Thirty-seventh Street to East Eighty-second Street in Portland when $21,000 is raised, the grade crossings eliminated and a guaranty is made that the company will not be required to pave beyond East Sixteenth Street.

Harrisburg (Pa.) Railways.—Material has been purchased by this company to build a connecting link between Rockville and Dauphin, a distance of between 4 and 5 miles.

Pittsburgh, Harmony, Butler & New Castle Railway, Pittsburgh, Pa.—This company has awarded a contract to the Swanston Contracting Company, Pittsburgh, to build its line between Beaver and New Castle. It is understood that the company has franchises and right-of-way along the entire line and it is expected that grading will be continued during the winter. The line will cross the Beaver River at a point near Ellwood City on a bridge to be constructed by this company and will extend through Koppel, Homewood and Beaver Falls to Beaver.

North Anderson Street Railway, Anderson, S. C.—This company has completed and will soon place in operation the 1-mile extension of its North Anderson line between Anderson and North Anderson. Under the arrangements with the North Anderson Development Company, the new

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line was constructed and will be operated by the Greenville, Spartanburg & Anderson Railway as a part of the regular city line. [E. R. J., Aug. 30, '13.]

*Abbeville, S. C.—Plans are being considered to build an electric railway between Anderson, Abbeville and Edgefield. Among those interested are C. C. Godman, Fort Smith, Ohio, and C. C. Gambrell, Abbeville.

Chattanooga, Tenn.—A tunnel through Missionary Ridge, near Chattanooga, has been completed by the county at a cost of $250,000. The tunnel is lined with concrete and is wide enough for railway tracks to be laid. It is reported that this tunnel will be used by the East Tennessee Traction Company, which plans to build an electric line from Cleveland to Chattanooga, 30 miles.

Southern Traction Company, Dallas, Tex.—Work has been begun by this company on the extension of the Sanger Avenue line in Waco to Huaco Heights. Arrangements are being made by this company for an extension from Temple and Belton to Austin.

Fort Worth (Tex.) Traction Company—This company has received thirty days in which to consider an extension of the university car line.

Northern Texas Traction Company, Fort Worth, Tex.—Plans are being considered by this company for an extension of the University line in the Tenth Ward in Fort Worth.

Salt Lake & Utah Railroad, Salt Lake City, Utah.—Track-laying has been begun by this company between Salt Lake City and Provo. This 75-mile line will connect Salt Lake City, Provo, American Fork, Pleasant Grove, Springfield, Spanish Fork and Payson. W. C. Orem, Salt Lake City, president. [E. R. J., Aug. 30, '13.]

Utah Light & Railway, Salt Lake City, Utah.—This company has completed the extension of its line between Warm Springs and Centerville, 13 miles. Surveys are still under way for the proposed line between Holliday and Big Cottonwood.

Virginia Terminal Company, Richmond, Va.—A bill has been introduced in the House of Representatives to authorize this company to build an electric railway from the Aqueduct Bridge in Georgetown across Washington to the Union Station, following Thirty-sixth Street, M Street, New Jersey Avenue and Massachusetts Avenue.

Seattle (Wash.) Municipal Railway.—Track work for division "A" of this municipal railway in Seattle has been completed. This means that the cars will be run over the line from its southern terminus at Third Avenue and Pine Street to its northern end at Thirteenth Avenue West and Nickerson Street, a distance of more than 4 miles. [E. R. J., Jan. 25, '13.]

SHOPS AND BUILDINGS

San Diego (Cal.) Electric Railway.—Plans are being made by this company to begin soon the construction of its new carhouse at Adams Avenue and Florida Street in San Diego. The structure will be 200 ft. x 300 ft. and of brick and concrete construction. The building will contain fifteen tracks.

Iowa Railway & Light Company, Cedar Rapids, Ia.—Plans are being made by this company to build a new interurban passenger and freight station in Cedar Rapids.

Clinton (Ia.) Street Railway.—Work has been begun by contractors Miller & Ladehoff for the foundation of this company's new carhouse in Clinton. The structure will be 60 ft. x 140 ft. and one story high.

Davenport-Muscatine Railway, Davenport, Ia.—It is reported that this company has secured an option on property, 60 ft. x 140 ft., on Front Street near Iowa Avenue in Muscatine on which it plans to build a new freight depot in the near future.

Oskaloosa Traction & Light Company, Oskaloosa, Ia.—Alterations and improvements are being made by this company at its offices and station in Oskaloosa.

Louisville (Ky.) Railway.—Work on the new repair shops of this company is progressing rapidly. Two of the buildings are under roof and the third has the steel work in position. The buildings are of brick and steel construction. They are separated from each other. One of the buildings is to be used as a carpenter shop, the second as a paint shop and the third as a machine shop, where repairing and construction work will be done. While there is ample room for the construction of new cars in the new repair shops, it has not been decided that the company will make all of its own cars, though some of them undoubtedly will be built there. The repair shops cover a site 275 ft. x 700 ft.

Kenner-New Orleans Interurban Railway, New Orleans, La.—Plans are being made by this company for new terminals and a new passenger station on Rampart Street between Tulane Avenue and Canal Street in New Orleans.

Washington, Baltimore & Annapolis Electric Railroad, Baltimore, Md.—This company has awarded a contract to the West Construction Company, Baltimore, for the construction of a new freight house on the property recently acquired by the company on West Pratt Street which adjoins its present Lombard Street Terminal in the city of Baltimore.

Trenton & Mercer County Traction Corporation, Trenton, N. J.—Work has been begun by this company remodeling its old carhouse in Trenton. A new roof and new front are being built. The company is laying new tracks from Lalor Street to its paint shops and repair shops in Trenton.

Greenville, Spartanburg & Anderson Railway, Greenville, S. C.—Plans are being made by this company to build warehouses on Wofford Street in Spartanburg. The cost is estimated to be about $40,000.

POWER HOUSES AND SUBSTATIONS

Kenner-New Orleans Interurban Railway, New Orleans, La.—Plans are being prepared by this company to build its new power house in New Orleans.

Norfolk & Bristol Street Railway, Foxboro, Mass.—This company has closed a contract for a new 352-hp Stirling boiler for its power house in Foxboro.

Milford & Uxbridge Street Railway, Milford, Mass.—About Dec. 1 this company plans to install one 300-kw rotary in its substation in Grafton. Within the next few days the company expects to set a 150-hp boiler at its power house in Milford. The company has placed an order with the Westinghouse Company for one 300-kw, 600-volt, three-phase, 60-cycle, 1200-r.p.m., alternating-current, self-starting rotary converter; three 100-kva, 13,200-volt, single-phase, 60-cycle transformers and one switchboard for the control of same.

Cape Breton Electric Company, Sydney, N. S.—This company plans to build a new substation at Reserve Junction and an addition to its machine shops.

Cleveland (Ohio) Railway.—This company has awarded a contract to W. Thompson & Son Company for the erection of the first unit of its new power plant. The contract involves more than $300,000.

Cleveland, Painesville & Eastern Railway, Willoughby, Ohio.—An order for two 500-kw, 600-volt, six-phase, 25-cycle, commutating-pole rotary converters has been placed by this company with the Westinghouse Electric & Manufacturing Company.

South Carolina Light, Power & Railways Company, Spartanburg, S. C.—Extensive improvements are being made by this company at its power house in Spartanburg. made by this company at its power house in the city of Spartanburg.

Norfolk & Western Railway, Roanoke, Va.—For use in connection with the electrification of this company's line which has been previously announced, the Westinghouse Electric & Manufacturing Company has received orders for the following power station apparatus: three 9000-kw, 25-cycle, 11,000-volt, 1500-r.p.m., single-phase turbo-alternators with two 150-kw, 250-volt turbo-exciters and one motor-generator exciter of the same rating; one 200-kva, three-phase, 25-cycle, 11,000/400-volt O. I. S. C. transformer; three 1500-kva, single-phase, 25-cycle, 33,000/11,000-volt O. I. S. C. auto-transformers, and six 2500-kva and four 3000-kva auto-transformers of similar characteristics; one 10 per cent reactor for the 11,000-volt feeder circuit and one type TA voltage regulator for the turbo-generators.

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Manufactures and Supplies

ROLLING STOCK

Cleveland (Ohio) Railway is preparing plans for fifty new cars.

York (Pa.) Railways is reported to be in the market for several cars.

Utah Light & Railway Company, Salt Lake City, Utah, is reported to be in the market for fifteen cars.

Northwestern Elevated Railroad, Chicago, Ill., is contemplating the purchase of fifty to 100 new cars.

Geneva & Auburn Railway, Seneca Falls, N. Y., is expecting to purchase from one to three new interurban cars.

Youngstown & Southern Railway, Youngstown, Ohio, expects to purchase one or two combination cars of the same type as those in present use.

Ohio Electric Railway, Cincinnati, Ohio, noted in the ELECTRIC RAILWAY JOURNAL of Sept. 6, 1913, as having ordered six freight trail cars from the Cincinnati Car Company, has specified the following details for this equipment:

Bolster centers, length, 27 ft. 6 in.	Headlining, No. 18 U. S. Ga. sheet steel
Length of body..36 ft. 10 in.	Roof .....arched
Lenth over vestibule, 38 ft. 6 in.	Underframe..... composite
Width of sills.....8 ft. 8 in.	Air brakes, West. Sch. HC-1012
Width over all.....9 ft.	Bumpers.....steel plate
Height, rails to sills, 42⅝ in.	Couplers .....Tomlinson
Height, sill to trolley base, 9 ft. 4 in.	Hand brakes.....Tower
Body .....wood	Trucks.....Standard MCB
	Wheels....33-in rolled steel

TRADE NOTES

Standard Roller Bearing Company, Philadelphia, Pa., has been placed in the hands of receivers.

Smiley Company, Edmonton, Alta., has received an order to equip the city of Edmonton with railway gates on practically all of its grade crossings.

Galena-Signal Oil Company, Franklin, Pa., has bought about three acres of land at Clearing, Ill., on which to build steel storage tanks, a concrete and brick warehouse and a power plant.

F. D. Spotswood, Lexington, Ky., is equipping a large number of cars of the Bay State Street Railway with its system of accident prevention, including overhead fixtures and other materials.

Walter E. Harrington, formerly general manager Camden & Suburban Railway, and later with the Lykens Development & Construction Company in Pottsville, Pa., has opened an office as consulting engineer in London. In this work Mr. Harrington is associated with Bruce M. Glasgow under the firm name of Glasgow, Harrington & Company, at 10 Drapers Gardens, Throgmorton Avenue, London, E. C. The firm announces that it is prepared to negotiate for the introduction and financing of any legitimate enterprise approved by its engineers.

Changes in the Ackley Brake & Supply Company.—James Arthur Noble, formerly secretary and treasurer of the Ackley Brake & Supply Company, of 50 Church Street, New York City, has purchased the entire capital stock of this corporation and will continue the business of the company under the same firm name, with himself as president and general manager. The Ackley Brake & Supply Company was established in New York City in the fall of 1910 by Griffin S. Ackley subsequent to his withdrawal as president and general manager of the National Brake Company of Buffalo, N. Y. During the time of Mr. Ackley's presidency the firm has manufactured and sold various electric railway specialties and has also dealt extensively in the sale of geared brakes in various sections of the world. These geared brakes consisted of the Peacock brake and the Ackley adjustable and Ackley no-staff brake, the two latter brakes being the inventions of Griffin S. Ackley. So far as the geared brake business is concerned the Ackley Brake & Supply Company, in association with the Deutsche Ackley Bremsen Company, of Berlin; the Cie Française des Freins Ackley, of Paris, and the British Ackley Brake & Supply Company, of London, has limited itself to a defined territory, consisting of all countries of the world except the United States, Canada, Hawaii and the Philippine Islands. In the field of railway appliances and specialties, the company will continue as sole manufacturer and sales agent within the United States and certain outside territory for the Anger improved automatic brake adjuster. It will continue the sale of various geared brakes throughout its territory and will act as sales agent and manufacturer for the Acme limit stop brake staff, a braking device for lightweight cars. It will also retain its export agency for tool steel gears and pinions and will continue to sell throughout the world the Automatic trolley guard, Monarch refillable fuses and Sjoberg car vestibules and sash springs. It is the intention of the new organization to deal more extensively in various railway supplies within the United States and also to exploit in the near future various braking devices of an advanced nature.

ADVERTISING LITERATURE

McGraw-Hill Book Company, Inc., New York, N. Y., has issued a catalog describing its new books on electrical engineering.

Wagner Electric Manufacturing Company, St. Louis, Mo., has issued a folder describing its transformers, motors and electrical instruments.

Mesta Machine Company, Pittsburgh, Pa., has issued a catalog describing its gas engines for all classes of service and for any kind of fuel gas.

Chicago Pneumatic Tool Company, Chicago, Ill., has issued Bulletin No. 34-T, describing its Class "M" Corliss type steam-driven air compressors.

Goldschmidt Thermit Company, New York, N. Y., has issued a catalog describing rail welding and motor case and truck frame repairing by the Thermit process.

Ohio Brass Company, Mansfield, Ohio, has issued its *O-B Bulletin* for September-October, 1913, which contains leading articles on "Thomas A. Edison" and "Train Operation in City Service."

Western Electric Company, New York, N. Y., has issued the *Western Electric News* for October, 1913, which contains a leading article on the distribution and extent of the foreign business of the company.

Railway Improvement Company, New York, N. Y., has issued Catalog No. 5 of its series of bulletins containing testimonial letters from electric railways showing the economy resulting from the use of its coasting-time recorders.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has issued a booklet entitled "Joe and His Travels," which contains a series of advertisements portraying the system of the company in having its railway engineers make frequent visits to operating men throughout the country.

Dahlstrom Metallic Door Company, Jamestown, N. Y., has issued an exceptionally complete catalog in nine sections showing many shapes of cold-drawn metal moldings, such as those used for car finishing and in building fireproof partitions and general interior work. The sections are shown in profile and they are cataloged as to sizes, weight per lineal feet and price. One page is devoted to an illustration and description of the details of a fire-proof swtchboard operator's bay for the Waterside generating station of the New York Edison Company.

The J. G. Brill Company, Philadelphia, Pa., prints in the October, 1913, issue of the *Brill Magazine* an illustrated biography of Frederic W. Hild, general manager of the Portland Railway, Light & Power Company, Portland, Ore. Among the feature articles are the following: "Conditions Which Govern the Type of Car for City Service in Syracuse, N. Y.," "Varied Types for Interurban Service in Southern Illinois," "Single-End Pre-payment Cars," "Combination First-Class and Second-Class Cars for Peru," "Severe Test for a Light-Weight Car," "Near-Side Cars for Atlantic City & Shore Railway," "Steel-Frame Cars for Mobile," "Steel Gas-Electric Motor Cars," and "Semi-Convertible Interurban Cars for the Valley Railways."

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CARHOUSE SPECIAL WORK

The recent construction of a carhouse with an inclosed ladder entrance track again brings up the question whether it is desirable practice from an economic standpoint to keep the special work under cover. It is sometimes necessary to roof over the special work at V-shaped carhouses or in those where the greater part of the available frontage is needed for a waiting room, but this is an unusual condition. In general, there is no more reason for covering special work at carhouses than there is to do so anywhere else on the system because the life of the track is limited by the conditions of service rather than by the weather. Doubtless, it is an operating convenience to have the special work protected against slush and ice, but the comparative rarity of that trouble and its easy correction do not seem to justify the expense of an extra wall and additional roofing. Neither is the covered ladder track of any value for storage purposes since it must be kept clear at all times for the operation of cars to and from the other tracks. While layouts of this kind are usually dictated by real estate conditions which are beyond the control of the company, it is well to bear that fact in mind when an installation of this kind is being considered.

PEAK LOADS FOR SURFACE CARS

The baneful influence of a peak in any load line was probably first recognized in power production. From this attention has been directed more recently to the peak in passenger traffic which exists because the majority of people want to ride to and from their business at about the same hours. Strenuous efforts to reduce or offset both of these have been made with considerable success, although the remedies are obscure and at best indirect. There is, however, another peak which is just as harmful as either of the foregoing but which differs from them in not being an absolutely irremediable condition inherent in passenger transportation. This is the peak load of passengers on the cars themselves. The fact that a car is loaded to its absolute physical limit at some point on its route is by no means an indication that the maximum amount of work is being obtained from it. On the contrary, it is quite likely that over the major part of the run the car will be carrying no more than the proverbial "corporal's guard" and that it is, in consequence, being operated at a loss. Indeed, the inspection of a number of traffic-count curves, such as show the varying number of passengers on a car during its trip, indicates that on many lines there exists a peak in the loading of each car which is even more severe than that found in the daily load curve of a power station and which decreases the load factor of the cars to a point well below 40 per cent. Since an increase in this figure results in the release of an equal proportion of the equipment otherwise required for handling the rush-hour traffic the opportunity for economy through the establishment of a high load factor for the cars themselves is worthy of quite as much attention as that existing in the case of the power plant or the total daily traffic. The remedy, of course, is a judicious location of cross-overs so that the cars may be turned back at various points on the line. These points can be determined easily, of course, by traffic counts, and the destination of the cars which are to be turned back before they reach the end of the line should be plainly indicated. If this is done there should be no ground for reasonable complaint on the part of the public.

MAKING ACCIDENT EDUCATION ATTRACTIVE

The accident prevention campaign which is now being conducted by many electric railways is undoubtedly reaching a large portion of the public with excellent results, but few companies as yet have succeeded in arousing the hearty interest of the children, who, of course, are the sufferers in by far the greater proportion of serious accidents. Mature persons can be taught by appeals to their reason, but the average child is very unwilling to receive instruction unless that instruction is presented in an attractive form. Children want to be amused even while they are being taught, and they instinctively resent and pay little attention to obvious lecturing. The best railway operator, no matter how sincere, will prove a failure as a lecturer on accidents if he cannot present his topic on the plane of his audience without constraint. The experience of the Brooklyn Rapid Transit System's children's safety crusade, to which reference was made in the Oct. 25 issue of this journal, has proved that the permanent interest of school children can be maintained by the use of attractive lecture material, presented through the medium of trained speakers. The material consists of car models, original colored cards showing almost every kind of accident pos-

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sible on the streets and finally a series of moving pictures. The lecturer is usually a woman who has the pedagogical skill to present the material not as a lesson but as a heart-to-heart talk about different children and what unhappiness came into their lives as the result of carelessness. To a sophisticated elder the accident scenes depicted in the moving pictures may seem too obvious a treatment of the subject, but they do attract the interest of the children, and that is the main thing after all. Doubtless, with more experience in this work, it will be possible to prepare scenarios in which the accident to the hero or heroine will carry the desired lesson in a more subtle yet equally effective fashion. Finally, the children are encouraged to write compositions upon the lecture they have heard, upon causes of accidents or even upon some accident which they have witnessed in the past. On one occasion a school paper was made up of compositions of this kind.

REAL COSTS OF INTER-DEPARTMENTAL WORK

In the estimates of electric railway engineers no error is more common than the failure to figure what a given job will cost the company as a whole rather than what it will cost their own department. This oversight, whether deliberate or accidental, is most frequent in operations where the use of electrical energy should be included as a portion of the cost. It would seem sometimes as if the electrical supply of the system was looked upon as an inexhaustible ocean which could be tapped at will without an accounting being made to anybody. It is true that in recent years the relation between the weight of cars and the size of the coal pile has become clear to all, but a further real saving in electrical costs is sure to follow if every department is charged with what it takes. Thus, the true cost of electric welding, whether in the shop or on the track, is yet to be determined on many systems. When the estimates on the comparative cost of each system of welding are prepared it is inevitable that electric welding should appear to be the cheapest if no allowance is made for the cost of energy. Yet nothing is more wasteful than the common method of obtaining welding current through banks of resistances. The fair procedure would be first to allow a unit charge per kilowatt-hour at a price settled with the electrical engineer of the company and then to determine whether the cost of current would be high enough to justify the purchase of a motor-generator set or the adoption of some other system of welding. Such a course should certainly be followed wherever great quantities of current are likely to be used as in the welding of several hundred or thousands of rail joints. Allowance for the haulage of material from storehouse to job is another uncredited drain on the power supply. This does not appear to be an inconsiderable item, for on one system, where every service car is operated on a mileage basis, the cost of hauling material for cast-weld rail joints is placed at 30 cents per joint. Even if this figure is purely arbitrary, it serves the purpose because in this respect at least all classes of joints can be compared on a common basis. Such instances as those quoted should be sufficient to prove that any work of one department which affects another may involve something more than nominal charges and countercharges.

INHERENT ADVANTAGES OF CENTRAL STATIONS

A paper of interest to officials of electric railways who are considering the substitution of purchased power for generated power was read by P. M. Lincoln at the last meeting of the American Institute of Electrical Engineers. In it the author states as a conclusion that the only reasons why central stations do not supply all of the electrical service within their territories are that the rates offered do not always bear a suitable relation to the cost of production and that some of the possible customers have motives other than the cost of supply for not purchasing their power from the central station.

No consideration is given by the author to the possibility of separate generation at a cost even approximately equal to that involved by production and distribution from a single center, this belief being based upon the economy in first cost of equipment accompanying increased capacity, the consequent opportunities for introducing labor-saving and fuel-saving machinery to reduce the cost of operation and the saving due to the diversified load which inevitably follows the service of many customers.

As applied to electric railway loads, except when they are small in amount, the first of these three reasons for the superior economy of central stations is of no great moment. The variation in first cost per kilowatt between stations of different sizes is by no means constant and in direct proportion to the capacity involved, and for magnitudes of the order of, say, 15,000 kw an increase of even 100 per cent brings hardly enough reduction in the unit cost to warrant any great consideration. In the matter of economy of operation, however, and especially with the incidental feature of reliability against break-down, the advantages of increased size are of importance up to a very much higher point. This applies especially to the possible close adjustment of the apparatus to the load carried and also to the small difference permitted between maximum load and maximum capacity of plant, notwithstanding the use, now generally conceded as a necessity, of large and economical units. The extent to which refinements may be carried is, in fact, limited only by the size of a plant, and where the first cost becomes relatively low on account of large-sized units the extreme elaboration of means to cut the cost of fuel and labor and to provide against shut-down by fuel storage, duplication of equipment and the like becomes more and more available as a commercial possibility.

In the matter of diversity of load, however, lies the greatest advantage for the central station, and to emphasize this there are cited in the paper a number of examples, of which the most interesting is a statement that in one of the Idaho irrigation districts the electric pumping plants to keep busy during the winter supply electric heat to the farmers at a price so low as to make it actually cheaper than the available coal burned in stoves. Another interesting figure is quoted in the case of diversity in large individual commercial lighting loads where the sum of the maximum requirements of several such consumers was found to be one and two-fifths times their actual maximum draft upon the central station.

The application of this factor in railway loads has been well brought out by Samuel Insull in a number of instances

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in the past. It is, of course, an important matter for consideration by electric railways, for if its influence together with that of the incidental advantages of central-station operation really produces an inherently large reduction in the cost of producing electricity, it is no longer necessary to approach the problem of purchased versus generated power from any standpoint other than that of price, and the indirect arguments used heretofore in favor of purchased power for electric railways such as the opportunity for concentration of attention on traction matters, reliability of power supply and reduction of investment become of insignificant importance.

STANDARDIZATION OF PERMANENT TRACK

An analysis of the permanent types of track construction used in paved streets indicates that there is a marked difference of opinion among engineers as to the design and materials to use to carry similar classes of equipment. It is purely an engineering problem which may be determined just as accurately, if all factors are considered, as the design of a bridge or building. The decision as to the type of foundation to be employed resolves itself into one of the bearing qualities of the materials employed and the soil conditions upon which they are deposited. The load to be considered at any particular tie not only depends on the live load determined by the character of rolling stock and the dead load included in the paving surface, foundation, rail, etc., but is contingent upon the tie spacing as well. It does not appear necessary to consider the headway at which the cars are operated to determine the type of foundations. Close headways may require a somewhat greater factor of safety in the design to meet vibration, but a foundation built to carry the heaviest loaded rolling stock will be just as effective under a one-minute headway as under a ten-minute headway.

While engineers may consider the weight of the rolling stock in their selection of the type of rail to be employed, it is not apparent in a comparison of the types of track construction installed in various cities in this country. For instance, in cities having approximately the same population and practically the same character of traffic, rolling stock, subsoil, etc., one employs a 6-in. concrete foundation with 1 : 4 : 7 proportions and another an 8-in. foundation with 1 : 2 : 4 proportions. Undoubtedly one of these foundations has been improperly designed. To determine the correct design to employ it is necessary to select some standard basis or principles from which any design may be computed. The American Electric Railway Engineering Association could well consider this problem in order to determine the fundamentals upon which all track designs may be based. It may be suggested first that the design be determined by the maximum live load, which should include the weight of the heaviest car loaded to its capacity with passengers or materials, or it should be based upon what may be considered the maximum loading which may come to the track during the period of its life. As already stated, these fundamentals are in every way similar to those considered in the design of a bridge, and the selection of unit loading is purely one of engineering. After the adoption of the unit load, which necessarily must be considered as a concentrated one, it will in a way determine the rail section to employ with a given tie spacing.

The depth of a concrete foundation is dependent upon several factors—first, the tie spacing; second, the richness of the concrete mixture employed; third, the bearing power of the subsoil, and, fourth, the concentrated load coming from the rolling stock, paving, tie and rail. Concrete transmits this concentrated load to the subsoil in different ways, depending upon the concrete mixture. If the mixture is poor, the load may be considered as being carried to the subsoil in the form of a truncated prism with practically vertical sides, because the bond between the particles in the concrete is of little value except under direct compression. If the mixture is correct or rich and the ingredients have been carefully selected, the angle of the sides of the compression prism increases from the vertical and may spread the load over a larger subsoil-bearing area. If steel bars are used for reinforcement, a thinner concrete foundation may be used to distribute the load over the subgrade. In practice, however, it has been found that the best and cheapest way to build the foundation is to use a simple concrete slab with a specified minimum depth and concrete proportions. Theoretically it may be possible to place rich concrete only under the ties for light cars, but the saving in concrete is counterbalanced by the extra cost of excavating. The finished job also is not waterproof, a quality necessary to produce maximum life. The cost, too, of depositing concrete in small batches is greater than that of depositing a continuous slab.

In the end, however, the service obtained from carefully designed foundations is limited by the life of the rail joints. At the present time best results appear to be obtained from joints installed to give rigidity equal to that of the rail. Experience has shown that it is unnecessary to provide for expansion and contraction of track in paved streets. This makes it practicable to use the welded or riveted joints or the mechanical joint with bolts driven in reamed holes. No mechanical joint, however, will remain absolutely tight unless the bearing area between the joint and the rail is free from scale and perfectly smooth so as to permit of a snug, tight fit. This joint, too, will fail unless nut locks or some other means are employed to prevent the bolts from becoming loose. Undoubtedly the best results would be obtained if it was practicable not only to ream bolt holes in the joint and rail and insert the bolts with a driving fit but if the contact areas of the joint and the rail were machined so that one would be absolutely assured of a perfect bearing. If the contact area between the joint and the rail is insufficient, a certain amount of play will develop as soon as the high points are battered down by vibration, and any play in the joint will ultimately mean track failure. For reasons already explained it is also unnecessary, in paved streets, to provide an opening between abutting rails. A tight joint at rail ends will eliminate the slight impact blow which develops with age, especially if the extra precaution has not been taken to grind the abutting rail heads to a perfect surface. The foregoing are only a few of the items worthy of consideration in permanent track design and construction and are offered as suggestions for arriving at track construction standards which will produce real permanent results.

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ELECTRIC RAILWAY SECURITIES AS INVESTMENTS

During the past three or four years the total amount of sales on the New York Stock Exchange has shown a gradual but considerable decrease, and concurrently there has been a notable increase in the sale of new securities "over the counter" by various financial houses in the Wall Street district. Whether these two events are closely connected we are not prepared to say, but that there has been a change in the method of marketing securities everyone will admit. And a very striking feature of this change is that a large proportion in number of enterprises, if not in amount of those securities thus being marketed "over the counter," are those of electric lighting and power companies. This seems to indicate that such securities appeal to the average investor who can be reached by advertisements or by circulars as being more desirable forms of investment than the securities of either steam railroads or new electric railway properties.

In previous issues we have analyzed some of the special reasons for the favor with which electric lighting securities are held at present. One of these is the increased gross business enjoyed by the lighting companies because of the introduction of the tungsten lamp. Another is the comparative freedom from labor troubles which the lighting companies enjoy, owing to the smaller percentage of low-priced labor which they employ, as compared with either steam or electric railway companies. Still another is the greater latitude which they have in the way of rates, inasmuch as the companies are not generally held down by custom or charter for their service to a fixed maximum like the 5-cent fare, which is very close to the cost of production. On the other hand, there is no doubt that electric railway securities, in the opinion of investors, are suffering to-day partly because they have been obliged to retain this low rate for service with increased cost of materials and labor and partly because of the belief that a too general practice of capitalizing depreciation in the past has made the capital account disproportionately large as compared with the assets.

In considering this situation we are reminded of the remark of a prominent and very successful operator in Wall Street during the past generation who in a confidential moment once disclosed his method of buying and selling stocks. He said: "I have found that it is a pretty good plan to sell stocks when everybody else has been bullish on them for some time and to buy when the general market is thoroughly bearish. In that way one is pretty sure to sell near the top and to buy near the bottom." We do not believe that this would always be a safe plan to follow, but there is enough of truth in the remark to warrant us in considering what encouraging facts there are in the electric railway security situation, even if we admit for the sake of argument that all that the popular investor thinks about them is true.

If we do this we shall find many opportunities for optimism. In the first place, the existing situation in regard to low rates is now pretty well understood by the public and the companies themselves as well as by the authorities. If the steam railroads, which are also facing largely the same problem and are also asking for an increase of rates, receive a concession, it should aid as a precedent in the request of the electric roads.

A considerable number of well-established interurban electric railways have already obtained fare increases. It is true that no satisfactory general solution has yet been reached as to the best method of increasing the fare on the city road, but at least there is a widespread recognition of the fundamental fact that such an increase is necessary if good service and extensions are to be expected, and this recognition must precede any means of relief. The same condition exists in regard to depreciation charges. Their necessity is recognized, and if the new and higher rates are to be based on the net receipts, the companies must logically be permitted to add the cost of depreciation to the operating expenses in the future, even if that has not been done in the past.

Finally, in several respects at least, the companies are in much better condition than ever before. In the first place, the narrow margin between receipts and expenses during the last few years has developed methods of economical operation which might not have been discovered under other conditions. In the second place, the population of the country and the demand for transportation has had its natural increase during the past few years, but during this time there has been practically a cessation in the construction of new track. In this way any over-construction that there might previously have been has been counteracted in a great many, if not most, parts of the country. Finally, any new franchises will be granted and accepted with the full knowledge that an electric railway enterprise is not an Eldorado. It is a service to be encouraged in every community, not to be mulcted for every privilege which it requests.

THE TRESPASSING PROBLEM

A recent issue of the *Outlook,* containing an article by M. A. Dow, general safety agent of the New York Central Lines, has brought into greater prominence than before the question of trespassing on steam railroads. Figures are presented from Interstate Commerce Commissioner McChord showing that during the last twenty years 181,379 trespassers were killed and injured on the railroads of the United States and during the year ended June 30, 1912, 10,971 trespassers were killed and injured. Twenty-eight persons a day killed or injured—a record surpassed by no string of disasters, grade crossing fatalities or any other source of danger. The essential point is, moreover, that over 75 per cent of these were not tramps or "hoboes," but rather able-bodied men of distinct value to the community and to their families as producing elements, wage earners and dependable units in the communities in which they lived. These figures include hundreds of women and children.

In this progressive and enlightened age conservation has become a watchword, conservation of natural resources, public health, even conservation of future generations through eugenics, but conservation of life, through the elimination of trespassing, has in the eyes of the public received almost an infinitesimal amount of attention.

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This neglect, however, can no longer be charged against the steam railroads of the country, and the electric railways are not far behind. For example, safety committees on the Pennsylvania Railroad are required to indicate points where "No Trespassing" signs should be provided and be especially vigilant in reporting all points where trespassing is noted or is known to be the practice. In localities where children attending school make a practice of using right-of-way or otherwise trespassing the company endeavors to enlist the co-operation of the school authorities in warning the children, and by posting notices to call attention to the danger.

The New York Central Lines are another good example of safety campaigners. Besides general safety work the company is conducting a vigorous campaign against trespassing and it is trying to invoke the aid of the law of New York State to stamp out the reckless practice. The safety exhibit car of the company, previously described in the ELECTRIC RAILWAY JOURNAL of Aug. 9, 1913, has one section devoted to the trespass question, and in the migrations of the car along all the lines of the company it offers tangible evidence to employees in regard to this evil. In addition to this warning notices have been posted along the entire system and a special representative has been assigned to the work of interviewing every justice of the peace, police court magistrate and city court judge in towns along the line to seek their co-operation and to bring about a more rigid enforcement of the law. The road is also seeking the co-operation of manufacturers by personal communication, asking them to warn their employees against walking the tracks, and it is following this up by making arrests when the warning has been disregarded. This special campaign has been in operation only a few weeks, but already an improvement has been noted in localities where the work has been faithfully carried on, arrests have been made and punishment has been meted out.

These are only two examples of the work the railroads are doing to prevent trespassing—work that is carried on not only on their lines but also in the homes and the schools. On city and suburban electric lines trespass signs are not practicable because of the use of the public thoroughfares. Here safety prevention must depend on the safety education of the employees and on what is more difficult to secure, carefulness on the part of the public in the use of their own roads of communication. With the interurban lines, however, the trespass question more closely resembles the one with which the steam roads are struggling. For the three months ended Dec. 31, 1913, the Interstate Commerce Commission reports that, on interstate electric lines coming under its jurisdiction, out of a total of 111 persons killed, thirty-one were trespassers. In addition, on these lines, thirty-six trespassers were injured. These figures clearly indicate the problem before electric interurban lines to-day.

The interurbans really have a double duty to perform—first, by means of a general safety organization, use of rules and safety appliances, such as the steam roads use, to insure in both employees and as much of the public as can possibly be reached the beginning and the continued development of an inherent self-restraint and control, and, second, to co-operate with the steam roads in keeping before the public and the legislatures statistics regarding the lives sacrificed to the trespassing habit and the social status of those lost until adequate laws are passed and enforced against the evil. The problem is much the same for each class of road. Much progress, we believe, has already been made by both steam roads and electric interurban lines, but the goal is far from being attained at the present time in either case.

THE LIGHT FREIGHT QUESTION AGAIN

The electric railway company, as a corporation, has suffered in its finances from the "increased cost of living," but in the opinion of many economists it can be made a very effective agent in the reduction of the cost of living to others, particularly to those living in large cities. The way in which this is to be accomplished is to use the tracks and cars of the electric road to bring in the food products from the surrounding country and carry them to convenient distributing points within the city rather than for the public to use the present cumbersome and expensive means of transportation provided by horse-drawn market trucks within the city limits and steam railroads for the longer hauls.

Our readers will remember an exhaustive analysis of this subject of market freight transportation as applied to Philadelphian conditions, compiled by Professor King of the Wharton School of Finance & Commerce and abstracted in this paper about a year ago. The subject has also become an active one in Cleveland now because the right to permit the railway company to conduct such traffic in that city is to be voted upon next Tuesday. Several of the daily papers in Cleveland have recognized the close relation between the transportation of package freight on the local lines in Cleveland and the cost of food in that city and are strongly urging the voters in the city to vote in favor of the plan. Some package business is now being carried on the Cleveland electric lines, but not to so great an extent as in some other cities, and the effect of the proposed ordinance and referendum, if carried, will be greatly to increase the possibilities of freight traffic in Cleveland along these lines.

Of course, many advantages will accrue from this method of local freight distribution besides those involved in an actual reduction in the cost of transportation. There is the reduced wear on the pavement by the substitution of cars running over rails rather than independent vehicles drawn or propelled over the pavement. A more frequent and rapid service between the purchaser and the distributing points, and hence to the consumer, is also obtained. In fact, there are so many arguments in favor of the plan—and there is none against it so far as we know except a senseless adhesion to existing methods—that it seems surprising more has not been done along these lines. The fault has not been with the railway companies, which have long been familiar with the possibilities of light freight transportation, but, as a special permit is usually necessary to a company before it can conduct a business of this kind, the railways have been unable to establish such a service without the approval of the municipality.

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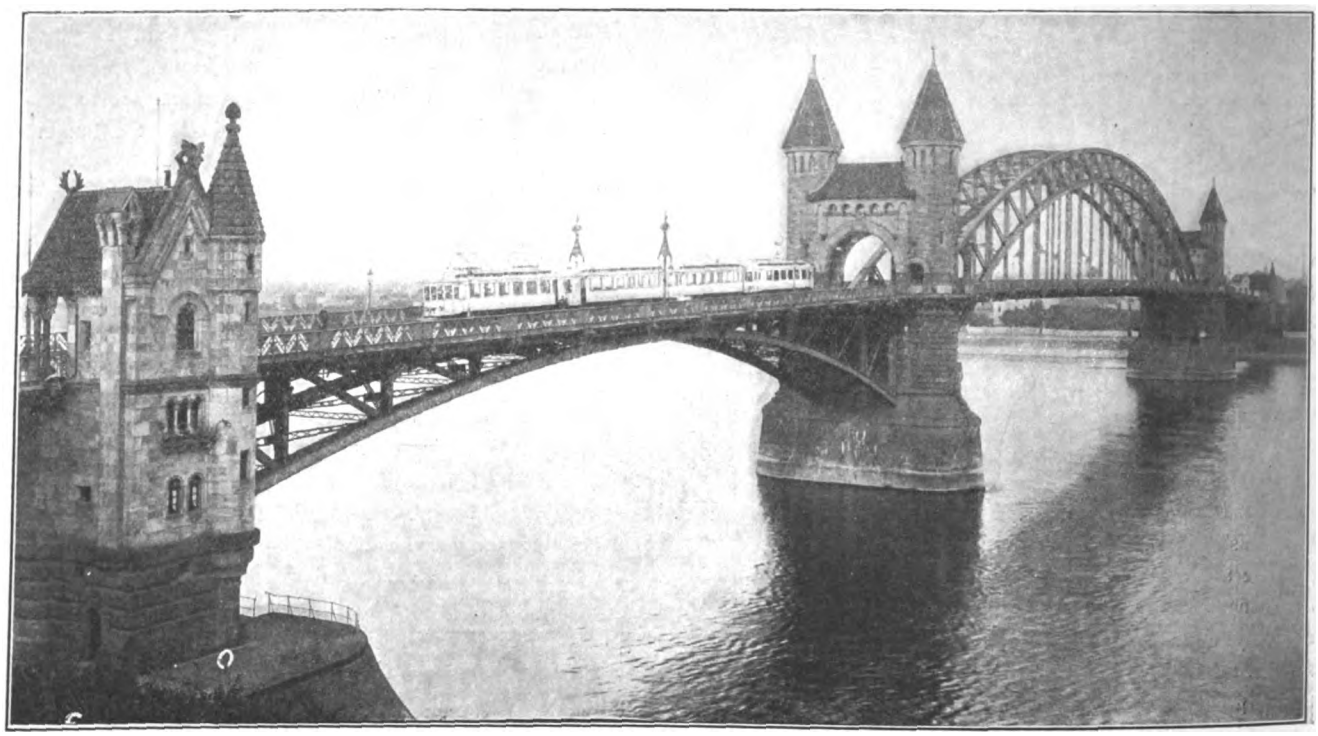
Rhine High-Tension Direct-Current Railways

This Is a Description of Two High-Tension Direct-Current Railways Which Are Operated in One of the Most Picturesque Parts of the Rhine River Country—Both Lines Approach the Standards of American Interurban Railway Practice

The Rheinuferbahn, a 17.6-mile railway in the Rhine Valley between Cologne and Bonn, is famous as the first railway on which high-tension and low-tension direct current was used on the right-of-way and city sections respectively. This road was placed in operation on Jan. 11, 1906, and its equipment was described in the Street Railway Journal for May 5, 1906. While the passenger service is electric throughout, steam locomotives are also operated, principally for the purpose of transporting a local brown coal.

The great success of the Cologne-Bonn line, especially in attracting tourist travel, led to the completion in September, 1911, of a second electric railway which runs from Bonn to terminals at Siegburg and Königswinter. The territory of both systems and the principal places served by them are shown in the accompanying map. The two roads have no physical connection, but their schedules are arranged to harmonize as closely as possible. Each line is equipped with Siemens-Schuckert station line and car apparatus for service at 1000 volts and 500-550 volts according to conditions. The latter installation, however, differs from the former in some particulars owing to the advancement of the art.



Rhine Interurban Railways—Four-Car Train of Bonn-Siegburg-Königswinter Line Crossing Bridge on a 3.3 per Cent Grade

THE COLOGNE-BONN RAILWAY

When the Cologne-Bonn railway was projected 1000 volts direct-current was chosen in preference to higher-voltage single-phase equipment owing to the condition that it was necessary to operate on the standard voltage d.c. circuits of the Cologne and Bonn street railways. To minimize line losses, the power station was placed at Wesseling, the approximate center of the line. From this plant current is transmitted directly from 1000-volt generators and a 660-amp-hr. storage battery to the middle section of the line, while the terminal divisions are fed from 518-amp-hr. booster-connected batteries at Hersel and Sürth, both of these places being located 3.1 miles from opposite sides of the generating plant. The main station equipment consists of one 520-kw and two 350-kw generators; two 12-kw, 1000/150-volt booster sets (one spare), which are connected to the outside battery stations over separate circuits, a 55/76-hp Pirani set (for the original battery capacity of 330 amp-hr.), now used for lighting, and a 120/195-hp Pirani set for the batteries. The battery houses require no permanent attendance because bell alarm signals are installed to notify the power plant men when the cells require electrolyte, etc.

The Siemens-Schuckert line construction is of simple catenary form carried on latticed steel poles 164 ft. to 180 ft. apart, but a novelty at the time was the installation of two trolley wires per track. These wires lie in the same horizontal plane, but the distance between them varies from 5½ in. to 40 in. as they are staggered to equalize the wear of the pantograph current collectors. The main reason for using two trolley wires was to have ample current-collection points per car. The success of this practice has led to its adoption on the Bonn-Siegburg-Königswinter railway and on other lines which have been equipped by the same contractor.

The rolling stock consists of twenty-one motor cars, each seating twenty-eight second-class and twenty-nine third-class passengers; nine trail cars, seating a maximum of seventy-two passengers each; two passenger trailers with postal compartments; three market-produce trailers with folding seats for passenger use; one parlor trailer, three small trailers, etc. All cars are framed in oak except that the side sills are exposed channels. They are of the side-

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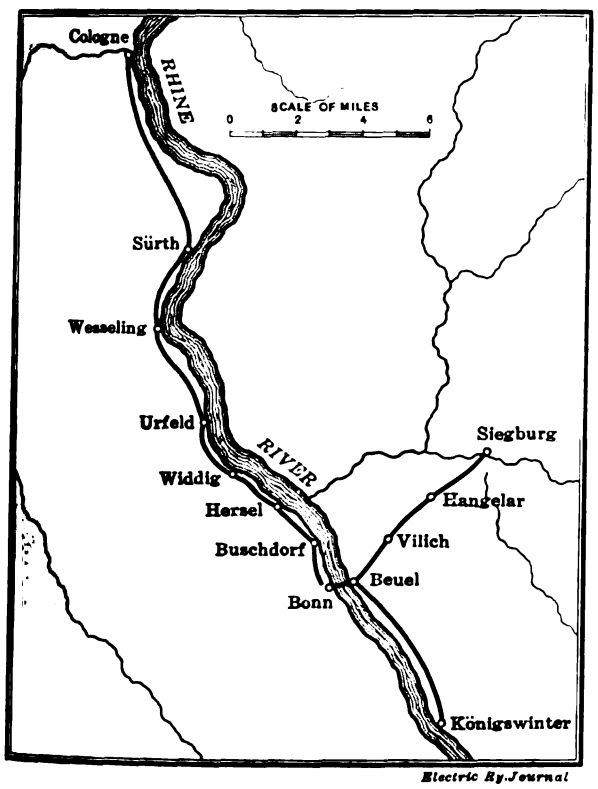
entrance type with subdivisions for the smokers and non-smokers of each class. The end doors are for the use of employees, but they are also available to the passengers when necessary. Each motor car is equipped with two 130-hp commutating-pole motors geared 1:3.1, and when run at 710 r.p.m. these can move a loaded motor car and trailer, totaling 54 tons, at a maximum speed of 44.1 m.p.h. The control system is operated from a 65-volt storage battery circuit.

Weekday operation is given for twenty-two hours, namely, from 3:20 a. m. to 1:23 a. m., and holiday service from 4:07 a. m. to 2:03 a. m. Four expresses and three locals are in all-day hourly service, but an eighth train is run in the morning and late afternoon for the accommodation of workmen's and school traffic. The express trains make the 17.6-mile run in forty-four minutes, and the local trains do so in fifty-eight minutes. Of the total running time of the through trains, the 3 miles on the Cologne tracks require sixteen minutes and the 1.5 miles in Bonn six minutes. The maximum speed of trains on the right-of-way varies from 43 to 50 m.p.h. and is not permitted to exceed 12½



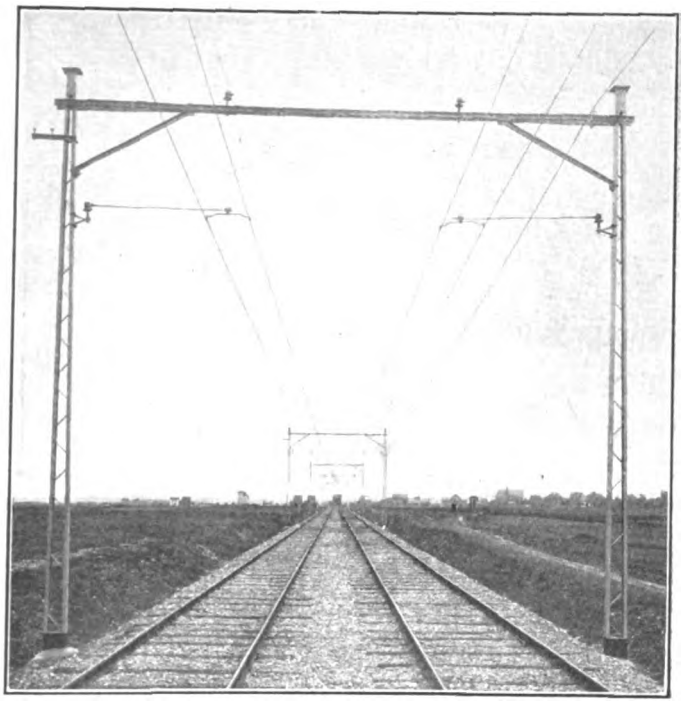
Rhine Interurban Railways—Map of Cologne-Bonn and Bonn-Siegburg-Königswinter Railways

m.p.h. on the city tracks. The total average daily run of through cars is about 332 miles. Every train consists of at least one motor car and one trailer. The other combinations are two motor cars and one trailer, or two motor cars and two trailers. The fine service given by this line is well patronized despite the fact that the fares are higher even than for similar service on American interurban railways. Thus, the second-class fare between Cologne and Bonn is 35 cents, or 2 cents per mile, and for the third-class riders 22.5 cents, or 1.3 cents per mile. The third-class travel is about four times as great as the second-class. The only difference in furnishings is the superior upholstery of the second-class compartments.

The cars are maintained at Wesseling. Their electrical equipment, brakes and lights are inspected dialy. Regular overhauling is on the basis of 30,000 km (18,600 miles).

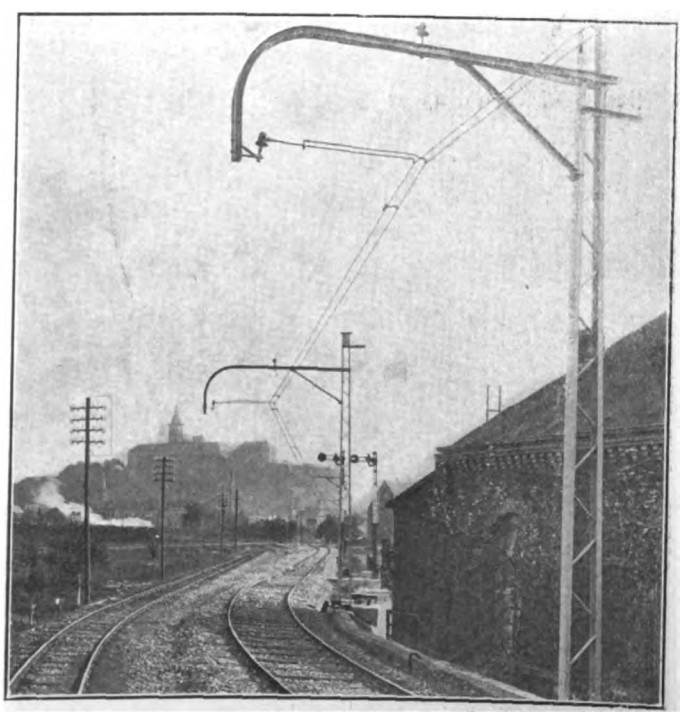
BONN-SIEGBURG-KÖNIGSWINTER LINE CONSTRUCTION

The types of overhead catenary construction selected for the Bonn-Siegburg-Königswinter line are well shown in the accompanying halftones. It will be seen that curved brackets are generally used on the single-track sections and bridges on the double-track sections except at stations. In both cases light lattice poles of the same type are used in connection with channels for bracket or yoke members. Experience on the Cologne-Bonn line showed that the pole



Rhine Interurban Railways—Catenary Bridges on Bonn-Siegburg-Königswinter Line

spacings could safely be increased from a minimum of 164 ft. to a minimum of 197 ft. and from a maximum of 180 ft. to a maximum of 213 ft. The catenary is carried on new-type insulators which are built up of a steel pin covered with vulcanized rubber and capped with green-



Rhine Interurban Railways—Curved Bracket Suspension on Bonn-Siegburg-Königswinter Line

glazed porcelain. The trolley wires are of 80-sq. mm section (almost No. 000).

The clearance between the trolley wire and the head of the rail is 18 ft. on open track and 15 ft. 9 in. at bridges. Line section breakers are installed at every station and at

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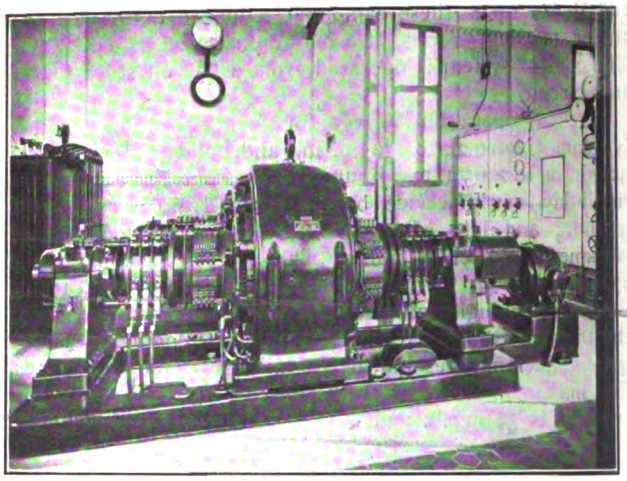
the junctions of feeder cables and trolley wires. On double-track sections each track can be cut out independently. The bridging switches and breakers of horn type are set on the adjacent pole and can be operated by authorized

Rhine Interurban Railways—Combined Residence and Railway Station at Hangelar



Rhine Interurban Railways—Double Commutator Rotary Converter

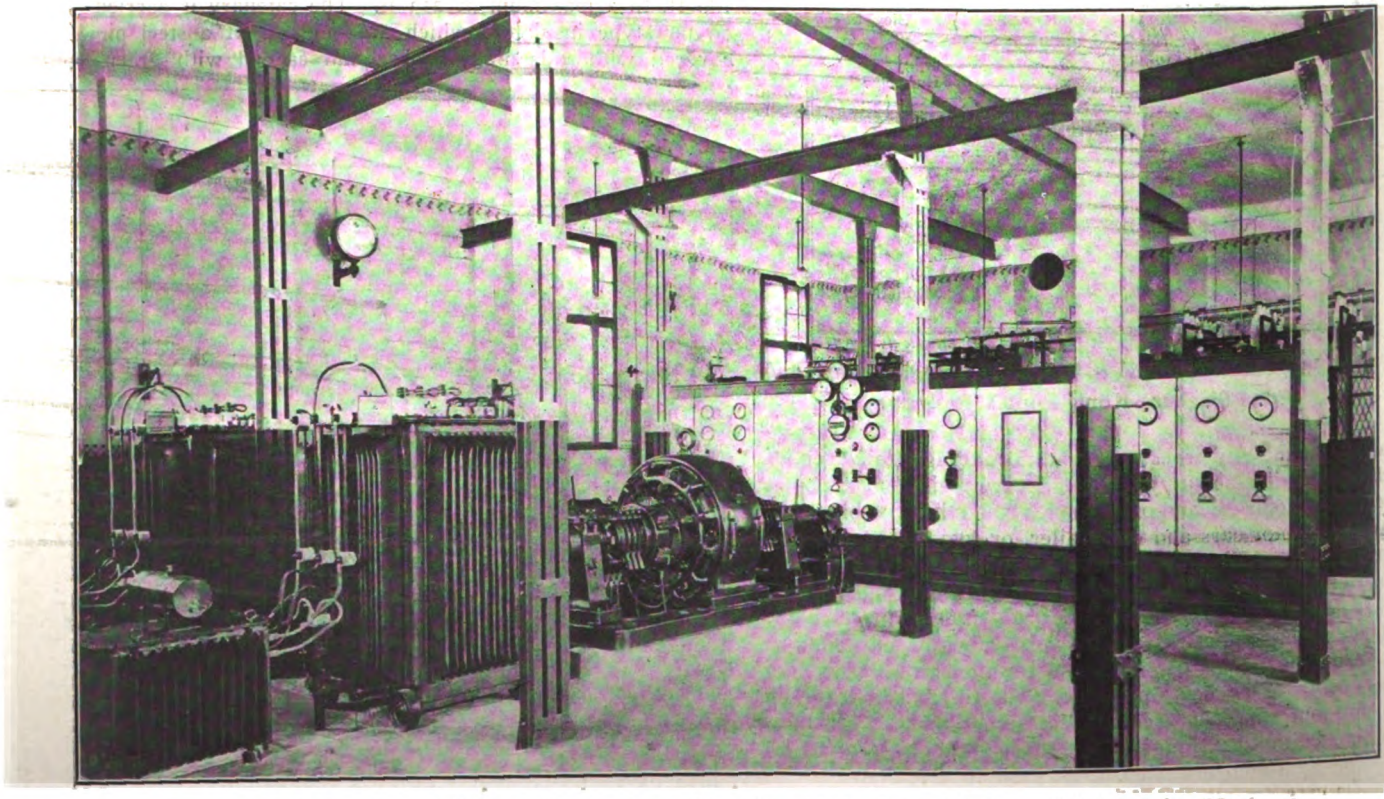
employees by means of levers. At the Bonn city limit an insulated section about 200 ft. long, corresponding to a four-car train, is inserted in the line to bridge the gap between the 1000-volt and 560-volt divisions.

BONN-SIEGBURG-KÖNIGSWINTER ENERGY SUPPLY

Energy is transmitted at 10,000 volts, three-phase, fifty cycles, from a central station at Brühl to Ramersdorf, a distance of 18.6 miles. The Ramersdorf converter station is 3.3 miles from Königswinter. It contains two 350-kw, 1000-volt rotary converters (one spare), transformers, etc. On account of the high voltage the rotary converters are of the double commutator type, each commutator being independently connected to the low-tension side of the transformer through a set of three collector rings. The rotary converters are started with 250-volt a.c. motors. The station further contains a 500-amp-hr. battery and a three-phase d.c. motor-generator charging set. Provision has also been made for the installation of a booster to raise the line voltage. An interesting feature of the switchboard is the use of a horn signal, in addition to the customary lamps, to announce the opening of a circuit breaker.

BONN-SIEGBURG-KÖNINGSWINTER ROLLING STOCK

The rolling stock consists of twelve motor cars and twelve trailers. These are about 46 ft. long over all and seat thirty-seven passengers each as compared with fifty-seven passengers on the Cologne-Bonn motor cars. The cars are of the vestibuled type with no side doors. Each car is arranged for only one class of passengers but has the usual compartment for smokers and partitioned cabs for the motorman. The seating arrangement is somewhat un-



Rhine Interurban Railways—Ramersdorf Substation of the Bonn-Siegburg-Königswinter Line

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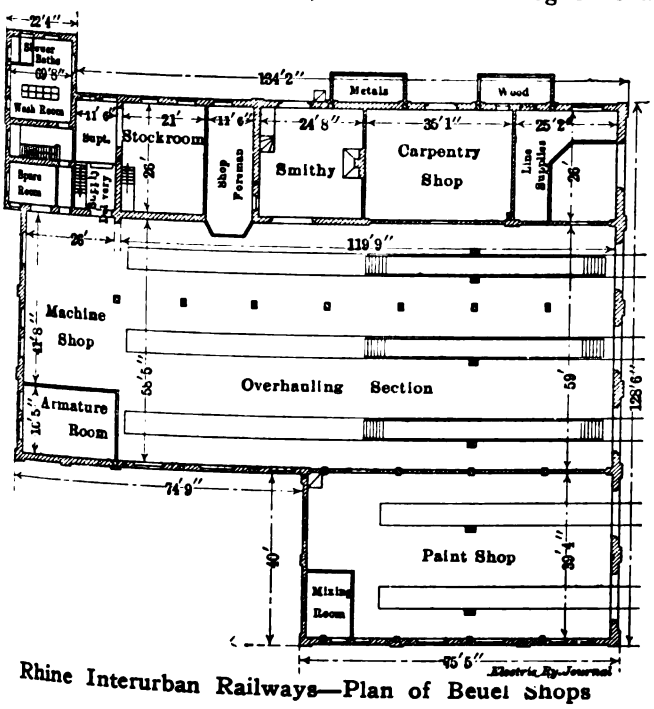
common for German cars in the use of longitudinal corner seats. The widths of the seats are as follows: single cross seat, 20 in.; double cross seat, 42 in.; three-seat corner, 64 in. The aisle between the cross seats is 20 in. wide. This seating arrangement has been found very effective for rapid loading and unloading. A feature which encourages pleasure riding is the use of windows fully 64 in. wide. However, to prevent danger to the public these windows are constructed to drop only half way. The cars are constructed of oak framing with exposed channel-iron side sills. They are finished in mahogany and have seats of teak. The weight of a motor car empty is 50,000 lb. and of a trailer 28,600 lb.

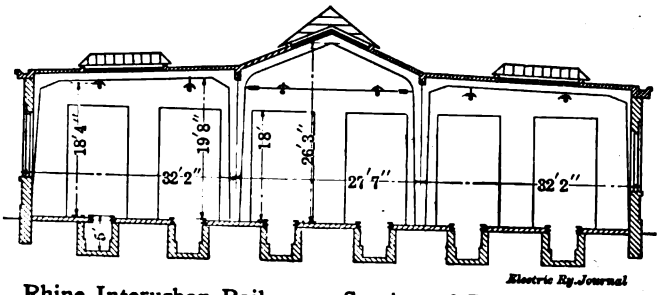
Each motor car is equipped with two 85-hp, 650-r.p.m. motors, geared 1:4.35. The motors have shunt-field connections to permit a 50 per cent variation in speed. They are much smaller per horse-power output than the Cologne-Bonn equipments. The compressors are wound for a maximum voltage of 750 volts so that it is necessary to cut resistance in automatically when the cars are on the 1000-volt division. Multiple-unit control current is taken directly from the line instead of a storage battery. This change requires greater care with regard to insulation but it avoids battery maintenance, which on the Cologne-Bonn



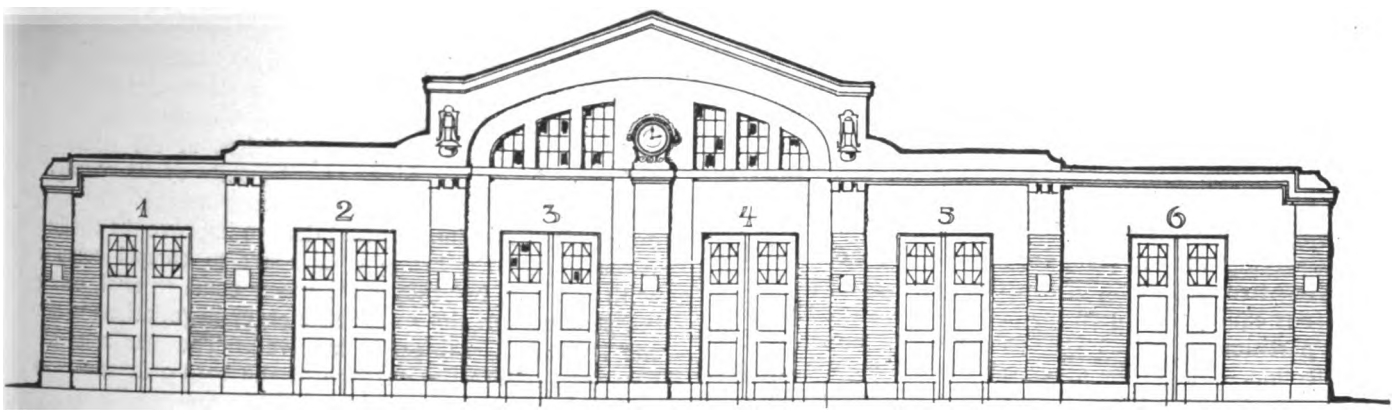
Rhine Interurban Railways—Plan of Beuel Shops

Railway, for example, costs $1,250 to $2,000 a year for twenty-one cars. All resistances are inclosed in perforated steel screens to protect them from mud and dirt. The resistances are easily removed by loosening a few bolts, and they receive attention only at the regular overhauling. Each car is furnished with twenty-four 25-cp tantalum lamps. On 1000 volts twelve lamps are operated in series, but on 560 volts the connections are changed to six in series and the excess voltage in each circuit is taken by a spare lamp. The lighting connections are made by means of an automatic change-over switch.

Trains are made up as on the Cologne-Bonn line, the largest train consisting of two 26-ton motor cars and two 18-ton trailers. The heaviest grade of 3.3 per cent is on the Rhine bridge, shown in an accompanying illustration. Train service is given from 5:35 a. m. to 12:35 a. m., usually at thirty-minute intervals. The run of 7.4 miles from Bonn and Königswinter is made in thirty-five minutes. The distance between Bonn and Siegburg is 6.2 miles and is made in twenty-three minutes. Cars are maintained at the Beuel shops hereinafter described.



Rhine Interurban Railways—Section of Beuel Carhouse



Rhine Interurban Railways—Front Elevation of Beuel Carhouse

The average daily run of a car is 248 miles. In addition to the daily inspection, cars are overhauled every 40,000 km to 50,000 km (25,000 to 31,000 miles).

CARHOUSE AND SHOP BUILDINGS

A very fine carhouse and adjacent shop, both of reinforced concrete construction, have been erected at Beuel. The carhouse is a double-end structure about 210 x 90 ft. Each of the six tracks accommodates four cars. The distance between track centers is 13 ft. 9 in. The roof is carried on two rows of reinforced concrete columns which are tapered downward to give the maximum clearance. These columns are spaced about 16 ft. apart longitudinally and 27 ft. 6 in. transversely. The accompanying cross-section shows the use of a continuous longitudinal skylight in the middle bay, transverse unit skylights in the other bays, and a series of windows in the side walls. The skylights are of wired glass. The ends of the carhouse and part of the steel-framed doors are also glazed. This care to insure ample daylight has produced a very pleasing interior, the cheerfulness of which is further improved by stenciled borders along the walls. A feature which tends to maintain the neat appearance of the building is the use of tile in the walls at water outlets, so that spattering water cannot stain the walls.

All of the tracks are furnished with closed concrete pits about 5 ft. deep. Two cross pits are also provided. Owing to the excellent natural light, permanent pit lamps are not required, but sockets are installed at convenient intervals.

The building is heated from a basement plant through

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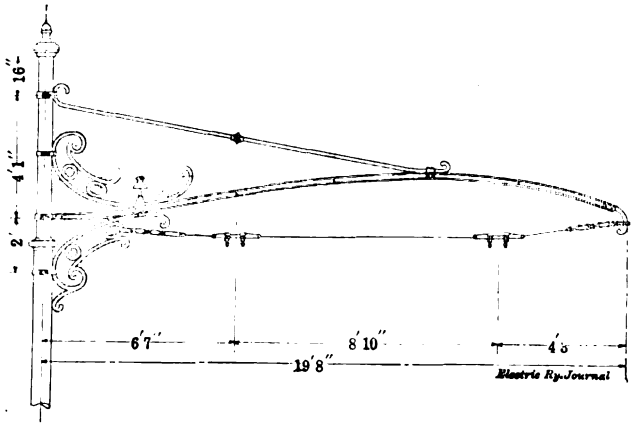
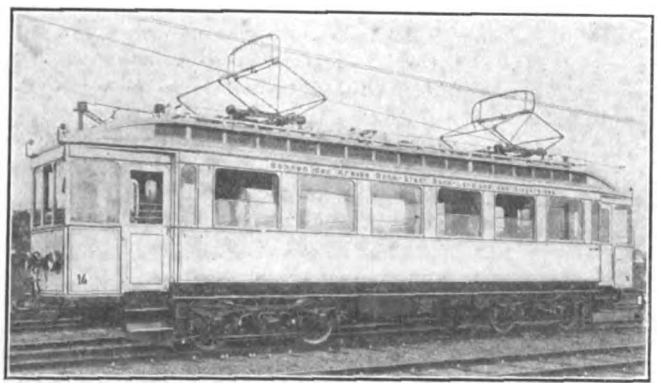
galvanized steel ducts, but it is stated that this indirect heating has not proved as satisfactory as steam. The carhouse utilities rooms are in a small lean-to.

The general layout of the shop building is shown in an accompanying plan. In construction it is similar to the carhouse except that the floor is of wood block instead of



Rhine Interurban Railways—Artistic Bracket for Double Track

concrete. The skylight is of monitor type with swing sash for ventilation and, like the carhouse, the walls embody a liberal amount of glazing. The building is steam-heated through wall registers and radiators. Of the five tracks, two, serving one car each, are in the paint shop, and three, serving two cars each, are in the overhauling shop. The latter is equipped with an 11,000-lb. crane. The plan shows the partitioning of the various shops for purposes of fire protection. Unlike the other section, the paint shop opens only to the track entrance and its mixing room has been isolated with special care. All machine shop tools, except the wheel lathe, are group-driven from a 16-hp, 210-volt, three-phase motor. The lathe is driven by a 6-hp motor. Following the usual care of German shops, the step-down



Rhine Interurban Railways—Standard Motor Car with Extra Wide Windows

transformer and switching equipment for the motors is placed under lock and key in a screened compartment.

As indicated in the plan, the convenience of the employees is served by a washroom with shower baths. Part of the basement level is used for a heating plant and toilet and part of the second-story level serves for a stockroom and living quarters for the caretaker.

The Montreal Street Railway has adopted orange as a standard color for its suburban and interurban cars owing to the fact that that color is visible at a great distance, especially against dull landscapes. This change is considered a good safety precaution on single-track lines where no dispatchers are used and for like situations.

PROPOSED MODIFICATION OF DRASTIC CHICAGO ELECTROLYSIS ORDINANCE

By a vote of twelve to four the local transportation committee of the Chicago City Council, after an animated all-day session on Oct. 25, approved a modification of the existing electrolysis ordinance to which the local traction companies have been so resolutely opposed. This ordinance was adopted by the City Council on July 15, 1912, and provided that there shall be no drop in voltage between any two points on the electric railway grounded return exceeding a maximum of 12 volts. It also further provided that between any two points on the return 1000 ft. apart, within a mile of the City Hall, the drop shall not exceed 1 volt, and between any two points on the return 700 ft. apart outside of this mile limit the drop shall not exceed 1 volt. The return-current flow in pipes and cable sheaths must not be greater than certain limits set forth in the ordinance, and it is also provided that the electric railway companies shall equip their uninsulated return-current systems with pilot circuits and instruments so that chart records can be kept to show whether the ordinance is complied with.

When this ordinance was under discussion it was opposed bitterly by the surface and elevated railway companies. An extended report of the discussion for the committee of the Council was published at the time in the Electric Railway Journal. In spite of its passage the ordinance has never been enforced, although the railway companies have done a great deal to improve the conditions. Suits have been brought in court to compel compliance with the law, but they have never come to trial, owing to the pendency of the so-called merger negotiations in which the electrolysis subject is involved. The maximum allowable drop before the passage of the 1912 ordinance was 25 volts between any two points within the city limits.

During the present merger negotiations the Board of Supervising Engineers, Chicago Traction, was asked to report on this subject. It said that so far as it knew there is no place where the conditions imposed upon the companies using grounded return circuits are so severe as those imposed upon the Chicago street railway companies by the 1912 ordinance. Further, it was the opinion of the board that there is no electric railway installation in existence where greater care has been taken to prevent damage from electrolysis on grounded return circuits than by the surface street railway companies of Chicago.

The National Bureau of Standards at Washington was also requested recently to send an expert to Chicago to advise on the subject. Burton McCollum, associate physicist of the bureau, went to Chicago in answer to this request and spent a week there during October of this year. As a result of the investigations of the representatives of the United States government the city of Chicago and the Board of Supervising Engineers it was agreed that the necessary first cost for the initial investment required of the companies to comply with the 1912 ordinance would be $4,984,424, provided the ordinance was interpreted upon an average maximum load for a fifteen-minute period. Mr. Palmer, the city electrician, however, said that the net cost would be about $3,000,000, taking into consideration only the cost of apparatus not useful to the companies otherwise than for correction of electrolysis.

The Board of Supervising Engineers was then asked by the Council to recommend a modification of the 1912 ordinance and suggested a compromise plan which has been approved by a sub-committee of the local transportation committee of the Council. This plan, drawn up by Bion J. Arnold, chairman of the board, is substantially as follows:

PROPOSED ORDINANCE

The city is to be divided into three zones. The first or inner zone is to comprise the most congested district, bounded

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by Chicago Avenue on the north, Lake Michigan on the east, Twelfth Street on the south and Halsted Street on the west. The second or middle zone comprises the more congested portion of the territory in the city lying outside of the first zone, while the third zone takes in that portion of the city not included in the other two zones. All uninsulated electric return circuits are to be so arranged that the sustained maximum difference of potential between any two points on any uninsulated portion of the circuit shall not exceed 10 volts in the inner zone, 15 volts in the middle zone and 20 volts in the outer zone. The Board of Supervising Engineers is to have the power, however, to prescribe limits from time to time, notwithstanding the exact figures mentioned in the plan. This is to provide for the potential gradient. It also has the power to increase the allowable drop in the outer zone to 25 volts at such points as it may deem advisable for the extension of track in outlying districts of the city where the underground utilities are not fully developed. The term "sustained maximum difference of potential" is defined as the highest average difference of potential for any thirty-minute period during normal conditions of operation. Wherever pipes or other underground metallic work are found to be electrically positive to the rails or the railway return circuit, they may, upon the direction of the Board of Supervising Engineers, be connected by conductors so arranged as to prevent the flow of current from the pipes to the ground.

Within three months from the date of the passage of the ordinance the railway companies shall file with the Board of Supervising Engineers and the city electrician a statement showing what plans they have adopted to comply with it. At the end of six months a further report must be made. Within one year from the date of the passage of the ordinance the companies shall have completed the necessary installations in connection with at least two of their power-supply stations. Within the period of two years the provisions of the ordinance must have been complied with by the companies throughout their entire railway systems. This is to be accomplished by the expenditure of not less than $1,000,000 as directed by the Board of Supervising Engineers, if, in its judgment, this expenditure is considered necessary. The companies shall expend further such additional amounts upon return circuits and other electrical apparatus as the Board of Supervising Engineers may from time to time prescribe in order to prevent damage from electrolysis. The penalty for failure to comply with the terms of the ordinance is a fine of from $50 to $200 a day during the time the offence continues.

DISCUSSION OF PROPOSED ORDINANCE

This proposed ordinance was considered at a public hearing held in City Hall on Oct. 25 at a joint meeting of the local transportation committee and the committee on gas, oil and electric light of the Council. Those present included Mr. Palmer and his assistants, Mr. Arnold and the other members of the Board of Supervising Engineers, L. A. Busby, president of the Chicago City Railway, W. W. Gurley, representing the Chicago Railways, and a large audience of engineers and others interested. Finally a vote was reached by which the committee upheld the Arnold modified plan by a count of twelve to four.

During the hearing Mr. Arnold said that the board's estimate of the net cost to the surface railway companies to carry out the provisions of the 1912 ordinance was $4,000,000, but admitted that Mr. McCollum's estimate was $2,800,000. He also admitted that Mr. McCollum, who was not in Chicago at the time of the public hearing, had said that the zone system was of little value and that the important thing was the potential gradient. To this Mr. Arnold substantially agreed and said that his plan contemplated potential gradients although it did not specifically tie the board to any of the several systems of mitigation.

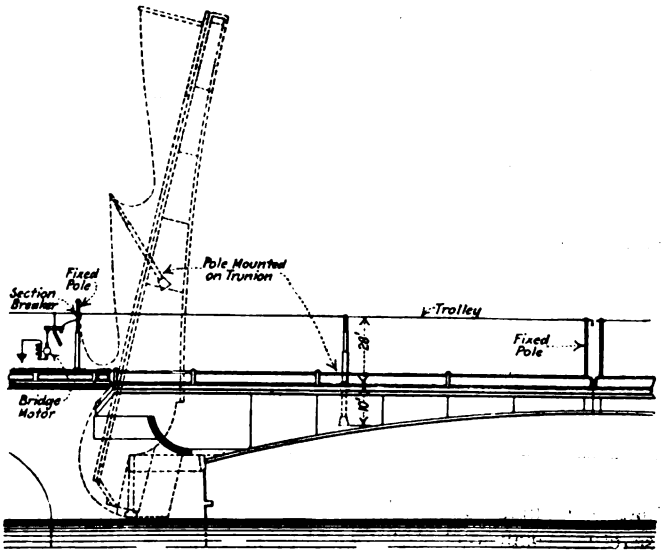
Mr. Busby, speaking for the street railway companies, regarded the modification of the electrolysis ordinance as vital and declared flatly that the companies would not accept the ordinance with the modification of the electrolysis ordinance left out.

Mr. Palmer made a strong plea for the 1912 ordinance and claimed that the proposed ordinance was so indefinite that it would be very unsatisfactory to enforce it.

The ordinance as passed by the committee must be passed by the City Council and approved by the Mayor to become law. If that is done, it would seem to be likely that similar action will be taken in the case of the elevated railway companies and the Chicago Tunnel Company.

TROLLEY WIRE TAKE-UP FOR BASCULE BRIDGE

A novel arrangement for taking up slack in the trolley wire over a bascule bridge when the span is raised has been installed by the Toledo Railways & Light Company on the Cherry Street bridge at Toledo, Ohio. In the design of this structure no towers or overhead construction were permitted, so that the usual trolley retractor equipment had to be abandoned. The problem of drawing up slack in the wire is, however, successfully met by providing a pivoted



Novel Trolley Wire Take-Up

trolley pole having its lower end loaded with a weight sufficient to hold it in a vertical position regardless of the angle at which the bridge-leaf stands. In this way the slack which accumulates ahead and behind the pivoted pole is divided equally on both sides, keeping the wire always clear of the rail.

As shown in the accompanying illustration, the weighted center poles are carried on heavy trunnions, which permit the member to maintain its upright position independent of the bridge position. These poles stand 18 ft. above the roadway, and the weighted portion extends 10 ft. below the trunnion mounting. For the bridge section, No. 0000, flexible hard-drawn stranded wire is used as the trolley conductor. The bridge section is separated from the main line by an insulating breaker, and receives its energy through one position of a double-throw switch, the other side of which supplies the bridge motor. To operate the bridge, therefore, this switch must first be thrown, thus automatically disconnecting the trolley wire before the lift motor can be started or the bridge moved.

The Cherry Street bridge has been in continuous operation since early spring, being lifted from fifteen to twenty times a day. According to W. E. Richards, superintendent of the electrical department, Toledo Railways & Light Company, it has developed absolutely no faults whatever in this long period of practical use.

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Fender and Wheel-Guard Tests in Vancouver

A Full Report Has Just Been Made Public of the Tests Recently Conducted at Vancouver, B.C., to Determine the Value of Wheel Guards in Connection with Fenders—A Series of Tables Giving the Results with Different Types of Apparatus Is Presented

For the purpose of comparing the action of different types of fenders and to demonstrate their fitness for service under local conditions, tests of three fenders and two wheel guards were recently made at Vancouver, B. C. These tests were conducted in the presence of government and company officials and representatives of the fender manufacturers. A preliminary report of this test was published on page 347 of the ELECTRIC RAILWAY JOURNAL for Aug. 30.

One of the objects of the test, a full report of which has just been made public, was to discover whether additional safety to pedestrians could be secured by the use of wheel guards in conjunction with the type of fenders tested. This matter was brought up by an act passed by the provincial government of British Columbia on Jan. 1 of this year which states, in specifying what safety appliances must be used on electric street cars, that a suitable fender and a wheel guard must both be provided in all cases.

In the accompanying tabular results, the tests in which the fender was operated manually have been rated on an equal basis with those entirely automatic. This does not, in the opinion of company officials, fairly permit of a direct comparison of results, as manual operation manifestly gives advantages over the automatic method greatly in favor of the fender. All manual trip tests were made by having the motorman drop the fender about 3 ft. from the dummy.

The tables give the results of the tests as tabulated by the government inspector of tramways, the gradings of A, B, C, D and E, made after the car came to a standstill, being as follows:

For a complete pick-up or removal from the track by either fender or wheel guard, a test grade of "A," counting four points.

If any part of the dummy remains under the fender or wheel guard, but is partially picked up or removed from the track, a test grade of "B," counting three points.

TESTS AND RATINGS OF FENDERS

	Speed, m.p.h.	PAVEMENT TEST									GRAVEL TEST										Summary Pavement			Summary Gravel			Averages
		Upright			Head On, Diagonal		Head On, St'ght		Feet On, St'ght		Upright			Head On, Diagonal		Head On, St'ght		Feet On, St'ght									
		Back On	Face On	Side On							Back On	Face On	Side On														
		76 lb.	76 lb.	76 lb.	130 lb.	50 lb.	130 lb.	50 lb.	130 lb	50 lb.	100 lb.	100 lb.	100 lb.	80 lb.	50 lb.	80 lb.	50 lb.	80 lb.	50 lb.	76 lb.	130 lb.	50 lb.	100 lb.	80 lb.	50 lb.	
Pogue	8	C	A	A	A*		B*		C*		A	B	C	B*	B*	B*	B*	C*	A*	83.5	75		75	66⅔	83.5	75½
	10																										
	15	B	C	C	B		A		B											58	83⅓					
Watson	8	D	B	A	Wit	hd	ra	w n			C	D	E	Wi	thd	ra	wn			66⅔			25			
	10																										
	15	B	C	B	Wi	th	dr a	wn												66⅔						
Nelson	8	A	A	A	A		A		B		A	A	A	A	A	B	B	B	B	100	91⅔		100	83⅓	83⅓	91.7
	10																										
	15	A	B	B	A		A		B																		

*Manual tests.

TESTS AND RATINGS OF WHEEL GUARDS

	GRAVEL SURFACE														PAVEMENT													Averages
	Speed, m.p.h.	Across		Head On, Diagonal		Head On, St'ght		Head On, at Rail		Feet On, Diagonal		Feet On, St'ght		Speed, m.p.h.	Across		Head On, Diagonal		Head On, St'ght		Head On, at Rail		Feet On, Diagonal		Feet On, St'ght		Summary, Gravel		Summary, Pavement		
		80 lb.	50 lb.	80 lb.	50 lb.	80 lb.	50 lb.	80 lb.	50 lb.	80 lb.	50 lb.	80 lb.	50 lb.		130 lb.	50 lb.	130 lb.	50 lb.	130 lb.	50 lb.	130 lb.	50 lb.	130 lb.	50 lb.	130 lb.	50 lb.	80 lb.	50 lb.	130 lb.	50 lb.	
Watson	10	B	B	B	C	B	B	D	B	B	B	C	C	8	E	C	A	A	B	A	B	A	B	C	B	B			66.7	79.2	70.9
														15	C	B	A	C	B	A	B	B	A	C	B	B	62.5	66.7	79½	71	
Hudson & Bowring	10	C	B B	B	B	B	B	B	B	D	A	D	B	8	A	A	B	B	B	B	B	B	C	B	B	B			75	79½	70.8
														15	B	A	D	C	B	B	B	B	C	A	C	B	54.1	79½	58½	79	

About 120 tests were made in all. More than fifty fender tests were made on cars which had no wheel guards attached. In all of the fender tests, whether the action of the fender was good or bad, the dummy was invariably picked up, thrown off or jammed beneath the fender in such a manner that a wheel guard would not have been brought into use at all.

If the dummy is for the most part under the fender or wheel guard but still is partially picked up or removed from the track, a test grade of "C," counting two points.

If the dummy is entirely under the fender or wheel guard, but is dragged sufficiently to prevent its going under the car or wheel, a test grade of "D," counting one point.

If the dummy passes under the car or wheels, the test is

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a failure, and the test grade is "E," counting o points.

In all of the tests the fenders were attached to double-truck cars to conform to local conditions. Tests were made both on pavement and on graveled roadway. For the upright position a wooden dummy 5 ft. 6 in. high, weighing 76 lb., was used, and for the prostrate positions there were employed three dummies stuffed with a mixture of sand and sawdust, and one wooden dummy. This wooden dummy weighed 100 lb., while the three stuffed dummies weighed 50 lb., 80 lb. and 130 lb. respectively and ranged in height from 5 ft. to 5 ft. 6 in.

DESCRIPTIONS OF WHEEL GUARDS AND FENDERS

The Pogue fender is arranged to be tripped automatically, but is also provided with an attachment for operation by motorman. The automatic trip extends 8 in. ahead of the fender and when pushed in toward the fender catches are released so that it is allowed to drop to the rail. For hand operation a plunger extending to the vestibule platform can be pressed down by the motorman to release the catch which holds up the fender. This fender has a framework of iron pipe and the apron and guard are made of 4-in. wire mesh linked together so as to form a loosely hanging basket within the fender frame. The dimensions follow:

Weight		145 lb.
Distance between the edge of fender and car bumper	4 ft.	1 in
Distance between the lowest point of fender and top of rail		7 in.
Vertical distance between the highest point of fender and top of rail; normal position, 4 ft.; when down on rail	3 ft.	11 in.
Width of fender over all, transversely	6 ft.	0 in.
Width of fender over all, longitudinally	2 ft.	9 in.
Distance from trip to fender		8 in.

The Hudson-Bowring wheel guard consists of a flat apron attached under the car just ahead of the forward truck. The apron is held in the raised position by a rod and toggle to a tripping gate or buffer carried on the pilot board. When the gate meets an obstruction it swings inward, tripping a catch which releases the apron. The dropping of the apron to the rails is accelerated by the action of a spiral spring. The apron can be reset by the motorman by the use of a lever in the vestibule. The main dimensions of the Hudson-Bowring wheel guard follow:

Weight		166 lb.
Distance behind bumper to trip		5½ in.
Distance behind bumper to edge of guard	4 ft.	2 in.
Distance from trip to guard	3 ft.	8½ in.
Distance between the lowest point of trip and top of rail		5½ in.
Distance between the lowest point of guard and top of rail		7 in.
Width of guard over all, transversely	6 ft.	6 in.
Width of guard over all, longitudinally		21 in.

The Nelson fender is operated by air pressure, both when automatically tripped and when released by hand. When tripped in either manner the air pressure thrusts fender and guard vertically to the rail, at the same time applying the air brakes of the car. The appliance for operating the device manually is attached to the motorman's brake valve, and this appliance can also be used for releasing the brakes should they be applied automatically so tightly as to skid the wheels. The main dimensions follow:

Weight		177 lb.
Distance between the edge of fender and car bumper	3 ft.	1 in.
Vertical distance between the lowest point of fender and top of rail in running position		7 in.
Vertical distance between the highest point of fender and top of rail in normal position, 3 ft. 6 in.; when down on rail	2 ft.	11 in.
Width of fender over all, transversely	6 ft.	6 in.
Width of fender over all, longitudinally	2 ft.	5 in.

The Watson wheel guard consists of a steel apron attached under the car body and just ahead of the forward truck, the apron being locked in position so as to be tripped by a gate or bumper swung from the car sills. At the same time that the catch supporting the apron is tripped compression springs are released which thrust the apron down and hold it against the rails. The dimensions are:

Weight		179 lb
Distance behind bumper to trip		5½ in
Distance behind bumper to edge of guard	4 ft.	2 in
Distance from trip to guard	3 ft.	8 in
Distance between the lowest point of trip and top of rail		5 in
Distance between lowest point of guard and top of rail	4 ft.	½ in
Width of guard over all, transversely	6 ft.	0 in
Width of guard over all, longitudinally		22 in

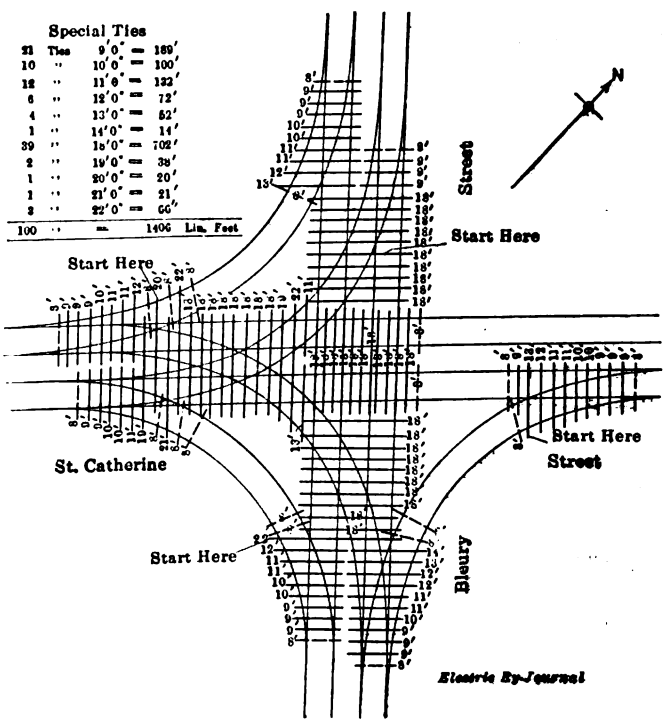
The Watson fender consists of a flat apron and bumper with an automatic trip attachment in the form of a projection on the apron. This projection slides back when it strikes any object on the track and releases the catches which hold the fender in normal position. The action of dropping the apron to the track is accelerated by springs. The dimensions of the Watson fender follow:

Weight		255 lb.
Distance between the edge of fender and car bumper	4 ft.	1 in.
Distance between the lowest point of fender and top of rail		7 in.
Vertical distance between the highest point of fender and top of rail, normal position	4 ft.	0 in.
Vertical distance between the highest point of fender and top of rail, when down on rail	3 ft.	11 in.
Width of fender overall, transversely	6 ft.	
Width of fender over all, longitudinally	2 ft.	9 in.
Distance from trip to fender		10 in.

TRACK IMPROVEMENTS AT MONTREAL

The year 1912 was a very active one for the way department of the Montreal Tramways Company, as the removal of overhead railway and non-railway wires from St. Catherine Street offered a good opportunity for rehabilitating the track on this, the most important street of Montreal. At the same time the company obtained the right to place tracks on Dorchester Street, in order to relieve St. Catherine Street, to which it is parallel. In all, therefore, about 40 miles of new track have been placed on these and other streets during the past two years.

The track taken up was largely on solid concrete foundation with steel ties spaced 6 ft. centers. There was also some track with no ties at all, also on concrete founda-



Montreal Track Improvements—Layout of Special Ties for St. Catherine Street and Bleury Street

tion. This construction had proved very noisy and was believed to cause corrugation, the rail quickly wearing its way into the concrete base and destroying adjacent paving. The new construction, as adopted in 1912, called for a sub-base of concrete, but owing to time limitation and the difficulty of keeping traffic from the street for so long a period, the work for 1913 was carried out with a sub-base of broken stone. This sub-base has been found superior to Then the ties are placed and brought to grade by tamping concrete as it is less noisy and permits better drainage. A cross-section of the latest construction is shown in an accompanying drawing.

In laying the new track the sub-grade is thoroughly rolled with an 8-ton steam roller upon which is placed 1½ in. of broken stone to a depth of 7 in., which is also rolled.

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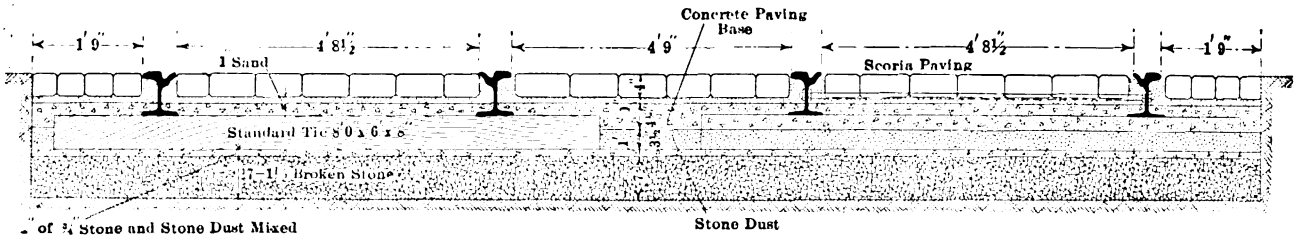
on a 1-in. layer of fine stone and stone dust mixed, which is also carried up another 3½ in. at the sides of the ties. This dust cushion carries 4½ in. of concrete and a 1-in. base of sand for scoria block, 4 in. deep, or Laurentian granite paving, these being grouted with a 1 to 2 mixture of cement and sand. A good feature is the use of 8-ft. instead of

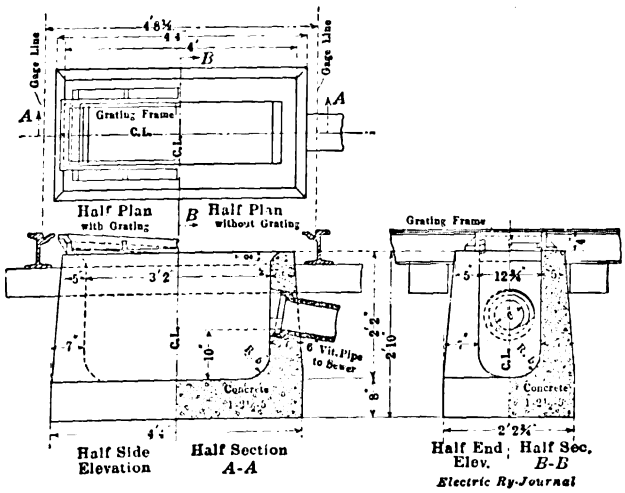


Montreal Track Improvements—87-Lb. T-Rail with Scoria Paving, Showing 8-In. Stone Ballast Under Ties

7-ft. ties of jack pine or cedar, space 2-ft. centers. The longer ties cost no more and give an extra bearing which easily justifies the greater amount of excavation. The rail is a special Lorain section, designed for the Montreal Tramways Company and known as 115-462. It is similar to section 116-434 except that the bevel in the head has been increased, thus making the tread narrower to suit the Montreal Tramways Company's standard wheels. The tie rods are spaced 6 ft. center to center. These bonds were adopted during 1910 to succeed the plug type. The Montreal company was one of the early users of cast-weld joints but did not meet with success with them, as Montreal is subject to a temperature range of 30 deg. below zero to 95 deg. above. The last cast-welded joints were removed in 1912.

TIES FOR SPECIAL WORK

Some years ago a great deal of special work was installed on a solid concrete foundation without ties and some on standard 8-ft. ties interlaced, but both types proved unsatisfactory, particularly the former. All new intersection work is now placed on 8 in. of crushed stone and special 6-in. x 8-in. ties from 8 ft. to 22 ft. in length of tamarack, hemlock or spruce. This construction, although expensive, is found to enhance the life of the steel work to a large extent besides more uniformly keeping the pav-



Montreal Track Improvements—Catch Basin for Track Drain

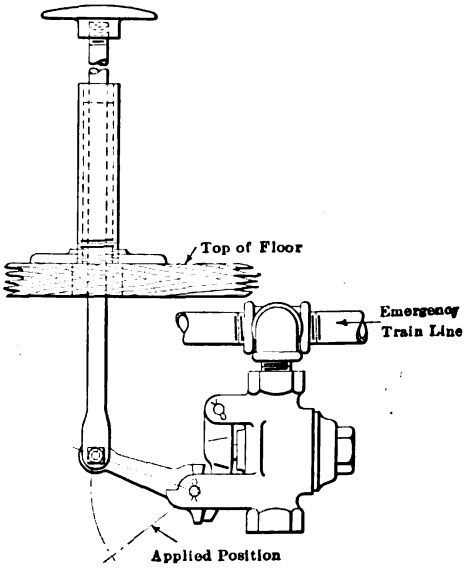
ing and joints in good condition. A similar plan is used by other companies, but the practice is far from common.

CATCH BASIN FOR TRACK DRAIN

At the request of the municipality of Maisonneuve, R. M. Hannaford, assistant chief engineer Montreal Tramways Company, designed a concrete catch basin for track drainage in some of the streets laid with granolithic paving. Details of this basin are shown in an accompanying drawing. It has proved so satisfactory, especially in ease of cleaning, that the railway company has adopted this basin as standard. About 150 are now in use or on order to replace iron drains. The basin is constructed with a concrete base and a cast-iron cover grating. It is installed between the rails as illustrated, the cover being sloped instead of crowned in order to provide a better catch-all. This cover is also provided with a special piece when made for installation with T-rail. The grating may be readily removed so that the basin can be cleansed quickly with a shovel instead of by the slower way of spooning. The devil-strips are crowned so as to pitch toward the basins. The side of the basin is fitted with a 6-in. vitrified pipe trapped to the sewer to carry off all silt as well as snow melted by the heat from the sewer.

MORE ARTICULATED CARS FOR BOSTON

The Boston Elevated Railway placed in service early in October forty-one additional cars of the articulated type on its Milton-Park Street subway cross-town line. These cars are similar to those of the previous type described in the Electric Railway Journal for Oct. 5, 1912, and were built in the company's own shops from the designs of John Lindall, superintendent of rolling stock and shops. Each of the new cars is composed of two 20-ft. bodies, with a central compartment. A new feature of these cars is the provision of a conductor's emergency foot valve by which



Foot Valve for Emergency Brake of Boston Articulated Cars

the air brakes can instantly be applied from the central compartment in case of trouble. The arrangement of the foot valve is shown in the accompanying drawing. The earlier cars of this type were provided with an emergency brake valve for the conductor's use, but this was arranged only for hand operation. On the later cars the conductor is provided with a change box to facilitate handling fares.

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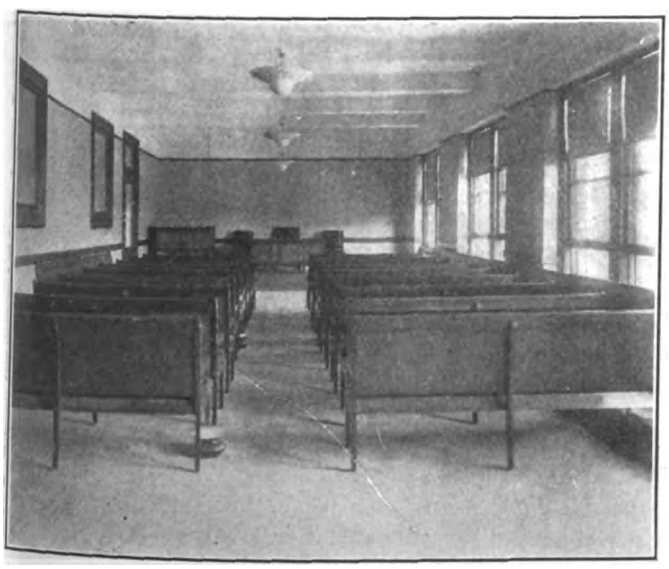
Westchester Electric Railway Building for Employees

New Building Recently Opened in Mount Vernon—Contains Billiard Room, Lunch Room, Library, Assembly Hall, Shower Baths and Other Features of Interest to Employees

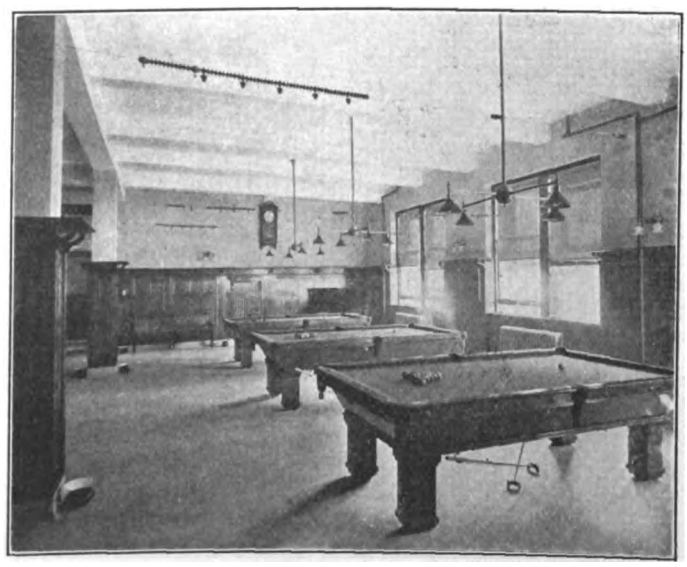
The Westchester Electric Railway, Mount Vernon, N. Y., which is controlled by the Third Avenue Railway, New York City, recently opened a new building for its officers and employees at 219 South Fifth Avenue, Mount Vernon. This new building, which is similar to one opened at the same time in Yonkers, N. Y., for the employees of the Yonkers Railroad, is an excellent example of the various measures instituted by Frederick W. Whitridge, president of these companies, for the comfort and welfare of the employees.

Westchester Electric Railway—Employees' Building at Mount Vernon, N. Y.

Westchester Electric Railway—Library and Reading Room in Employees' Building



Westchester Electric Railway—Assembly Hall in Employees' Building



Westchester Electric Railway—Billiard Room in Employees' Building

The building, shown in the accompanying illustration, is 50 ft. x 95 ft., two stories high, and is constructed of brick. The front is light-brown brick, with bluestone foundation, window bases and lintels and coping. In the interior the woodwork is of light oak. The entire first floor is terrazzo, with the exception of the tile floor in the vestibule and entrance hall and the concrete floor in the shower bathroom and toilet. Marble is used for the lower part of the side walls in the vestibule and entrance hall and for the treads and platforms on the stairway to the second story.

The most striking feature about the building is the amount of space reserved in various ways for the employees as compared with that set aside for official use. Approximately two-thirds of the entire floor space in the building is devoted to employees' uses, as is indicated by the accompanying floor plans and illustrations. These clearly show that the recreation and enjoyment of the employees were the prime motives leading to the construction of the building.

The ground floor contains several features that have met with the hearty approval of the men. In the rear of the

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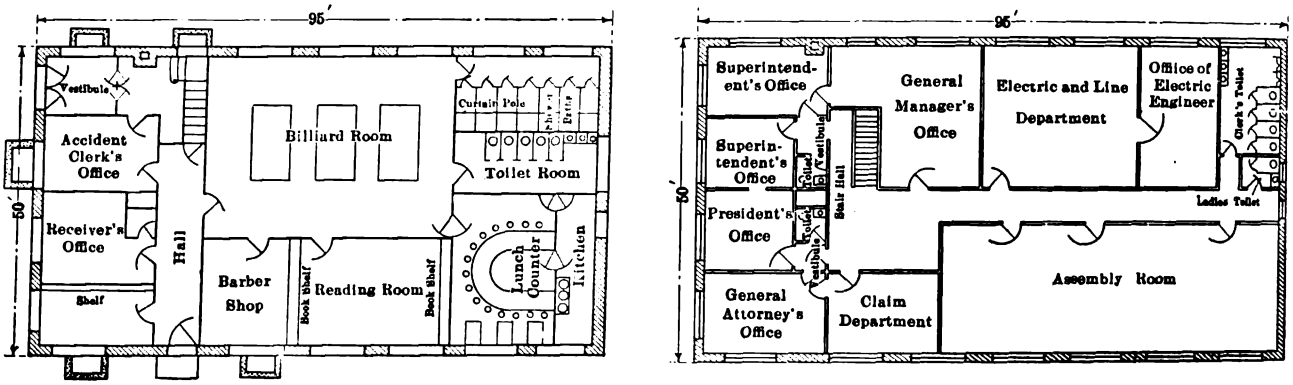
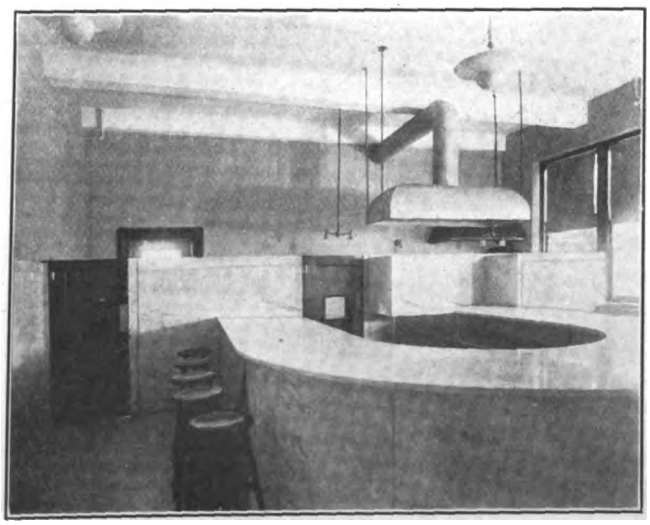
marble hall is a spacious billiard room with three standard billiard tables and all the necessary accouterments. Behind the billiard room there are located seven shower baths, whose white cleanliness and inviting features have proved a great boon to the stream of hot and dusty motormen and conductors at the end of the day's run.



Westchester Electric Railway—Plans of First and Second Floors in Employees' Building

On the right-hand side of the first floor, as one enters the vestibule, are found the accident clerk's office and the receiver's office, where the men are paid off. Across the hall behind these rooms there is a room which is to be used as a barber shop, and behind this is a library. Works of both technical and non-technical nature may be found herein, together with current newspapers and periodicals, and additions will be made to the files and catalogs as rapidly as time allows. The rear right-hand corner of the building is taken up by the lunchroom. This at present is reserved for the use of the men actually employed in the building, but it is the purpose of the administration to throw it open to the outside employees as soon as adequate provisions can be made for such a move. The lunchroom contains a curved lunch counter, with eighteen stools on the outside, and also four wall tables. Back of the lunchroom is the kitchen, containing a gas range, a refrigerator, coffee and tea tanks and complete culinary fixtures.

The second floor of the building contains the offices for



Westchester Electric Railway—Lunch Room in Employees' Building

the various company officials. The front is given over to those of the president, superintendent and general attorney. Next on the left come the rooms devoted to the general manager, the electric and line department and the electrical engineer of the company On the right, behind the general attorney's office, is situated the office of the claims department. The remainder of this side of the building is occupied by the assembly room, which is the chief feature on this floor of interest to the employees from the standpoint of recreation. The room is fitted up with oak benches, rostrum and piano. In the rear there is a stereopticon, with which the company intends to pursue the plan followed in recent years of giving occasional entertainments and lectures for the benefit of the men and their families. The room also lends itself admirably to dance purposes.

The building stands on a plot of ground which adjoins land owned by the railway. This gives a permanent assurance of good light and fresh air for all the rooms. It is true that, although it is on one of the principal streets in Mount Vernon, the building is a considerable distance from the carhouses and terminal in that city. This, at first, might be construed as a vital disadvantage, but this is not the case, owing to the peculiar local conditions existing. The homes of the approximately 350 employees of the company are almost evenly divided between Mount Vernon and New Rochelle, and the location of the building on one of the main lines of the Westchester division between these cities makes it equally accessible to both sections. In addition to this fact, it is not improbable that a future development of the company's plans may mean the removal of the carhouses and terminal to the new locality.

President Whitridge made some remarks in connection with the opening of this building that well illustrate the attitude of the company in desiring to help the employees. He told the men that the legal relation existing between the officers of the company and themselves was that of fellow servants of the public and the personal relation not that of partners but of master and servant. He continued:

"There is in this, however, nothing to prevent mutual respect and the warm human fellowship that fellow service ought to create. The formation of the employees' association and the opening of these club rooms are intended to show that such sympathy does really exist. Antagonism between us is unreasonable and impossible, and we are not likely to have a repetition of strike troubles such as we had in Yonkers last January, for the employees of the company understand me better now."

According to an English contemporary, the London & Northwestern Railway Company has under consideration the model of a signal device for bringing to a stop any train which has passed a signal at "danger." The appliance is said to be simple, and it is stated that it can be worked very economically and without any expensive addition to the existing signal plant. It is intended to be attached to the present type of signal, and consists of an arm extended from the standard over the rails. Attached to the arm is a swinging disk, which, when a signal is in the stop position, comes into contact with the corresponding disk on the cab of the engine, automatically applying the brake and bringing the train to a stop.

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Meeting of Railroad Commissioners

Abstracts of the Reports of the Committees on Railway Capitalization and on Railroad Taxes and Plans for Ascertaining Fair Valuation of Railroad Property—The Discussion During the Opening Sessions—The Bureau of Standards and Its Investigations of Electrolysis

The twenty-fifth annual convention of the National Association of Railway Commissioners, which was held in Washington this week, was largely attended by representatives of railroad and public service commissions of the country. In addition to the usual program of committee reports, bearing mostly upon railroad questions, papers were read upon various aspects of the subjects of regulation. The presence in Washington of representatives of so many of the state commissions and their interest in the valuation of railroads by the Interstate Commerce Commission led to a number of conferences on this topic. The matter of valuation of railroads was more prominent in the formal and informal conferences than that of valuation of other classes of public utilities.

Edgar E. Clark, chairman of the Interstate Commerce Commission, made an address of welcome to the delegates, which was thought by many to indicate views favorable to an advance in railroad rates. Mr. Clark said it would be a mistake to try to correct past evils in railroad financing by a policy of reprisal which would impair the efficiency or usefulness of the carriers. An abstract of Mr. Clark's address is published elsewhere.

O. P. Gothlin, of Ohio, the president, called attention in his address to his action in appointing during the year a committee on valuation to represent the interests of the states before the Interstate Commerce Commission in the pending valuation of railroads. This committee was as follows: Mr. Thorne, Iowa, chairman; Mr. Martin, Kansas; Mr. Glasgow, Michigan; Mr. Erickson, Wisconsin; Mr. Henshaw, Oklahoma; Mr. Staples, Minnesota; Mr. Berry, Illinois; Mr. Clarke, Nebraska; Mr. Gothlin, Ohio; Mr. Maltbie, New York; Mr. Thelen, California; Mr. Atchison, Oregon; Mr. Richards, South Carolina; Mr. Bishop, Massachusetts, and Mr. Prentis, Virginia. As part of the plan each state was requested to name a member to serve on a general advisory committee.

The report of the committee on railway capitalization was presented by John M. Eshleman of California, the chairman. It attacked the report of the Railroad Securities Commission appointed by President Taft and aroused prolonged and sharp debate. In the course of the discussion H. F. Bartine, of Nevada, a member of the committee, said that the report was written by Mr. Eshleman. He thought that Mr. Eshleman did not intend to criticise in the least degree the report of the Railroad Securities Commission, which was rendered at an earlier date than this, but that the world was moving and it was possible to go further now than then.

Commissioner B. H. Meyer, of the Interstate Commerce Commission, who was a member of the Railroad Securities Commission, also discussed the report. Mr. Meyer called attention to certain features of the report of the Railroad Securties Commission. With power to establish and value the public utilities on the one hand, and adequate power to regulate rates and service on the other, he thought that the question of regulation of stocks and bonds was largely a question of public morals. How best to promote and to achieve these public moral purposes was the object of all proposed stock and bond legislation; and that, he thought, was also the purpose of the report of the committee.

Among the amendments to the act to regulate commerce pending before Congress in 1910 was one aimed to control in certain respects the issuance of stocks and bonds of interstate carriers. Congress could not agree upon a definite program, as the result of which that matter was referred to a commission of five, of whom Mr. Meyer was one. That commission was directed to make a report upon this subject with a view of submitting suggestions that might assist Congress in enacting legislation at that time, namely, late in 1911 and early in 1912.

There were before the securities commission two broad fundamental questions: On the one hand, should the commission recommend to Congress legislation which would place the responsibility of the issuance of securities in the hands of the corporation, or should it take away from the corporation the initial responsibility and place it in the hands of the State, meaning, of course, state governments as well as the federal government? The securities commission decided in favor of the alternative of leaving the initial responsibility in the hands of the carriers and placing in the hands of the federal government adequate power, as was thought, to reach in when wrongdoing was in progress and to correct it if possible if it had been done. Mr. Meyer quoted a paragraph from the report of the commission which suggested the lines of thought which it had been considering as follows:

"If railroad securities were to be issued only after express authorization of each particular issue by the Interstate Commerce Commission or other governmental agency, it is difficult to see how the government could thereafter escape the moral, if not the legal, obligation to recognize these securities in the regulation of railroad rates."

Mr. Meyer suggested the possibility of the offer of public utility securities to prospective purchasers, accompanied by engraved certificates carrying the seal of the State. Continuing, Mr. Meyer said that the securities commission did not suppose for a moment that it was drawing up a program which would settle this question once for all, but it was agreed that this was one step that in good faith and with some degree of confidence of success it could recommend to Congress. It had in mind possible additional steps to be taken in the future, but that was a question for the future to take care of.

In the report of the committee on railway capitalization, the report of the Railroad Securities Commission had been represented as primarily passive. The theory of publicity had been represented as a passive theory. The Securities Commission recommended many things which it believed should be required, either directly by statute or supplemented by specific requirements in an administrative way by the Interstate Commerce Commission. After enumerating a good many of these things, the securities commission recommended that every railroad corporation should furnish to the Interstate Commerce Commission or other governmental authority, in addition to its income account, a balanced statement of receipts and expenditures on capital account and of the surplus or income accruing during the period, as well as of all other financial transactions that had taken place during the period, with whom had, whether in cash, in securities or in other valuable consideration.

Other recommendations were outlined by the securities commission looking to a degree of administrative supervision far in advance of anything now provided under the rather liberal provisions of the interstate commerce act. Mr. Meyer said this was scarcely to be characterized as a passive program. It was passive in the hands of passive commissioners who were unwilling or unable to do their work. It was active in the hands of active commissioners who knew their business and were willing and able to do their duty.

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The report characterized the Wisconsin act as one of the best if not the best in the country. As a Wisconsin man, who not long ago was charged with one-third of the responsibility in the administration of that act, he fully shared in that view. But was it not rather significant that the Wisconsin member of the securities commission hesitated so much to extend the theory of that act over the whole country that he was unwilling to recommend to his colleagues on the securities commission the taking of this additional step? Not a single thing was done under the excellent Wisconsin act which could not have been accomplished under the act suggested by the securities commission without assuming moral or legal responsibility.

After lengthy further discussion the association adopted all but the fourth recommendation of the committee on railway capitalization.

OTHER PAPERS AND REPORTS

Lawrence B. Finn, chairman Kentucky Railway Commission, read a paper on the subject "Should Congress Extend the Power of the Federal Government to the Regulation of Intrastate Rates?" Discussion over the question of enlarged federal authority took place during two sessions of the convention and finally resulted in the passage of a resolution on Oct. 30. This action followed directly a statement made by Chairman Clark of the Interstate Commerce Commission, in which he made it plain that that commission was not seeking to extend its authority. It was not jealous of the authority of the states. It welcomed and solicited the widest degree of co-operation from all of the states. It had no desire other than to fulfil faithfully the obligations imposed on it by law.

The resolution which was adopted as the sense of the convention was then offered by Mr. Eshleman of California. It provided that no legislation by Congress attempting to extend the authority of the federal government over intrastate rates was either necessary or desirable at this time.

Abstracts are published below of the address of welcome of Commissioner Clark, the report of the committee on railway capitalization, a paper on the Bureau of Standards by Dr. Rosa, and the report of the committee on railroad taxation and valuation. The latter was accompanied by five communications. Abstracts of the paper on the Bureau of Standards and of the reports of the two committees mentioned above are published in abstract elsewhere in this issue. The report of the committee on railroad taxation and valuation says that the two remaining members of the committee did not submit their statements in time for them to appear in the printed report.

NEW OFFICERS AND DATE OF NEXT MEETING

The election of officers resulted as follows: President, Laurence B. Finn, Kentucky; first vice-president, Clifford Thorne, Iowa; second vice-president, Robert R. Prentis, Virginia; secretary, William H. Connolly, Interstate Commerce Commission; assistant secretary, William Kilpatrick, Illinois.

The next meeting will be held in Washington, D. C., beginning Nov. 17, 1914.

ADDRESS OF WELCOME BY COMMISSIONER CLARK OF THE INTERSTATE COMMISSION

We all occupy positions of tremendous responsibilities and are invested with unprecedented authority. Upon our zeal, patriotism, efficiency and judgment rests largely the commercial welfare of our country.

In this, as in other lines of public work, we find the extremists on both sides, who, unless their ideas are accepted and followed, exercise to its full extent the American's prerogative of criticism. Their criticism is often founded in lack of knowledge as to facts and sometimes in a willingness to disregard the rights of others. Such criticism creates misunderstandings and misconceptions, but if we are not broad enough to refrain from being influenced or swerved by it, we are lacking in true capacity and fitness for the positions which we occupy.

The situation that existed when regulation was undertaken was permitted to grow up. State and nation could have prevented it. But it was a long time before public sentiment, which is really the power of the state and of the nation, awakened to the facts and roused itself to the task of establishing equity in place of gross and unjust discrimination, and law in place of license.

The multitude of evils could not be eliminated nor the wrongs corrected by one heroic action. Under the conditions that then existed such things grow rapidly and easily. The attempt to eradicate them involves the interests of many who had nothing to do with creating or fostering them, as well as the interests of the carriers whose agents, in co-operation with the representatives of favored ones, created and nourished the wrongs.

Even if it be true that the present financial condition of transportation agencies is due to reckless, improvident, or even dishonest, financing in the past, it would be a mistake to undertake to correct it by a policy of reprisal which will impair the usefulness or efficiency of the carriers upon which the welfare—the very life—of the commerce of the country depends. That commerce grows continually, and we have seen each year periods during which the available transportation facilities were sadly lacking in efficiency.

This is in part due to the failure of carriers to provide themselves with facilities, in part to inefficient handling and movement of equipment, in part to failure of shippers and receivers to provide room and facilities of their own sufficient for their needs, and in part to customs that have grown up in some lines of business that necessarily cause serious delay to cars and congestion of terminals. Of course, the ideal situation would be one in which the carriers were ready to provide all the equipment needed and promptly transport all the traffic offered at the time of the maximum demand, but that situation can be attained only by large additions to the facilities and great improvement in methods. The added facilities can be secured only through expenditures from surplus earnings or from expansion of credit. In either way the total cost to purchasers of transportation would be increased. It seems to me that no more helpful work can be done than to bring about the highest possible degree of efficiency in the operation and utilization of the facilities now possessed.

It seems to me also that the traveling public is justly entitled to a greater degree of safety while patronizing our railroads. The importance of this should be brought forcefully to the mind of every railroad official and every railroad employee. They should realize and respond to the great responsibilities which they have undertaken and be held to a strict accountability for neglect therein. It would be well to revive and enforce the old fundamental rule for train operation, "In case of doubt, take the safe side."

REPORT OF COMMITTEE ON RAILWAY CAPITALIZATION

There seems to be no dissent from the conclusion that stocks and bonds of railroads, as well as of other utilities, should be regulated; we will therefore discuss the question before us from the general standpoint of the regulation of securities of all utilities.

Were it not for the fact that the eminent body of men composing the Railroad Securities Commission has practically indorsed regulation by publicity, your committee would not consider it necessary to discuss such a method of regulation, which we believe utterly inadequate to produce the results demanded. In fairness to the report of the securities commission, however, it is proper to state that this commission gave as its main reason for reporting in favor of publicity as the proper method of regulating rail-

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way securities the conflicting state laws and conflicting jurisdiction between state and federal authorities which might result in rendering a more stringent form of regulation ineffective.

When it is borne in mind, however, that more than half the states have no regulation on this subject and that of those that assume to regulate stocks and bonds of carriers one (Georgia) refrains from attempting to regulate such issues of interstate carriers on the ground that such state does not have jurisdiction thereover, and several others limit their regulation to domestic corporations and some do not require either of domestic or foreign corporations engaged in interstate commerce that they submit to state control when the moneys to be realized from the sale of stocks and bonds are to be expended without the state borders, it will readily appear that a very large field is not covered. It further appears that Arizona, California, Colorado, Illinois, Missouri and Pennsylvania have for the first time attempted to regulate the securities of interstate carriers since the presentation of the report of this securities commission. Therefore, at the time of the presentation of this report the effective regulation of interstate carriers by state authority was limited to a comparatively few states.

Another reason for the conclusions of this national commission against affirmative regulation by the federal government of stocks and bonds of interstate carriers was the fact that important cases were then pending before the Supreme Court of the United States, the decision of which cases in the opinion of this commission might be determinative of the power of Congress to act in this field. Since this report the Supreme Court of the United States has decided the cases referred to, and has made it more apparent, as your committee believes, that if Congress chooses it may assume jurisdiction over at least a considerable portion of the field we are here considering. While it may be that the Supreme Court of the United States will hold that it is within the power of any state to control liens on property of interstate carriers located within the boundaries of such state and that the state chartering the corporation still may retain its power to regulate the stocks and bonds of such corporation even though it operates without the state chartering it, yet we are quite sure that a state may be prevented from regulating the stocks of an interstate carrier chartered by another state, and certainly by the federal government, and that it may be prevented from regulating issues of bonds that do not constitute a lien upon property within the state involved.

It is our general opinion from a somewhat careful consideration of the law on this subject that no one is competent to advise what the Supreme Court will do with reference to the powers of the states to regulate stocks and bonds of interstate carriers until Congress has passed legislation assuming such authority in the federal government and the Supreme Court of the United States has passed thereon.

We are not at all sure that it is necessary under constitutional provisions as they now stand to resort to a federal incorporation act in order to subject interstate carriers to regulation by federal government as regards their stocks and bonds. It is to be regretted that the federal securities commission did not report on this subject.

We have it dinned into our ears that the public is a partner with the public service corporation, but we doubt if this idea is as fully and sincerely accepted as it should be. Not only is the public a partner in the business, but it has come to be and is and must be recognized henceforth as the dominant partner. This merely affirms that the public interest is superior to the private interests. This is not a fitful movement of the moment. We are witnessing a new order of things throughout the United States. The last decade in American history is the story of the assertion of the human right above the property right and the property of individual men is being made to serve the purposes of the community of men. Nor has there been aught of confiscation in this movement. Those who once believed that this was a passing whim no longer deceive themselves. The public has asserted and will continue to assert even more vigorously than it has in the past its right to the dominant partnership in public utility enterprises.

If we should attempt to name the one factor which has been most productive of financial troubles and which has contributed most to the necessity for regulation, we would have no hesitancy in saying that it has been the design of the men promoting and controlling utilities to make somebody take the risks when they themselves take the chances of profit, and not even to-day when utilities are supposed to be very much reformed do we find stockholders adverse to getting their stock for nothing and taking the chance that value may be placed behind it out of the rates which the utility will be permitted to earn.

It may be a serious thing when a utility already overburdened and mortgaged beyond its value finds itself unable to secure the necessary funds to make the proper repairs and extensions mentioned, but to say that such utility must be permitted further to burden itself seems to border on the ridiculous. When the finances of a corporation are in a bad way, such corporation should not be permitted to borrow more money and to increase its indebtedness. A tottering concern should be saved by its stockholders and not by its rate payers. This seems to us so plain that it is difficult to understand how any difference of opinion could exist with reference thereto. It is a practice which is uniform with reference to all kinds of business except a utility.

The salvation of any property is more to the benefit of the owners of that property than the patrons thereof. It is utterly immaterial to the user of gas or the purchaser of railroad transportation who is the owner of such utility, and a change in ownership or control in the ordinary course of affairs does not affect the patron in the least as far as the mere substitution of ownership is concerned. Neither should the change in ownership necessitated by the financial difficulties of a public utility owner affect the patron of such utility. Nor should receivership and consequent reorganization on a different financial plane injure the consumer but rather aid him by putting in control of the agency serving him those better able from a financial standpoint to serve him.

In short, the only persons interested in the maintenance of the property interest in a utility by the present owners of such utility are such property owners, who, of course, are the stockholders, when a utility, as is usually the case, is a corporation, and these stockholders should be called upon to save the utility property if the ownership is to be retained by them, it being immaterial to the rate payers or the public generally in whom the title to utility property rests; and the stockholders reaping all the benefit of the continued ownership in them should be the ones to furnish the means required to continue such ownership.

Our conclusions are that regulation of securities of utilities is demaided on the following grounds:

1. The protection of the investor. We consider this of least importance, but laws preventing frauds, particularly wholesale frauds, have always met with favor, and if the laws requiring the regulation of public utility securities performed nothing more than this least important function, we believe that such public regulation would be justified.

2. Protection of the utility. If we were dealing always with the corporate entity, which in its corporate capacity could realize its own needs, our problem would be much simpler, and it would be correct to say, just as is often urged, that the interest of the corporation induces it to resort to sound financial methods, in order to obtain from the sale of its stocks and bonds the very largest amount possible to obtain, and to place the proceeds in the treasury of the corporation for its benefit. But corporations are handled by men, and admittedly the history of corporations, and utility corporations particularly, has been a history too

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often of conflicting interests between men and the agencies which they represent.

3. Protection of the patrons of the public utility. We have called attention to the fact that the public is the partner of the utility. By reason of this fact the public cannot permit the stockholders and their representatives, the officers of the company, who stand in the place of the other partner, the corporation, to have the entire say as to the financial affairs of such corporation, because, just as it is too often the inclination of the representatives of the stockholders to favor their own interests when such interests conflict with the interests of the stockholders, so the inclination both of the stockholders and their representatives, the officers of the corporation, is to favor the interests of that partner when they conflict with the interests of the other partner, the public.

Your committee agrees generally with the provisions of the model act of the National Civic Federation, but we believe that not quite enough discretion is allowed to the commissions, particularly with reference to the selling price of stocks and bonds. We advise against writing into the law the amount for which stocks and bonds shall be sold; a better method would be to repose more discretion in the commissions, particularly as regards the selling of stock below par, so as to enable the commissions, when they are confronted with a condition where a utility is not insolvent but still so heavily in debt that it should not be permitted to raise more money from bonds and likewise cannot secure its par from stock, to permit the sale of stock to a limited extent below par, so as to bring back the margin of safety and restore the credit of the utility rather than allow excessive debt to impair its service and drive the utility into the hands of a receiver.

COMMITTEE'S RECOMMENDATIONS

We do not believe it necessary for the purpose of this paper to recommend any particular form of an act but we do believe that we should recommend the minimum which should be provided, and this minimum we believe should be the following:

1. The limitation in the act of the purposes for which the issue of stocks and bonds shall be permitted.

2. Authority to the commissions to see to it that the proceeds of the sales of stock and bonds are devoted to the purposes for which they are issued.

3. No stocks or bonds to be issued without the positive approval of the commission, or at least a veto power should be reposed in the commission similar to the power which the Interstate Commerce Commmission has to suspend rates. If this method is pursued, the same full investigation should be required on the part of the commission in every instance as is required when the affirmative action of the commission is provided for.

4. No limitation in the statute as to the amount for which either stocks or bonds shall be sold.

5. The power should be reposed in the commission to impose conditions and to grant the application of the utility either in accordance with such application or in lesser or greater amount, and to impose such other conditions as the commission shall deem necessary.

6. Regulation of the stocks and bonds of interstate common carriers to be delegated to the Interstate Commerce Commission.

Basing our recommendation upon the foregoing conclusion, your committee respectfully recommends that Congress immediately pass an act empowering the Interstate Commerce Commission to regulate the stocks and bonds of interstate carriers in the manner and to the extent hereinbefore outlined.

The finances of all utilities, but particularly of the tremendous agencies engaged in interstate commerce, have been a pawn of the manipulators who demonstrably are more interested in gain than in the proper service to the public, and such service, as conclusively appears from history, is merely incidental to their main design. The design is to make money, and it grows out of natural inclination. There these financial magnates sit apart, building tremendous fortunes, nominally in control of great enterprises, but really delegating the control to others who are prevented from doing that which they would do by the very financial manipulations of their superiors, who are their superiors only in prevention and not in co-operation. The great financial interests and not the active railroad managers have been found to be responsible for most of the mismanagement of railroad enterprises.

RELATION OF BUREAU OF STANDARDS TO STATE COMMISSIONS

Edward P. Rosa, chief physicist Bureau of Standards, read a paper in which he referred to methods of testing the quality of gas. He also referred to the studies which the bureau had made of the electrolytic corrosion of gas and water pipes and lead cable sheaths by earth currents due to electric railways. He said that in the course of this investigation the engineers of the bureau had made field examinations in many cities, both large and small, and with the co-operation of the gas, water, telephone and railway companies had examined the pipes and made electrolytic surveys of earth currents. Continuing he said in part:

"A complete system of electrolytic mitigation has been worked out for two cities and is being put into operation. The work has progressed far enough to demonstrate that the method may be successfully applied in many cases. This is a matter of great practical importance because hundreds of millions of dollars' worth of underground pipes and cables are subjected to damage by electric railway current, and the bureau believes that the public service commissions can render a great service by seeing that the railways take such precautions as to reduce this damage to a minimum.

"Such questions should be kept out of the courts entirely, and the bureau believes that when the engineering aspects of the subject are better understood street railway companies will generally be ready to co-operate with the public service commissions and to remove, as far as possible, the cause of the trouble. In two of the cities studied by the bureau it was found that the saving of electric power effected by the methods of mitigation proposed was enough to pay a fair return on the entire cost of the changes and new construction required, and the systems will be in better operating condition for the change. The work was conducted as a scientific investigation, although it was done in a thoroughly practical way and all conclusions verified by frequent reference to working conditions."

Another investigation of great practical importance recently undertaken by the bureau, according to Mr. Rosa, was on the live hazards of electrical work. The bureau hoped soon to place some of its preliminary results along these lines in the hands of the public service commissions. The bureau is also conducting an investigation into the test of instruments used in electrical measurements.

In referring to the facilities possessed by the bureau Dr. Rosa said that one of the most serious objections that had been urged to the regulation of public utilities by commissions was that if the same rate of return on the capital invested was allowed to all companies it removed in many cases all incentive to enterprise, hard work and economy on the part of the responsible officers of utility companies, and that in consequence both the public and the stockholders were losers and great injury was done the industries. He admitted that as yet there was so little experience with rate-making that one could not say perhaps whether this had already occurred in some degree or not. Nevertheless, it was a tremendously important consideration and should not be ignored. Dr. Rosa then called attention to the fact

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that the California Legislature had recognized the importance of the matter and had provided for it in the public utility act of 1911, by enabling the commission so authorized to make any arrangement it might deem wise with a public utility to encourage economies, efficiencies and improvements. The Idaho bill and the Pennsylvania bill also contained clauses of the same character. Continuing, he suggested that as few state commissions could maintain engineering staffs the Bureau of Standards could co-operate effectively in this work so as to utilize their combined resources most efficiently, and with the federal government assisting and co-ordinating the work, it was possible that standards of economy and efficiency could be set and operating data determined that would be of vast service, not only in enabling the commissions to act more intelligently and more justly but also in securing greater uniformity of action among the various commissions. The bureau hoped to be in position soon to do something in this direction.

Finally, he said that the relation of the Bureau of Standards to the public service commissions was unlike that of the Interstate Commerce Commission in some respects and like it in others. He believed that there was an immense opportunity for usefulness in assisting to solve some of the problems presented by the public utilities, co-operating in this work with the state commissions and assisting them as far as possible to get full and reliable information, but not assuming any responsibility that belonged to them nor interfering in the slightest degree with their freedom of action. The bureau would thus serve in some measure as a clearing house for technical information and in some degree as an agency for scientific and engineering investigations.

REPORT OF THE COMMITTEE ON RAILROAD TAXES AND PLANS FOR ASCERTAINING FAIR VALUATION OF RAILROAD PROPERTY

We suggested to the executive committee that the usual course of committee work be varied and that our committee be authorized to secure the preparation and distribution of several papers upon important phases of valuation work for discussion at this convention.

In submitting these papers, the committee does not express approval or disapproval of the ideas expressed therein. So far as statutes and court decisions have established rules, they must be followed by administrative bodies until repealed, amended or modified, but whatever may be the decisions of legislatures, courts or commissions, in the last analysis they must be based on sound ecomonic principles or they will not persist.

The persistence with which an expression will obtain, though open to criticism, is well illustrated by the rule that rates may not be reduced by governmental authority below what will be sufficient to allow a fair return upon the fair value of property used in the public service. Value in ordinary usage and in economic parlance is determined by the return to be obtained in the future. Applied to a public utility, the principle means ordinarily that the value of an undertaking is determined by the money profit which can be made from such utility in the future. Now, it is evident that the return which may be derived is largely dependent upon the rates which may be charged. Hence, if the rates are under discussion and the problem is what should be a fair rate for the service rendered, it is obvious that one is reasoning in a circle; if rates determine value, it is obviously unsound to say that value is to determine rates.

It must be assumed, and we think it is conceded, that the courts in giving their approval to the principle that rates must be sufficient to yield a fair return upon fair value did not intend to approve the unsound principle that in fixing value one should include any factor which is determined by earnings or rates, but rather that fair value should be fixed in a logical way and independently of the rates which were being considered as to reasonableness.

The situation would be greatly simplified and many of the problems which have aroused such discussion could be dismissed if the courts had adopted, or were to substitute, the word "amount" for "value." It is true that "amount" has not a definite or positive meaning, but the word "value" has been robbed of its ordinary meaning, and has been used in so many different ways that it is not of much assistance in solving the problem of the reasonableness of a given rate. The Supreme Court of the United States has repeatedly announced that no one factor is determinative, but that various factors must be considered. If each case must be considered upon its merits, and if a number of factors are to be considered and a decision based upon all, it follows that a general term, such as "amount," would be much more satisfactory and as full of meaning as the word "value," the ordinary meaning of which is not accepted, and as to which an explanation and apology must be made whenever it is used.

PAPER BY MAX THELEN OF CALIFORNIA

The first paper in the report of the committee, written by Max Thelen, commissioner and attorney California Railroad Commission, was on the subject of "A Just and Scientific Basis for the Establishment of Public Utility Rates, with Particular Attention to Land Values." A brief abstract follows:

It has been said that original cost, including betterments and additions, should not be used as a basis for utility rates, for the reason that it is often difficult to ascertain original cost. This objection goes not to the correctness of the principle, but to the difficulty of applying it in a given case. It is true that in the eastern and to some extent the middle western sections of this country it is often impossible to ascertain the original cost of public utilities. In such case the courts and commissions should strive to ascertain as nearly as they can what the original cost reasonably should have been. A number of commissions in applying the reproduction test ascertain as nearly as possible what the work reasonably should have cost under the conditions under which it was actually performed. If it is impossible to ascertain the unit prices and the conditions under which the work was originally performed, it may become necessary to ascertain reproduction value less depreciation as of the time when the rate inquiry is held. In doing so, it should be clearly borne in mind that this is being done not because reproduction less depreciation is the proper ultimate basis, but because it furnishes in the particular case the best available evidence of what the original cost reasonably should have been. If we bear this fact clearly in mind, we shall not rush into the dangers which ensue from the use of the present value or reproduction value test, without clearly understanding its significance.

It has frequently been urged that a public utility is entitled to a return upon the present value of its property or upon the reproduction value thereof, for the reason that it has title to the property, and it has been argued that a failure to give a public utility a reasonable return upon the property to which it has title would be to confiscate its property in violation of the Fourteenth Amendment to the federal Constitution. This conclusion overlooks the relationship between the public and the utility and is based on the erroneous assumption that title is the basis of a fair return in public utility cases.

The reason why a private citizen buying land is entitled to the unearned increment while a public utility acquiring land is not so entitled is that the citizen is performing no function of government and is not acting as an agent of the goverment, while the utility owes its entire existence and right to operate to the action of the state in conferring upon it certain of the powers of government, such as the right to use the streets and to take private property, to be used in the pursuance of its agency.

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Commissioner Maltbie, of the New York Public Service Commission of the First District, has clearly seen the difficulties arising out of appreciation of values and has tried to avert the danger by considering appreciation in values as income and balancing it against depreciation in other kinds of property. However meritorious this theory may be, the Appellate Division of the Supreme Court of New York, in the case of People ex rel. Kings County Lighting Company vs. Willcox, decided on May 9, 1913, refuses to adopt this view.

Mr. Thelen suggested that in making physical valuations of utility properties and making their findings thereon the commissions should confine themselves to findings on questions of fact and refrain wherever possible from finding as to the ultimate question of value. This is the policy pursued by the California commission. The commission accumulates all the facts and makes its findings on them, but refuses to make a finding on the ultimate question of the value of the property. That value may be one sum for one purpose and another sum for another purpose. The correct value depends fundamentally both on the purpose for which it is to be ascertained and on the correct principles to be adopted in ascertaining it. Until the Supreme Court of the United States has clearly and unequivocally established the principle which it considers correct after its attention has been squarely drawn to the tremendous importance of the question of appreciation in value, Mr. Thelen believed it would be far wiser for the commissions to adopt the policy which the California commission is at the present time pursuing.

PAPER BY GEORGE A. HENSHAW, OF OKLAHOMA

George A. Henshaw, member Oklahoma Corporation Commission, read a paper on "Elements of Appreciation in Railroad Valuations." An abstract follows:

The items of unearned increment of right-of-way and solidification of roadbed are not carried in capital account. In the uniform classification of road and equipment accounts, all additions and betterments are charged to capital account, which only means additions and betterments for the acquisition of which an original expenditure is made.

There has been much discussion as to whether the unearned increment of right-of-way and the solidification of roadbed should be considered in ascertaining the value of railroad property for rate-making purposes, or should the public share in at least a portion of all increase in property which was a result of the development of the country?

The paramount question is: To what extent could the value of adjoining property affect the value of terminal grounds and rights-of-way? Without the railroads, the adjoining property would be worth but little, and without the cities and adjoining properties, the right-of-way would be worth but little. The value of one is interdependent upon the other.

Mr. Henshaw's conclusions were that there must be a limit to the increased values of right-of-way because of the building of large cities, or the particular location of a railroad. What that limit is must be determined by the rules of equity; that is, what is fair to the carrier and what is fair to the public. What he meant to emphasize was that the value of right-of-way and terminal grounds in large cities is not without limit as compared with value of adjoining property when the value or use of the adjoining property depends on the existence of the railroad.

The solidification of a roadbed is an element of value which is reflected in reduced operating expenses as compared with a newly constructed roadbed of like grade and character.

Solidification is not the result of an actual expenditure of money for that purpose; it is a result of the use of the property and the action of the elements. The increased cost of use of the property is charged to operating expenses and new and undeveloped roads are usually permitted to charge a higher rate for the service performed to take care of the increased cost of operation. Notwithstanding that fact, a solidified roadbed is more valuable than a newly constructed one.

The difference in value of a solidified roadbed as compared with a newly constructed roadbed is reflected somewhat in the increased cost of operation during a period of usually from three to four years, for a like volume of traffic. On a new roadbed light equipment is usually used for the first three or four years, and in fact in most instances, the business does not justify the operation of heavy equipment even though the roadbed was sufficiently solidified to carry the same. There is some additional cost in the maintenance of the roadbed during this period.

Another item of additional cost is in the maintenance of equipment—that is, the equipment moving the same distance will deteriorate more rapidly on a new road than on an old one, notwithstanding that on the old road the equipment may be loaded more nearly to its maximum capacity and operated at a greater rate of speed. This additional expense is not felt so perceptibly by the new road, because of the interchange of equipment between roads.

During the past twenty years wages have increased from 15 to 40 per cent in cost per hour. Such increased costs are offset by the reduction in the cost per finished unit due to the mechanism of machinery which has been modernized, such as earth excavators, elevators, graders and spreaders, which have reduced the cost per cubic yard of earth in place.

The horse-power pile driver has been replaced with the steam-driven hammer with increased efficiency and a lower cost per unit in place. The use of modern track-laying machines reduces the cost per unit for laying track far below the cost of laying track when hand labor was used entirely. The pneumatic riveters, with unskilled operators, at wages from $2.50 to $3 per day, drive ten to one more rivets per day than were formerly driven by hand experts who commanded a higher rate per day. There are some conditions, however, where the cost of labor has appreciated per unit—for example, wages of bricklayers, carpenters and stone masons. While the labor cost per finished unit, such as laying 1000 bricks and a square of shingles, has increased, the appreciation of cost of labor should be governed by the finished unit cost and not the cost per man per hour.

Appreciation of material is due to a greater demand for an available supply. The cost of lumber for railroad purposes, such as ties bridge piling and bridge lumber, has increased. The present cost of passenger car equipment per seat has increased, which is due to increased space per seat and to the advanced price of lumber and material and general elegance of design. While it is a fact that the cost of locomotives has increased, on acount of their increased weight and size, yet the cost per tractive pound hauling capacity has decreased. For example: in 1870 a 4-4-0 type cost per tractive pound 61.30 cents, or $6,400, while in 1902 the same type of engine cost per tractive pound 57.35 cents, or $11,185, and in 1913 the cost per pound of tractive power was 44.5 cents.

So far as freight car equipment is concerned, the present cost per car is more than ten or twenty years ago, but the cost per ton of capacity, both steel and wooden cars, is less to-day than formerly. For an illustration: in 1886 a 40,000-lb.-capacity box car cost $566.50, or $28.335 per ton, while in 1906 an 80,000-lb.-capacity box car cost $961.07, or $21.326 per ton, and steel cars purchased in 1910 of 80,000-lb. capacity cost $21.70 per ton capacity.

PAPER BY PROF. EDWARD W. BEMIS

Prof. Edward W. Bemis, of Chicago, presented a paper on "The Accounting Side of Rate-Making," an abstract of which follows:

Broadly speaking, nearly all of our courts and commissions and other rate-making bodies confine their attention

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to two considerations: (1) the cost of reproducing the property new to-day, less depreciation, and (2) the history of the property in question. These two points of view, which may be called the engineering and the accounting methods, may have more or less relative weight in the final decision, but they are in essence very different, and, as commonly presented in rate cases, lead to vastly different results. The engineering, or replacement, or reproduction point of view generally reaches a much higher basis of rate-making than does the historical or accounting method. The former deals with estimates, the latter with vouchers.

The public has hardly begun to realize the magnitude of the issue. The corporations, quick to see their opportunity, are marshaling all the engineering and legal talent they can command to get our courts and commissions to give precedence to the reproduction theory, as interpreted by interested parties. Cities, states and other public bodies have not realized the importance of the historical method. It must be recognized at once, however, or far-reaching and dangerous precedents are likely to be speedily established that will seriously handicap all future efforts for any fair basis of rates.

It may be that on further consideration the courts will continue to concede to the companies a large addition over cost in the case of land, and may insist on present prices of labor and material, but the public will still keep for itself a considerable part of the various unearned increments now claimed by our public utilities, if it can eliminate most of the hypothetical and vast overhead charges usually attendant upon the reproductive theory. To do this, and to meet the rapidly rising claims for going value, resort must be had to a thorough study of the accounts and history of every property under investigation.

The accounting method offers two lines of information: (1) the actual cost of the property now in use, or, where the records are not complete, the cost of the one-half or two-thirds of the property most recently constructed, with sufficient data to form a comparatively close estimate of the cost of the older construction; (2) data by which one may determine what the cost would have been had existing prices of labor and material prevailed, but with the methods of construction such as had been in operation from the start.

In the last analysis, questions of fair rates must be decided as a matter of public policy by those especially trained for that work. A fair return on a just basis will be sought. The actual, efficient sacrifice of the investor, as revealed in accounting and other historical studies, supplemented by engineering advice as to the adaptability and present condition of properties for the purpose intended, will count far more than the estimates of engineers as to what it will cost to buy again land that will never be bought again, to duplicate property that will never have to be duplicated, and to build up a business that will never again have to be developed.

Both our industrial structure and our life in cities would be inconceivable without the existence of the various public utilities whose rights are being investigated. But the cost of recreating this structure cannot be capitalized to the benefit of our public service corporations. They bore but little of the cost of that development, and what they did bear, and the profits obtained and divided in the process, will be fully revealed by the historical method. Considerations of justice in courts and regulating bodies seeking to conserve fairness and public policy may then be trusted to work out a fair result to all concerned.

PAPER BY DR. A. F. WEBER

A paper on "Depreciation and Its Relation to Fair Value" was read by Dr. A. F. Weber, chief statistician New York Public Service Commission, First District. An abstract follows:

It cannot be denied that the physical property other than land that goes to make a productive plant is a wasting asset that sooner or later is consumed in operation. The line between the "circulating capital" and "fixed capital" of the economist must necessarily be an arbitrary one. Coal, oil, water and other materials of manufacture have an exceedingly short period of useful life and are, of course, charged to expense and not to capital account. The bell rope in a car has a somewhat longer life, but when renewed is nevertheless treated by accountants as a supply rather than a repair item. If an automobile had a similarly short life, its cost would also be charged against the revenue of the period during which it was put into service, but since our generally accepted period of accounting is the year and an automobile will render service more than one year, its cost must be distributed over more than a single year. It is idle to say that no depreciation accrues until the automobile is discarded and thrown on the scrap heap or sold for what it may be worth to some less exacting *entrepreneur*. At that time the accrued depreciation becomes realized depreciation.

In estimating the economic life of a wasting asset, it will be manifestly improper to consider only physical depreciation and ignore functional depreciation. The former is, of course, capable of more accurate determination than the latter, but experience must in either case be the real guide. In this comparatively young country there are, for example, many buildings of brick and stone that are more than a century old and are still in very good condition, but this fact does not deter the engineer from limiting to fifty or possibly seventy-five years the estimated useful life of a building that he is appraising. Experience has taught him that the building will in all probability be torn down on account of the march of improvements within that period; and he recognizes obsolescence as an element of depreciation despite any disclaimer he may make.

While an estimate of the prospective life of particular classes of apparatus like engines, boilers, etc., must be based upon life tables or experience relating to units that have been displaced by reason of functional as well as physical depreciation, it is not practicable to include in that experience apparatus thrown out of use in consequence of the stoppage or destruction of an entire industry. The loss of assets in the form of turnpikes, stage coaches, road inns, etc., which followed the introduction of railroads in England and the older parts of this country was one of the risks of the business. Risks are taken into consideration in determining the rate of return rather than the amount allowed as the fair value, and in the valuation of a public utility the deduction for depreciation will not include allowance for the possible obsolescence of the entire industry.

In view of the disputed meaning of the word depreciation, it might be well to substitute for it whenever accuracy of statement is desired in discussions of productive plant the alternative term "expired capital outlay," which exactly describes the nature of depreciation in the case of wasting assets.

Although depreciation in its relation to value has but recently become the subject of general discussion in connection with public utility regulation, it long ago received judicial construction in connection with other questions laid before the courts for determination. The assessment of property for purposes of taxation necessarily involved the question of depreciation, which was always allowed to the property owner as a deduction from value. In the adjustment of fire losses, also, depreciation had to be considered, for no insurance company could be compelled to reimburse a policy holder for the accrued depreciation on a structure destroyed by fire. In condemnation proceedings, again, depreciation was invariably deducted, although the final determination of value was based on some factors that do not enter into a rate case. The most important of these factors, of course, is earning power, which is itself derived from and based upon the rates under consideration.

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Since 1909 the public utilities have contested the rule laid down in the Knoxville case, and while they have secured some degree of recognition on the part of a few commissions, they have made little impression on the state courts and no impression on the highest national court. Only last June the Supreme Court in its unanimous decision in the Minnesota rate cases reversed the lower court and held that an appraisal was manifestly incomplete that included structures at reproduction cost new when in fact they had depreciated owing to ordinary wear and tear or other causes.

When the advocate of the sinking-fund method of depreciation asserts that the productive plant which has been well maintained and is working at 100 per cent efficiency is as valuable in its twentieth year as a new plant of the same original cost, he is obviously ignoring the fact that the older plant cannot be made to yield the same net profits as a new plant.

It must be assumed that in the usual case present value represents a judgment reached by the appraiser after inspection of the condition of the property, assisted it may be with life tables of standard machines and apparatus. There are many problems still to be solved in connection with overhead expenses attending the installation of fixed capital, and there are grave difficulties in the way of handling depreciation and fixing rates during the development period of newly established public utilities. But with respect to enterprises that have entered the stage of reasonable profits, it is clear that the annual allowance to be made for depreciation as an item of operating expense should be whatever amount the company regularly puts into its depreciation fund, provided that amount be found, after careful investigation, not to be excessive. No more than this charge should be allowed because it is unfair to tax consumers in order to swell dividends. Consumers will not be satisfied with the answer that the company is obliged to return depreciation moneys to the property when needed, because they have too often been obliged to put up with inferior service on the plea that funds could not be obtained for necessary improvements. Stock assessments are actual things rather than names only in foreign countries. They are never heard of here except in cases of reorganization when the stockholders receive new securities of an equal or greater par value than the assessment that they pay. The public will willingly pay rates that will enable the company to keep its investment intact, provided such moneys are used to develop the property and the issue of new capital obligations is correspondingly curtailed. The success of this policy may be seen in the low price of gas combined with relatively high dividends in Toronto and in most of the cities of England.

Fortunately, there may now be noted a strong tendency on the part of the courts to enforce that policy here through their refusal to sanction new security issues for replacements that ought properly to be paid out of depreciation reserves accumulated from income.

PAPER OF DR. ROBERT H. WHITTEN

Dr. Robert H. Whitten, librarian-statistician New York Public Service Commission, First District, discussed valuation decisions of the commission with which he is connected. An abstract follows:

In the following discussion the principles of valuation used by the commission in its decisions are considered in so far as they have a bearing upon the determination of fair value. The opinions in these cases were written by Commissioner Milo R. Maltbie.

In determining fair value for rate purposes, the decisions of the commission do not disclose that any one rule or factor has been selected as a single standard. The underlying thought is that, valuation being a step in the determination of just compensation, the whole problem is to determine that amount which, used as a base, will at the rate of return fixed result in just compensation to the company for the service rendered. In determining the fair value as one step in the process of determining the reasonable cost of production, both actual cost and reproduction cost are considered important.

The commission has recognized the close interdependence of fair value, fair rate of return, and current expense and income accounting. It is actual total return that is of prime importance to both parties. This actual return is the product of all these factors. The real actual return cannot be known unless all these factors are known. The actual return is altered whenever one of these factors is altered. The interdependence of fair value and fair rate of return is the basis of the commission's ruling as to "going value." The interdependence of fair value, income accounting and fair rate of return is the basis of the commission's treatment of the appreciation in land value. It is the total actual return that is of importance. Justice, equity and public policy demand that the company be permitted a total actual return that will be adequate, but no more than adequate, to compensate it for the service rendered. In the past attention has often been centered on valuation to the exclusion of the end for which the valuation is made, which is the determination of the total actual return for the service rendered. Fair value cannot be determined without reference to rate of return and income and expense accounting as it is the interplay of all these factors that produces the total actual return.

Actual cost.—The general practice of the commission has been to have its bureau of statistics and accounts make a thorough examination of the accounts and records of the company, with a view to determining as far as practicable the actual investment or sacrifice on the part of the company. The financial history and capitalization of the company are studied, and operating expenses for a series of years are analyzed. In none of the decisions thus far rendered have the construction accounts been in such shape as to admit of an accurate determination of the actual cost of any large proportion of the property. Consequently, much more weight has necessarily been attached to estimates of reproduction cost than would be the case if actual cost had been known. In many cases, however, records of recent construction have been secured that have been of material assistance in checking the estimate under the reproduction method for unit prices and overhead expenses. Through an examination of books and accounts the commission, while not able to determine actual cost, has in most cases been able to fix on a maximum investment. It has been able to say that the actual cost could not have exceeded this maximum amount. Even this has been of great value as it has enabled the commission to refuse with equity certain purely hypothetical claims for allowance under the reproduction method.

Reproduction cost.—As the investment records proved inadequate the commission has in each case been compelled to rely largely on an estimate of reproduction cost. This estimate has been made with great care by the commission's engineers. In certain cases the inventory has been prepared by the commission's engineers with the co-operation of the engineer for the company, and the appraisal has then been checked by the engineer for the company. In other cases the company's witnesses have made independent appraisals. The unit prices have been fixed after an examination of the company's records and a comparison with prices of well-known manufacturers and contractors for a period of about five years.

Contractors' profit, engineering and administration, contingencies and incidentals.—The net cost of labor and materials having been determined by the commission, an allowance is added to cover general contractors' profit, engineering, supervision, contingencies and incidentals where these allowances seem justifiable. It has been a general practice for the commission to allow 10 per cent for general contractor's profit and from 10 per cent to 15 per cent

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for engineering, supervision, contingencies and incidentals upon the items to which these charges would properly apply. Even where a general contractor is assumed, his profit is not allowed upon land, rolling stock, tools, supplies, fixtures, etc., as such items are not purchased through a general contractor. The allowance for general contractor's profit is in addition to the allowance for sub-contractor's profit, which is taken care of in the unit prices upon which the net cost is based. The percentages allowed vary somewhat with the particular items. Thus, in valuing a street railway property but 5 per cent was added to the cost of rolling stock to cover all these items. In some cases the general allowance has been 15 per cent while in others it has been but 10 per cent or 12 per cent. In the latter cases there has been a very thorough checking and rechecking of the inventory, with the result that omissions have been largely obviated; where the inventory is complete, the allowance for incidentals and contingencies is relatively small. The commission illustrates this by stating that in its experience in planning subways it is unable to foresee just what conditions will be met and just what conditions will be necessary. An additional station or connecting track may be found desirable as the work progresses; these would not appear in the original plans, but in an appraisal of the system when completed they would all appear and would be appraised. The commission is gradually collecting accurate data on the question of proper percentage allowances through the examination of accounts, the approval of securities, and the supervision of rapid transit construction contracts. The indications are that the allowances heretofore made have been quite liberal. The commission is disinclined to allow for expenditures under these heads for work of which there is no record and which is based largely on hypothetical conditions of reproduction. The commission feels that the particular kind and amount of allowances included should in general follow the methods by which the particular plant in question has been developed. This appears to be of particular importance in the case of allowance for piecemeal construction and contractor's profit. It is evident that the entire appraisal must be treated as a unit. Otherwise duplications or omissions are sure to occur. In the Kings County lighting case the commission's allowance for the above items amounted to 15.4 per cent on the net cost of physical property, including land.

Preliminary and development expenses.—The commission includes allowances to cover promotion expense; organization of the company; franchise and consent expenses; interest and taxes during construction; trial operation; adjustment of parts, etc. These are mostly items such as are ordinarily classified as overhead charges. Certain of the items, such as trial operation and adjustment of parts, are sometimes considered in estimating going value. For many of the items included under the general head of "preliminary and development expense" there are few data upon which an estimate of cost may be based. The commission gives great weight to any evidence showing actual expenditures incurred by the company for these purposes. It is inclined to give slight consideration to estimates of reproduction cost for these items based on hypothetical conditions. The allowance made by the commission is not given as a percentage of net cost, but is a lump sum which under the conditions applicable to the particular company seem to the commission adequate to cover all of these expenses. This allowance as a percentage upon the reproduction cost of physical property, including land, would naturally vary considerably for different companies. Many expenses are nearly the same in amount regardless of the size of the company. Discount on bonds is not considered by the commission a proper part either of actual cost or of reproduction cost. The question of a usual or normal discount would doubtless have some bearing in determining the rate of return to be allowed a company, but has no direct bearing upon money cost. It has been the practice of the commission to compute interest upon the entire cost for one-half of the equated period of construction.

Accrued depreciation.—From the cost of reproduction new the commission deducts the accrued depreciation. The estimate of accrued depreciation is based chiefly on life tables and the application of the straight-line method. The estimate covers depreciation due to wear and tear and age and to some extent to changes in the art and the abandonment or supersession of property because of inadequacy. The commission's ruling that accrued depreciation must be deducted in determining fair value for rate purposes has subsequently been sustained by the Appellate Division of the State Supreme Court, and by the recent decision of the United States Supreme Court in the Minnesota railroad rate cases.

Land.—In its valuations the commission has taken the position, following what it believes to have been the decisions of the courts, "that land should be taken at its present fair value, provided the plant is wisely located and well planned." The commission points out, however, that inasmuch as the buildings upon the land are appraised upon a use-value basis, instead of a scrap-value basis, there would be duplication and inconsistency in appraising the land at the highest price it might bring, assuming the land to be unoccupied. The commission has refused to allow the fair value of the land to be increased by an estimate of the assumed cost of buildings upon the land at the time of purchase. The commission's refusal to apply the strict reproduction theory to land value is clearly upheld in the recent decision of the United States Supreme Court in the Minnesota railroad rate cases. The Supreme Court goes further, however, and disallows all overhead charges, including interest during construction, that have been included as a percentage on land value.

Appreciation in land value.—Although the commission takes land at its present or appreciated value it has adopted a method of treating appreciation as income, and thus neutralizing to a certain extent the effect of appreciating land values in the determination of a reasonable rate of charge. If the problem is to determine the fair cost of production, it is clear that income or profit from every source must be considered. Some persons in considering the matter very frankly admit that appreciation in land value does constitute a very important part of the real income of certain public service companies. But they argue that inasmuch as this source of additional income was probably counted on by those who originally invested money in the enterprise it is not fair to deny them the advantage of such appreciation in a rate case. In this they overlook the true nature of a "fair average return." A "fair average return" is assumed to be not a part payment but a payment in full. It should necessarily take into consideration all the conditions and be full compensation for the service rendered. If, however, the view is taken that income from land appreciation should be treated as a separate and additional item and should not be included in the fair return, then the fair return must necessarily be reduced by the amount of such appreciation. The result is, of course, the same. If appreciation is disregarded in the income account, it must nevertheless be considered in fixing the rate of return. There is no escape from the logic of the position that in determining a fair average return profits from every source must in some way be considered. If they are not included in the income account, they must necessarily be considered in fixing the fair rate of return. There can be neither logic nor equity in the position that a total fair average return can be determined without a due allowance for profits from appreciation in land value.

Pavement over mains and services.—The commission has declined to include in fair value the estimated cost of replacing pavement over mains and services where such pavement has actually been laid without expense to the company.

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Property donated.—In the Brooklyn Union Elevated rate case the proposition to include in value property constructed out of the city's contribution to the expense of grade separation was rejected.

Going value.—The commission points out that certain expenses often included in an estimate of going value have been included by the commission in its allowances for overhead percentages and preliminary and development expense. In so far as going value is used to cover provision for pioneer losses or failure to earn profits during a development period of normal length the commission holds that it should be taken into account in fixing the fair rate of return. In doing so the commission properly distinguishes between valuation for rate purposes and valuation for purchase purposes. In a rate case the justice of the result does not depend upon the fair value alone or on the rate of return alone, but on the total return or net income allowed, which is the product of the fair value and the rate of return. In a rate case, therefore, certain equities may be provided for either in the fair value or in the rate of return. If they have been considered in the rate of return it would be duplication to allow for them again in the fair value, and vice versa. These two factors are interdependent and must be considered together. It is interesting to note that in the Minnesota Railroad rate cases the Supreme Court of the United States, while it did not discuss the general topic of going value, did in considering adaptation and solidification as an offset for depreciation refer to the fact that "knowledge derived from experience" and "readiness to serve" were mentioned as additional offsets and holds that "the realization of the benefits of property must always depend in large degree on the ability and sagacity of those who employ it, but the appraisement is of an instrument of public service, as property, not of the skill of the users." The commission points out that throughout its appraisals all units are treated as parts of a going concern, and not as parts of a system that is to be dismantled and sold as second-hand property. Some court decisions and even certain decisions of the United States Supreme Court seem to mean that the going concern factor receives sufficient consideration if to a plant in successful operation is given a valuation based on cost-less-depreciation of the complete plant, and not on the mere salvage value of its separate units.

Municipal lighting contract.—In the Kings County lighting case the company claimed that there should be included in the valuation a capitalization of profits from an exceedingly profitable street-lighting contract which, at the time of the valuation, still had five years to run. The commission rejected this claim.

Working capital.—A discriminating discussion of working capital as applied to a gas company is contained in Commissioner Maltbie's opinion in the Kings County case.

Annual depreciation allowance.—In estimating the annual depreciation allowance in a rate case the commission has not followed literally either the straight-line method or the sinking fund method. In the first place, it has attempted to ascertain the extent to which minor replacements are included in the repair account and treated as current operating expense. It has then estimated the amount which in addition will be required to take care of all replacements due either to wear and tear and age or to obsolesence and inadequacy. In the case of long-lived units it has taken into consideration the interest accumulations from the annual depreciation allowances. To this extent it has applied the sinking fund method. The commission holds that the allowance must be for current depreciation only, and that in cases where a company has not set aside in past years a sufficient amount to cover the accruing depreciation such fact cannot be taken into consideration in fixing the annual allowance for depreciation in a rate case.

Rate of return.—The commission holds that fair value and rate of return are interdependent factors. The commission holds that the rate of return should be adequate to induce investors to construct utility plants within the particular areas in question. The commission calls attention to the interdependence of rate of return, fair value and income accounting. If, for example, average annual appreciation in land value is not included in income, and thus constitutes an additional profit to that indicated by the rate of return, this fact would necessarily have an important bearing upon the fixing of the rate of return. In so far as the rate of return fixed does not include all elements of profit, it may be less than a rate of return where all elements of profit are included. Moreover, if the commission were to allow a fair value for uncompensated losses incurred in the establishment of the enterprise, instead of including such allowance, as is its custom, in the rate of return, such rate of return could of course be smaller.

RAILWAY ELECTRICAL ENGINEERS AT CHICAGO

About 200 delegates, representing the electrical departments of the principal railroads of the United States and the allied manufacturing and supply interests, attended the opening sessions of the Association of Railway Electrical Engineers' convention, held at the LaSalle Hotel, Chicago, Oct. 21 to 24.

A number of papers were presented and discussed. These covered among other things the subjects of head-end train-lighting systems, terminal facilities for handling car-lighting equipments, electric headlights, methods of battery charging, building and yard lighting, and self-propelled cars.

W. A. Del Mar, of the New York Central & Hudson River Railroad, chairman of the committee on wire specifications, presented the report of that committee, which covers wires and cables for pressures up to 15,000 volts. Paragraphs on the chemical analysis of rubber, potential test requirements, explanation of terminology used and order forms for wires and cables were included in the report. R. H. Rice, Chicago, told of the work of the American Electric Railway Association in compiling similar specifications.

C. R. Gilman, of the Chicago, Milwaukee & St. Paul Railroad, chairman of the committee on data and information and the question box, read a report which revealed a tendency among railroads to replace arc lamps with large tungsten units. For the twenty-two roads reporting, the total rating in alternating-current shop motors exceeded that of direct-current motors by 8877 hp. The increasing use of alternating-current motors was ascribed to their lower first cost, greater reliability, lower maintenance expense and greater flexibility.

The relative merits of various reflecting and diffusing media with different spacings of units were discussed in the report of the committee on illumination, of which Mr. Lewis S. Billau was chairman. The experiments from which the committee derived its conclusions were conducted in passenger coaches furnished by the Lake Shore & Michigan Southern Railway. Center-deck and side-deck systems were investigated with a view to obtaining adequate illumination, pleasing effects, good efficiency and satisfactory distribution of light. Center-deck lighting was found to compare favorably with side-deck illumination. For direct lighting, units should not be spaced more than 6 ft. apart. The color of head-linings had no appreciable effect on the useful illumination produced by direct units. The illumination values obtained showed the desirability of using lamps of higher lumen output.

Arthur J. Sweet, Milwaukee, said that head-linings should have a light color in order to reduce the contrast with the lamps. Fifteen-watt lamps had been found inadequate for proper illumination, and 600-lumen lamps were better.

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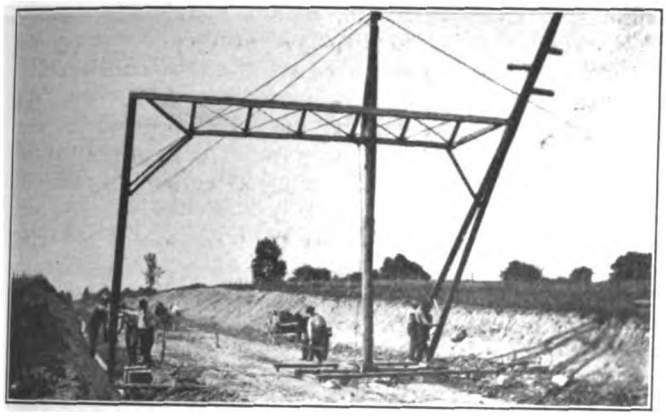
NEW CATENARY CONSTRUCTION ON CUT-OFF OF NORTHERN OHIO & TRACTION LIGHT COMPANY

The Northern Ohio Traction & Light Company has recently opened for service a portion of the proposed double-track interurban line between Akron and Cleveland. This cut-off leaves the old line at Chittenden and is built on a

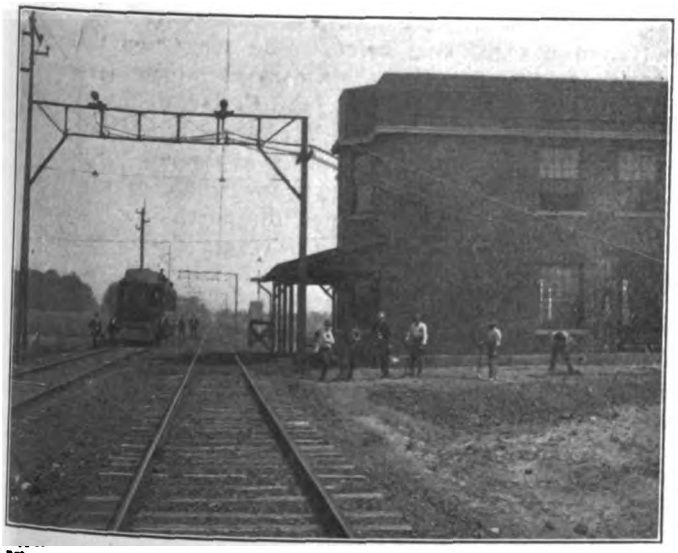


Steel Catenary Bridge Being Erected in One Piece

private right-of-way for a distance of 7½ miles until it rejoins the old line at Fells. This leaves only 5 miles of single-track line between Cleveland and Akron.

The rails are 80-lb. A. S. C. E. on wooden ties. Cinders were used for ballast throughout. The maximum curve is 1 deg., and the maximum grade is one-half of 1 per cent. All waterways are cared for by concrete culverts except that ingot iron pipes are used where the drainage areas are small. Way stations, 8 ft. x 10 ft., were built at each highway crossing. These stations are mounted on a concrete platform 15 ft. x 18 ft. The walls are of cement plaster on Trussit metal lath, and the roofs are covered with Spanish tile.

The catenary trolley system was adopted for this cut-off and will replace the poles on the rest of the line as fast as they require replacing. The overhead structure is supported on steel bridges placed 300 ft. apart. Two 500,000-



View Showing Steel Catenary Bridges and Substation on Cut-Off of Northern Ohio Traction & Light Company

circ. mil copper feeder cables were used as messengers, and the trolley wires are suspended from these by twelve hangers in each span. In addition, the bridges carry a three-phase, 22,000-volt transmission line with ground wire which feeds substations at Northfield and Bedford.

The bridges are shown in the accompanying engravings. They consist of two bents of A shape, with a cross-truss. The two vertical members of each bent are 7-in., 9¾-lb. channels. The truss has an 8-in., 11¼-lb. channel for the top chord and a 6-in. channel for the bottom chord. The vertical members of the trusses are angle struts of a special design, and the diagonal members are ⅝-in. rods. The whole construction is stiffened by knee braces. An extension to carry the high-tension line, consisting of two 5-in., 6¼-lb. channels, braced together, is bolted to one of the bents. The complete bridge is supported on four concrete piers, each leg being held by two 1-in. anchor bolts 3 ft. 6 in. long. The bridges were designed and furnished by the Archbold-Brady Company, Syracuse, N. Y., but were erected by a local contractor. As shown by the erection view they are sufficiently stiff to be raised in one piece.

SAN FRANCISCO ASSOCIATION DID NOT WANT MR. DALRYMPLE

Considerable interest was excited in San Francisco during the recent visit there of James Dalrymple, manager Glasgow Corporation Tramways, because of a series of resolutions which the Public Ownership Association of that city adopted last August. The president of this association is C. W. Eastin, and its purpose is to promote the public ownership of public utilities in the city of San Francisco, as provided by the charter of the city. Word was brought to this association early last summer that Mr. Dalrymple expected to visit this country, and at the following meeting of the association, held Aug. 6 in the Pacific Building, San Francisco, the resolutions printed below were adopted. Under instructions of the association a copy of these resolutions was forwarded to the Lord Provost and City Council of Glasgow by the secretary of the association. Evidently, however, they were not effective in preventing the visit of Mr. Dalrymple.

"Whereas, in response to the request of the then Mayor of Chicago, Edward F. Dunne (now Governor of the State of Illinois), the city of Glasgow in 1906 sent, instead of John Young, James Dalrymple, its tramway manager, to Chicago, to advise Mayor Dunne as to the construction and operation of municipal street railways in that city; and

"Whereas James Dalrymple during a large part of his sojourn in this country hobnobbed with representatives of the corporations that control the street railways of the American cities and in his report to Mayor Dunne violated the confidence of his host (who was paying out of his personal funds all the expenses of Mr. Dalrymple!) and, instead of confining his advice to the purposes for which he was invited, devoted a large part of it to a political attack upon the people of the cities of America; and

"Whereas more than a score of large cities throughout the United States are now considering the taking over of their street railways for municipal operation; and

"Whereas the Glasgow City Council has just granted permission to Mr. Dalrymple to visit the street railways of America. therefore, be it

"Resolved, that the Public Ownership Association of San Francisco regards the proposed visit of Mr. Dalrymple to the United States as a political move on the part of the corrupt corporations that own and operate the street railways of American cities, which intend to use him to injure the widespread movement in favor of public ownership of street railways in this country; and be it further

"Resolved, that the Public Ownership Association of San Francisco respectfully urges the Lord Provost and City Council of the city of Glasgow to withdraw their permission to James Dalrymple to visit the street railways of the United States, in order that he may not insult the American people again by his presence in this country, desiring, as we do, to promote the continuance of the harmony and good-will which has always prevailed between the people of America and progressive Glasgow."

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COMMUNICATION

ENGINEERS ON COMMISSIONS

Nebraska State Railway Commission, Engineering Department
Lincoln, Neb., Oct. 18, 1913.

To the Editors:

There has appeared recently in the public press notice to the effect that Hon. Charles A. Prouty, now a member of the Interstate Commerce Commission, is to retire at an early date to become director-general in an appointive position in charge of the national valuation work now begun. If this report is correct, a vacancy on the commission board will occur. It is certain that one of the greatest problems ever placed before any body is now before this commission in the finding of the value of our railroad, telegraph and telephone properties. It further must be a fact that this is and will be the great question before this body. There is no member of the commission at present professionally equipped to treat with the matters at first hand, which, in other words, is saying that no present member can be said to be an engineer economist of experience in solving such problems.

It is true that engineers and economists have been and will be employed extensively to carry out the great task, but this can hardly be made an argument against the suggestion of the appointment of a new man who shall be an engineer competent and experienced in appraisal and economic matters. There are excellent reasons for offering this suggestion, and it is trusted that it will be looked upon with favor by those empowered to name the new member. It is trusted, also, if this suggestion meets with favor, that engineers generally will become active in its behalf. Our boards of health are composed of doctors and specialists, while similar conditions are prevalent everywhere. In this situation why cannot a member of the commission itself be an engineer fully qualified to deal with matters at first hand?

E. C. Hurd, Engineer.

THE MANGANESE OPEN-PRICE ASSOCIATIONS

An account was published on page 767 of the issue of this paper for Oct. 15 (Convention Daily edition) of a meeting, Oct. 14, at Atlantic City, of the standardization committee of the Manganese Steel Founders' Society and the Manganese Track Society. As this committee and the two societies themselves have recently been organized largely as the result of the suggestions of Arthur J. Eddy, of Eddy, Wetten & Degler, Chicago, Mr. Eddy was requested to describe more in detail the "open-price" arrangement under which the various companies operate. In reply Mr. Eddy said:

"There was one line in the article in the Electric Railway Journal of Oct. 15, referring to the meeting of manganese open-price societies, which requires correction, and that is the statement at the opening of the article that the open-price associations are formed on the basis of a 'new theory of price agreement.' No agreement of any kind or character regarding prices is permitted in an open-price society. On the contrary, the very theory of the open price is diametrically opposed to any agreement or understanding, direct or indirect, regarding prices. It is my personal conviction that such agreements and understandings are not only illegal but are of no practical value and not worth the breath it takes to utter them. The history of 'gentlemen's agreements' in the past has been one of violation of confidence imposed and resulting conditions more vicious and disastrous than existed before the agreements were entered into. I have no faith in the practical efficacy, to say nothing of the legality, of any sort of pool, combination or association that has ever been tried the object of which was to fix prices or control competition.

"I have a great deal of faith in the open price and in the operation of open-price associations, which were very well described in the remainder of the article printed in your issue of Oct. 15. Personally, I believe in prices so openly and publicly quoted by manufacturers and contractors that if I had my way each industry would have headquarters as public as a stock exchange, with a blackboard in public view whereon would be displayed every pricee, every bid and every offer, very much as are the transactions on the blackboards of stock exchanges and boards of trade. All bidding should be as open as on government work. The secret price is a thing of the past. The open price is the price of the future and is coming as certainly as the sun will rise to-morrow morning."

Mr. Eddy was asked whether the open price would apply to buyers as well as to sellers.

"Precisely the same. For instance, there is no reason in the world why the purchasing agents of railroads, steam and electric, should not have their associations wherein they would interchange the prices they pay for all purchases. The government and every city makes known the prices they pay for all materials and labor. Why should not the large corporations of the country be equally frank and public in the transactions of their business? Is there any conceivable reason why the purchasing agent of a great steam railroad or of an electric railway should not make known to the stockholders and the public generally where every dollar that he expends goes and the price he pays for every article he purchases? When you come to consider it, is there not every reason in favor of his so doing? Would not such a policy immediately destroy all opportunity for graft, and would not the effect of such a policy be to stabilize all prices at normal levels?

"For instance, if the purchasing agent of a railway interchanged freely information regarding prices for products, is it not perfectly plain that the manufacturers of those products would be compelled to treat all railroads exactly alike? A manufacturer could not sell at one price to an electric railway in San Francisco and at a lower price to an electric railway in Los Angeles. If he knew that the prices he received would immediately become public property, he would sell to both cities on an equal basis, transportation charges considered. The suggestion that purchasing agents organize their own open-price association is not new. It was made by John C. Jay, of the Pennsylvania Steel Company, in an interesting article in one of the iron trade journals wherein he, as the head of the selling department of a great company whose principal customers are the railroads, urged the purchasing agents of the roads to organize an open-price association and bring out into the limelight every price they paid for whatever they had to buy. His article aroused such widespread interest that he received not less than thirty-one letters from purchasing agents discussing the suggestion pro and con. Most of them thought the suggestion was too far ahead of the times, but I am sure that we are on the eve of that very thing; that the time is at hand when the public generally, and the stockholders in particular, will insist that detailed statements be made regarding all expenditures of money by corporations.

"The members of the manganese steel societies have already taken action toward the extension of the facilities of their organizations to their customers with a view to enabling their customers to form open-price buying associations. This fact alone illustrates how fundamentally different the open-price associations are from the old-line combinations. The very last thing in the world that an old-line combination desired was any sort of an association on the part of its customers. In a word, this entire open-price proposition is a revolutionary step in the direction of publicity and the suppression of secrecy."

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NOTES ON TRACK MAINTENANCE

BY E. W. GOSS, SUPERINTENDENT MONTGOMERY TRANSIT COMPANY

In lining curves where they are full of kinks at the joints the use of the bender or jim crow should not be neglected. It should be applied on the outside of the joints after the spikes are pulled, and the joint should be bent in beyond the true line of the curve so that it will not spring back out of line when the bender is taken off before the rail is spiked down. If the curve was sprung in when it was laid, as many of them have been, the chances are that the only way to make it stay in place will be to pull the spikes and run the bender all the way around the curve, care being taken not to tighten it up too much and thus give too much set in the rail. The inside rail should be made true as well as the outside one.

Too many track men do not appreciate the value of using the rail bender on their curves when first laying the track. The tendency of rail is to straighten itself unless specially bent, and this makes "sprung" curves hard to keep in shape as they are constantly getting out of line. Curves that have "flat joints" are extremely hard on rolling stock. Not only are they uncomfortable to ride over but they give the wheel a sidewise hammer blow which is detrimental to the flanges. In fact, not a few broken axles as well as wheel flanges have been caused by this action.

The above remarks, of course, do not apply to special work or curves that have come from the manufacturer all ready shaped, though care must be used in putting this work together to have it properly line up. In putting in switches where the lead rails have to be curved in the field they should be bent with the bender so they can be laid in place without springing. If the track man will pay attention to this he will, after a few years, have much less trouble with the switches than if everything had been forced into place.

In putting in special work, switches, frogs and curved rails from the shop, it is most undesirable to tighten the joint plates until everything is properly lined and in place, as it is impossible to straighten a kink in the tightened connections without first loosening the bolts and allowing them to assume new positions. No amount of heaving on the lining bars will move them when tight, but when loosened they will take their proper positions with the exercise of but little effort.

As no track will ever keep in place unless the surface water is taken care of, proper drains should be provided wherever necessary, and at some points where it is impossible to get the ditches alongside of the track low enough a "blind drain" through the center of the track may be put in and the water taken away underneath, leaving the surface in shape to drive over. At places where more water passes than can be taken care of with the ordinary drain pipe and not enough to require a bridge, it is better not to have the rails run across from abutment to abutment on stringers of iron or wood. Instead, a concrete slab reinforced with old rail or I-beams may be advantageously installed. This can be covered with ballast and this permits the track to be brought to surface without being tied to the height of the stringers or having a bad dip at their ends.

The subject of greasing curves looks like a minor detail and probably receives about as little attention as any one of the little things about track maintenance. On most roads this matter is attended to by the operating force and the track foreman has no say as to how or when it shall be done. A boy is usually sent out after being told to put the grease on the inside of the "high rail," or else he receives no instructions at all. He naturally greases at this point, with the idea that it will stop the wheels from climbing over the rail, which to a certain extent is correct. Yet if a heavily loaded car is run around a curve with the inside rail sanded the outer wheels are likely to climb the high rail, even if the high rail is greased. If they do not actually go over, they will rub very hard. The inside wheel must slide across the top of the inside rail, otherwise it must keep going straight ahead. A practice that the writer has made use of for years is to grease the top of the inside rail and thus allow the wheel on that rail not only to slip in its rotation, but to slide endways on that rail, taking much of the thrust off the high rail. Motormen who have run for years over track where the inside of the outer rail has been greased will generally regard with suspicion the custom of greasing the top of the inside rail of a curve. However, they soon find that the car goes around the curve more easily than before.

PRIZES FOR BALL TEAMS

An unusual scene was enacted in the offices of the Public Service Railway at Newark, N. J., last week, when President Thomas N. McCarter greeted a large group of employees, mostly trainmen, and handed out twenty-one gold watches and an even dozen watch fobs. It was an evidence of the lengths to which this company has gone in its welfare work among its men, for the recipients of the gifts were the winners and runners up of the Public Service baseball league. There were so many teams from the different carhouses that two leagues were formed, one in northern Jersey and the other in the southern end of the State. The North Jersey league was again divided into two sections for convenience and to minimize loss of time in traveling for home and home games. At the close of the regular schedule the Camden team had won the championship of the southern league and the Hoboken and Hilton teams were the winners in their respective divisions in the northern end of the State. These two played off, and Hoboken won.

As an incentive to the men and an evidence that the company management was encouraging their sports, announcement was made at the opening of the season that President McCarter would give watches to the individual members of the northern champion team and that Second Vice-president John J. Burleigh would do likewise for the southern champions. The fobs were added as consolation prizes for the Hilton players, and as an added surprise a watch was given to W. H. Shepherd, the league manager, by General Superintendent Newton W. Bolen.

The presentation of the prizes was made quite a ceremony. The three teams were brought to headquarters and met by Mr. McCarter and other executive officials. In giving the tokens, the president also gave a brief talk commending the men and touching on the company's interest in their welfare. The ball players had luncheon in the home office dining room and then went to Hilton, where Camden and Hoboken tried to settle the question of supremacy, but darkness intervened before five innings had been played. Both sides were satisfied, and Mr. Bolen took the three teams to dinner at the company's expense. Several other officials attended the dinner.

WELDING ON LIGHTING CURRENT

It is well known that the voltage required for arc welding is so low in comparison with the standard railway voltage from which it is obtained that about 80 per cent of the original input is wasted in resistances. On the face of things, this practice is most inefficient and one which should be abolished if possible. Where much welding is done it is a question of simple arithmetic as to whether it would pay to install a motor-generator set. The small user, however, still remains at a disadvantage. It has been suggested, therefore, that since most welding is done during the daylight hours, it might be profitable to purchase from

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the local lighting company direct current at 110 volts or 220 volts. One criticism of this plan is that owing to the fluctuations on an arc-welding circuit, the lighting company might object to the business because of the effect upon the lights of its other customers on the same line. This could be determined only by actual experience in each case, but it is probable that in most cases the effect on the voltage would be no greater than that caused when power motors are thrown on and off the circuit.

METALLIZED GRAPHITE FOR BEARINGS AND COLLECTOR BRUSHES

A new metallized-graphite product suitable for self-lubricating bushings, for collector brushes on dynamo-electric machinery, for packing rings in steam turbines and for many other uses where a self-lubricating metal is desired is being put on the market by the Graphite Metallizing Corporation, Yonkers, N. Y. The basic element of "graph-alloy," as it is called, is pure graphite, and to this constituent by a process of impregnation is added a molten metal to give the completed product solidity that it may be machined to the desired form and have the requisite strength and durability. The process of impregnation of the graphite with the metal is accomplished by the use of air pressure of high values, such as have hitherto been considered commercially impracticable.

Graphalloy has a high compressive strength and can be accurately machined, threaded or tapped with no more difficulties than are met with in working brass. For machining a speed about 25 per cent in excess of that used for brass is to be recommended. Some of the most important mechanical properties are given below:

Weight of solid graphite electrodes per cubic inch	0.057 lb.
Weight of graphalloy impregnated with babbitt	0.145 lb.
Increase in weight due to impregnation	150 per cent
Specific gravity of graphalloy	0.4 per cent
Percentage of metal in graphalloy by weight	60 per cent
Percentage of metal in graphalloy by volume	25 per cent
Compressive strength of graphalloy per square inch	14,000 lb.
Modulus of rupture	12,500 lb.

The lubricating qualities of this product are said to be practically those of graphite and the manufacturers claim that on light-duty machines operating at high speeds excellent results can be obtained. For use on circuit-breakers and other electrical contactors graphalloy is made from pure graphite and copper or brass as the service demands. Experiments have shown that for controller and circuit-breaker contacts which are being continually subjected to the action of an electric arc the best combination is graphite impregnated with brass, the theory being that the zinc in the brass vaporizes under the action of the arc and tends to disrupt it. It has been found that with this combination of materials less trouble is experienced from pitting. In cases where the lowest possible specific resistance is needed pure copper is used instead of brass. Graphalloy contacts are said to be entirely free from "freezing troubles."

Pressure, Lb., per Sq. In.	Current, Amp.	Current Density, Amp. per Sq. In.	Contact Drop, Volts
1.0	12	48	0.090
1.0	25	100	0.177
1.75	12	48	0.053
1.75	25	100	0.066
2.5	12	48	0.045
2.5	25	100	0.052

Tests made by the New York Testing Laboratories show that graphalloy slip-ring brushes have a specific resistance of 20.77 microhms per cubic inch. When these figures are compared with the specific resistance of a cubic inch of carbon, which is 1240 microhms, and of graphite, which has a specific resistance of 320 microhms per cubic inch, it will be seen that the combination product presents a large advantage in conductivity.

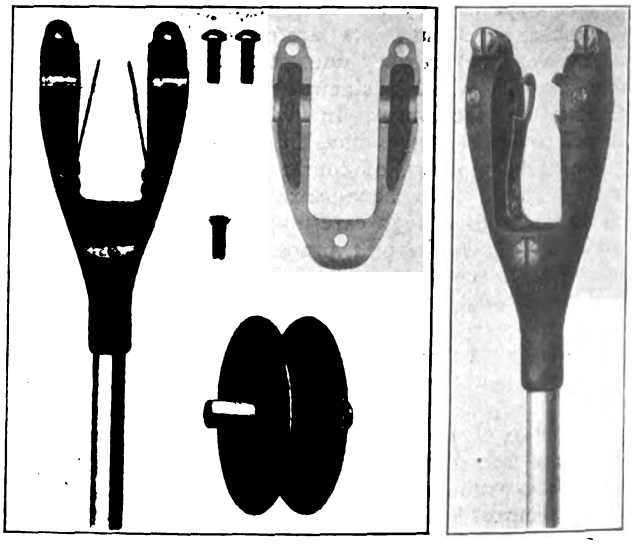
A table is also published of the various contact drops in voltage at a speed of 2500 ft. per minute and at various pressures used in commercial brush holders.

From this table it will be noted that the average contact drop is 0.07 volt. The current-carrying capacity of graph-alloy has been found to be approximately 200 amp per square inch, although the maximum allowable current density varies largely with the class of service and also with the limiting temperature of the brush.

A NEW TROLLEY HARP

A new trolley harp, embodying some distinctly novel features in design, has been added to the Western Electric Company's already extensive line of electric railway supplies. The new design, known commercially as the "M-B" trolley harp, is a radical departure from the former standard type, which made use of a graphite bushing.

The harp proper is made in two parts with two steel wheel bearings set in recesses and held in place by steel dowel pins. Both halves of the harp are provided with chambers for holding a lubricating device which consists of a wool yarn packing or oil wick which is saturated with heavy motor oil. To insure thorough lubrication, a slot is cut in the steel bearings so that the wheel spindle may come in contact with the wick. The oil chambers have sufficient capacity to hold a week's supply of lubricant. To replenish the oil supply, it is only necessary to press the point of the oil can against the spring checks on the top of the harp.



New Design of Trolley Harp and Parts

The trolley wheel is equipped with a bronze axle, which is sweated into the hub, and the combination of the bronze spindle or axle and the steel bearings is calculated to lengthen the life of the wheel to a considerable extent. Another excellent feature of the design is found in the fact that the tension of the trolley base keeps the wheel spindle resting on the bottom of the steel bearings. This has been found to aid greatly in reducing vibration and in increasing the conductivity. Furthermore, current is not conducted through the spindle or bearings, but is collected by strong bronze contact springs.

Several hundred actual service tests were made before the new trolley harp was finally declared ready for the market. These covered a period of over three years, and they have given the equivalent of over 10,000 miles of service for the harp when used in conjunction with a standard 4-in. wheel. The new design, with its various features which insure long service life, is particularly adapted to high-speed work, and is therefore desirable for both urban and interurban use.

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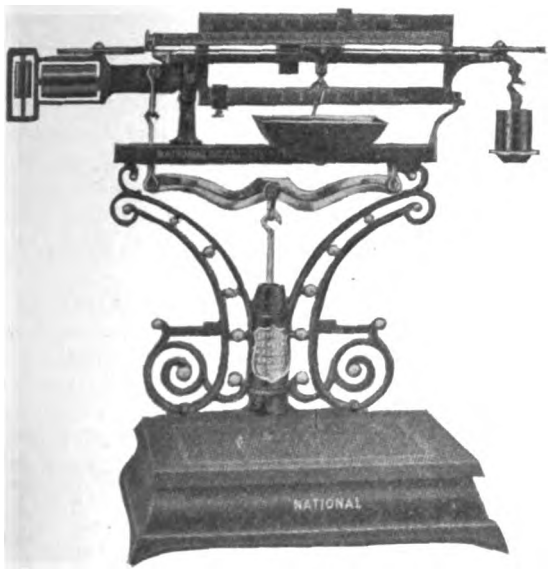
WEIGHING AND COUNTING MACHINE

Several electric railway companies, including those in Detroit and Philadelphia, are using a machine for counting transfers and tickets by weighing them. This machine is made by the National Scale Company, Chicopee Falls, Mass. This machine is so delicate that it can be used for



Weighing and Counting Machine

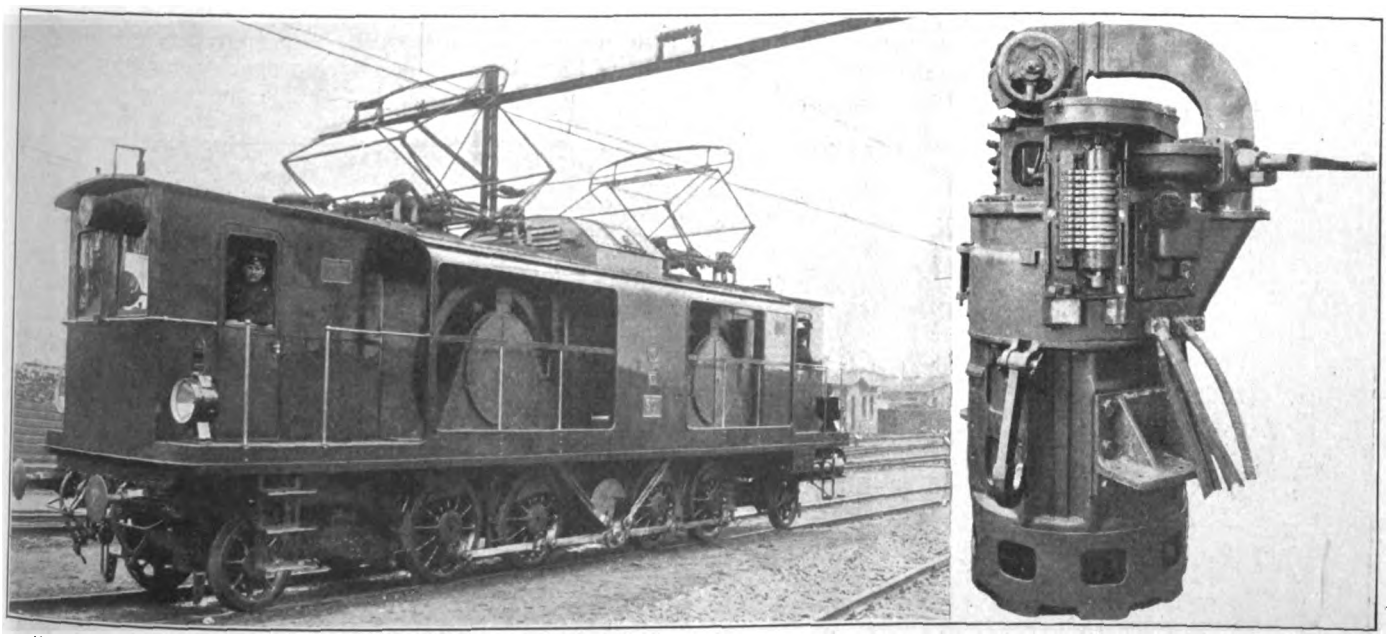
counting items weighing from 1/25,000 oz. to 15 lb. each, in capacities ranging from 8 oz. to 6 tons. This permits a very wide variety of applications. The machine illustrated is type No. 97, which counts pieces weighing ¼ oz. or more up to a weighing capacity of 100 lb.

To obtain the number of tickets, transfers, etc., the tare of the package is first set out on one of the weighing beams. Then enough pieces to represent the average condition of the stock are placed in the ratio pan on the counting bar. The pieces placed in this pan are not weighed, nor is it necessary to know their weight. The count obtained on the bar does not include the pieces in the ratio pan. After the articles to be counted have been placed on the weighing platform, the ratio pan is moved along the bar until the beam is in balance. The indicator above the pan, as set for a desired maximum, will then show upon the counting bar the number of pieces on the weighing platform. It is asserted that the count will be practically correct and more nearly absolute than any other method of counting. If the individual pieces themselves are subject to variation in weight, such a condition is overcome by increasing the number of pieces in the ratio pan. Weight may be obtained in addition to count as upon any other weighing machine. The capacity of any machine is limited only by its weighing capacity. By doubling or multiplying the number of pieces placed in the ratio pan, the capacity of the counting bar is doubled or multiplied in the required degree.

It is believed that machines of this character should save much time and labor in the auditor's office and the storeroom. In the former they can be used as already noted and even for checking standard coin-counting machines. If the transfers or tickets given up by passengers are segregated according to routes, the machines can be used to obtain traffic counts at lowest cost. In storerooms they are desirable to save time in counting accurately the number of bolts, nuts, screws and other small parts, because the ordinary storeroom scale is not accurate or fast enough for such work.

NEW DESSAU-BITTERFELD LOCOMOTIVE

The latest locomotive furnished by the Siemens-Schuckert Company for the Dessau-Bitterfeld single-phase electrification of the Prussian-Hessian State Railways is the combination freight and passenger type shown in one of the accompanying illustrations. This locomotive is designated as type 1-D-1, which means that it has one leading axle, four driving axles and one trailing axle. The driving axles are operated from two floor-mounted motors by means of crank rods, which are connected through the crank pins of a single jack-shaft. Each pair of driving wheels is on a separate truck. This locomotive is capable of drawing a train of 1200 metric tons at 21 m.p.h., or one of 700 tons at 34.7 m.p.h. For passenger service this locomotive can be operated at a speed of 55.8 m.p.h. The tractive effort at the circumference of the driving wheels is 39,600 lb. momentarily at starting and 18,040 lb. for one hour.



Semi-Inclosed Locomotive of the Dessau-Bitterfeld Line and Potential Regulator for Same

The superstructure of this locomotive is one of its most striking features, since only the end cabs for the engineer are fully inclosed, enough of the sides being left open to

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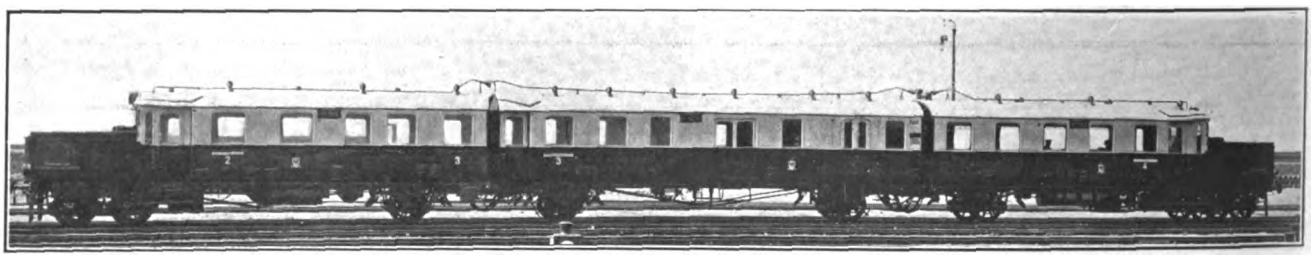
expose the motors and the sides of the transformer to the open air. The motors, however, are protected by means of sheet-iron covers, which may be raised for inspection whenever desired. In addition to the cooling effect of the open-side construction, special provision for the commutator is made by means of a ventilator. It will be noted also that a louver is built in the roof directly over the water-cooled transformer.

The high-tension oil switch is operated with compressed air. The control apparatus includes a main switch for each motor and two reversers. These switches are operated from a low-voltage control circuit. Speed control is attained through the potential regulator illustrated. An unusual feature of the locomotive outfit is an electrically heated boiler for use when passenger trains are hauled.

TRIPLET STORAGE BATTERY CARS IN GERMANY

In the chapter on self-propelled cars published in the Oct. 4 issue of the Electric Railway Journal an elevation was presented of the triplet car outfits which have recently been constructed for the storage battery car service of the Prussian-Hessian State Railways. The accompanying illustration shows one of these cars ready for use. The general arrangement of the end cars is like that of the standard twin articulated design which has been developed for these railways, but the middle car has been added primarily to give larger baggage and postal compartments or a greater variety of passenger classes. If the three cars are used exclusively for passengers, the passenger capacity is 167, but if baggage and postal compartments are provided, the passenger capacity is reduced to 118. As in the other cars, the batteries, which are mounted in cabs at the ends, were furnished by the Accumulatoren-Fabrik Aktiengesellschaft. The battery manufacturer states that the contract price for the maintenance of its standard batteries, as noted in the Electric Railway Journal for Oct. 4, should have been 3.4 cents instead of 3.04 cents; also that no equipments have been furnished for a greater operating radius than 111.2 miles. The equipment figures have also advanced about 5 per cent, as compared with the prices given in the former article.



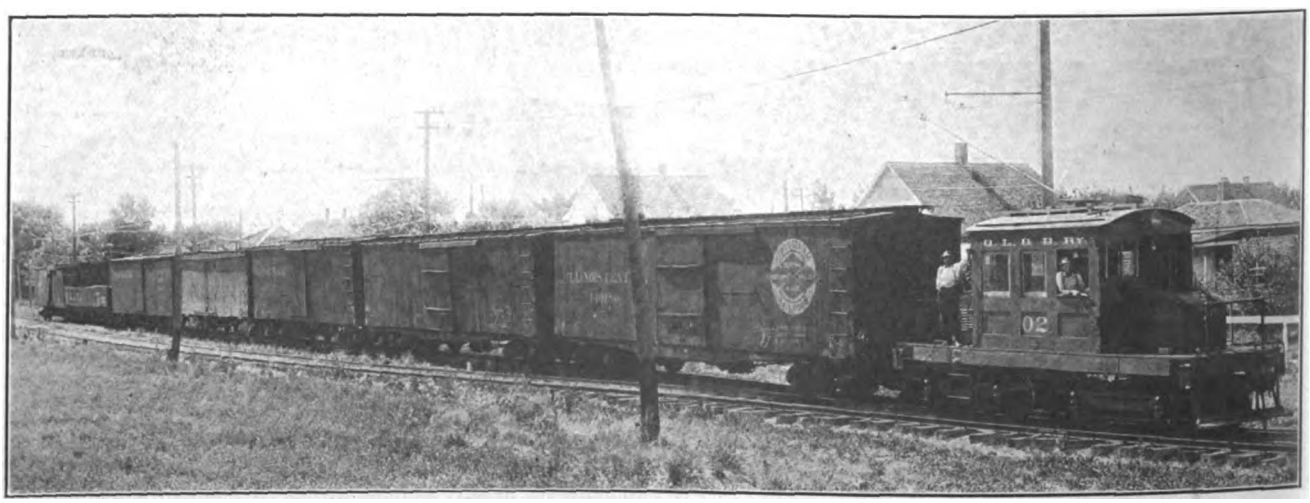
One of the New Triplet Storage Battery Cars, Prussian State Railway

SERVICE OF 31.5-TON FREIGHT LOCOMOTIVE

The Omaha, Lincoln & Beatrice Railway received in March, 1912, a 26½-ton Baldwin-Westinghouse electric locomotive equipped with four Westinghouse 101-K, 35-hp, 500-volt, non-commutating-pole railway motors and HL unit switch control. Shortly after this locomotive was placed in service it was ballasted up to 31½ tons, by means of long castings bolted to the underframe into the pocket provided for this purpose. The locomotive has pneumatic sanders, engine bell ringer and Westinghouse A.M.M. brakes with emergency features.

The locomotive is equipped with four rail-carrying hooks, two on each side, with a capacity of three rails each. This arrangement allows for the carrying of a small amount of rails and ties for light repair work, while heavy repair material can be carried on the work train hauled by the locomotive. In the winter when freight business is light the locomotive is fitted with a snow plow. At other times the locomotive may be used for switching, coal, lumber, emigrant cars, freight, express and baggage service and also for construction work. Up to the present time no repairs have been needed during over one year of service.

In view of the fact that the locomotive was ready to handle freight, the management of the road induced manufacturers to locate their plants at different points on the system. While the present freight service is not sufficient to keep the locomotive constantly at work, traffic is steadily increasing. On the 8-mile line between Lincoln, University Place and Bethany, this locomotive handles 2000 to 2500 loaded cars in and out a year.



Electric Locomotive of Omaha, Lincoln & Beatrice Railway Hauling Freight Cars

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LONDON LETTER

(From Our Regular Correspondent)

With regard to the offer made recently by George Balfour to purchase the tramways and electric light and gas undertakings of the Stirling Town Council, the tramways committee of the Council has recommended that Mr. Robertson, manager of the Greenock Corporation Electricity Works, be asked to report in regard to the electric light undertaking; that Peter Fisher, manager of the Dundee Tramways, furnish a report on the tramways, and that the Stirling Burgh Surveyor report to the Council as to the circumstances.

Three new lines are contemplated at Preston to link up portions of the existing system. A line will be constructed from Moor Park Avenue, on the Garstang Road, to Brook Street, near the Cattle Market, and join the present line at Ashton-on-Ribble. The second extension will connect the Fulwood line with Fylde Street. The existing dead ends in Corporation Street will be linked up, making a through line to the railway station. Another new line will be laid along London Road to Walton Bridge, a distance of 1 mile.

Large profits are reported at Wolverhampton, where the Lorain surface contact system of tramways is installed. The profits for the twelve months ended March 31 are £24,232, to which is added £306 profit on a motor char-à-bancs service. The traffic receipts for the year constitute a record in the history of the undertaking.

The special committee appointed recently by the Bristol Corporation to consider whether the corporation should take over the Bristol Tramway retained J. B. Hamilton and J. F. C. Snell to advise on the matter. As the result of the report of these two gentlemen, the committee recommends the Corporation to apply to Parliament for powers to work the company's undertaking if it should decide subsequently to acquire it.

A sub-committee representing the County Councils of Renfrew, Lanark and Dumbarton has been appointed to confer with representatives of the Corporation of Glasgow in order, if possible, to make an arrangement applicable to all the areas concerned regarding the conditions under which the Glasgow tramways should be extended outside the city boundaries. The question arose recently in connection with a proposal of the Corporation to extend its lines from Cathcart to Clarkston in the south and from Anniesland to Blaurarthill in the west. The county councils wish to stipulate that all widenings of roads or formation of new roads in connection with corporation tramway extensions should be carried out entirely at the expense of the corporation, but to the satisfaction of the district committees of the different county councils and according to their specifications. Hitherto the tramways have been bound to maintain only the roadways between their tramway rails and 18 in. on either side. The county councils think that the responsibility of the Corporation for maintenance should extend further.

A new petrol car has been completed for the Stirling & Bridge of Allan Tramway and has been tried on the Glasgow Corporation lines. The car, made by the Lanarkshire Motor Company, Glasgow, holds twenty passengers inside and twenty-four in open-air seats on the outside. The chassis is of the single trolley type, with axles 6 ft. apart, and the motor is of 25 hp with four cylinders. For keeping the engine cool there is a large radiator on the top of the car, connected by pipes to the water jackets of the cylinders. The flywheel and leather clutch are of the ordinary type, and the drive is through a three-speed gear box to double bevels lying centrally between the axles. A double sprocket is fitted, so that the drive is taken by both axles. The car, which is to run between Bridge of Allan and St. Ninians, through Stirling, will be the first of the kind in Scotland.

At a recent meeting of the Glasgow Town Council a motion was carried advising the Corporation to appoint a special committee to consider and report as to the feasibility of establishing a system of tube electric railways from the extreme east to the extreme west, and from the extreme north to the extreme south, as a means of solving the question of congestion on the streets. In seconding the motion it was suggested that parallel routes as a tramway reform would not relieve congestion very much, and the three remedies open to the Corporation to relieve congestion on the busy streets were aerial railway, underground tube and motor buses. This committee will consider the whole question.

The tramways committee of Newport Corporation has resolved to report to the Council in favor of promoting a bill in Parliament which would secure to the Corporation the exclusive power to provide services of railless trolley cars within the borough of Newport and certain adjoining areas. The committee is encouraged to report in favor of applying for powers to increase the services as the experiment with increased fares on the existing system of tramcars resulted in a substantial increase in revenue and in the number of passengers. Important sections of the town and suburbs are not reached by the present system, and, with the new powers, the docks and other places not hitherto served will be accessible. Conferences will also be held with local authorities in the lower part of the Western Valleys with a view to running the new cars in outlying districts.

The electricity committee of the Manchester Corporation has determined to erect a new station at Trafford Park with an output of 100,000 kw, though the first instalment of the plant will probably amount to only 25,000 kw. The new site is a considerable distance from the center of the city, but the economies which will be effected will be such as more than to balance any disadvantages. The delivery of coal by boat to the works will effect saving of as much as a shilling a ton, and if the necessary arrangements can be made with the Ship Canal Company condensing water will doubtless be available from the canal, obviating the necessity for the erection of cooling towers. The final effect of all the possible economies will be that whereas the cost of the plant at the existing stations works out at £20 per kw that at Trafford Park will probably be little more than half that amount.

The London County Council has under consideration the question of installing on the tramways of the Bermondsey Borough Council a service of cars worked by means of a petrol-electric generator. The Council is of the opinion, however, that it is desirable to test the working of the cars on a route which has already been electrified, and has accordingly applied to the Board of Trade, under the provisions of the London County Tramways (electrical power) act of 1900, for sanction to run cars of the type described as an experiment on the tramways between Tooley Street and Greenwich Church.

The highway committee of the London County Council for some time past, in order to popularize the tramways, has had copies of the tramways map and guide distributed in the Council's schools, and now has under consideration the question of further advertising the tramways. It has been decided to arrange a map, in twelve sections, indicating evening institutes and polytechnics, and to take various other steps to bring the tramways under the notice of those attending the Council's educational institutions. In the meantime the highways committee reports that for the eleven weeks ended Oct. 2 there has been an increase in gross revenue of about £14,000.

The general manager of the London, Brighton & South Coast Railway has announced that the extension of the electrification of suburban lines is to be rushed and that probably within a year all the stations on the line between Balham, Thornton Heath and West Croydon will have a fast electric service with London Bridge and Victoria. It is also intended to extend the electrification as far as Sutton and Cheam, on the Portsmouth line, and then to electrify between London, East Croydon, Purley and Stoat's Nest, the whole work being completed in from four to five years. There are at present 900 trains which run in and out of London Bridge Station each day, which is 50 per cent more than before the electrification of the South London and Tulse Hill lines, and 700 trains are now run from Victoria compared with 400 before electrification. The general manager states that under electric operation the company can run a train in and out of the station in one minute, whereas with steam it takes six or seven minutes.

A. C. S.

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News of Electric Railways

Progress with Unification Ordinance in Chicago

The sub-committee of the local transportation committee of the City Council of Chicago, which is considering the terms for the unification ordinance for the Chicago Railways and the Chicago City Railway, the members of the board of supervising engineers and the officers of the companies met on Oct. 18 and after a long session it was announced that only three points in the proposed merger ordinance remained unsettled after adjournment. Agreement had up to that time been reached on the following points:

"Surface lines of Chicago shall enter into a physical merger, providing for the unified operation of all railways.

"Through routing of all cars so far as local conditions permit—eliminating switchbacks and downtown switching.

"Purchase of enough additional cars to utilize completely the added track facilities, giving through routing and increasing downtown transportation facilities 30 per cent.

"More rapid transit by through service cars.

"Five-cent fare throughout the whole city.

"Accounting basis to be the same as under the old ordinance.

"Provision for investment in first mortgage bonds.

"Authority for the company to lease such property as it now owns but does not have immediate use for.

"Agreement of the city to guarantee payment of shortage in the receipts of the Calumet company, growing out of its failure to make 5 per cent.

"Heat within the cars to be 50 deg. Fahr. when it is 10 or more deg. above zero outside and 45 deg. when only 5 deg. above zero."

The three points which remained unsettled by the committee on Oct. 18 were the electrolysis provision, the price to be paid by the companies for street cleaning and the use of T rails in the outlying parts of the city instead of the standard type of grooved rail. These points have all been settled since then and the corporation counsel's office will draft a unification ordinance which will be presented to the Council on Nov. 10 for passage. It is expected that the ordinance will be passed in the form that it was submitted by the local transportation committee. It will be necessary to pass the ordinance as quickly as possible, owing to the fact that the Illinois State Public Utility Commission has been created, effective on Jan. 1, 1914. Following the passage of the ordinance by the City Council it will be necessary to give thirty days' notice to the holders of the securities of surface railways before submitting the matter to them for approval.

The proposed plan of merger submitted by the surface railways originally on Oct. 4, and published in the Electric Railway Journal of Oct. 11, page 698, formed the basis of the merger ordinance.

Section 2 of this ordinance, which provides for an operating agreement between the companies to carry out the provisions of unified service, has been fulfilled by the companies, and the form of agreement has been made a part of the ordinance. This agreement provides for a board of operation, consisting of seven members, four of whom shall at all times be chosen and be members of the board of directors of the Chicago Railways, and three of whom shall at all times be members of the board of the Chicago City Railway. This board is to be designated during the period of agreement as "Chicago Surface Lines Board of Operation." The first board of operation is to be appointed when the unification ordinance goes into effect and it will hold office from the date of its appointment until Feb. 1, 1917. The successors to this board will be appointed at the end of this period and every three years thereafter. The term of office of the members of the last board of operation will extend from Feb. 1, 1923, to Feb. 1, 1927, when the 1907 ordinances expire.

Other provisions of the operating agreement stipulate that the board of operation shall appoint from its members a chairman whose power shall be similar to a chairman of a board of directors of a corporation. To provide an umpire to settle claims of discrimination by the board of operation against any company, it is required that one be selected by the companies (acting by or under the authority of their respective boards of directors) within ten days after the unification ordinance goes into effect. The umpire's term of office will be the same as that of the board of operation, the first umpire's term expiring on Feb. 1, 1917. The terms of office of the succeeding umpires are the same as those of the board of operation, namely, three years.

Another provision of the operating agreement is that the board of operation is to appoint from its members an executive committee consisting of three members, one of whom will be designated as chairman. The purpose of this executive committee is to provide for authoritative action during the intervals between the meetings of the board of operation. It will possess and exercise all the powers of the board of operation in the management and direction of the affairs of the surface lines.

The agreement further provides for an executive officer who is to hold office during the existence of the board of operation appointing him. This officer will have charge of the management and operation of all the properties of the companies under the agreement. His authority will be similar to that of a president or general manager in actual charge of operation, and he will have authority to employ, suspend and discharge employees engaged in the operation and management of the Chicago surface lines. His jurisdiction, however, will not include those officers appointed by the board of operation, or the heads of departments who may also be officers appointed by the board of operation.

Another section of the agreement states that City Council is to have the same control over the board of operation, executive committee and executive officers as the City Council now has, with reference to the officers now managing and operating the several companies. It also is understood that this agreement contains nothing which in any way will affect the control over the operations of the street railway lines in the city now conferred upon the City Council and the board of supervising engineers by the traction ordinances.

The concluding paragraphs of the operating agreement include the disposition of receipts provided for in the 1907 traction ordinances, which stipulate that after all expenses of operation have been deducted 45 per cent of the net earnings shall be retained by the surface railways and 55 per cent be paid to the city of Chicago. The operating agreement also provides for a division of the gross receipts between the several companies entering into the agreement.

An inventory of all materials and supplies of each company will be taken as soon as possible after the execution of the agreement. The board of operation will take possession of such material and supplies and make proper credit to each of the companies to the amount of its interest in such material and supplies. In conclusion the operating agreement provides that as soon as possible after the unification ordinance becomes effective, and not later than Feb. 1, 1914, unified operation of all the surface lines under the ordinance will be affected.

Under Section 5 of the unification ordinance, the railways are authorized to lease from time to time any real estate belonging to them and not used for transportation purposes, for such period and upon such terms as shall be approved by the board of supervising engineers and the city comptroller. The net income derived from such source is to be considered and accounted for by the companies as a part of their gross income under the present traction ordinances.

Section 6 of the ordinance provides for the re-use of rail having a wearing life of not less than five years. Under the old settlement ordinance it was necessary to scrap all rail regardless of its remaining wearing life. Under this provision such rails as may be repaired and relaid as directed by the board of supervising engineers will be allowed to remain in the street during their remaining wearing life.

At the time the proposed plan of merger was introduced L. A. Busby, president of the Chicago City Railway, raised the point that the city should clean the streets and bill the

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companies for cleaning their right-of-way. As a result of a conference between the commissioner of public works and the engineers of the railway companies, it was agreed that a sum of $51.50 per month should be charged for cleaning each mile of double track operated during a five-year period. Heretofore the city has been doing the work, but disputes arose as to the amounts of the bills rendered by the city to the companies, a contingency which this new contract removes.

Terms, provisions and conditions with reference to electrolysis prevention were included in the unification ordinance. The discussions and final terms of agreement on this subject are recounted elsewhere in this issue.

In Section 9 of the unification ordinance the city of Chicago agrees to pay to the Calumet & South Chicago Railway, out of its 55 per cent of the net receipts of the South Side surface lines, a sum equal to the aggregate annual deficit of this company as defined in the settlement ordinance, including interest adjustment at the rate of 5 per cent per annum. The board of supervising engineers has computed this aggregate amount of deficit accruing up to July 31, 1913, and found that it was $303,545. By the acceptance of this provision of the ordinance the Calumet & South Chicago Railway relinquishes all claims and rights under its existing ordinance to charge or collect the second additional 5-cent fare in the territory south of Seventy-ninth Street, as now permitted by its ordinance.

One clause of the ordinance provides that in all construction or reconstruction of sewers and water mains in the streets now occupied by railway tracks, when the width of the street and the location of the underground structures permit, they are to be placed in the street so as not to cause removal of the street railway track. This question has been raised a number of times under the old settlement ordinance and disputes always arose over the proper accounts to which work of this character should be charged. The railway companies contended that it should be a capital charge while the city insisted that it should be taken from operation.

Another provision of the ordinance includes authority to use high T-rails of a design satisfactory to the board of supervising engineers for future track construction in paved streets. This authority is made revocable, however, as it provides that in case the Mayor and City Council do not approve of track constructed in this manner, they may require the company to replace it with the standard 129-lb. girder-groved rail.

The ordinance also provides that the companies may lay temporary tracks on unpaved streets, or streets where the sewer and water supply pipes have not been constructed, of such types as may be approved by the board of supervising engineers. Under the old ordinances the companies were required to build both permanent and temporary tracks of standard rails and ties, the variation being allowed only in the foundation.

In compliance with the request of the companies the clause covering the heating of cars has been modified as follows:

1. A minimum temperature of 50 deg. Fahr. above zero shall be maintained in all cars in service carrying passengers when the outside temperature is 10 deg. Fahr. above zero or higher.

2. A minimum temperature of 45 deg. Fahr. above zero shall be maintained in all cars in service carrying passengers when the outside temperature is below 10 deg., but not below 5 deg. Fahr. above zero.

3. When the outside temperature is below 5 deg. Fahr. above zero, the temperature in all cars in service carrying passengers shall be maintained at 45 deg. Fahr. above zero, or as near this point as the continuous operation of all heaters in the cars to their full capacity will permit.

Tennessee Power Company Opens Another Plant

The second hydroelectric plant of the Tennessee Power Company on the Ocoee River, in the Appalachian Mountains of southeastern Tennessee, near Parksville, was placed in operation on Oct. 23. This plant, together with the other, 7 miles away, on the same river, will ultimately produce a total of 68,000 hp. The power is transmitted to Knoxville, Chattanooga and Nashville, Tenn., and to Rome, Ga. The length of the transmission line to Nashville is 150 miles.

The total cost of these two power developments on the Ocoee, which are practically two units of the same plant, was about $5,000,000. Both were constructed by the J. G. White Engineering Corporation. The one which is just completed took fifteen months to build. In the former the chief feature of the work is a gigantic dam of concrete. In the latter it is an open flume nearly 5 miles long, by which the flow of water is carried along the mountainside. At the end of its journey it passes through steel penstocks, dropping 250 ft. to the turbines. These are of the pressure type, and each has a capacity of 10,000 hp. The transmission line is built for 120,000 volts, but is operated at present at 66,000 volts. The generators are connected to transformers which step the current up to that voltage.

In addition to the 47,000 hp which the Tennessee Power Company generates at its two developments it has the use of 40,000 hp in steam stations belonging to companies with which it holds contracts. The company is already supplying, over transmission lines of 420 miles, all the current used by the Chattanooga Railway & Light Company, Knoxville Railway & Light Company, Nashville Railway & Light Company, Rome Railway & Light Company and Cleveland Electric Light Company, together with numerous other concerns, constituting almost the entire electrical market of eastern and central Tennessee. The population served by those companies is estimated at 330,000.

Complaint Filed Regarding Service in Rochester

A 3-cent car fare with full transfer privileges in rush hours, the re-routing of several lines in the central part of the city and the abandonment of a down-town carhouse for housing purposes, except for cars it is necessary to keep in the center of the city, are demands made by Mayor Hiram H. Edgerton of Rochester, N. Y., in a complaint filed with the Public Service Commission of the Second District of New York against the New York State Railways, Rochester Lines. The complaint is based upon a recent investigation following action taken by the City Council on July 22, 1913. The hearings will start on Nov. 24.

It is charged in the complaint that the income of the street railway system in the city and suburbs exceeds $1,200,000, after paying operating expenses and the necessary reserve, and that a sum exceeding $1,200,000 was set aside for the payment of dividends on the capital stock of the New York State Railways. The gist of the complaint is that all the money set aside to pay these dividends was derived from the Rochester lines and that no revenue was derived from the Sodus line or the Rochester & Eastern line. It is claimed that the money set aside was sufficient to pay dividends of not less than 15.5 per cent on the capital stock of the New York State Railways.

Following is the text of the demand for a reduction in fares:

"That the New York State Railways charges the sum of 5 cents for one continuous ride within the limits of Rochester; that such rates are unjust and unreasonable, and the city of Rochester asks that the New York State Railways be permitted to charge only the sum of 3 cents, with full transfer privileges, for one continuous ride within the limits of the city of Rochester between the hours of 5 a. m. and 8.45 a. m. and 4.30 p. m. and 6.30 p. m. on all days except Sundays; that such proposed rates are sufficient to yield reasonable compensation for the service rendered by said New York State Railways and to yield a reasonable return upon the capital actually invested in the street railway system in the city of Rochester and its suburbs."

The second complaint relates to the routing of two lines, which is declared to be "unjust, unreasonable and inadequate." The request is that the cars run down Main Street east to the Four Corners, except during the rush hours between 5 and 6.30 o'clock in the evening. The complaint against the maintenance of a storage carhouse in State Street is based on the congestion and inconvenience to the public, interfering with the use of the street by pedestrians and drivers of vehicles as well as impeding the operation of street cars that run in State Street.

The special railroad committee of the City Council in-

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vestigated electric railway conditions and made an extensive report which was served upon officials of the company some time ago. At that time the recommendation was made and the company was asked to reduce the fares to 3 cents during the rush hours. The New York State Railways failed to make the reduction asked for, but it proceeded to put new cars in operation on all lines and to reconstruct many of the cross-town lines. The company also laid much new track in accordance with the recommendation of the Council. After the company had filed an answer to the recommendations of the Council committee and had stated that the reduction of fares during the hours specified was impracticable and that it would not follow out the recommendation, it was decided to ask the Public Service Commission for the reduction.

Chicago Terminal Recommendations Presented

John F. Wallace makes the following recommendations in his report to the terminal committee of the City Council of Chicago:

Establishment of two passenger terminals, one on the West Side and the other at Twelfth Street and the lake front.

Passage of an ordinance allowing plans of the Pennsylvania Railroad, as modified, to be carried out, and permitting Illinois Central to erect a terminal to care for the South Side roads.

Elimination in the course of time of the Dearborn, La Salle and Grand Central terminals.

Adjustment of the routes of surface traction lines to agree with the "two-station" plan.

Widening of Canal Street 100 feet from Twelfth Street to Harrison Street, and, if possible, farther north, by extending it eastwardly over railroad property and supporting it over the tracks.

Reconstruction of Canal Street upon two levels, the upper plane for rapidly moving through traffic and the lower for local hauling. The through cross streets to connect with the upper level and the short cross streets with the lower.

Extension of Monroe Street across the river, making it available as a continuous avenue to the West Side.

Reconstruction and widening of Harrison Street by increasing the width of the roadway to the present building line on each side, arranging for sidewalks by cutting back the first stories of the buildings and forming an arcade.

Approval of the Pennsylvania freight terminal west of Canal Street, providing plan is amended to eliminate objections set forth.

Move north line of main freight building back from Van Buren Street to Harrison Street.

For elevated structure carrying tracks from Twenty-first Street and Stewart Avenue northward to Taylor Street depressed tracks should be substituted north of the river so as to pass under all intervening streets.

Widening of Twelfth Street westward and extending Michigan Avenue to the North Side.

Widening of the principal thoroughfares connecting the central district with the North, South and West Sides of the city.

Establishment of a clearing house for handling less than carload lots of freight outside of the city limits.

At the meeting of the committee at which the report was received Alderman Ellis Geiger, chairman of the committee, read a letter from Alfred L. Baker, president of the City Club, requesting that action on the report be deferred until Bion J. Arnold, retained by the citizens' terminal plan commission, could present his criticism of the finding. The committee notified Mr. Arnold to state what progress he had made, so that it could be determined whether it was advisable to wait.

Opinion of City Solicitor in Regard to Re-routing in Philadelphia

In an opinion submitted to Councils holding adversely as to the Philadelphia Rapid Transit Company's right to re-route its lines without Councils' permission, City Solicitor Ryan summarizes his conclusions as follows:

"First—Under the constitution, no street railway can be constructed in Philadelphia without the consent of Councils.

"Second—The charters of the various street railway companies now controlled by the Philadelphia Rapid Transit Company, as well as the various ordinances granting them permission to occupy streets, designate specifically the streets to be occupied and the routes to be followed by the cars, and these franchises are based upon the reciprocal duty of the company to run its cars for the accommodation of the public over the streets and routes authorized.

"Third—The act of May 15, 1895, does not authorize the Philadelphia Rapid Transit Company to run its cars along other streets or routes than those for which permission has been given by ordinance of Councils.

"Fourth—The contract between the city and the Philadelphia Rapid Transit Company, authorized by ordinance of July 1, 1907, does not relieve the company of the duties imposed upon it by the franchises which it now controls.

"Fifth—The Philadelphia Rapid Transit Company has no right without the consent of Councils to re-route its system so that the cars shall be run over different routes from those authorized by ordinances, and especially has it no right when such re-routing increases the cost of public travel."

The executive committee of the Philadelphia Rapid Transit Company in its reply to City Solicitor Ryan's opinion denying the company's right to re-route its cars without Council's consent points out, first, that the re-routing was based on a scientific study of the flow of traffic and was designed to give better transportation facilities. Secondly, it was only commenced after full publicity and consultation with various civic bodies. Thirdly, re-routing has been frequently practised before, as in the case of the Darby and Lancaster Avenue lines, which would stop at Thirty-second and Market Streets if the old franchise routes were followed. The company also maintains that its right to re-route does not rest upon expediency or practice but has been expressly granted by the Legislature. The statement quotes from the act of May 15, 1895, which confers on street railways controlling or leasing different lines the right to operate the same "as a general system," and "from time to time lay out new routes or circuits . . . as will in the opinion of the operating company best accommodate public travel." The consent of Councils is not required under this act and the company is made the judge of what constitute the best routes. The Supreme Court of the State, in interpreting this act, has said, "The company is bound to keep pace with the progress of the age in which it continues to exercise its corporate rights."

Newark Terminal Plan Progress Reviewed

Thomas N. McCarter, president of the Public Service Corporation of New Jersey, reviewed the history of the company's plan for the erection of a terminal in Park Place and the re-routing of its lines in Newark at a hearing on Oct. 22 before the Board of Public Utility Commissioners of New Jersey on twenty-seven applications made by the company to the city in connection with its plan. All of the twenty-nine franchises necessary for the carrying out of the project have been granted by the Board of Works, but under the State law the grants by the city body must be approved by the Utility Commission, which has already approved of two. Mr. McCarter likened the proposed terminal to the Hudson terminal in New York. Incidentally, he said that the cost of putting the plan in operation would be nearly $5,000,000. He told of the congestion, due to the city's peculiar formation, which has made its electric railway service unsatisfactory, and declared that the proposed plan possessed merits which would correct the prevailing evils. Referring to the Morris Canal, he said that it would afford ideal opportunities for a subway running east and west, which would permit the development of an interurban service. The delay of action on the proposed abandonment has been a disappointment to him. The proposition of having subways along Broad and Market Streets was also mentioned by Mr. McCarter, and he declared that the proposed subway which the company would construct across Broad Street at Cedar Street would not interfere with any future subway.

As has been stated previously in the ELECTRIC RAILWAY JOURNAL, the company proposes to modify its transfer plan. This matter was referred to at the hearing on

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Oct. 22, and Mr. McCarter explained that the company was willing to give a transfer on a transfer, but he declared he would never be a party to an agreement which would permit a passenger to cheat the company by making a round trip for a single fare.

The Boston Arbitration Hearings

The board of arbitration sitting in the Boston Elevated Railway wage and working conditions investigation resumed its sessions on Oct. 29 to enable the company to reply to the case submitted by the employees' organization. Frederic E. Snow, counsel for the company, presented the opening statement of the road's position. He reviewed the points at issue and set forth in detail the present financial condition of the corporation. Important features of the company's case are its existing obligations for the financing of improvements, the effect of the so-called nine-hours-in-eleven law upon its operating costs, and a comparison of its wage scales with those prevailing elsewhere, the last being highly favorable to the company.

The company must provide $6,350,000 in the near future for improvements to which it is committed. Its stock is selling below par, so that under present conditions no part of this capital can be raised by the sale of additional stock. Only about half the necessary money can be raised by the sale of bonds under the existing statutes. The present outstanding capital stock of the company is $23,879,400, for which the company has received in cash from its stockholders, $26,586,828. Practically every dollar paid in is represented by permanent investment. The company has paid 6 per cent dividends to its stockholders. It proposes to show that the working conditions are fair and reasonable, that it pays more than the going rate of wages for similar work under similar conditions and that it can get all the help it needs at the present wages and working conditions.

The payroll of Aug. 1, 1913, had 9474 employees, of whom 4591 were surface conductors and motormen, 443 elevated trainmen, 913 in stations and miscellaneous transportation work, 556 in carhouse service, 1029 in the department of maintenance of way, 161 in the department of wires and conduits, 446 in power and substations, 798 in repair shops and 537 in other departments. The average payment per employee last year was more than $760. Chairman Howard Elliott, of the New Haven system, stated that the average payment to its 93,000 employees was about $700 per year. The total Boston Elevated Railway payroll for the fiscal year 1913 was about $7,250,000, of which $3,720,000 was paid to motormen, guards, conductors and brakemen. In the daily rush hours there was work for more than twice as many motormen and conductors as at other times. From 40 to 45 per cent of the men were "regulars" and 25 per cent "regular extras." Since Jan. 1 the regular men receive for nine hours' work the pay formerly received for ten hours' service. The regular extra men receive for nine hours' work the pay formerly received for an actual working time of eight hours thirty-six minutes, but the length of time between the first car in the morning and the last car at night has been cut from sixteen hours twenty-nine minutes to fourteen hours fifty-six minutes. The present rate paid by the company to extra men was higher than that paid by other companies similarly situated, and as a rule the others do not have the guaranteed $12 minimum weekly wage.

An exhaustive study by the company of the wages received by motormen and conductors of at least five years' standing indicates that they averaged $17.40 per week, or $907.59 per year, eliminating those not working at least six days per week. In four representative weeks it also appeared that 991 first-year men earned $12.39 per week; 428 second-year men, $14.27; 531 third, fourth and fifth-year men, $15.47; 521 sixth to tenth-year men, inclusive, $16.80; 346 eleventh to fifteenth-year men, $17.55, and 564 sixteenth-year men and above, $17.87. The minimum rate of 25.6 cents per hour paid by the Boston company for first-year men was higher than the rate paid by any other company in New England or in the Middle Atlantic States with the exception of the Empire United Railways, Syracuse, N. Y., which pays 24.5 cents per hour for the first six months and 26.5 cents for the second half-year, and the Hudson Valley Railway, which pays a flat rate of 27 cents per hour regardless of the length of service. The maximum rate of 28.9 cents per hour paid at Boston was higher than that of any other company in New England, and with few exceptions was higher than the maximum paid by any company in the Middle Atlantic States. Up to and including the third year of service the rate of 26.8 cents per hour paid by the Boston Elevated Railway was higher than that of any other company in Massachusetts except the Berkshire, Springfield and Worcester companies, which pay 27 cents to third-year men. The Connecticut Company pays 23.5 cents to third-year men. The rates of the Brooklyn Rapid Transit Company are from 24 to 28 cents per hour compared with the Boston rates of 25.6 and 28.9 cents, and for every year of service the rate per hour at Brooklyn is less than at Boston. It takes the man at Boston longer to reach the maximum pay, but his average is higher in the intervening years. Elevated guards at Boston range from 23.9 to 27.3 cents as compared with 23.5 and 26 cents on the Manhattan Railway, New York. Brakemen on Boston rapid transit lines receive from 21.2 to 24.5 cents compared with 22 and 25 cents in Philadelphia and 20 and 23 cents in Brooklyn and Manhattan.

It is figured that the adoption of the two-class system for shop employees as proposed by the employees' organization would cost the company $110,728 more per year than the present wages, including a 15 per cent raise in the former. Applications for employment greatly exceed the number of positions available. In the ten months ended June 30, 1913, 3252 men applied for employment as motormen and conductors; 1579 were rejected, 1673 were accepted.

Regarding piece-work, Mr. Snow stated that while the amount done in the company's shops was relatively small, figures for four recent weeks show that shop employees working by the piece earned from 55 to 71 per cent more than if they had worked at the regular rates per hour. It is advantageous to employees and economical to the company. It would be against the interests of economical operation to grant free transportation to employees not in uniform.

Regarding the nine-hours-in-eleven law, the company submitted a discussion showing how its terms cripple the schedule department in laying out work to be handled at a reasonable cost, and contended that if the full effect of this statute is pressed by the men, it will cost the road about $1,000,000 a year more than at present to operate its service. Owing to the irregularity in the amount of transportation required at different times of the day, no street railway like that at Boston could be properly or economically operated under the limitations of such a law as the one in question. The change from the ten-hour to the present nine-hour day on Jan. 1 last was costing the company from $150,000 to $200,000 a year. The permanent investment of the company had increased from $25,291,913 in 1897 to $105,684,146 at present, or 317.8 per cent, compared with a gross income increase of 94.6 per cent. The number of free transfer points had increased from fourteen to 103, and the number of free transfer passengers has increased from 23,177,726 to 217,568,572 per year. The ability of the company to maintain its service standards, and in fact its very existence, was largely dependent upon the outcome of these proceedings.

Progress with Rapid Transit Construction Contracts in New York

When the dual system agreements were signed with the Interborough Rapid Transit Company and the Brooklyn Rapid Transit Company not one section of the Seventh Avenue line, in Manhattan, was under way. Since then the Public Service Commission has opened bids for one section, has advertised for bids for two additional sections, will soon advertise for two more, and during November will hold hearing on the forms of contract for the last two sections of that line. By the first of the year, therefore, the whole Seventh Avenue subway, from Times Square south to the Battery, should be under contract. Plans for additional sections of the Broadway subway, in Manhattan, and for subway extensions in Brooklyn, the Bronx and Queens have also been completed. In the borough of Queens every construction contract for all the new lines in that

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borough has been placed, with the exception of the Steinway Tunnel from its present terminus to the Queensboro Bridge, and that is now being advertised.

In Brooklyn the New York Municipal Railway Corporation (Brooklyn Rapid Transit) has been authorized to contract for the reconstruction of the Sea Beach line, which will connect the Fourth Avenue subway with Coney Island, and work thereon has been started. The same company also has been authorized to contract for the building of the proposed line through Thirty-eighth Street, Brooklyn, to connect the Fourth Avenue subway with the proposed elevated railroads through New Utrecht Avenue and Gravesend Avenue to Coney Island. Work has also begun on this line. It is expected that this road, as well as the reconstruction of the Sea Beach line, will be finished within eighteen months. The commission has about completed the plans for the elevated railroad through New Utrecht Avenue and will soon advertise for bids for its construction. It also has the plans for the Gravesend Avenue, or Culver line, well under way and will advertise for bids for its construction within a short time. Plans are also approaching completion for the two new tunnels under the East River—one for operation by the Interborough Rapid Transit Company and the other by the New York Municipal Railway Corporation. These should be ready to advertise before the end of the year. Plans for the Eastern Parkway subway in Brooklyn and its connections are also well advanced. The first sections of the line, from the end of the existing subway along Flatbush Avenue to Eastern Parkway, will be submitted to bidders within a short time.

In the Bronx three separate lines of feeders for the new subway system will soon be under construction, namely, the Pelham Bay Park branch, the Jerome Avenue branch and the White Plains Road branch. The plans for all these branches are nearly completed, and while it is necessary to hold a few hearings on forms of contracts for new sections, a large portion of the work will be put under contract during November. The total amount of money to be expended by the city of New York in the construction of new lines under the dual system contracts is estimated at $200,000,000. Of this amount about $83,000,000 worth of work is already under contract, and it is expected that $65,000,000 worth additional will be ready to let by the close of the year; so that by Jan. 1, 1914, nine months after the signing of the dual system agreements, three-fourths of the city's part of the work should be under way.

The commission has consented to the assignment of the contract for Section No. 1 of Routes Nos. 10 and 22, the Southern Boulevard and Westchester Avenue branch of the Lexington Avenue subway, from the John F. Stevens Construction Company to the Richard Carvel Company.

New Chart of Organization.—The San Francisco-Oakland Terminal Railways, Oakland, Cal., issued under date of Oct. 1, 1913, a new chart of organization. The chart covers the changes which have been made in the scheme of organization of the company since the property was placed in the hands of trustees.

Canadian Pacific Electrification Plans.—Thomas Shaughnessy, president of the Canadian Pacific Railway, has denied the report from Milwaukee crediting him with stating that the whole Canadian Pacific Railway system might be electrified. It is intended to electrify Rogers' Pass tunnel, and if this proves successful to extend the electrification over the mountain division from Revelstoke to Field, B. C.

Short Strike in Knoxville.—Fifteen employees of the Knoxville Railway & Light Company, Knoxville, Tenn., recently went out on strike because the company did not recognize a union that a visiting agitator endeavored to form. Only eight men joined the body, however, and the strike was settled peaceably in two days. One hundred and sixty-five employees signed a published statement to the effect that they had no grievance against the company.

Duluth Franchise Case.—Federal District Judge Amidon recently dismissed the application of the Central Trust Company, New York, N. Y., for an injunction to restrain the city of Duluth from bringing suit to test the validity of the franchise of 1881 under which the Duluth Street Railway operates. The case has since been argued, the company closing with the defense that for more than a quarter of a century the State and the city repeatedly recognized the legislative franchise granted to the company in 1881.

Plan to Amend West Virginia Commission Law.—Unless the present Public Service Commission law of West Virginia gives the commission absolute authority to control rates of public service corporations, the Legislature will be convened in extraordinary session at once and the law will be amended, according to a statement issued by Governor Hatfield, apropos of the questioning by representatives of gas and water companies as to the authority of the commission to prevent gas companies in the northern part of the State from increasing their rates.

London & Port Stanley Electrification Approved.—The by-law to raise $700,000 in debentures to provide funds to electrify the London & Port Stanley Railway was carried on Oct. 22. As a result of the vote the City Council must now appoint a board to take over the control of the steam road to Port Stanley. This will be done immediately, and Adam Beck, chairman of the Hydro-Electric Power Commission of Ontario, is to be offered the chairmanship. Engineer Warfield, who reported favorably on the project, will probably be general manager of the line. He declared that the road will be ready for operation by electricity by next June if preparatory work is started at once.

Meeting of Toronto Council Postponed.—The special meeting of the Toronto City Council called for Oct. 23 to discuss the proposal to purchase the property of the Toronto Railway and Toronto Electric Light Company has been postponed. Mayor Hocken has announced that the meeting will probably be held in the first week of November, after the reports of Auditor John Mackay and Engineer H. H. Couzens have been presented. The former document, which is to deal with the proposed purchase from the standpoint of its financial merits or demerits, is expected about Nov. 1. The report of Mr. Couzens will state the advantages or disadvantages of amalgamating the electric light property with the city's hydroelectric system.

Municipal Ownership Propcsals in British Columbia.—A joint committee of members of the City Council of Nelson, B. C., and business men formulated a plan recently for the purchase by the municipality of the street railway system owned by the British Columbia Electric Railway. Following the suggestion made recently by Mayor Baxter of Vancouver that the city purchase the street railway system from the British Columbia Electric Railway, Alderman McMaster moved that the company be asked to state on what basis it would be willing to dispose of the system to the city. On receipt of the statement of terms the Council will probably seek through a plebiscite to obtain power to act.

Extension of Time for Installation of Block Signals.—The Public Service Commission of Indiana has granted the Terre Haute, Indianapolis & Eastern Traction Company, Union Traction Company of Indiana, Fort Wayne & Northern Indiana Traction Company, and the Ohio Electric Railway an extension of time of three months from Oct. 1 to complete the installation of the block signals which were ordered for these lines for the year 1913. The companies petitioned the commission for the extension of time. They showed that they had completed all their work for the installation of these additional signals, but that the signal company had not been able to get all its material on the ground in time and that it was impossible to complete the work by Oct. 1.

Mayor Harrison of Chicago on Subway Matters.—In a speech which he made at the recent annual municipal dinner of the Chicago Association of Commerce Mayor Harrison, in reviewing the problems before the city for settlement, said: "In the matter of subways we are like the Duke of York—we have marched up hill and down again. There are three forms of subways proposed to Chicago. The first is a system in the 'loop' district for surface lines; the second is for elevated roads in the 'loop' district, and the third is a comprehensive system of underground routes. The first of these I believe to be a delusion and a snare, and it will not relieve congestion in the central district. At present

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the surface lines do not want the elevated roads to have subways and the elevated roads do not want the surface lines to have subways and neither wants a franchise to be awarded to outside parties."

Plans Outlined for Proposed Subway in St. Louis.—James D. Houseman, president of the St. Louis & Western Traction Company and the St. Louis County Belt, Illinois & Eastern Traction Company, has issued a prospectus explaining his plans for rapid transit facilities for St. Louis and its suburbs at a cost of $17,000,000. According to the prospectus these plans include a subway for the downtown district, with an elevated extension in the West End, two interurban systems, one in Missouri and the other in Illinois, two new bridges, one across the Missouri and the other across the Mississippi River, and an electric belt line around St. Louis, paralleling the city limits. The prospectus contains a map showing the route of the subway, the St. Louis County Belt Railway line and the location of the two proposed new bridges, for which he has obtained franchises, as well as a copy of the bill for a subway franchise, which was introduced in the House of Delegates on July 15, 1913, as referred to previously in the ELECTRIC RAILWAY JOURNAL.

Seattle Accepts Highland Park & Lake Burien Railway.—The City Council of Seattle, Wash., has passed an ordinance accepting as an unencumbered gift the property of the Highland Park & Lake Burien Railway, including the line extending from Iowa Street and Alki Avenue to Lake Burien, a distance of 9 miles, half of the line being within the city limits and the whole of it within King County. Councilman Oliver T. Erickson announces that as soon as the property of the Seattle, Renton & Southern Railway is acquired by the city he will introduce a bill authorizing the issuance of $100,000 of utility bonds in order to extend the Lake Burien line from Iowa Street and Alki Avenue across the Waterway to a connection with the Seattle, Renton & Southern Railway on Jackson Street, and later will urge the issuance of similar bonds for an extension of the municipal street railway lines into the Green Lake district. A. L. Valentine, superintendent of public utilities, estimates the cost of making the extension from West Seattle to Seattle Boulevard at $113,000, the cost of a substation at $10,800 and the rehabilitation of the line at $6,400.

Arrests in Connection with Disorder During Recent Indiana Strike.—As a sequel to the recent short-lived strike on the Indiana interurban lines, United States Marshal Edward H. Schmidt and his deputies made a trip to Mooresville, Ind., on Oct. 6, and on affidavits sworn to by Post Office Inspector William T. Fletcher arrested twelve men, the specific charge being the violation of the federal law against obstructing the United States mails. Several of the men were trainmen in the employ of the Terre Haute, Indianapolis & Eastern Traction Company who had reported for work upon the company's ultimatum which ended the strike in August. The other men were former employees who had been discharged. On Aug. 25, after the last car had completed its night run, poles and wires were cut near Mooresville, on the Martinsville Division of the Terre Haute, Indianapolis & Eastern Lines, and the poles laid across the track. The first car from Indianapolis on the morning of Aug. 26, carrying the mail for Mooresville, was compelled to return to Indianapolis on account of the poles and high-tension lines being down, which brought about the arrest of the twelve men on Oct. 6. The men were all arraigned for a hearing before United States Commissioner Howard S. Young on Oct. 6. They asked for time to obtain counsel, and the case was continued.

PROGRAM OF ASSOCIATION MEETING

Railway Business Association

The annual meeting of the Railway Business Association will be held at the Waldorf-Astoria Hotel, New York, at 11 a. m., on Dec. 11. The election of officers will take place at 1:30 p. m. and in the evening the annual banquet will be held. The speakers at this banquet, so far announced, will be Howard Elliott, chairman, New York, New Haven & Hartford Railroad, and Hon. James M. Cox, Governor of Ohio.

Financial and Corporate

Stock and Money Markets

Oct. 29, 1913.

The sales of stock on the New York Stock Exchange to-day totaled only 216,366 shares. While the transactions were light in volume and the market opened weak, trading rallied and toward the close buying became more vigorous and slight upturns were noted all through the general list. The local transaction issues were especially strong. Third Avenue Railway sold at 40, showing a gain of two points for the day. Rates in the money market to-day were: Call, 4@5¼ per cent.; sixty days and ninety days, 4½@4¾ per cent.; four, five and six months, 4½@5 per cent.

Trading on the Philadelphia exchange to-day was very narrow and for the most part in odd lots. There was considerable demand for bonds.

Trading on the Chicago exchange to-day was indifferent. Considerable gains were made, however, in several of the leading issues. The bond market was dull.

The Boston market to-day was dull and irregular. Most of the railroad issues sold off.

The sales of stock on the Baltimore exchange to-day totaled only 373 shares. Bond sales were $64,200, par value.

Quotations of traction and manufacturing securities as compared with last week follow:

	Oct. 22	Oct. 29
American Brake Shoe & Foundry (common)	88½	88½
American Brake Shoe & Foundry (preferred)	128	128
American Cities Company (common)	36	36
American Cities Company (preferred)	63	62¾
American Light & Traction Company (common)	336	330
American Light & Traction Company (preferred)	103½	105
American Railways Company	38¾	38⅞
Aurora, Elgin & Chicago Railroad (common)	40	40
Aurora, Elgin & Chicago Railroad (preferred)	82	84
Boston Elevated Railway	85	85
Boston Suburban Electric Companies (common)	7	7
Boston Suburban Electric Companies (preferred)	59	59
Boston & Worcester Electric Companies (common)	a10	a10
Boston & Worcester Electric Companies (preferred)	42½	39
Brooklyn Rapid Transit Company	87	87¾
Capital Traction Company, Washington	115	115
Chicago City Railway	160	160
Chicago Elevated Railways (common)	25	25
Chicago Elevated Railways (preferred)	75	75
Chicago Railways, ptcptg., ctf. 1	93	90
Chicago Railways, ptcptg., ctf. 2	29	29¼
Chicago Railways, ptcptg., ctf. 3	7½	7¼
Chicago Railways, ptcptg., ctf. 4	2½	2½
Cincinnati Street Railway	107½	107½
Cleveland Railway	103½	103¾
Cleveland, Southwestern & Columbus Ry. (common)	5½	*5½
Cleveland, Southwestern & Columbus Ry. (preferred)	30	*30
Columbus Railway & Light Company	18	18
Columbus Railway (common)	69½	a69½
Columbus Railway (preferred)	88	88
Denver & Northwestern Railway	*111	*111
Detroit United Railway	69	70
General Electric Company	141½	140¾
Georgia Railway & Electric Company (common)	119½	119⅞
Georgia Railway & Electric Company (preferred)	85¾	85½
Interborough Metropolitan Company (common)	14	14
Interborough Metropolitan Company (preferred)	57⅞	58
International Traction Company (common)	*40	*40
International Traction Company (preferred)	95	95
Kansas City Railway & Light Company (common)	*22	*22
Kansas City Railway & Light Company (preferred)	*30	*30
Lake Shore Electric Railway (common)	7	*7
Lake Shore Electric Railway (1st preferred)	92	*92
Lake Shore Electric Railway (2d preferred)	25	*25
Manhattan Railway	128	127
Massachusetts Electric Companies (common)	11½	11½
Massachusetts Electric Companies (preferred)	67	67
Milwaukee Electric Railway & Light Co. (preferred)	*100	*100
Norfolk Railway & Light Company	25¼	25¼
North Amreican Company	72½	72
Northern Ohio Light & Traction Company (common)	63½	63½
Northern Ohio Light & Traction Company (preferred)	97	97
Philadelphia Company, Pittsburgh (common)	40	40
Philadelphia Company, Pittsburgh (preferred)	40	40½
Philadelphia Rapid Transit Company	20	22⅝
Portland Railway, Light & Power Company	56	56
Public Service Corporation	111	108
Third Avenue Railway, New York	37½	40
Toledo Traction, Light & Power Company (common)	30	30
Toledo Traction, Light & Power Company (preferred)	80	80
Twin City Rapid Transit Co., Minneapolis (common)	105	104
Union Traction Company of Indiana (common)	*13	*13
Union Traction Company of Indiana (1st preferred)	*83	*83
Union Traction Company of Indiana (2d preferred)	*25	*25
United Rys. & Electric Company (Baltimore)	25¼	26
United Rys. Inv. Company (common)	18	18
United Rys. Inv. Company (preferred)	35½	34½
Virginia Railway & Power Company (common)	a53½	56
Virginia Railway & Power Company (preferred)	93½	93½
Washington Ry. & Electric Company (common)	95	93
Washington Ry. & Electric Company (preferred)	89	88½
West End Street Railway, Boston (common)	70	70
West End Street Railway, Boston (preferred)	89	90
Westinghouse Elec. & Mfg. Company	67	66½
Westinghouse Elec. & Mfg. Company (1st preferred)	110	110

*Last sale. a Asked.

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ANNUAL REPORT

New York, New Haven & Hartford Railroad

The consolidated statement of income, profit and loss of the New York, New Haven & Hartford Railroad and all steam railroads, electric railways, steamship lines and other public utility companies wholly owned and operated by or for the account of the New Haven line for the fiscal year ended June 30, 1913, is as follows:

Revenue:		
Freight	$41,134,782	
Passenger	44,645,766	
Mail	698,947	
Express	3,343,549	
Other transportation revenues	2,246,065	
Electric light	48,429	
Electric power	370,894	
Gas	382,306	
Water	11,185	
Other revenues	2,308,543	
Total		$95,190,466
Less operating expenses		65,694,518
Gross revenue		$29,495,948
Net revenue from outside operations		641,061
Total revenue		$30,137,009
Taxes		5,062,683
Operating income		$25,074,326
Income from other sources:		
Dividends on stocks	$2,219,751	
Interest on bonds and debentures	326,485	
Interest on unfunded securities and accounts	1,146,794	
Rentals from properties leased	410,417	
Joint facility and other rentals	656,074	
Hire of equipment	115,946	
Net profit from separately operated properties	42,581	
Miscellaneous income	61,362	
		4,979,409
Total income		$30,053,735
Deductions from income:		
Interest on bonds, debentures and other liabilities	$13,160,164	
Rentals of leased properties	6,016,533	
Joint facility and other rentals	2,934,191	
Miscellaneous deductions	283,450	
		22,394,338
Net income for year		$7,659,397
Dividends on New Haven stock:		
Nos. 132 to 134, inclusive, 2 per cent each	$10,786,308	
No. 135, 1½ per cent	2,700,255	
Total	$13,486,563	
Less dividends on stock in the treasury of the system	1,702,720	
	$11,783,843	
Dividends on subsidiary stock held by the public	3,187	
		11,787,030
Deficit		$4,127,633

Howard Elliott, president of the company, says in part:

"The most important pieces of work that have been under prosecution by the electrical department during the past fiscal year are as follows: (1) electrification of Oak Point, Harlem River, Westchester and Van Nest yards; (2) building of electrical shops at Van Nest; (3) extension of electrification from Stamford to New Haven; (4) elimination of electromagnetic induction on foreign wires in the electric zone, and (5) electrical equipment.

"The electrification of the Oak Point and Westchester yards has been completed and electric switching service inaugurated in those two yards. The Harlem River yard electrification is practically completed, and it is anticipated that the Van Nest yard will be completed in the course of a few months. The electrical shops at Van Nest have been finished and the installation of machinery is far advanced.

"The completion of the work of electrifying the main line tracks from Stamford to New Haven has been delayed on account of strike and flood conditions at the point where steel bridges for the catenary construction were being manufactured. It is hoped, however, that the work will be sufficiently advanced to permit operation between Stamford and New Haven early in 1914.

"The elimination of electromagnetic induction on foreign wires in the electric zone has been pushed as rapidly as possible, and it is expected that the new system of electric power distribution will be inaugurated early in 1914.

"The following orders for electrical equipment have been placed: Thirteen a.c.-d-c. motor cars, four a.c. motor cars, twenty trailers, straight passenger, and four trailers, passenger and baggage. The first a.c.-d.c. motor car is expected within a few months from the manufacturers, and thereafter four motor cars a month are promised until the order is completed, followed by the trailer cars. The a.c. motor cars will not be constructed until the order for the a.c.-d.c. motor and trailer cars has been filled.

"Effective May 1, 1913, a lease was made to the Shore Line Electric Railway of the so-called New London division of the Connecticut Company, extending from New London to South Coventry, both in Connecticut, and from Moosup to a point in West Thompson, in Connecticut, consisting of 104.9 miles of road, for a term of ninety-nine years, with an option to purchase the property during the first ten years of the lease. The rental provided for is substantially the net earnings of the property for the year preceding May 1 last, and the purchase price substantially the cost of the property to the Connecticut Company."

Besides the general consolidated financial statements of the New York, New Haven & Hartford Railroad and its subdivisions, the report contains individual income statements and balance sheets for the subdivisions. The income statement of the Connecticut Company for the year ended June 30, 1913, is as follows:

Operating revenue:		
Freight revenue	$314,804	
Passenger revenue	7,904,805	
All other revenue from transportation	127,405	
Revenue from operations other than transportation	107,611	
Total operating revenue		$8,454,625
Operating expenses:		
Maintenance of way and structures	$995,973	
Maintenance of equipment	655,669	
Traffic expenses	550	
Operation of power plants	976,981	
Operation of cars	1,954,971	
General expenses	632,559	
Miscellaneous expenses	154,999	
Total operating expenses*		5,371,702
Net operating revenue		$3,082,923
Taxes		496,824
Income from operations		$2,586,099
Income from other sources		62,078
Total income		$2,648,176
Deductions from income:		
Interest, rentals, etc.		1,039,154
Net income		$1,609,022
Dividends		1,500,000
Surplus		$109,022

*The operating expenses and taxes were 69.41 per cent of the total operating revenue.

Concerning the New York, Westchester & Boston Railway the report gives the following statement:

"The business of the New York, Westchester & Boston Railway during the past year has shown a satisfactory increase month by month and the company is now handling passengers at the rate of 3,000,000 per year. During the last year freight service has been inaugurated and a contract has been entered into with the Adams Express Company granting the latter company express privilege over the Westchester line. It is estimated that considerable revenue will be received from these two sources in the coming year.

"During the past fiscal year the Public Service Commission for the Second District of New York has approved a change of route of the extension of the line between New Rochelle and Port Chester from a location on the easterly side of the tracks of the New York, New Haven & Hartford Railroad and at an average distance of one-quarter of a mile therefrom to a location along the westerly side of the tracks of the New York, New Haven & Hartford Railroad and upon that company's present right-of-way. The order provides that the right-of-way required by the Westchester company, now owned by the New Haven company, is to be sold to the Westchester company. This change of route represents a saving in the cost of construction of more than $1,500,000.

"Negotiations have been concluded with the Public Service Commission for the First District of New York for the sale to the city of New York of the right-of-way required for the extension of the Lenox Avenue branch of the subway to the New York, Westchester & Boston Railway at 180th Street. The property to be sold was originally acquired for a connection between the Westchester line and the subway to be built and operated by the Westchester company. This connection will now be built and operated by the Interborough Rapid Transit Company, representing a saving to the Westchester company of $1,000,000 and a considerable

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saving in operation. Plans are being prepared by the city of New York for this connection, and from present indications the line should be completed within the next year. The actual construction work of third-tracking the Second and Third Avenue elevated lines in New York, also operated by the Interborough Rapid Transit Company, has not yet been commenced, although plans are being prepared, and it is probable that construction work will be commenced at an early date. The earning power of the New York, Westchester & Boston Railway cannot be fully demonstrated until these various connections are completed.

"The charge to the income account of the New York, New Haven & Hartford Railroad for the fiscal year by reason of its guaranty of the interest on the bonds of the Westchester company was $777,750; there was also a further sum of $357,107 representing interest on bonds and notes held by the New Haven company and on advances made by it, which on account of the inability of the Westchester company to pay has not been credited to the income account of the New Haven company."

The statement of income, profit and loss of the New York, Westchester & Boston Railway for the year ended June 30, 1913, follows:

Operating revenue:		
Freight revenue	$4,091	
Passenger revenue	268,918	
All other revenue from transportation	3,607	
Revenue from operations other than transportation	12,412	
Total operating revenue		$289,028
Operating expenses:		
Maintenance of way and structures	$105,477	
Maintenance of equipment	34,168	
Traffic expenses	15,781	
Transportation expenses	278,432	
General expenses	35,084	
Total operating expenses*		468,942
Operating deficit		$179,914
Taxes		105,605
Loss from operations		$285,519
Income from other sources		9,536
Total loss		$275,983
Deductions from income:		
Interest on bonds and other liabilities	$1,073,638	
Miscellaneous rents	51,713	
Amortization of discount on securities	4,665	
Total deductions from income		1,130,016
Deficit		$1,405,999

*The operating expenses and taxes were 198.79 per cent of the total operating revenue.

The earnings of the Rhode Island Company for the period ended June 30, 1913, are shown by the following statement:

Operating revenue:		
Freight revenue	$230,644	
Passenger revenue	4,900,951	
All other revenue from transportation	61,131	
Revenue from operations other than transportation	129,921	
Total operating revenue		$5,322,647
Operating expenses:		
Maintenance of way and structures	$430,069	
Maintenance of equipment	349,130	
Traffic expenses	2,678	
Operation of power plants	486,054	
Operation of cars	1,256,349	
General expenses	495,341	
Miscellaneous expenses	116,816	
Total operating expenses*		3,136,437
Net operating revenue		$2,186,210
Taxes		425,176
Income from operations		$1,761,034
Income from other sources		134,336
Total income		$1,895,370
Deductions from income:		
Interest, rentals, etc.		1,225,319
Net income		$670,051
Dividends		581,130
Surplus		$88,921

*The operating expenses and taxes were 66.91 per cent of the total operating revenue.

According to an income statement shown in the report, the operating revenue of the Berkshire Street Railway system for the year ending June 30, 1913, was $979,068, from which operating expenses of $860,976 and taxes of $46,720 were deducted, leaving an income from operations of $71,371. Income from other sources amounted to $1,430, giving a total income of $72,801, from which, after deductions from income to the extent of $164,662, there remained a deficit of $91,861.

The income statement of the Millbrook Company for the year ended June 30, 1913, showed miscellaneous rent revenues, interest revenues and miscellaneous non-operating revenues to the extent of $75,516, from which rent expense of $31,767, non-operating taxes of $45,789 and interest accrued of $177,103 were deducted, causing a deficit of $179,143. No credit was made on the New Haven books for accrued interest on unfunded debts amounting to $176,803 on notes of the Millbrook Company held by the New Haven Company. The Millbrook Company is the owner of a large amount of real estate purchased originally for the proposed route of the Westchester line. Such of this real estate as was not acquired for actual right-of-way is in the market for sale, and as fast as sold the proceeds will be available for application to the payment of a note of $3,536,062 held by the New Haven company and also to interest thereon to June 30, 1913, amounting to $324,139.

The operating revenue of the New York & Stamford Railway for the year ended June 30, 1913, was $370,100. Operating expenses were $302,019 and taxes $18,297, which left an income from operation of $49,783. Income from other sources amounted to $407 and deductions for interest, rentals, etc., $86,747, giving a deficit of $36,556.

The Westchester Street Railroad showed for the year ended June 30, 1913, a total operating revenue of $242,507, from which deductions were made for operating expenses of $274,865 and taxes of $11,140, leaving an operating deficit of $44,298. The income from other sources was $220 and deductions from income $10,676, or a total deficit of $54,753.

The above information is supplemental to that published in the ELECTRIC RAILWAY JOURNAL of Oct. 11, 1913, regarding the New York, New Haven & Hartford Railroad.

First Hearing on Modified Plan of Reorganization of Buffalo & Lake Erie Traction Company

At the first hearing before the Public Service Commission of the Second District of New York on the modified application on the part of the Canadian-American Power Corporation to import 46,000 hp to operate cars of the new Frontier Electric Railway, the Buffalo & Lake Erie Traction Company and other corporations, held on Oct. 24, opposition developed to the capitalization of the new company at $3,000,000. The matter was first brought before the commission as part of the reorganization plan of the Buffalo & Lake Erie Traction Company and called for the reorganized company to acquire the $3,000,000 of capital stock of the new power corporation. Henry W. Killeen, counsel for the parties entering the objection, in a statement filed with the commission said:

"Public policy and sound reasoning alike forbid the capitalization of a contract by a public service corporation for the same reasons which forbid the capitalization of a franchise and the commission has already decided along this line."

The statement went on to the effect that the contract with the Electrical Development Company, Niagara Falls, Ont., might be terminated at any time as the Electrical Development Company cannot transport the current without a license from the Canadian government, which license must be renewed annually. All that the Canadian-American Power Corporation controls is a contract with the Canadian Power Company at Niagara Falls, Ont., for the importation of 46,000 electrical hp at $12.50 per hp.

Chairman Decker of the commission objected to the 8 per cent cumulative stock which the company proposes to issue. He pointed out that the commission was inclined to consider 6 per cent a reasonable return.

Among those who attended the hearing were Charles S. Beekman, New York, counsel for the Canadian-American Power Corporation; Thomas Penney, former president of the International Railway, now counsel for the company; Glenn M. Congdon, representing William F. Sheehan and Joseph B. Mayer, New York; Edward G. Connette, president of the International Railway and a director in the new Canadian-American Power Corporation, and others.

The hearing was adjourned until Oct. 31.

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Annual Meeting of Chicago Railways

The annual meeting of the Chicago Railways on Oct. 24 resulted in the election of the retiring board of directors with the exception that John A. Chapman was chosen to fill the vacancy caused by the resignation of Charles L. Hutchinson. The proxy committee reported the vote as follows: ticket headed by Henry Blair and others, 128,147; ticket headed by Joseph Beifeld and others, 41,567; not voting, 42,809; total number participation certificates, 212,523.

The opposition to the present management of the company which was voiced in the vote for the ticket headed by Joseph Beifeld was organized last spring.

The purpose of the meeting on Oct. 24 was clearly set forth to the holders of the participation certificates in a communication addressed to them early in October by the proxy committee of the company, consisting of Wallace Heckman, Seymour Morris and Henry A. Blair. In this communication the following interesting reference was made to the progress of the negotiations for the unification of operation of the Chicago Railways and the Chicago City Railway:

"Negotiations have been carried on for some time with the Chicago City Railway looking to the possible unification of operation between that company and the Chicago Railways. The proposed agreement will relate only to the joint operation of the properties of the two surface railways. No agreement has been entered into, but it is fair to say that the negotiations have reached a point where the management is prepared to recommend an agreement drawn along the lines discussed, provided that the City Council will authorize the agreement and in connection therewith will make certain concessions to the companies.

"No agreement of any character will be entered into until a copy of the proposed agreement with a full explanation of the various features involved therein shall be delivered to each and every participation certificate holder of series 1, series 2, series 3 and series 4 at least thirty days before such agreement shall be entered into, and until such agreement shall be approved in person or by proxy by a majority of the total amount of equal parts represented by all of the participation certificates, series 1, series 2, series 3 and series 4, issued and outstanding under the participation certificate agreement hereinabove mentioned.

"The counsel of the company has already stated to the local transportation committee of the City Council that the entering into the agreement by the Chicago Railways is contingent upon its previous approval by a majority of all the equal parts represented by all participation certificates outstanding under the participation certificate agreement."

Pennsylvania Railroad's Proposed New Financing

Samuel Rea, president of the Pennsylvania Railroad, has issued the following statement in regard to the plan of the company to create a $1,000,000,000 blanket mortgage:

"Under this mortgage it is contemplated to issue bonds in such amounts from time to time as may be required to provide necessary conditions, betterments and improvements to its railroads, equipment, property and facilities, as well as the funds that may be necessary to meet maturing obligations, and for such other corporate purposes as may now or hereafter be duly authorized by law. The aggregate amount of bonds that may be issued shall not at any time exceed the outstanding capital stock.

"When approved by the directors the whole question will be laid before the stockholders for their consideration at the annual meeting in March next. The company has no expenditures that require immediate financing, but desires to announce the contemplated preparations for the necessary refunding and capital expenditures in 1914, 1915 and later years, which it will be able to meet through the issue of either capital stock, consolidated (first) mortgage bonds, the new general mortgage bonds, or such other form of financing as will produce the best results for the company and meet the monetary conditions prevailing at the time of issue."

An official of the railroad explains that the one-billion-dollar mortgage is strictly for making betterments, providing for improvements in the way of electrifying the road, reducing grades and erecting bridges. He also explains that such a step is necessary for the purpose of cutting down the fixed charges. The additional funds, representing the difference of about $850,000,000, the present liability of the Pennsylvania properties, and the billion dollars to be obtained by the mortgage, will be used in betterments, as will the money saved in fixed charges. The first important redemption to be met by the Pennsylvania Railroad, some $85,000,000, will come in 1915.

Ruling in Regard to Pledging of Bonds as Collateral in New Jersey

The Board of Public Utility Commissioners of New Jersey has issued a general memorandum in the matter of the pledging of their bonds as collateral by public utility companies. The board directs the attention of the companies subject to its jurisdiction to the statutes relating to the issuance, sale and delivery of stock and securities by corporations of the State and to the act to create a board of public utility commissioners. The board does not, in the absence of a specific case before it, determine that the first of these statutes wholly prevents the use by the corporations to which it applies of their bonds as collateral for loans, nor does it determine under what, if any, conditions the statute permits such use of bonds. It considers it, however, the part of prudence to suggest these questions to the companies subject to the provisions of the statute and to the jurisdiction of the board, and directs attention to the case of Pfister et al. v. Milwaukee Electric Railway et al. (Wis., 53 N. W. Rep. 27), an action involving validity of 250 bonds of the defendant company for $1,000 each, delivered by the company to the plaintiff, Pfister, as a collateral security for a loan of $125,000 made by him to the company.

The board determines, however, that, if the first of these statutes admits, under any circumstances, the use by the companies of their bonds as collateral for loans, such use constitutes an "issue" of bonds under the second of these statutes and that such issue requires authorization by the board.

Alabama Traction, Light & Power Company, Ltd., New York, N. Y.—The London Stock Exchange has listed $10,000,000 of first mortgage 5 per cent bonds of the Alabama Traction, Light & Power Company, dated July 1, 1912, in lieu of receipts for these bonds. The bonds are secured by developed and undeveloped water-power sites in Alabama and also deposit under them of first mortgage bonds of Alabama Power Company, of which an issue of $20,000,000 has been authorized.

American Cities Company, New York, N. Y.—Bertron, Griscom & Company, New York, N. Y., announce that more than 70 per cent of the common stock of the American Cities Company has been deposited under the offer to exchange $75 par value of second preferred and $25 par value of common stock of the United Gas & Electric Corporation for each $100 share par value of stock of the American Cities Company. The United Gas & Electric Corporation has extended the time in which it will purchase American Cities Company common stock on these terms to Nov. 10.

Brooklyn (N. Y.) Rapid Transit Company.—The suit of the Brooklyn Rapid Transit Company against the Brooklyn City Railroad, which has been pending since April, 1900, is said to have been settled out of court for $1,500,000. In 1900 the Brooklyn Rapid Transit Company began suit against the Brooklyn City Railroad to recover $2,000,000 claimed to be due under the terms of the lease as the result of the failure of the Brooklyn City Railroad to fulfil certain obligations imposed by the lease. A referee was appointed and after several years a decision was rendered giving judgment of $1,740,258 for principal against the Brooklyn City Railroad and $1,616,680 for interest. Subsequent appeals through the New York courts resulted in striking out the award of interest, but the judgment of $1,766,892 for principal has been sustained. The last appeal was taken in July, 1912, to the New York Court of Appeals.

Columbus Railway & Light Company, Columbus, Ohio.—The period for depositing securities for the consolidation of the railway and lighting properties at Columbus, Ohio,

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will expire on Nov. 15. The stockholders of the Columbus, Light, Heat & Power Company have filed an amended petition to their complaint protesting against the terms of the consolidation in Judge Dillon's court, where their objections were recently overruled.

Columbus, Urbana & Western Railway, Columbus, Ohio.—L. P. Stephens and Edward W. Zigler, receivers of the Columbus, Urbana & Western Railway, have asked the court for an order making Smith W. Bennett, trustee, a defendant in the action and that he be required to set up the number of bonds outstanding and the nature of his trust. The receivers state that, after paying operating expenses, they have nothing to apply upon the indebtedness of the company, which they say is $438,000, to the best of their knowledge. The petition states that the outstanding capital stock amounts to $280,500; notes, $29,495; overdrafts, $2,164, and other indebtedness, $4,000.

Dedham & Franklin Street Railway, Westwood, Mass.—Eugene H. Mather, as receiver of the Dedham & Franklin Street Railway, has reported to the Supreme Court that under its instructions he sold the franchise and the property of the company on Sept. 15 for $10,000 to H. M. Verrill, Portland, Maine, and R. H. Johnson, Cambridge. They are acting as a committee for the bondholders.

Grand Valley Railway, Brantford, Ont.—On the application of counsel for the Grand Valley Railway, Chief Justice Meredith, in the non-jury Assize Court on Oct. 23, modified his judgment in regard to the forfeiture of the company's franchise to operate street cars in Brantford. The time given to the company to elect whether or not it will comply with the conditions imposed has been extended to Nov. 23. These conditions now include the placing of modern cars in service within a year, the construction within the same period of lines on five streets, the operation of cars to West Brantford along Oxford Street to the end of the line within thirty days after the completion of the bridge by the city and the payment before Jan. 23, 1914, of all moneys in arrear. The company is also ordered to pay $100 each month to the city. Unless these conditions are complied with, the city is to take possession of the streets, but not of the assets of the company.

Interborough Rapid Transit Company, New York, N. Y.—In a brief filed with Supreme Court Justice Van Sicklen by attorneys for the defendants in the suit brought by Clarence H. Venner and the Continental Securities Company as minority stockholders against August Belmont, Andrew Freedman and others, and the Interborough Rapid Transit Company, the motives and character of the action are assailed. Mr. Venner's suit is based upon an allegation of fraud on the part of the original board of directors in the purchase from August Belmont & Company of the stock and charters of the Pelham Park & City Island Railway. In referring to Venner's motives in the litigation the brief quotes from a decision of Chief Justice Sawyer in the federal court, which in part reads: "It is always a suspicious circumstance where a single stockholder among a number in a corporation rushes into a court of equity to vindicate, unaided and alone, the rights of the corporation and all other stockholders; and especially is this so where the amount of stock owned by him is so very limited that in case of success his own share of the recovery will be so small as to make the maxim *de minimis non curat lex* very properly applicable." The brief contends also that the plaintiff's cause of action as pleaded is for actual fraud on the corporation and that no actual fraud has been proved. Therefore, the contention is made that the plaintiff is not permitted to ask consideration of his case on the theory of "constructive fraud" or any other theory, "particularly since there is a complete variance between the facts alleged and the facts proved." The entire issue of Interborough Rapid Transit Company forty-five-year 5 per cent bonds will be redeemed at the office of the trust department of the Guaranty Trust Company at 105 and accrued interest on and after Nov. 1.

Louisville (Ky.) Traction Company.—Frederick S. Wicks, representing the Major Alexander H. Davis estate, has denied knowledge of negotiations for the purchase of the 33,000 shares of stock in the Louisville Traction Company owned by the estate. Mr. Wicks, who is a director of the corporation, is reported to have said that a suggestion of a possible purchase had been made to him some time ago, but that nothing ever came of it.

New York, New Haven & Hartford Railroad, New Haven, Conn.—Morgan G. Bulkeley, Hartford, on behalf of himself and other stockholders of the New York, New Haven & Hartford Railroad, has asked the Supreme Judicial Court of Massachusetts to pass upon the legality of the action of the Public Service Commission of Massachusetts in permitting the company to issue $67,000,000 of convertible bonds. The principal ground for the appeal is that the present indebtedness of the company is $202,844,450, and that as guarantor of obligations it is liable for the further sum of $79,648,900. The appellants contend that the Public Service Commission exceeded its powers in authorizing a new bond issue. The appeal of Mr. Bulkeley came up in the Supreme Court on Oct. 28. C. F. Choate, representing the company, said that he would file his answer on or before Nov. 7. Justice Loring said that he would fix a time for the hearing as soon as Mr. Choate's answer was filed.

New York (N. Y.) Railways.—The New York Railways has applied to the Public Service Commission of the First District of New York for authority to acquire capital stock in various companies and a hearing has been ordered for Nov. 6. Included in the application are 15,000 shares of the People's Traction Company and the same amount of the Twenty-eighth & Twenty-ninth Streets Crosstown Railroad, although the latter company has been superseded by the Mid-Crosstown Railroad, which is being operated by the Third Avenue Railway. The Eighth Avenue Railroad, a subsidiary of the New York Railways, has applied to the Public Service Commission of the First District of New York for authority to issue $750,000 certificates of indebtedness in $100 and multiples thereof, bearing interest at 6 per cent and payable on or before Feb. 1, 1934.

Ocean Shore Railroad, San Francisco, Cal.—Judge Seawell has decided against the plaintiffs in the suit brought by John McGinty and others to compel the trustees of the Ocean Shore Railroad to give them bonds of the new company instead of stocks for the bonds which they held of the old company. The court says that the holders of the bonds of the old company could have foreclosed under the trust deed against the assets, but instead of doing this they assigned their securities to the reorganization committee and permitted the latter to go ahead with the reorganization. They thus became parties to the reorganization and were barred from exercising their original rights as bondholders. The court says that they cannot now be permitted to have their claims secured by bonds since the reorganization has been carried into effect.

Rock Island Southern Railway, Monmouth, Ill.—A meeting of the stockholders of the Rock Island Southern Railway has been called for Nov. 29 at Rock Island to vote upon an increase in the capital stock to $3,550,000, to consider a bond issue of $20,000,000 and if a bond issue is authorized to increase the capital stock to not to exceed $20,000,000, to consider and authorize the construction of a line into Rock Island, to authorize the purchase of any railway for a part of this line if necessary, and to amend the charter so that the company can operate its line into and through Alexis.

Seattle, Renton & Southern Railway, Seattle, Wash.—Negotiations looking toward the purchase by the city of the Seattle, Renton & Southern Railway were halted on Oct. 17 when Attorney Howard Hughes, representing the bondholders' committee and Peabody, Houghteling & Company, said that the bondholders' committee and Peabody, Houghteling & Company would consent to a transfer of the property on the basis of $400,000 worth of general fund car-line bonds from the issue voted in 1911; $100,000 in the form of a warrant in the condemnation case now pending for the widening of Rainer Avenue, the remainder of $700,000 to be in utility bonds secured by the earnings of the system to be taken over by the city. Mr. Hughes also said that his clients would deposit $150,000 in cash with the city to insure the three branch lines now under discussion, and provide the money to do the work through the purchase of general fund car-line bonds. All of this, Mr.

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Hughes says, is conditional on the State of Washington purchasing at par value $400,000 of the issue of street railway bonds voted in 1911, only $500,000 of which remains. These terms differ from those proposed by the receivers of the company, and the purchase by the city will be held in abeyance pending a decision by the courts.

Union Street Railway, New Bedford, Mass.—At the annual meeting of the stockholders of the Union Street Railway held on Oct. 17 it was voted to authorize an issue of $2,000,000 of 4½ per cent twenty-year mortgage bonds, callable after five years at 115, at the option of the company, on any coupon day. These bonds will be issued from time to time as the needs of the company may require.

Dividends Declared

American Railways, Philadelphia, Pa., quarterly, 1¾ per cent, preferred.

Easton (Pa.) Consolidated Electric Company, 2 per cent.

Lewiston, Augusta & Waterville Street Railway, Lewiston, Me., quarterly, 1½ per cent, preferred.

Lincoln (Neb.) Traction Company, quarterly, 1½ per cent, preferred.

Toledo, Bowling Green & Southern Traction Company, Findlay, Ohio, quarterly, 1¼ per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

BATON ROUGE (LA.) ELECTRIC COMPANY

Period			Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1 mo.	Aug.	'13	$13,862	*$9,422	$4,440	$2,126	$2,314
1 "	"	'12	11,767	*7,519	4,248	1,730	2,517
12 "	"	'13	153,695	*93,473	60,132	23,253	36,879
12 "	"	'12	139,583	*84,327	55,257	34,498	34,498

BROCKTON & PLYMOUTH STREET RAILWAY, PLYMOUTH, MASS.

1 mo.	Aug.	'13	$17,289	*$9,253	$8,037	$1,096	$6,940
1 "	"	'12	15,958	*9,145	6,813	1,030	5,783
12 "	"	'13	124,842	*95,708	29,134	13,005	16,129
12 "	"	'12	120,415	*90,207	30,208	12,537	17,671

CAPE BRETON ELECTRIC COMPANY, SYDNEY, N. S.

1 mo.	Aug.	'13	$33,454	*$17,299	$16,154	$6,082	$10,072
1 "	"	'12	31,598	*16,100	15,498	5,703	9,795
12 "	"	'13	375,071	*202,584	172,487	71,070	101,418
12 "	"	'12	350,103	*192,578	157,524	68,030	89,494

COLUMBUS (GA.) ELECTRIC COMPANY

1 mo.	Aug.	'13	$50,403	*$23,706	$26,698	$24,489	$2,209
1 "	"	'12	50,824	*23,313	27,511	18,952	8,558
12 "	"	'13	639,591	*293,482	346,109	249,380	96,729
12 "	"	'12	600,787	*268,302	332,485	223,853	108,632

DALLAS (TEX.) ELECTRIC CORPORATION

1 mo.	Aug.	'13	$180,735	*$103,645	$77,089	$25,011	$52,078
1 "	"	'12	147,352	*88,229	59,122	24,666	34,455
12 "	"	'13	2,072,483	*1,202,222	870,263	296,289	573,970
12 "	"	'12	1,746,018	*1,104,541	641,477	270,127	371,350

EL PASO (TEX.) ELECTRIC COMPANY

1 mo.	Aug.	'13	$65,590	*$37,078	$28,512	$5,785	$25,947
1 "	"	'12	63,401	*35,314	28,086	5,359	22,727
12 "	"	'13	867,855	*467,492	400,363	57,830	360,867
12 "	"	'12	750,768	*415,656	335,111	79,869	255,242

GALVESTON-HOUSTON ELECTRIC COMPANY

1 mo.	Aug.	'13	$223,139	*$118,014	$105,126	$34,644	$70,482
1 "	"	'12	199,208	*103,921	95,287	33,666	61,621
12 "	"	'13	2,289,112	*1,308,638	980,474	412,532	567,942
12 "	"	'12	1,835,279	*1,099,285	735,995	347,511	388,484

JACKSONVILLE (FLA.) TRACTION COMPANY

1 mo.	Aug.	'13	$55,255	*$34,537	$20,718	$12,976	$7,742
1 "	"	'12	48,856	*33,471	15,385	9,934	5,451
12 "	"	'13	607,296	*403,451	203,845	133,202	70,643
12 "	"	'12	588,981	*373,610	215,371	114,147	101,224

REPUBLIC RAILWAY & LIGHT COMPANY, YOUNGSTOWN, OHIO

1 mo.	Sept.	'13	$250,813	*$151,023	$99,791	$44,086	$55,705
1 "	"	'12	224,138	*132,072	92,066	43,974	48,092
9 "	"	'13	2,192,176	*1,342,494	849,682	405,872	443,810
9 "	"	'12	1,926,296	*1,171,466	754,830	397,443	357,387

*Includes taxes.

The South Lancashire scheme for the carriage of goods over various tramway systems between Liverpool and Manchester is making progress. The idea is to load specially-constructed cars at the docks, and by running through the night be in a position to deliver goods early the following morning in any of the towns that are linked together by tramways. The scheme, if adopted, will involve the construction of certain new lines, establishment of depots at various places, and the organization of motor-lorry services for conveying the goods from tramways to the consignees' premises.

Traffic and Transportation

Accidents on Interstate Electric Railways

The Interstate Commerce Commission, Washington, D. C., has issued a summary for the three months ended March 31, 1913, of the casualties to persons on steam railroads and electric railways under its jurisdiction. The total number of casualties of all classes reported for steam railroads amounted to 2341 for persons killed and 47,634 for persons injured. This statement includes 2086 persons killed and 17,194 persons injured as the result of accidents sustained by employees while at work, by passengers getting on or off cars, by persons at highway crossings, by persons doing business at stations, etc., as well as by trespassers and others, and also ninety-seven person killed and 26,812 perons injured in casualties reported as "industrial accidents," which term covers accidents not involved in train operation but occurring to railway employees, other than trainmen, on railway premises. The report for interstate electric railways by themselves shows that the number of those killed during the three months was seventy-two, or 2.9 per cent of the total on both steam and electric lines, and the list of injured numbered 1281, or 2.62 per cent of the total.

From the statement of the commission, which is appended, the columns have been eliminated which show casualties to employees not on duty and to trespassers. Of the former class one was killed and eight injured, while twenty trespassers were killed and twenty-five injured. The summary, with these eliminations, is as follows:

Causes.	Number of Accidents.	Passengers Killed.	Passengers Injured.	Employees on Duty Killed.	Employees on Duty Injured.	Other Persons Not Trespassing Killed.	Other Persons Not Trespassing Injured.	Total Persons Killed.	Total Persons Injured.
Collisions	51	1	308	1	30	..	..	2	340
Derailments	14	..	37	2	5	1	..	3	43
Accidents to trains, cars or engines, except collisions, derailments and boiler explosions	..	..	..	..	..	..	..	..	..
Bursting of, or defects in, locomotive boilers or boiler attachments	..	..	..	..	..	..	..	..	..
Total train accidents	65	1	345	3	35	1	..	5	383
Accidents to roadway or bridges not causing derailment, such as fires, floods, landslides, explosions, etc.	4	..	..	..	..	..	..	..	..
Coupling or uncoupling cars (exclusive of accidents with air or steam hose)	**	..	..	..	8	..	..	..	8
While doing other work about trains (not in shops or engine houses) or while attending switches	**	..	..	1	34	..	..	1	34
Coming in contact while riding on cars with overhead bridges, tunnels, or any signal apparatus or fixed structure above or at side of track	**	..	6	1	5	..	..	1	11
Falling from cars or engines	**	1	19	..	12	..	..	1	32
Getting on or off cars or engines	**	1	266	..	18	..	3	1	296
Other accidents on or around trains not here named	**	..	61	..	2	..	22	..	86
Being struck or run over by engines or cars at stations or yards	**	..	..	2	2	3	6	7	9
Being struck or run over by engines or cars at highway grade crossings	**	..	..	..	..	16	118	16	120
Being struck or run over by engines or cars at other places	**	..	1	..	4	11	59	29	79
Other causes	**	1	29	1	1	2	..	5	31
Total, other than train accidents	**	3	382	5	86	32	208	61	706
Grand total, exclusive of industrial accidents	**	4	727	8	121	33	208	66	1,089
Industrial accidents to employees	**	..	..	6	192	..	..	6	192
Grand total	**	4	727	14	313	33	208	72	1,281

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The bulletin published by the commission also contains the following statement of the collisions and derailments on the interstate electric railways during January, February and March, 1913:

Classes	Number	Number of Persons Killed	Number of Persons Injured	Damage to Road and Equipment and Cost of Clearing Wrecks
Collisions:				
Rear	26	2	254	$16,023
Butting	9	..	43	20,234
Train separating	..	..	..	.....
Miscellaneous	16	..	43	9,704
Total	51	2	340	$45,961
Derailment due to—				
Defective roadway	2	..	2	$125
Defects of equipment	1	..	2	....
Negligence of trainmen, signalmen, etc.	..	..	..	....
Unforeseen obstruction of track, etc.	1	..	1	970
Malicious obstruction of track, etc.	..	..	..	....
Miscellaneous causes	10	3	38	1,081
Total	14	3	43	$2,176
Total collisions and derailments	65	5	383	$48,137
Total for same quarter of—				
1912	79	5	402	48,074
1911	52	1	195	10,173
1910	52	5	352	37,087

Chicago Elevated Railways Begin Through Route Operation

On Nov. 3 the work of rearranging the Chicago elevated loop structure, providing overhead transfer bridges and extending platforms for through routing of elevated trains will have progressed far enough to permit beginning operation as provided under the ordinance passed by the Chicago City Council on July 21, 1913. Under this ordinance the elevated railways will begin operation with universal transfers and a single 5-cent fare throughout the city. In order to provide for a universal transfer of passengers in the loop district, four overhead transfer bridges have been constructed.

The through route elevated trains will be arranged between the Northwestern Elevated Railroad, extending north of the business district of Chicago, and the South Side Elevated Railroad, extending south of the business district. According to the plan adopted by the elevated railways, which will be put in operation Nov. 3, through route trains will be run over the Northwestern, and the South Side Elevated Railroads from early in the morning until late in the evening. During the remainder of the twenty-four hours all trains will go around the loop and passengers may transfer at the transfer stations. The through route service will be divided into through express trains making only designated stops and through local trains which will continue to stop as at present at all stations.

This arrangement of operation will make it necessary to change the operation of trains on the Northwestern elevated lines from left-hand to right-hand movement, and all the Northwestern and South Side elevated trains will be run over the outside track of the double-track loop. The trains of the Metropolitan West Side Elevated Railway and the Chicago & Oak Park Railroad will use the inside loop track.

It is not contemplated at this time that through route service will be put in operation either on the Metropolitan or the Oak Park elevated divisions. In order to facilitate transferring between the four divisions of the elevated railways, a shuttle train service will be operated around the loop during the periods outside of the morning and evening rush hours. Under this new plan of operation it is estimated that the capacity of the loop structure will be increased from 700 cars per hour to approximately 1200 cars per hour. Under the present method of operation, that is, looping all trains from the four divisions, the loop has been the controlling factor. The increased capacity under the new method of operation will not be limited by track facilities on the various divisions of the elevated railways leading from the loop to the outlying districts of the city.

Order in Regard to Height of Car Step in New Jersey.—The State Board of Public Utility Commissioners of New Jersey has issued an order directing the Public Service Railway to put no more new cars in service with a first step exceeding 15 in. in height and a second step exceeding 14 in.

New York State Railways Changes Rates.—Changes of rates have been filed by the New York State Railways with the Public Service Commission, Second District, State of New York, in regard to local fares between Mohawk and certain stations and local cash fares over the motor bus line from Utica to certain stations.

Interurban Terminal Station Proposed for Kansas City.—A meeting of representatives of all electric railways now running into Kansas City will be called in the near future to discuss plans further for a terminal station. A recent conference resulted in no decision, though four sites are under consideration. The meeting will be held as soon as a decision is reached in regard to the Metropolitan Street Railway franchise.

Fare Complaint Filed with Nebraska Commission.—A complaint has been filed with the State Railway Commission of Nebraska by James A. Davis asking that the Omaha & Council Bluffs Street Railway be compelled to sell six tickets for a quarter. The complaint asks that the rule be put in effect on all of the company's lines in Omaha, Florence, Benson, Dundee, South Omaha and Albright, good from any point in one city to any point in any of the other cities mentioned.

Accident on New Interurban Line.—The motorman and three passengers were instantly killed and twenty-three out of twenty-seven passengers were injured on the new Dallas-Waco interurban line on Oct. 14 when a flat car loaded with ties crashed into a southbound interurban car, about 2½ miles south of Dallas, where the Southern Traction Company's interurban tracks cross the Santa Fé overhead. Passenger service on the Dallas-Waco interurban line had been inaugurated two days prior to the accident.

New Club House in Kansas City.—The Metropolitan Street Railway, Kansas City, Mo., has decided to give $10,000 toward the erection of a club house for car crews while off duty. The new structure will be built at Ninth Street and Lister Avenue. It will be two stories high. The second floor will be devoted to a gymnasium, shower baths, billiard and pool tables and a library. Work will begin on the building in the near future, and the structure will probably be ready for occupancy early in 1914.

New Mileage Books on Sale on Buffalo Line.—The Buffalo & Lake Erie Traction Company is advertising that it will place on sale at all regular agencies interchangeable 1000-mile mileage books for $15. These will be good for passage over the Buffalo & Lake Erie Traction Company between Buffalo, N. Y., and Erie, Pa.; Cleveland & Erie Railway, between Erie, Pa., and Conneaut, Ohio; Chautauqua Traction Company, between Westfield and Jamestown; Northwestern Pennsylvania Railway, between Erie, Meadville and Linesville, Pa.

Automobile Ordinance Passed in Kansas City.—The City Council of Kansas City, Mo., has passed an ordinance making it a misdemeanor for an automobile driver to run past a street car which is taking on or discharging passengers. All drivers must stop within 10 ft. of such cars. The need of the ordinance was emphasized by a number of accidents, caused in most instances by autos running down passengers as they dismounted from the cars. The Kansas City Motor Car Dealers' Association may test the constitutionality of the measure.

New Poster of Lake Shore Electric Railway.—The Lake Shore Electric Railway, Cleveland, Ohio, has printed a poster calling attention to the present conveniences of travel. The poster is 11 in. x 17½ in. in size, and is printed in red and blue. It is put up in fronts of compartments where it can be read by the passengers. The poster reads as follows: "Consider the conveniences of the modern mode of travel as compared with those before the advent of the interurban. We appreciate your patronage of the past and solicit a continuance for the future."

Use of Trains Being Considered in Syracuse.—B. E. Tilton, general manager of the New York State Railways,

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Syracuse Lines, is quoted as follows in regard to the possible use of trailers in Syracuse: "It is only a question of time when 'trailers' or two-car trains will be placed on the Syracuse lines of the New York State Railways in an effort to relieve the rush-hour congestion. We are seriously considering the proposition, and if investigation proves its adaptability to existing conditions an amount to cover the necessary addition to equipment will be included in next year's budget."

Washington State Public Service Commission Sets Dates of Hearings.—The Public Service Commission of the State of Washington has set the following dates when complaints against the Puget Sound Traction, Light & Power Company and other public service corporations will be heard: Duwamish Valley complaints against the Puget Sound Electric Company, Seattle, Oct. 30; continuation of 4-cent fare case against the Puget Sound Traction, Light & Power Company, Seattle, Oct. 31; car-heating case against the Puget Sound Traction, Light & Power Company, Seattle, Nov. 6; rate complaint against the Northwest Traction Company, Everett, Nov. 6.

Trolley Pleasure Trips from Los Angeles.—An attractively illustrated folder, describing in popular narrative style the pleasure of four special trolley trips to points of interest near Los Angeles, has been issued by the Pacific Electric Railway. The four trips suggested are as follows: from Los Angeles to the top of Mount Lowe; the Balloon Route trolley trip, including a 30-mile ride along the ocean beach from Santa Monica; the "Triangle" trolley trip, visiting the ships at San Pedro, and the "Old Mission" trolley trip to Pasadena and the orange groves along the foothills, including a visit to the San Gabriel Mission and the Cawston ostrich farm.

Rearrangement of Toronto Street Car Routes to Be Given Fair Trial.—Until the Teraulay Street line is in operation and the Toronto (Ont.) Railway has had a chance to show what a rearrangement of its routes based upon the use of the new line can do in the way of relieving the traffic congestion, the Ontario Railway & Municipal Board will not appoint an independent expert to report upon means of relieving the situation. At the last hearing of the city's application before the board Chairman McIntyre announced that the board in addition to having Engineer Middlemiss report on the Terauley Street delay would appoint a traffic expert to make an independent report.

Price Cannot Control Rates.—In a ruling which it handed down on Oct. 28, the Interstate Commerce Commission laid down this significant general principle: "If, when viewed in the light of those considerations which enter into proper rate-making, a particular rate is fair and just for the service performed, the price at which the shipper markets his product cannot be accepted as the controlling factor in fixing the rate." It is explained that if, on account of an over-supply or for any other reason, the price falls to a low figure in a particular market, that cannot be considered as controlling the freight rate to that market. The commission holds that the railroads are entitled to a fair return for the transportation service.

Joint Railway and Ferry Fare Held in Abeyance.—When the report of a Board of Estimate committee on the exchange of transfers between the New York Railways and the municipal ferry to Staten Island was submitted to the sinking fund commission recently the matter was referred to a committee of the sinking fund, consisting of Alderman Curran and the city chamberlain. The New York Railways agreed to exchange transfers between its surface lines terminating at South Ferry and the municipal ferry, upon the basis of a division of a 5-cent fare, 3 cents to the company and 2 cents to the city. The report of the committee of the Board of Estimate recommended that the commissioner of docks be authorized to enter into a contract with the company.

Near-Side Stop in Detroit.—If the majority is to rule, the near-side stop, proposed by Police Commissioner Gillespie and adopted by the Common Council at his suggestion, will remain in effect in Detroit. After several weeks of balloting by the patrons of the company the vote showed that the near-side stop has received 51 per cent of the total against 49 per cent for the return to the far-side stop. The Detroit United Railway announced before the ballot was taken that it was neutral on the question and would be pleased to abide by whatever decision the car riders reached. But the operating department believes that the near-side stop should be given a trial of at least one year, particularly through one winter season, before any change is effected.

Influence of Public Service Corporation in the Development of Meridian.—The Meridian (Miss.) *Despatch* in a descriptive article praises the Meridian Light & Railway Company for having won "the good will and consideration of the community in which it is operated through its liberal policies, fair and equitable treatment of the public and efficiency of its service in every department." A notable benefit that has been derived from the street railway service of this public service corporation has been the enhancement of real estate values in suburban territory traversed by its lines. Induced by the facilities thus offered, people of moderate means have been able to build homes of their own at a cost less than that demanded in the more densely populated districts of the city and to go to and from their daily work in less time than that required when they lived in more central parts, dispensing with the street car.

Transfer Question Before the Washington (D. C.) Commission.—Additional hearings will probably be held by the Public Service Commission of the District of Columbia to determine whether in justice to the Washington Railway & Electric Company and the Capital Traction Company an order should be issued to require the companies to adopt a universal system of transfers. At a recent hearing before the commission counsel for the companies contended that the adoption and enforcement of an order by the commission for universal transfers would amount to confiscation of property rights. The members of the commission have intimated that they would be within their rights in ordering universal transfers in view of the act of Congress of 1894 which requires the Metropolitan Railroad, now the Washington Railway & Electric Company, "to make reciprocal transfer arrangements with street railroad companies whose lines connect with its lines."

Filing of Schedules in Missouri.—According to an order of the Missouri Public Service Commission taking effect Oct. 6, 1913, street railway corporations engaged in the transportation of persons or property within the State of Missouri must file with the commission, at its office in Jefferson City, free of all expense, and print and keep open to the public inspection at all its offices and stations in the State where tickets are sold or passengers or freight are received or forwarded, schedules showing the rates, fares and charges for the transportation of persons and property applicable to and from such stations to and from points within the State upon every route leased, operated or controlled by it, and all points within the State upon the route of every common carrier whenever a through route and a joint rate exist between any two such points. Schedules filed with the commission prior to July 1, 1913, and schedules filed with the former Board of Railroad & Warehouse Commissioners prior to April 15, 1913, which are still in force must be refiled with the commission not later than Dec. 31, 1913.

Hearing in Regard to Smoking in New York.—On Oct. 23 the Public Service Commission for the First District of New York held a hearing upon a petition for an order directing the operating companies to provide smoking cars or compartments for smokers on the elevated and surface car lines of the city. The petition was sent in by the United Cigar Stores Company, which circulated it for signatures at its stores. It was claimed that the petition contained the names of 72,000 signers. It was one of the largest hearings ever held by the commission, and several addresses were made for and against the proposal. As a rule, the representatives of the transportation companies opposed the proposition, both on the ground of expense and the difficulty of separating smokers and non-smokers. The order of the commission now in force forbids smoking on cars of the elevated railroad and on closed cars on the surface lines, it being permitted only on the four rear seats of open cars with running boards. The hearing has been adjourned to Nov. 6, when the railroad companies expect to put in testimony.

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Personal Mention

Mr. De Witt Smith, formerly of Meriden, Conn., has been appointed chief engineer of the plant of the Trenton & Mercer County Traction Corporation, Trenton, N. J.

Mr. William Irvin has resumed his position as superintendent of construction of the Bloomington & Normal Railway, Bloomington, Ill., after fifteen months' absence because of ill health.

Mr. Conrad H. Syme has been appointed general counsel for the Public Utilities Commission of the District of Columbia. Mr. Syme succeeds Mr. Edward H. Thomas, who has resigned to take up the practice of law.

Mr. Thomas Penney, who for the last five years has devoted himself largely to the executive affairs of the International Railway, Buffalo, N. Y., has resumed the active practice of law at the offices of Norton, Penney, Spring & Moore, Buffalo.

Mr. V. L. Edmunds has resigned as superintendent of transportation of the Binghamton (N. Y.) Railway to resume his duties as traveling representative with the Railway Audit & Inspection Company, with headquarters at its Philadelphia office.

Mr. E. C. Sherwood has been appointed general foreman of the De Kalb Avenue shop and carhouse of the Coney Island & Brooklyn Railroad, Brooklyn, N. Y. Mr. Sherwood was formerly connected with the New York Railways as general foreman of the mechanical department.

Mr. Albert Akers, Quincy, Ill., has resigned as general manager for the Chicago, Peoria & Quincy Traction Company, Quincy, Ill. He will be succeeded by Mr. W. D. Chapman, Sr., of the Chapman Company, Chicago, Ill., which has the contract to build the road. Mr. Akers will retain his position as vice-president.

Mr. C. J. McCuaig has been appointed honorary lieutenant-colonel of the Fifty-third Regiment of Sherbrooke, Que. Mr. McCuaig is president of the Sherbrooke Railway & Power Company, a director of the Ottawa Light, Heat & Power Company and is interested in the Southern Canada Power Company, incorporated with a capital of $3,000,000 to develop electrical enterprises in the eastern townships of Quebec.

Mr. A. F. Henry has been appointed assistant superintendent of the Buffalo-Lockport and Lockport-Olcott divisions of the International Railway at Lockport, N. Y., to succeed Mr. George Lamberts, resigned. Mr. Henry has been associated with the International Railway for twelve years and for three years was in charge of the Broadway carhouse in Buffalo. He was stationmaster at Lockport for nine years.

Mr. C. D. Garretson has been appointed a member of the City Public Utility Commission of Wilmington, Del., by Mayor Howell, succeeding Mr. Samuel G. Cleaver, resigned. Mr. Garretson is secretary-treasurer of the Electric Hose & Rubber Company and is first vice-president of the Chamber of Commerce of Wilmington. He is a native of York, Pa., and a graduate of Girard College, Philadelphia. He is thirty-two years old.

Mr. C. C. Burford has been appointed chief clerk of the Kankakee & Urbana Traction Company, Urbana, Ill., in charge of the advertising and publicity work for the company. Mr. Burford was formerly connected with Busey's Bank, Urbana, Ill. He studied at the University of Illinois and for four years has been correspondent of the Chicago *Banker*. He has also contributed articles on business and other subjects to many newspapers and journals.

Mr. John Kilgour, who has been president of the Toledo, Bowling Green & Southern Traction Company, Findlay, Ohio, for a long period, has resigned because of ill health and Mr. Bayard L. Kilgour, his son, has been elected in his stead to serve until the next meeting of the stockholders in May, 1914. Mr. Harry J. Gibson, first vice-president, who had tendered his resignation some weeks ago, has been succeeded by Mr. Charles Kilgour, second vice-president, and the position of second vice-president has been left vacant until the next meeting of the stockholders of the company.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Detroit, Almont & Northern Railway, Detroit, Mich.**—Incorporated in Michigan as a preliminary to the construction of an extension of the Detroit, Rochester, Romeo & Lake Orion line of the Detroit United Railway from Romeo to Almont, a distance of 188 miles. Capital stock, $500,000. Directors: J. C. Hutchins, Joseph Bampton, F. W. Brooks, Irwin Fullerton and A. E. Peters, all associated with the Detroit United Railway.

***Ruhlman Railway, Youngstown, Ohio.**—Incorporated in Ohio in the interest of the Lake Erie & Youngstown Railroad to build a double-track line from Youngstown to Steubenville. John H. Ruhlman, incorporator.

FRANCHISES

Phoenix, Ariz.—The Salt Lake Valley Electric Railway has received a one-year extension of its franchise in Phoenix. This 20-mile line will connect Phoenix and Mesa. C. C. Lewis, president. [E. R. J., Oct. 25, '13.]

***San Francisco, Cal.**—Charles S. Swan, San Francisco, has asked the Board of Supervisors for a right-of-way for an elevated railroad which he says will be constructed according to his plans by a local corporation to be formed after the necessary rights have been obtained. This railroad is to be built for exposition passenger traffic from the ferry depot to the exposition grounds.

***Sausalito, Cal.**—W. W. Hicks and associates have asked the Council for a franchise in Sausalito. This is part of a plan to build an electric line from the reservation gates through the business section of Sausalito.

Morris, Ill.—The Fox & Illinois Union Railroad has received a fifty-year franchise from the Council to operate a railway in Morris. This 20-mile railway will connect Yorkville, Morris, Dwight and Sandwich. H. H. Evans, president. [E. R. J., July 5, '13.]

Muscatine, Ia.—The Muscatine-Davenport Railway, Davenport, has received a franchise from the Council for an extension on Front Street to the proposed site of its new freight depot in Muscatine.

Oswego, Kan.—The Kansas Central Traction Company, Topeka, has asked the Council for a franchise in Oswego. This line will connect Coffeyville and Parsons, via Edna and Altamont, with a branch from Altamont to Oswego. Philip Strack, Parsons, president. [E. R. J., Oct. 25, '13.]

Jefferson, Ohio.—The Chardon, Jefferson & Meadville Interurban Railroad has asked the Council for a franchise in Jefferson. The company has also asked the Councils in Chardon and the County Commissioners of Ashtabula and Geauga Counties for franchises. This is part of a plan to build a 30-mile line to connect Chardon, Hampton, Fontville, Rock Creek and Jefferson, Ohio, and Linesville, Pa. C. H. Felton, 735 Williamson Building, Cleveland, secretary. [E. R. J., Sept. 20, '13.]

Portland, Ore.—George F. Heusner, Portland, has received a franchise from the Council for a line from the Kenton district to the West Side business district in Portland. [E. R. J., Oct. 11, '13.]

Portland, Ore.—The Portland Railway, Light & Power Company has asked the City Commission for a franchise across the bridges over the Willamette River as follows: Hawthorne Avenue, Morrison Street, Burnside Street, Broadway and the bridge of the Oregon-Washington Railway & Navigation Company. The franchise, if granted, will permit the company to operate over the bridges named until 1932.

Chehalis, Wash.—The Washington Electric Company has asked the Commissioners of Lewis County for a franchise to use certain public roads in the southeastern and eastern part of Centralia. The company also asks for the privilege of using certain roads in southwest Centralia that will enable the Washington Electric Company to make physical connections with the proposed railway which the Chicago,

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Milwaukee & St. Paul Railway is to build at once into Centralia and Chehalis. The date of hearing has been set for Nov. 17.

Tacoma, Wash.—The Seattle-Tacoma-Olympia Railway has asked the Council for a franchise from the east end of Lincoln Bridge easterly to the city limits of Tacoma. W. D. Hall, Seattle, president. [E. R. J., May 31, '13.]

***Wenatchee, Wash.**—The County Commissioners of Chelan County recently annulled the franchise granted to the Wenatchee Valley Railway & Power Company as it had failed to begin work on the proposed line when it had agreed to do so. Should the company secure the necessary funds, a new franchise will have to be obtained from the city of Wenatchee and the county of Chelan. Hyman Harris, Wenatchee, has petitioned for the same franchise recently held by the Wenatchee Valley Railway & Power Company.

TRACK AND ROADWAY

Arkansas Interurban Construction Company, Little Rock, Ark.—This company has authorized an issue of $250,000 of 7 per cent bonds, which, added to the $500,000 of paid-in capital stock, will be used as a fund to begin work on the proposed electric line between Little Rock and Hot Springs, Ark. The officers are as follows: W. H. Garanflo, president; Lewis Rhoton, first vice-president; W. S. Sorrels, second vice-president; M. B. Moore, treasurer; Louis Garrett, secretary-manager, and H. C. Couch, superintendent of construction. [E. R. J., Jan. 18, '13.]

Northern Electric Railway, Chico, Cal.—Right-of-way is being secured by this company for a line between Fairfield and Vallejo, the last section necessary to complete the line to Sacramento. A branch which will leave the Fairfield-Vallejo road at Napa Junction and extend north to Napa is also to be built at once.

***Denver, Col.**—E. W. Merritt, Denver, and associates are considering plans to build an electric line between Denver and its chain of mountain parks.

Georgia Railway & Electric Company, Atlanta, Ga.—Plans are being made by this company to build a 1-mile extension along Howells Mill Road in Atlanta.

Valdosta (Ga.) Street Railway.—During the next two months this company expects to rebuild 1 mile of track on North Patterson Street in Valdosta, taking up small rails and laying 70-lb. T-rails.

Idaho Falls (Idaho) Electric Railway.—It is reported that this company has disposed of bonds in the sum of $1,500,000 and that the work of constructing 42 miles of railway, with a terminus in Idaho Falls and another at Blackfoot, will begin in the immediate future. The line will probably be completed and in operation by Nov. 1, 1914. J. L. Milner, Idaho Falls, president. [E. R. J., Oct. 23, '13.]

Quincy (Ill.) Street Railway.—Work has been begun by this company on an extension on South Fifth Street and a loop in Indian Mounds Park.

Kankakee & Urbana Traction Company, Urbana, Ill.—Grading has been begun by this company between Rantoul and Ludlow.

Lake Charles Railway, Light & Water Works Company, Lake Charles, La.—This company expects to build a concrete bridge over Pithon Coulee in connection with the city of Lake Charles. The city will award the contract. The company proposes to replace two crossings over railway tracks.

Worcester (Mass.) Consolidated Street Railway.—Double-tracking of Hamilton Street in Worcester will be begun by this company early next year.

***Detroit, Almont & Northern Railway, Detroit, Mich.**—This company, the incorporation of which is noted elsewhere in this issue, is understood to have acquired a private right-of-way for the section of the line between Romeo and Almont, 18 miles. J. C. Hutchinson is interested.

Detroit (Mich.) United Railway.—This company has been authorized by the Common Council of Detroit to begin construction of the Junction Avenue line, a four-mile double-track extension which was included in the recent settlement ordinance. This extension will serve as the beginning of a belt line which will surround the business district of Detroit. It will connect all of the trunk lines radiating from the business district as well as a number of industries which, when the new extension is complete, may be served without transferring passengers through the business district. The work on this new extension will be begun at once, and a number of other extensions to the Detroit United Railway Company's lines will be built as soon as the Common Council authorizes the proposed lines now before it.

Minnesota Northwestern Electric Railway, Minneapolis, Minn.—Right-of-way is being secured by this company through Thief Falls, Germantown, North Silverton, Cloverleaf and Goodridge, and it is planned to begin construction on the first 25-mile section of the line this fall. Capital stock, $500,000.—[E. R. J., Oct. 25, '13.]

St. Louis-Kansas City Electric Railway, St. Louis, Mo.—W. I. Allen, in charge of the plans for this railway, announces that the financing of the company is proceeding rapidly and that work will be taken up in the near future. This line will connect St. Louis and Kansas City, via Jackson, Lafayette, Saline, Howard, Boone, Callaway, Montgomery and St. Louis Counties. [E. R. J., Jan. 11, '13.]

***Ismay, Ekalaka & Southern Electric Railway & Power Company, Ismay, Mont.**—This company was recently organized to build an electric line in Ismay and the surrounding country. The following officers were elected: William Fulton, president; George J. Murphy, secretary and treasurer; M. H. Heldman, C. O. Wright, H. N. Sykes, M. L. Maxwell, W. H. Peck and John Oliver, executive committee.

Omaha & Council Bluffs Street Railway, Omaha, Neb.—This company has been asked to consider plans to extend its East Side Hanscom Park line to South Omaha along Twenty-ninth Street, Dupont Street, Gold Street to Forty-second Street, and to connect with the L Street line in South Omaha.

***Reno, Nev.**—Plans are being considered to build an electric railway between Reno and Wellington. Ultimately it is planned to connect this line with the Copper Belt line at Wellington and extend it through Carson Valley, Minden, Gardnerville and Carson City. From Carson City the line will be extended directly to Reno. The power to operate this line is to be furnished by the Truckee River General Electric Company.

St. John (N. B.) Suburban Railway.—Plans are being considered by this company for an extension from Kane's Corner to Crouchville this fall or next spring and further extensions thereafter.

Exeter, Hampton & Amesbury Street Railway, Exeter, N. H.—During the next two weeks this company will award contracts to build a new siding between its carhouse and Hampton.

Frontier Electric Railway, Niagara Falls, N. Y.—Work on this company's three-track line between Buffalo and Niagara Falls will not be begun until the spring. Application for an extension of time on its franchise will soon be made. The line will connect Niagara Falls, Buffalo, Tonawanda and North Tonawanda. James S. Simmons, Niagara Falls, vice-president. [E. R. J., Aug. 23, '13.]

Syracuse & Suburban Railroad, Syracuse, N. Y.—This company is asked to consider plans for an extension from Syracuse to Oran.

Hocking-Sunday Creek Traction Company, Nelsonville, Ohio.—Financial arrangements are being made by this company to build its line between Chauncey and Athens.

Toledo & Western Railroad, Toledo, Ohio.—During the next month this company will award contracts to relay 1 mile of track with new 75-lb. A. S. C. E. rails and will rebuild three pile bridges and replace with steel bridge work on concrete abutments.

Lake Erie & Youngstown Railroad, Youngstown, Ohio.—Plans are being made to build a new double-track line south from Youngstown to Steubenville. About 10 miles of the roadbed on the Youngstown end has been completed. Work on the Conneaut end is to begin in the spring.

Berlin & Northern Railway, Berlin, Ont.—This company has let a contract for eliminating a curve on its old line and building a 1300-ft. culvert and abutments on an extension.

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Dunnville, Wellandport & Beamsville Electric Railway, Wellandport, Ont.—Gainesboro Township has voted a large bonus to this company as an inducement to get the new line started which has been dormant since last season. Bonds are now being sold to provide funds to construct the Dunnville & St. Ann division of the line. [E. R. J., Oct. 4, '13.]

***Ortley, Ore.**—Cornelius Gardiner, Ortley, plans to build an electric tram line from Ortley to Rowena. The right-of-way has been purchased.

Portland, Ore.—An agreement was made recently between the Portland Railway, Light & Power Company and the Halsey Street Improvement Club by which the former will construct a line on Halsey Street from Sandy Boulevard east to the city limits, provided a bonus of $21,000 is raised by the residents of this district. Property owners interested have subscribed $16,000, leaving only $5,000 additional to be raised.

West Side Electric Street Railway, Charleroi, Pa.—This company plans to build about 5 miles of extensions from Charleroi to Ellsworth. It has 3 miles in operation between Weaver and Ellsworth.

Hummelstown & Campbellstown Street Railway, Hershey, Pa.—This company plans to build early in the spring about 10 miles of new track from Hershey to Elizabethtown.

South Fork-Portage Railway, South Fork, Pa.—This company's line between South Fork and Portage is being completed by the Portage Construction Company.

Wilkes-Barre (Pa.) Railway.—Work has been begun by this company on a 3-mile extension to Askam, Warrior Run and the Eighth Ward of Nanticoke.

Jackson Railway & Light Company, Jackson, Tenn.—During the next few weeks this company will award contracts to build about 2 miles of new track in Jackson.

Austin (Tex.) Street Railway.—During the next few weeks this company expects to rebuild 1 mile of track in Austin.

Houston (Tex.) Electric Company.—Plans are being made to double-track and pave this company's line on Harrisburg Road in Houston.

Spokane & Inland Empire Railroad, Spokane, Wash.—James J. Keane, Moscow, representing citizens of Moscow, recently petitioned this company to extend its line to Colton and Uniontown and if possible to Genesee. A definite answer has not been given by the company, although, it is said, the officials have promised to give the matter careful consideration.

Tacoma, Wash.—Mayor Seymour was authorized by the Council recently to make an offer to the Tacoma Railway & Power Company to operate over Lincoln Bridge and the tide flats. It was tentatively agreed that the commissioners would offer a ten-year permit to operate across the bridge with the option of purchase of tracks by the city at any time after five years. The question of building a municipal line from the heart of the business district to the tide flats, the manufacturing section, is being considered seriously in Tacoma, and in all likelihood the matter will be settled, as regards the builder of the line, shortly. If the Tacoma Railway & Power Company cannot be induced to build it, the city will.

Sheboygan Railway & Electric Company, Sheybogan, Wis.—During the next eight weeks this company plans to purchase gravel-handling apparatus for its way department in Sheboygan.

SHOPS AND BUILDINGS

Fox & Illinois Union Railway, Aurora, Ill.—This company is now building a carhouse in Yorkville.

Kankakee & Urbana Traction Company, Urbana, Ill.—This company has awarded a contract to Sutherland & Sowers for the construction of a new carhouse.

Boston & Worcester Street Railway, Boston, Mass.—During the next six weeks this company expects to buy a wheel-boring machine, an air compressor and a milling machine.

Holyoke (Mass.) Street Railway.—This company has awarded a contract for the erection of a new 190-ft. x 400-ft. carhouse to the Caspar Ranger Company, Holyoke, at a price of about $150,000. Plans for the building have been prepared by the Samuel M. Green Company, engineer, Springfield. The carhouse will front on Canal, Lyman, East and Bridge Streets, Holyoke, and will include general offices and a repair shop, the construction being of brick, concrete and steel. Work will be begun as soon as the company obtains a permit from the city to lay track into the property from the adjoining streets.

Exeter, Hampton & Amesbury Street Railway, Exeter, N. H.—During the next two weeks this company will award a contract to build a new carhouse in Hampton. The structure will be 50 ft. x 150 ft.

Niagara Gorge Railroad, Niagara Falls, N. Y.—During the next two months this company will award contracts to build two new carhouses in Niagara Falls.

Columbus, Delaware & Marion Railway, Columbus, Ohio.—Contracts have been awarded by this company for a new carhouse and repair shop.

Toronto & York Radial Railway, Toronto, Ont.—Plans are being made by this company to build an addition to its carhouses on Kingston Road in East Toronto.

Northwestern Pennsylvania Railways, Meadville, Pa.—Work has been begun by this company on its new passenger station in Edinboro. The structure will be of brick construction and will be built by the Constable Brothers, Edinboro. The cost of the station is estimated to be about $10,000.

Jackson Railway & Light Company, Jackson, Tenn.—During the next few weeks this company proposes to award contracts to build an addition to its carhouse in Jackson.

Seattle (Wash.) Municipal Railway.—Bids are being received by this company to build a new carhouse and repair shop at Third Avenue West and West Ewing Street in Seattle.

POWER HOUSES AND SUBSTATIONS

Northern Illinois Electric Railway, Amboy, Ill.—Negotiations have been made by this company with the Illinois Utilities Company for the purchase of power.

Columbus, Delaware & Marion Railway, Columbus, Ohio.—Contracts have been awarded by this company for the erection of additional coal storage facilities at its Stratford power house. Contracts have been awarded by the company and construction is well under way for an auxiliary power plant at Marion, Ohio, to contain a 750-hp Curtiss turbo-generator, a Wheeler surface condenser, a Wheeler air pump and circulating pump, two 250-hp Heine boilers, a Worthington boiler feed pump, a Goulds motor-driven deep-well pump, a 6-ft. x 130-ft. steel smokestack and a 10-ton Case traveling crane.

Toledo Railways & Light Company, Toledo, Ohio.—This company is installing a General Electric 12,500-kw horizontal steam turbine with a Westinghouse-LeBlanc surface condenser. The company is also installing five Stirling boilers with a capacity of 3300 boiler hp and a 1000-kw rotary converter for the down-town lighting. A 1500-kw Westinghouse frequency changer has just been added.

Tennessee Railway, Light & Power Company, Memphis, Tenn.—The second hydroelectric plant of the Tennessee Power Company, the principal operating subsidiary of the Tennessee Railway, Light & Power Company, was placed in operation on Oct. 23. The construction of the plant was done by the J. G. White Engineering Corporation and, together with the first plant, will ultimately produce 68,000 hp. The present capacity of the new plant is 20,000 hp, and the current is transmitted over a high-tension line to Nashville, 150 miles distant.

Austin (Tex.) Street Railway.—During the next few weeks this company will purchase one 1000-kw unit complete for its power house in Austin.

Wisconsin Traction, Light, Heat & Power Company, La Crosse, Wis.—This company plans to build a new substation in La Crosse.

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Manufactures and Supplies

ROLLING STOCK

Austin (Tex.) Electric Railway expects to purchase four closed cars.

Hull (Que.) Electric Company expects to p ırchase four double-truck car bodies.

Toledo & Western Railway, Toledo, Ohio, expects to purchase thirty 80,000-lb. capacity gondola cars.

Jackson Railway & Light Company, Jackson, Tenn., expects to purchase four steel one-man cars.

Northwestern Ohio Railway & Power Company, Toledo, Ohio, expects to purchase two new coaches in 1914.

Toledo Railways & Light Company, Toledo, Ohio, is building ten pay-as-you-enter cars in its own shops.

Exeter, Hampton & Amesbury Street Railway, Exeter, N. H., expects to purchase two fourteen-bench open cars.

Northern Illinois Electric Railway Company, Chicago, Ill., is reported to be in the market for an electric locomotive.

Chicago (Ill.) Railways expects to purchase six sweepers. Fifty cars have been ordered from the St. Louis Car Company.

Tri-City Railway, Davenport, Ia., has purchased three new snow plows and sweepers to replace those destroyed by fire last winter.

New York State Railways, Rochester, N. Y., contemplates the purchase of new cars and will try out the new type of side-entrance, stepless cars before placing the next order.

Utah Light & Railway Company, Salt Lake City, Utah, has issued specifications for twenty-four semi-steel closed pay-as-you-enter cars, with seating capacity of fifty-six; length over body, 37 ft.; length over all, 50 ft. Eighteen of these cars are to be equipped with 40-hp motors and six with 60-hp motors.

Youngstown & Ohio River Railroad, Leetonia, Ohio, has ordered one 50-ton electric Baldwin-Westinghouse locomotive with 308-D-5 field-control motors and HL control. The electrical equipment will be designed for 600-volt d.c. operation and will produce a maximum drawbar pull of 25,000 lb. with a gear ratio of 16:57 and 36-in. drive wheels.

Montreal & Southern Counties Railway, Montreal, Que., expects to purchase about twelve new cars. These will be 57 ft. long, as against 50 ft. for the present cars and are designed to have through platforms. They will be of the multiple-unit, single-control type. Toilet accommodation will be provided. Baggage cars are also to be purchased.

Cincinnati (Ohio) Traction Company, reported in the Electric Railway Journal as having ordered fifty semi-convertible cars from the Cincinnati Car Company, has specified the following details for this equipment:

Bolster centers, length, 21 ft. 8 in.	Curtain fixtures. Cur. Sup. Co.
Length of body.....43 ft.	Curtain material...Pantasote
Length over bumpers..44 ft.	Heating system. Peter Smith
Width over sills...8 ft. 5/8 in.	Push button signal, Consolidated
Width over posts at belt .....8 ft. 1¾ in.	Registers .....International
Height from top of rail to sills .....2 ft. 3/16 in.	Roofs .....turtle-back
Body .....semi-steel	Sash fixtures.....Dayton
Interior trim.....mahogany	Seats .....longitudinal
Underframe .....steel	Seating material, canvas lined hard enameled rattan
Air brakes.....West.	Step treads, Mason carborundum
Brakeshoes, combined brake shoe and head.	Trucks .....Baldwin
Bumpers..5-in. steel channel	Varnish ....Flood & Conklin
Car trimmings.....Dayton	Wheels, chilled cast iron, 24-in. dia.

TRADE NOTES

Standard Underground Cable Company, Pittsburgh, Pa., has issued a catalog describing its D. S. type indoor cable terminals.

F. C. Rose, assistant to E. N. Chilson, manager of purchases, J. G. White & Company, Inc., New York, and allied interests, has resigned to accept a position as general purchasing agent of the Foundation Company, Ltd., Montreal, Que. Mr. Rose will be located in the Ottawa Bank Building, Montreal.

Ewbank Electric Transmission Company, Portland, Ore., has been organized to develop a self-propelled car designed by H. B. Ewbank, Jr. This car uses an internal-combustion engine with electric drive and motors on the car axles. Some tests have been made with this car on the line of the Portland, Eugene & Eastern Railroad.

ADVERTISING LITERATURE

National Car Appliances Company, Spokane, Wash., has issued a folder describing its car wheel flange oiler.

Cooper Heater Company, Carlisle, Pa., has issued a folder describing its pressed-steel heater for city and interurban railways.

Whiting Foundry Equipment Company, Harvey, Ill., has issued a catalog describing the operation of its quick-detachable grab bucket.

American Engineering Company, Philadelphia, Pa., has issued a booklet entitled "What's the Matter?" in connection with Taylor stokers.

Sangamo Electric Company, Springfield, Ill., has issued Bulletin No. 36, describing and illustrating its ampere-hour meters for general service.

Field Omnibus Company, New York, N. Y., has issued two catalogs describing its electric buses operated by Edison storage battery and trolley buses for operating from a double trolley line.

Trussed Concrete Steel Company, Detroit, Mich., has issued the eleventh edition of its "Hy-Rib" handbook, describing in detail its new concrete reinforcement material, "Seven-Rib Hy-Rib."

Cincinnati Milling Company, Cincinnati, Ohio, has issued a catalog describing and illustrating its plain, universal and vertical milling machines, both cone-driven and high power with single pulley drive.

W. E. Belcher, Bloomfield, N. J., has issued a folder discussing the subject of transmission line protection and describing a new device for the attachment and support of the continuous ground wire. This clamp is manufactured by Hubbard & Company, Pittsburgh, Pa.

G. L. Simonds & Company, Chicago, Ill., have issued a catalog on the subject of economical steam production and the Vulcan system of soot cleaning as applied to all types of water tube and return tubular boilers. This system involves perfect distribution of the steam, so directed and controlled as to clean the entire surface of every tube.

The Street Railway Question in the Political Campaign in Cleveland

Notwithstanding the fact that the street railway question was supposed to have been removed from politics in Cleveland, it is often mentioned in the present campaign between Mayor Newton D. Baker and Harry L. Davis. It was hoped that they would omit all mention of the matter and allow street railway problems to be solved on the basis of facts and experience. Several motormen and conductors of the Cleveland Railway were suspended recently for violating a rule to the effect that they must not talk politics. The men were subsequently reinstated.

The two-transfer system has been put into effect so that a passenger may reach any part of the city on one fare. The old system called for two fares where a passenger boarded a car on a cross-town line, transferred to a main line and then to an east or west line.

Peter Witt, street railway commissioner, has suggested that the new bridge across the Cuyahoga River, between the East and West Sides, be so constructed that a connection may be made with a subway terminal in the center of the city for surface cars.

W. R. Hopkins, head of the Cleveland Underground Rapid Transit Company, states that his company will be ready to announce its plans in detail within a short time

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Electric Railway Journal

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THE INDIANAPOLIS STRIKE

We are glad to learn that Governor Ralston of Indiana has taken the question of the enforcement of order in Indianapolis out of the hands of the Mayor of that city. During the first few days of this week the disorder and destruction of property which prevailed there on account of the strike on the lines of the Indianapolis Traction & Terminal Company was a disgrace. It justified the common criticism upon our country on the part of many keen observers from abroad that there is far too general a disregard for the law. We do not mean that the condition of affairs in Indianapolis has been any worse this past week than that which has prevailed in other cities in the past, but this is no excuse. It seems as if in one of our large cities the call of a strike agitator is all that is necessary to precipitate a condition of disorder and bloodshed practically as bad as that experienced in regular warfare. In some respects war is more merciful. As it is usually preceded by some warning, each side can arrange for the conflict. But during a strike the property of persons engaged in peaceful occupations may be swept away over night, and there seems to be no redress. The threadbare excuse offered by the labor leaders in Indianapolis that the disorder there is not being caused by the strikers but by the hoodlum element is being brought forward, but its inadequacy is apparent. If the leaders of the strike did not think that they would profit by this intimidation, destruction and murder, they could easily restrain their followers, and they are morally, if not legally, as responsible as those who commit the actual crimes.

INFORMATION FOR CITY RIDERS

Nowadays many city railways publish a great deal of travel information, but as a rule the data are compiled to meet the needs of the pleasure rider only. When a stranger tries to find his way about town, or when a resident desires to travel to an unfamiliar section, he is likely to encounter some difficulty in learning just what route will bring him nearest to his goal. In London, Berlin and other large cities it is customary for the local tramway company to publish at a nominal price a street railway guide which meets almost every possible condition. However, if a railway company considers such a publication to be too great a burden, it would be of help if it made some other provision for guiding the stranger, especially at its terminals and waiting rooms. Thus a very convenient form would be to list the route names alphabetically and also show the number of the nearest house on the cross street. This is practically the plan followed in the pay station directory of the New York Telephone Company, in which all addresses are listed alphabetically in conjunction with the number of the nearest house on the intersecting street. By this means the stranger would be saved much annoyance and loss of time. The need for some aid of this kind is illustrated by the fact that on one of the large systems near New York no information either printed or oral is obtainable at a terminal from which some ten routes are operated. At such a place one starter cannot be expected to answer inquiries continually, nor is the average conductor in the humor to make explanations while a large number of people are entering the car.

SCIENTIFIC CAR LIGHTING

We have commented before on the difficulty, from the standpoint of the illuminating engineer, of securing proper lighting in a car body. But, in spite of the fact that reading in cars is injurious to the eyes, most passengers insist on doing it, regardless of whether the light is intense enough or not, and this fact must be considered in selecting types and candle-powers of lamps. The tungsten lamp has, of course, revolutionized car lighting by making it practicable to furnish lighting of excellent quality and ample quantity without excessive expenditure of power, and with plenty of light at command it has now become important to distribute it uniformly and to avoid glare. Indeed, with these intense light sources, the practice followed with carbon filament lamps is highly objectionable. Various schemes of indirect and semi-indirect illumination are being tried out, and the judgment of the public is being sought as to the results. Some excellent data from Toledo, showing the results of actual measurements made with different kinds, numbers and arrangements of lighting units, are given elsewhere in this issue. These show that it is practicable to secure intensities of 4 foot-candles or more at the reading level with the expenditure of about 0.5 kw in a standard city car, and that with semi-indirect lighting. This is fine reading illumination, and the general effect in the car is delightful. The power expenditure is less than was formerly used with carbon lamps, and, in spite of the diffusion of light, the mean

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intensity is much greater. This is a good example of the rate at which illuminating engineering has progressed, although there is still so much inadequate illumination in evidence that some improvement is possible almost anywhere. It is, in consequence, a matter which may well be taken up by any railway manager with excellent possibilities for satisfactory results.

HAS BOILER INSURANCE BECOME A GAMBLE?

An account of an examination of the boiler which recently exploded with fatal results in the power plant of the Richmond Light & Railroad Company is published elsewhere in this issue. It shows, without necessity for any great degree of practical experience with boilers, that the disaster was due solely to the failure of a plate whose progressive deterioration should have been discovered long before it reached the dangerous stage. The cracks in the plate into which a knife blade could be inserted ¼ in. certainly did not grow overnight, and since a plain indication of the corrosive action of the feed water was given by still deeper cracks which were clearly distinguishable at the angles of the crow-foot braces, there is overwhelming evidence that not even the most elementary inspection had been made for a long period.

The explosion, which cost a total of seven lives, might easily have been avoided had only the most obvious defects been seen, because it is hardly likely that the weakened plate, rotten with pitting as it was, would have suddenly let go if all the crow-foot braces had been holding. The boiler, it should be stated, was of the vertical water-tube type with large drums top and bottom and for this reason was more susceptible to disastrous explosion than one with smaller drums. At the same time, inspection was greatly facilitated. Expert advice had been employed by the railway in the form of a steam-boiler insurance policy with a presumably reputable casualty company, and its supervision, together with the less directly interested inspection of the city authorities, certainly entitled the railway to the belief that its boilers would not be allowed to develop dangerous defects. Precedent warranted this position, because very few steam users can have boiler experts among their regular employees and dependence upon boiler insurance has become universally accepted practice. Now it appears that at least in one case this confidence has been misplaced. What assurance exists that there are not many others?

Deliberately or negligently the premium for this insurance seems to have been applied not to meet the expense of proper inspection but instead put up as a wager at long odds that the boiler wouldn't explode. If that is what the boiler insurance companies are doing, it is high time that the states, instead of feebly attempting the herculean task of inspecting individual boilers, should devote their energies to inspecting the boiler-inspecting companies. A gamble which may result in the extinction of seven lives at one losing turn of the wheel is too ghastly a game to be permitted, and if the public authorities will not act and act promptly, it is the duty of every owner of steam boilers to check the inspection work of his insurance company himself.

HYPOTHECATION OF UNISSUED BONDS

The recent warning of the Board of Public Utility Commissioners of New Jersey to companies under its jurisdiction not to pledge bonds as securities for loans before the commission has legally approved the issue of the bonds brings up an interesting point in corporation finance. The reason given by the board is that such hypothecation creates a liability that may force the public sale of the bonds at a later date and thus virtually bring about a flotation of securities without the approval of the commission. Such a contingency may seem remote, but it is possible, and its effect would not only be to put an "unauthorized" bond issue on the market but the utility would still owe the balance of its loan to the lender as well as the full face value of the bonds to their holders. Of course, this would be the case even if the use of a company's bonds as collateral for its loan should receive the authorization of the commission, a fact which makes particularly poignant the reticence of the New Jersey commission as to whether public utilities are permitted at all by statute to hypothecate their securities. Until a specific case arises the exact attitude of the commission cannot be known with certainty, but from the tone of the memorandum it would appear either that an authorization of bonds for the purposes of hypothecation will not be granted to the utilities or that, if such permission is given, the securities, to be valid, must be accounted for, in case of forced sale, at the 80 per cent or 75 per cent of the par value designated by the public utility law as the miniumum rate of insurance.

There is no doubt that the necessity for short-time loans often rises suddenly and that heretofore bonds have frequently been used for their hypothecation. In the light of the recent warning, however, it might be well for the companies to try to prevail upon the banks to take their short-time notes without collateral security or else with some of the company's investment securities as collateral instead of their own bonds. In case this proves too difficult, there remains an alternative plan, the use of a blanket mortgage and a single type of bond instead of the usual piecemeal mortgage and securities as diversified as Joseph's coat.

The most advanced teaching in corporation finance, we believe, is that which declares the desirability of having all the indebtedness of a company converted into one standard form of security, to be available at all times not only for expected or unforeseen financing but also for refinancing purposes. The world-wide scramble for capital has amply demonstrated that he borrows best who borrows on a uniform, well-known security, instead of presenting heterogeneous evidences of indebtedness that only complicate the financial books and the relations with creditors. The complexity and inexplicability of some electric railway financing since the advent of holding companies makes us welcome alike for the public, the lenders and the electric railways themselves the use of limited open-end or pure open-end mortgages, such as are exemplified by the latest Pennsylvania Railroad and New York Central Railroad proposals. Whether a definite mortgage principal is fixed or not, the idea is that provision is made for a reservoir of authorized credit ample for years to come and so carefully

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guarded by the mortgage agreement that it cannot be abused or dissipated. Under such a mortgage, bonds may be issued from time to time as the directors of the company and the public service commission deem necessary and wise.

A large part of the delay of public service commissions in passing on bond issues is due to bickerings regarding interest rates, the proper type of security to be issued and the complexity of the existing capitalization, but all this could be avoided by obtaining once for all the authorization of a standard security. Then, in each case where the company desired to issue a certain portion of bonds under the blanket mortgage, there would be left only the necessity of showing the need. And to say that the consent of a public service commission cannot be acquired quickly enough in the time of emergency or catastrophe is rather a travesty upon the clear thinking and decisiveness of men chosen as commissioners. The desired authorization of securities will be granted with as much rapidity as the need therefor is shown with thoroughness and truth. This unification of a company's mortgage plan and the resulting possibility of borrowing quickly for any occasion is much more in line with modern financing than a temporary miscellaneous short-time loan system with its now, more than ever, apparent difficulties.

THE MEETING OF COMMISSIONERS

The meeting of the National Association of Railway Commissioners in Washington last week is clear proof of the fact that regulation of public utilities is a condition, not a theory. When the regulative policies of the states were less powerful the meetings of this association seemed to deal with possibilities rather than with actualities. The meetings have changed because conditions have changed.

With the exception of one report, the proceedings seemed from a corporate standpoint to be less radical than in former years. This is partly because the corporate point of view has been altered. That which sounded very radical a few years ago has now an appearance of reasonableness. At the same time we believe that there has also been a modification in the point of view of some of the public officials charged with the duty of regulation. This change is less easy to define or illustrate than the one in the corporate point of view, but it is the kind that usually comes logically from the sense of approaching responsibility or from continued responsibility. Although neither the organization of the Interstate Commerce Commission for the pending federal valuation of railways nor the details of the work have been planned, this stupendous task has brought a sobering sense of responsibility to more than one regulating official in the country.

One of the expressions which received much attention at the meeting was that of Chairman Clark of the Interstate Commerce Commission. He said that it would be a mistake to undertake to correct the present financial condition of transportation agencies, even if that was due to reckless or dishonest financing in the past, by a policy of reprisal which would impair the usefulness or efficiency of carriers. Chairman Clark did not say that he approved of increases in rates, but it is scarcely thinkable that he would have committed himself publicly on a subject of such importance. He did not dwell, however, on that extension of power to regulate which some of the members of the commission are said to want.

The most extreme view presented at length during the meeting was contained in the report of the committee on railway capitalization, written by Mr. Eshleman, member of the California Railroad Commission. Most of the report of this committee was adopted, however, and if this acceptance of the recommendations may be taken as the final conclusion of the members of the association, those in attendance at the Washington meeting seek full authority over the issue of securities, not only for the state commissions so far as their properties are concerned, but also for the Interstate Commerce Commission so far as interstate carriers are concerned.

The sobering word on this point was spoken by Commissioner Meyer, of the Interstate commission, who was a member of the Railroad Securities Commission appointed by President Taft. Mr. Meyer, whose remarks on this point were published in last week's issue, said that not a single thing was done under the Wisconsin stock and bond law which could not have been accomplished under the act recommended by the Securities Commission without the assumption by the regulating body of either legal or moral responsibility. This view is confirmed by the opinion of Chairman Roemer of the Railroad Commission of Wisconsin. Mr. Roemer was the author of the Wisconsin stock and bond law, but the experiences of the commission under the authority which it imposed have changed his views. It is significant that those who have had to administer the act which the report declares is "one of the most carefully worked out stock and bond laws now in effect" hesitate to recommend regulation in that direction, and that those who have not had this experience should favor such measures. We have frequently expressed our judgment that the supervision and approval of issues of securities by the state involves a moral if not a legal responsibility from which investors will not hold it to be free in the event of loss. Bankers like the approval of commissions on securities because it helps the sales. But, as the Railroad Securities Commission has pointed out, either the approval of the state on new securities means nothing or it means more than the public ought to permit to mean.

Although the subject of valuation of railroads received more attention during informal conferences at the time of the association meeting than at the actual business sessions, the scope of the report of the committee on railroad taxes and plans for ascertaining fair valuation of railroad properties was enlarged to take in questions relating to the valuation of all utilities. This report, of which an abstract was published in last week's issue, fixes attention on the varied views on the different elements of valuation. It shows why companies should be ready to present their views in such a reasonable way that they will stand the test of commissions, courts and public opinion. A fair recognition of public interest is just as essential as a fair recognition of corporate interest.

The meeting of the commissioners makes their views known. The views of the companies should be known just as well, because a policy of full publicity in these matters will help to establish a fair middle ground of settlement.

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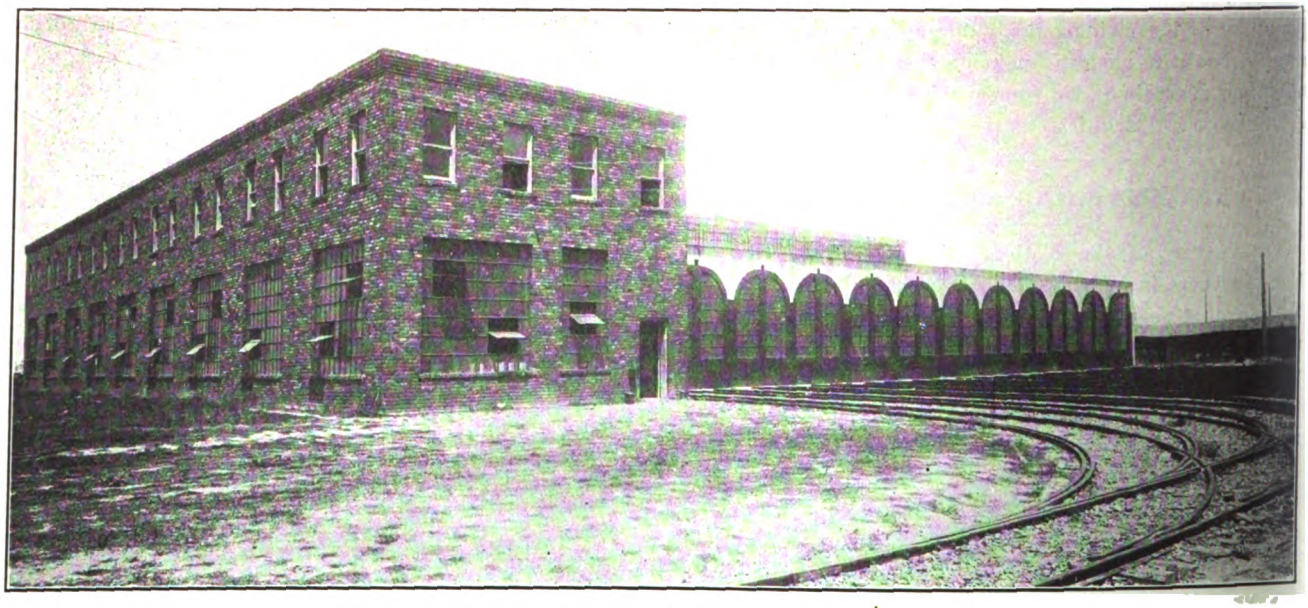
New Carhouse of the Muskogee Electric Traction Company

A New Carhouse and Shop at Muskogee, Okla., Combines Unusual Features in Building Design, Spacious Trainmen's Quarters, Effective Shop Equipment and Novel Inspection Pit Construction

A new combination carhouse and general repair shop has been completed recently by the Muskogee Electric Traction Company, Muskogee, Okla. The arrangement of the building as well as the design of details embodies a number of distinctive features well worthy of mention. Facilities for handling heavy parts of equipment were installed to aid in keeping the repair force at a minimum, and the scheme of operating the repair shop as well as the storeroom has resulted in great economy.

ARRANGEMENT OF TRACKS AND BUILDINGS

The new carhouse and shops are situated at the northeastern limits of the city of Muskogee on a triangular-shaped piece of property the hypothenuse of which parallels the main track. It is 750 ft. long on one leg and 900 ft. long on the other, so that an area more than sufficient for present shop and yard requirements is provided. The track layout was designed to meet conditions of future expansion, that is, with a view to occupying the whole area. As shown on the general plan, the trackage is in the form of loops which provide ingress and egress either from the front or rear of the carhouse. The building site was selected at the approximate center of the long leg of the triangle, which permits of shop expansion to the south and additional carhouse storage capacity to the north. The triangular portion remaining between the shop and the main line will be utilized as a material yard.



Muskogee Carhouse—Front View of Shop and Carhouse

Twelve tracks entering the building are built at right angles to the ladder approach and are connected to it by 50-ft. radius curves with built-up tongues and mates at the turnouts. Two storage tracks extend the full length of the shop property. These are parallel to the main track to Hyde Park, the company's pleasure resort on the Arkansas River. Cross-overs at both ends of the shop property, between the main track and these storage tracks, facilitate train movement to and from the shop tracks. In addition to being accessible from the street railway lines, the carhouse site is served by a connection to the St. Louis & San Francisco Railroad, a steam road on an adjoining right-of-way.

The shop and car-storage portions of the building are respectively 32 ft. x 155 ft. and 120 ft. x 144 ft. in plan. The former is two stories in height and is of brick, steel and reinforced-concrete construction, while the latter consists of a structural steel frame on concrete foundations inclosed with corrugated ingot-iron roof and siding. The first floor of the shop building section is occupied by the car repair department, and the second floor serves as a trainmen's clubroom and a reserve stock storage room. Seven counterbalanced structural-steel doors 12 ft. wide by 9 ft. high provide passageways between the shop and carhouse. The track adjacent to the repair shop section was not built over an inspection pit, but the remainder of the interior storage tracks are on open structural-steel trestles over one large inspection pit. This pit occupies practically all the carhouse floor, being 104 ft. by 126 ft. in plan and 5 ft. 3 in. in depth.

A transverse pit crosses this inspection pit near the center of the building and extends into the repair shop bay. This transverse pit is 3 ft. in depth by 8 ft. in width and is built in the floor of the inspection pit. It serves as a runway for a car used in the removal of repair parts between the large inspection pit and the shop bay. In order to accommodate the transfer car the pit is provided with runway rails. The height of the car was made the same as the elevation of the inspection pit floor. This permits repair parts to be handled from the inspection pit to the transfer truck without lifting. At the repair shop end of this transfer pit an air hoist has been installed to elevate the car to the shop floor level.

Heretofore the daily inspection has been made by one man who moved each car over a pit of sufficient length to accommodate two cars. If he performed his duty according to instructions it was necessary for him to walk 21 miles to inspect fifteen cars properly. This was an impossible

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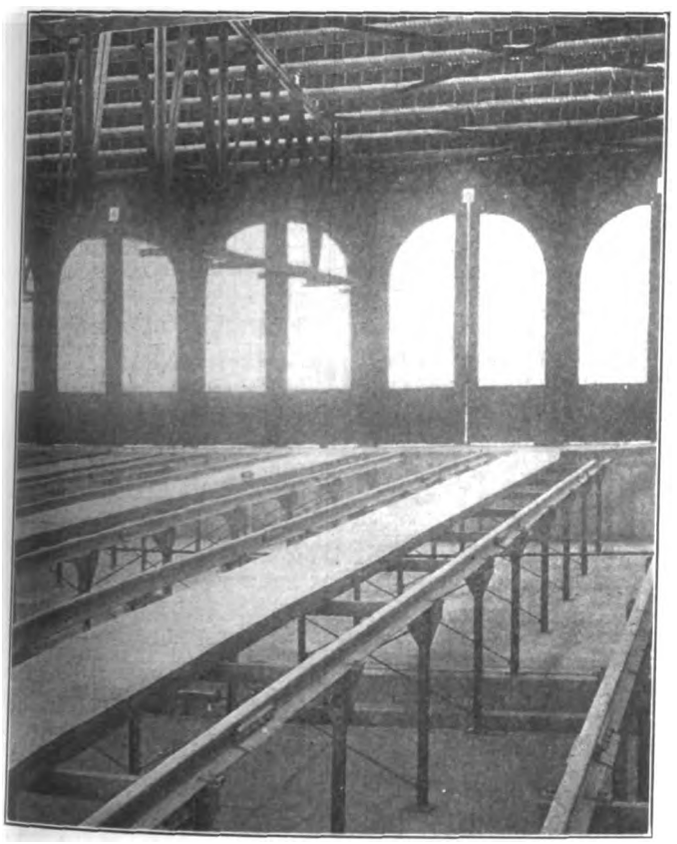
task during the hours in storage, and the single large inspection pit has greatly reduced the amount of walking necessary as it permits the inspectors to examine all cars from below without moving them. In addition to this facility, transverse and longitudinal running boards supported on the roof trusses have been installed to reduce climbing over cars to a minimum. Present practice with the new facilities is to inspect from the pit first, then from the floor level and finally from the overhead running boards.

BUILDING CONSTRUCTION DETAILS

The materials used in the design of the repair shop and trainmen's quarters section of the building included concrete, steel and brick. The exterior walls are 13 in. thick, faced with dark cherry-red paving block and backed with common brick. Architecturally, the exterior is quite plain. It is typical of factory building construction with unadorned brick walls corbeled five courses at the top and finished with a concrete coping. Liberal natural illumination and ventilation are supplied in the repair shop through

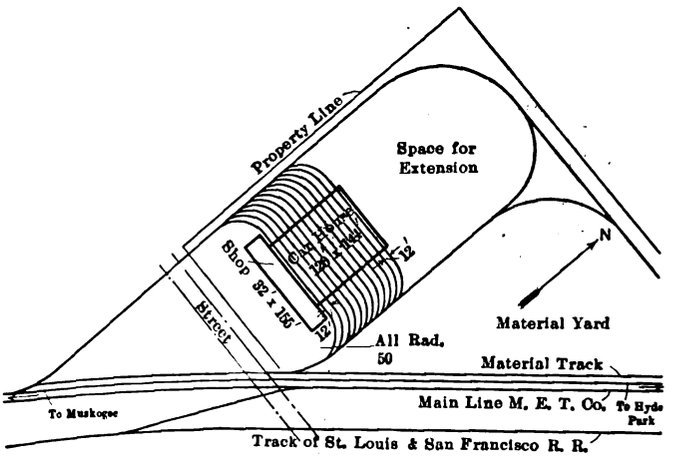


Muskogee Carhouse—Open Pit Construction

twin window openings 10 ft. 6 in. wide by 10 ft. 9 in. high, spaced at 17-ft. intervals. These openings are inclosed with Fenestra steel sash, and each window is provided with a six-light pivoted section for natural ventilation.

The second floor of the shop bay also is equipped with a liberal spacing of single windows with sliding sash. A structural steel frame supports the floor and roof in this section of the building except at the exterior walls, where the floor beams rest direct on the masonry. The floor construction includes a 4-in. reinforced-concrete slab, containing 0.180 sq. in. of steel per foot of width. The roof is constructed in a similar manner and contains 0.165 sq. in. of steel per foot of width. A five-ply tar and gravel roof covering has been applied over the reinforced-concrete slab to waterproof it thoroughly.

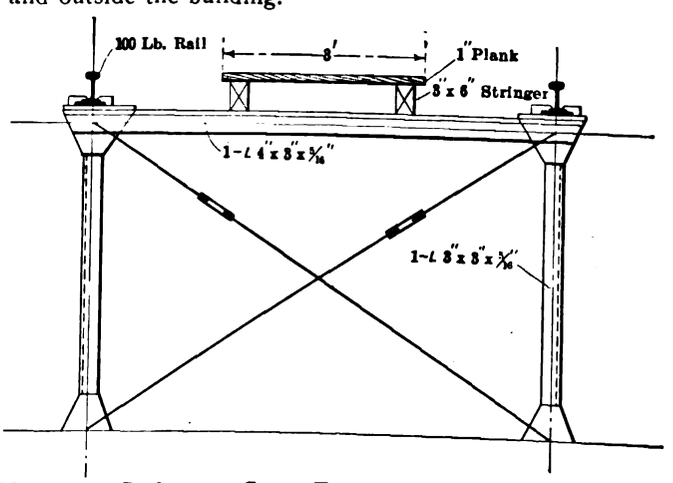
The structural steel frame in the repair shop serves as a means of attaching the car storage section superstructure. It also makes possible the installation of the seven large counterbalancing lifting doors in the partition between the two sections. Unusual features embodied in the carhouse construction in addition to those already mentioned are found in this design of the supporting steel frame. The carhouse floor is clear of columns, a desirable condition obtained by the use of roof trusses set parallel to the tracks. This arrangement required trusses 120 ft. in length and 15 ft. in depth at the ridge of the roof. With walls at



Muskogee Carhouse—Plan of Building and Tracks

the end of the trusses 17 ft. 9 in. in height, only 10 ft. of clear head room was obtained under the lower cords. However, this was not objectionable as the tracks were spaced so that the trusses came in the aisles between them. This arrangement also permitted the angle brackets to be attached to the lower cords which carry one of the overhead runways used in car inspection. Both the roof and the side walls of this self-supported steel building frame were inclosed with No. 20 and No. 22 gage corrugated ingot iron which is securely fastened to the steel frame by clips riveted to the roofing and spaced at 12-in. intervals. An inclosure of this character would be impracticable if it had been intended that heat should be provided in the carhouse, but as this was not the case it serves very well.

The track entrance doors are quite unusual as they are built of structural steel with pressed steel sash and wire glass. Practically the entire area of each pair of doors, which are 12 ft. wide by 16 ft. high at the center of the arched opening, is inclosed with wire glass. A small notch cut in the doors at the point where they join at the crown of the arched opening permits a trolley wire entrance. The wire is carried on span wire construction, both inside and outside the building.



Muskogee Carhouse—Cross Frames for Pit Track Supports

In addition to the provision for natural illumination in the carhouse doors on both sides of the building, a monitor extending over all tracks has been included in the design of the roof. It is 12 ft. and projects 7 ft. above the level of the roof. Each side is inclosed with metal sashes which extend the full length of the building. Frequent pivoted

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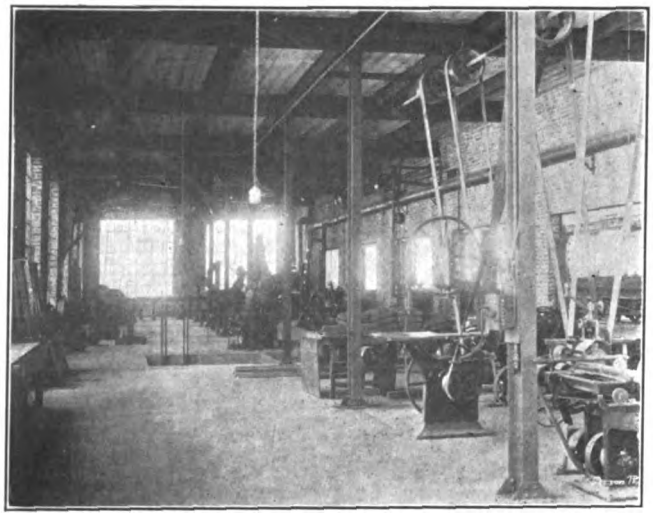
panels in the monitor sash area provide natural ventilation.

INSPECTION PITS

Probably the most unusual feature in the carhouse is the inspection pit design. As already explained, a single pit sufficient in size to cover all tracks has been constructed in the carhouse floor. Tracks over this pit are supported on columns made of a single 3-in. x 3-in. x 5/16-in. angle with



Muskogee Carhouse—General View of Repair Shop

a gusset plate at the top to serve as a point for attaching a strut, two diagonal tie rods and the rail clips. Two angle lugs at the bottom serve to spread the load on the concrete pedestals and as a means of anchoring the supporting structure to the pedestal foundations. These track columns are spaced 9 ft. 6 in. apart and are built in bents similar to bridge buck braces. They are paired to support the rails of parallel tracks, and are stiffened diagonally by round tie rods with turnbuckles for adjustment. A 4-in. x 3-in. x 5/16-in. angle between columns serves as a strut to prevent overturning and as a support for the walkway between the tracks. In order to provide sufficient girder strength between the pit columns 100-lb. A. S. C. E. rail has been used to span the 9-ft. 6-in. interval between them. The method of fastening the rail at the columns is by means of clips bolted to the horizontal leg of the structural angle strut.

Artificial illumination in the pits is obtained from pipe conduit which extends across the center and ends of the building, with a liberal spacing of outlets and sockets. This arrangement permits an inspector to insert a plug attached to a long flexible cord at the nearest outlet, and the lamp may be carried to any point desired within the range of the cord. Tungsten lamps furnish general illumination. These are swung from drop cords attached to overhead electric circuits in pipe conduit. A general view of the car storage bay is shown in the illustrations.

SHOP EQUIPMENT

The shop machine tools, which include those required for general repairs, have been arranged so that the small force may work to the best advantage. All tools are driven by a motor mounted on a shelf at one end of the shop, which is belt-connected to a system of line shafting. Other equipment in the building designed to facilitate repair work includes three pairs of air jacks used to raise car bodies. These have been installed in the floor beside the track adjacent to the repair shop bay. Two pairs of jacks serve for single-truck cars, and one pair of this set and the third pair of jacks are used for double-truck cars.

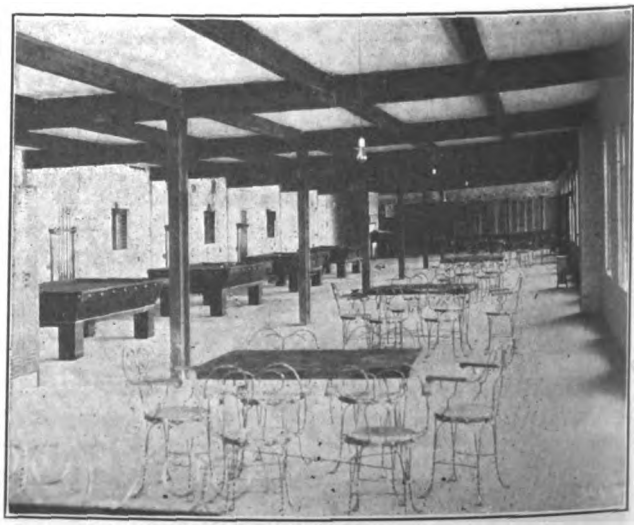
The method of providing a compressed-air reservoir in the shop department also is novel. This consists of a 10-in. pipe, 110 ft. in length, supplied from an air compressor at one end of the shop. It is supported on malleable-iron brackets, above the doors in the partition between the shop and carhouse. Several taps in the pipe make compressed air available at any point in the shop. This type of reservoir was employed because it made the full reservoir pressure available at each tap. It also serves both as a reservoir and pipe system for compressed-air service.

Another feature worthy of mention is the workbench for general use at one end of the shop floor. This is built with 4-in. pipe and floor-flange legs to which a ¼-in. sheet steel top has been securely attached. While a bench of this construction is more expensive than a wooden one, it is especially adapted for rough work. In many instances it takes the place of an anvil and its life is unlimited.

A trainmen's club room with the usual equipment such as pool, billiard and card tables occupies a portion of the second floor. Individual steel lockers for trainmen's use also have been installed at one end of the club room. One side of the partition between the club room and the stock room serves as a blackboard for official notices.

The method of handling the repair shop stock is quite novel. A wire cage stock room has been installed on the shop floor, where all materials for general repair work are kept. The shop foreman has charge of this room and from time to time issues orders for additional supplies from the reserve stock room on the second floor. Reserve supplies are kept in lots based on the maximum monthly requirements. Each month the shop stock cage is replenished with the maximum monthly allotment of each kind needed from the reserve stock. No reserve supplies are removed, however, without an order on the general superintendent.

From time to time the reserve stock is invoiced to check the amounts shown on the orders received. This system of handling supplies serves two purposes: first, only a small quantity of any material need be carried in the shop stock room, which permits the use of minimum space; second, the necessity for a special clerk to look after supplies is obviated. The men are placed on their own responsibility as to quantities of materials used. The foreman has a check on his men as he knows just how much material has been placed at their disposal. The general superintendent has a check on the foreman because he knows how much material has been issued to the shop by referring to the orders, and



Muskogee Carhouse—General View in Trainmen's Quarters

these may be checked against the supplies in the reserve stock room.

Many of the features in the design of the Muskogee Electric Traction Company's repair shops and carhouse, as well as their operation, are entirely new. They were conceived by R. D. Long, general manager, who directed the design and construction.

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Reports of Railway Commissioners

Abstracts of Reports of Committees Presented at the Meeting Held in Washington, Oct. 28 to 31—Electric Railway Accounts, Rails and Equipment, Safety Appliances and Legislation Among the Topics Considered

Supplementing the reports of committees of the National Association of Railway Commissioners published in last week's issue, abstracts of other reports are published herewith. The report of the committee on statistics and accounts of electric railways, which is printed this week, was not discussed during the meeting of Oct. 28 to 31.

REPORT OF COMMITTEE ON RAILROAD EQUIPMENT

The committee on rails and equipment, of which James E. Sague, New York Public Service Commission, Second District, is chairman, discussed first the subject of rails and rail failures. The report cited the rapid increase in the manufacture and use of open-hearth rails as compared with Bessemer rails and the smaller number of failures in the open-hearth rail. It also referred to the report of the rail committee of the American Railway Engineering Association on this subject. This report said that while the average rate of failure of the open-hearth rail was lower than that of the Bessemer rail, both were higher than last year. However, the theory that possibly as the age of the open-hearth rail increased so as to approach that of the Bessemer rail the rate of failure would increase is not corroborated. The production of both classes of rail during 1912 in this country was: Bessemer, 1,099,926 tons, and open-hearth, 2,105,144 tons. The committee believed that such failures as have occurred in both types of rails can be attributed very largely to the great increase in speeds and weights of trains and also to severe track conditions, especially during winter operation. The trouble seems to be confined to railroads handling large amounts of fast and heavy traffic, although their standard of maintenance is much above that of the small roads and the latter have few or no failures. The report said that the best information on the subject of the cause of rail failures is contained in the report No. 31 of the American Railway Engineering Association. The report also said that there is no reason for believing that foreign rails are on the average of better quality than American rails.

SPEED RECORDERS

The report referred to the practice of a number of steam railroad companies in using speed indicators and speed recorders. The committee felt that much caution should be exercised in recommending the adoption of any additional apparatus for train operation, but that the advantages to be secured both in economy and safety from a reliable speed recorder are sufficient to justify extensive and thorough trial of this device.

STEEL CARS

The report said that a rapid introduction of steel cars seems to have started with the electric operation of New York City terminals and from the necessities of electric subway service. Statistics from a large proportion of the steam railroads in this country indicate that practically no orders are now being placed for wooden passenger cars. Between Jan. 1, 1913, and July 1, 1913, 1140 passenger cars were ordered, of which 93.3 per cent were of all-steel construction and 6.7 per cent had steel underframes. The committee said that the cost of replacing wooden passenger, baggage and postal cars by steel cars of the same type in this country has been estimated at $614,619,900, and the committee believed that any legislation requiring wholesale change would be undesirable. The American wooden car, although inferior to the steel car from the standpoint of safety, is superior in that respect to the passenger cars used in Europe. The committee did not express an opinion upon the relative merits from the standpoint of safety of all-steel cars and cars with steel underframes, but it believed that this subject should receive study. It also rejected a recommendation that carriers should be required to use steel cars throughout in every train containing any steel cars. It believed that one, two or perhaps three steel cars at the end of the train made up with the other cars of wood would afford a great deal of protection in case of a rear-end collision.

SIGNALS

The committee referred to the increasing use of the overlapping system of signals, but made no direct recommendations in the matter.

REPORT OF THE COMMITTEE ON STATISTICS AND ACCOUNTS OF ELECTRIC RAILWAYS

This report was presented by A. F. Weber, chief statistician New York Public Service Commission, First District. An abstract follows:

Owing to the reorganization of the Massachusetts Railroad Commission and the inability of Mr. Bishop to devote sufficient time to the work of the committee, the chairmanship devolved upon the second member of the committee. With members in Maine, Washington and Georgia, it was found impossible to arrange a meeting of the committee at which there could be a full discussion of the more important questions involved in classification of accounts. Some progress has, however, been made as a result of correspondence, and the committee is prepared to make certain recommendations to this convention.

The situation with regard to the regulation of public utilities is changing so rapidly that it will probably prove impossible to arrive at finality in accounting matters. Up to the beginning of the present year seventeen states in addition to the national government had conferred upon a railroad or public utility commission authority to prescribe the accounts of corporations under their jurisdiction, including the following: Alabama, Arizona, California, District of Columbia, Georgia, Maryland, Massachusetts, Nebraska, New Hampshire, New Jersey, New York, Ohio, Oregon, Texas, Vermont, Washington, Wisconsin. About one-half of these states have adopted classifications of certain groups of accounts for electric railways, although only a few, including New York, Wisconsin and Maryland, have prescribed complete systems of accounts. In the present year the States of Maine, Pennsylvania, Illinois, etc., have enacted comprehensive public service commission laws which confer ample authority to supervise accounting methods. Several of these laws show the influence of the model utility bill prepared by the National Civic Federation's department of public utility regulation. As a member of the committee on accounts and reports, the chairman of your committee assisted in preparing the bill and can bring you the assurance that the sections of the bill relating to the regulation of statistical and accounting procedure embody the best results of experience and should be of assistance to the legislatures of states that have not yet provided for such supervision of electric railway accounts and statistics.

SEGREGATION OF POWER ACCOUNTS

Mention was made in the report of the committee last year of the serious objections to the inclusion of accounts

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relating to the maintenance of electric power plants and facilities in the groups "maintenance of way and structures" and "maintenance of equipment," and it is generally conceded that such inclusion impairs the usefulness of the present classification of operating expenses in making comparisons between different properties, some of which include no power plant. Where companies buy electric energy, the price which they pay includes the expense of maintenance as well as operation of the power plant that delivers the energy. Similarly, if a company exercises a franchise for the sale and distribution of electric current as well as the transportation of persons and property, all of the detail accounts which contain the expenses of producing power are found in the commercial lighting department expense classification, and the cost of power used by the railway department is transferred by a single entry.

It may be stated that the only question now involved in doubt regarding the segregation of the power costs is the question as to where the line should be drawn between power costs and railway costs. Some engineers who have been especially interested in comparing the relative economy of electrified branches of steam railroads with steam operation have argued that the cost of power taken over by the railway department should include all power costs up to the point of the delivery of power to the car. This classification, however, would result in separating from the maintenance of way all the expenses of inspecting and repairing wires and cables oftentimes attached to the track structures, third-rails and even rail bonds, all of which constitute a part of the plant and facilities of every electric railway whether it produces or buys its power. It, therefore seems advisable to leave the power distribution expenses in the railway classification and to set apart from that classification only the production and transmission expense accounts, which show the cost of electric current as delivered to the distribution system.

The segregation thus proposed would remove from the group of maintenance of way and structure accounts the account entitled transmission system repairs and would require the division of the following accounts in the same group: superintendence of way and structures; pole and fixture repairs; underground conduit repairs; repairs of buildings and structures; depreciation of way and structures.

In the group "maintenance of equipment" the two accounts "superintendence of equipment" and "depreciation of equipment" would likewise have to be divided, and the seven accounts relating to repairs of furnaces, steam engines and other power-plant equipment, as well as repairs of substation equipment, would be transferred bodily to the new group of power accounts, as would also all of the accounts in the group "operation of power plant" relating to labor and materials. Commissions or companies which have not already subdivided the account superintendence of transportation would, of course, make such subdivision so as to leave in the railway department group "operation of cars" only such superintendence as relates strictly to transportation.

RENTS

Certain classifications of operating expenses include one or more accounts for rents payable by the accounting corporation for the use of cars, tracks, etc., owned by other corporations. But operating expenses are always understood to represent the cost exclusive of any return upon the investment in the plant and facilities used to produce a commodity or service. Where the operator owns the plant he will receive the entire surplus over the operating expenses diminished only by the amounts claimed by public authorities as an enforced contribution to government. If he has borrowed capital his operating costs will not be affected, but his profits will be diminished by the existence of claims of creditors (bondholders, etc.). If he borrows (i. e., hires or leases) his plant or equipment he must still meet the expense of maintenance and operation and his operating costs will not be affected, but his profits will be diminished by the rent he pays as compensation for the use of the property leased.

No railway company would now think of including in operating expenses the interest upon equipment trust obligations representing the cost of rolling stock advanced by investors through a trustee. And yet, as a matter of principle, such interest differs in no wise from a payment, let us say, of $2 per car per day which may be charged as hire of equipment to an operating expense account.

Operating expenses should not be affected by changes in ownership; the cost of maintenance and operation will be the same whether the cars are owned by the accounting corporation, by a trustee or by some other railway company. This principle has been fully recognized by the Interstate Commerce Commission in its classification of operating expenses for steam railroads, which requires that rents that cover maintenance as well as a return upon investment should be subdivided and only the former element included in operating expenses. The only rents that are allowed in operating expenses in their entirety are the rents of offices, which cover light, heat, service, etc. The same principle should be followed in the classification of operating expenses on electric railways.

MAINTENANCE (REPAIRS, RENEWALS AND DEPRECIATION)

None of the questions thus far discussed equals in importance the subject of maintenance, viewed as the cost of maintaining the railway investment unimpaired. If maintenance had been properly defined in the past, public utility commissions would not now find themselves so frequently confronted with the problem of giving their approval to the issue of securities for the purpose of acquiring funds to be used essentially for replacements and renewals. In one rate case after another commissions find that the property accounts of public utilities carry the cost of plants in duplicate—an existing plant and a superseded plant which should have been written off the books. Possibly the authorized fares or rates have not always been sufficient to permit utilities to make all necessary replacements out of earnings, but proper accounting methods will at least reveal any such inadequacy if it exists.

Repairs do not of course constitute complete maintenance. In the case of the steam railroad running on its own right-of-way it is true that the regular inspection and repair of roadbed, ties and rails may include all necessary renewals and, therefore, provide complete maintenance. But in the case of street railways the situation is different even in respect to track maintenance, since track is in most cases laid in paved streets which cannot be disturbed from day to day or week to week for the purpose of making piecemeal repairs. Consequently if the street railway company defers the making of repairs and renewals and distributes all surplus earnings above the necessary transportation expenses, it is likely to find itself financially embarrassed when it has to renew rails and ties along an entire street. Cars again can be repaired almost indefinitely, but sooner or later every car for one reason or another will be discarded even if it is still capable of being further patched up. It is no longer denied that the gradual consumption of the capital embodied in the car constitutes a necessary expense which should have been included in the operating expenses deducted from earnings before any distribution is made to stockholder; and the only question now being debated concerns the method of making such reservation for replacements and abandoned property.

The discussion of renewal and depreciation accounts in this country is still in its early stages. The Interstate Commerce Commission in its classification of operating expenses of steam railroads of 1907 prescribed depreciation and renewal accounts for the several classes of rolling stock, and since then several of the state commissions have

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required electric railways to set up depreciation accounts in two or more groups. In neither case was there any attempt made to impound moneys set aside from revenue to provide for future renewals, it being intended that such moneys should be expended for new equipment so as to maintain the value of the original equipment in the aggregate, but without reference to individual replacements. Some of the companies, however, have preferred to set aside a definite fund for the larger replacements and turn back into this fund all its accumulations in the way of interest on securities in which it is invested.

There is a growing belief, however, that accuracy in estimating the necessary reservation to be made for deferred renewals must necessarily depend upon the detailed itemization of renewals. This has been recognized by the Interstate Commerce Commission in its accounting series circular No. 35, containing the tentative 1913 revision of operating expenses of steam roads. Each one of the numerous repair accounts is accompanied with its own depreciation account. Under maintenance of road, for example, there are thirty primary accounts besides the depreciation accounts, which number twenty-three. Such detail in accounting will eventually insure more careful and accurate estimates of current depreciation as it accrues.

The committee is not prepared at this time to make any recommendations as to the formulation of rules regulating depreciation accounts and, therefore, submits the subject to the convention for discussion. The only recommendations which it asks the association to adopt are those relating to the segregation of power accounts and rents.

It is proper to say that Mr. Ham has views that may differ from these recommendations.

MEMORANDUM OF THE COMMITTEE ON STATISTICS AND ACCOUNTS

Renewed attention has been given to the analysis of expenses among the several branches of railway service. The Interstate Commerce Commission by formal order required all operating carriers having a revenue of $1,000,000 or more to state the extent to which and the manner in which they separate their operating expenses between freight service and passenger service.

The result of this inquiry is exceedingly interesting. It appears that the universal requirement from all large carriers that an analysis of this kind be regularly made would not be so much of an innovation as one might be led to think from some of the discussions, since at the present time such an analysis is made regularly for their own purposes by carriers whose aggregate mileage is about one-half of the total mileage operated by the large roads in the United States. In addition, roads operating together about 15,000 miles made a complete separation of their operating expenses in this circular, but apparently do not do so regularly for their own purposes. Furthermore, a large number of additional roads separate their important transportation accounts between freight service and passenger service, although not doing so for items of maintenance of way and structures. Altogether, we have been surprised at the widespread extent of this practice of analyzing expenses between freight service and passenger service.

In justice to the opponents of cost accounting it should be understood that most of the roads which separate their expenses between freight and passenger traffic do so as a measure of efficiency in operating and not for measuring the reasonableness of the rates.

There is great need for standardizing the practice. The most common rule for separating common expenses is that of train miles, but other bases are also used such as locomotive mileage, car mileage, etc. There is also need for standardizing the practice with respect to those items which are regarded as directly assignable, for it is apparent that some roads make these assignments with much greater thoroughness than other roads.

Generally speaking, it may be said that when the accounting has been suitably planned at least two-thirds, and perhaps more, of the operating expenses can be separated either directly or on reasonably convincing bases of apportionment. The percentage obviously depends in part on the nature of the traffic. An all-freight road can apportion 100 per cent of its expenses to freight. The Erie entered 73.3 per cent of its operating expenses in columns calling for expenses caused by either service alone. For the Pennsylvania Lines West the corresponding figure was 72.2 per cent.

Theoretical opinion is showing some tendency to be more favorable to the cost-of-service principle, and the argument for a system of cost accounting is strengthened by a consideration of the nature of the questions with which regulating bodies have to deal. Up to the present time the courts have not shown any inclination to discontinue considering cost as an important factor in the ultimate determination of a rate. We believe that if cost of service is to continue to be the determining factor in measuring the reasonableness of rates it is time that the division of expenses among the several branches of the service should be threshed out to a finality.

A system of accounting designed to permit of the analysis of expenses between freight, passenger and other services should provide for a division of expenses between terminal and road operations. A number of state commissions, in correspondence with your committee, have expressed especial interest in the separation of revenues and expenses along state lines, and in view of recent court decisions we think little argument is needed on this point, but before anything satisfactory can be achieved along this line we believe it is necessary to have a separation of expenses between terminal and road operations.

REPORT OF COMMITTEE ON LEGISLATION

Within the past decade many states, including most of the states of the Northwest, have enacted statutes empowering their commissions to pass upon all questions affecting the stock and bonds issued by railroads and other public utilities. To-day a railroad traversing a half dozen states must submit its application for securities at as many different state capitols under varying conditions of both law and procedure. A federal statute making use of the state agency already provided would remove this duplication and the burden incident to it and tend to bring about uniformity in regard to those securities that must remain exclusively under state control.

REPORT OF COMMITTEE ON SAFETY APPLIANCES

The most important matter along the line of safety appliances at the present time is the installation of block signals on the railways of this country and the application of a rigid discipline against the violation of signal indications.

Another phase of block signal installation is the desirability of some form of automatic train control. Every one will admit that the interlocking systems at grade railroad crossings are an absolute necessity in modern railway operation, and yet how can we reconcile our ideas of "safety first" with a device that under certain circumstances provides for deliberately opening the main track and throwing a train into the ditch with a possible loss of life and an inevitable damage to rolling stock and roadbed of many hundreds of dollars, when there are devices which under like circumstances would immediately operate the train brake and bring the train to a stand before reaching the

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danger point? That there are devices of this kind in successful operation is beyond question.

One of the things that have engaged the attention of the Illinois commissioin has been an endeavor to reach a standard for overhead and side obstructions. A great many accidents are caused by overhead bridges and umbrella sheds at industrial plants, and the Illinois commission has a rule of not less than 22-ft. clearance for all overhead obstructions measured from the top of the rail to the lowest point overhead.

The greatest difficulty is from the side obstructions, coal sheds, loading platforms, water cranes, mail cranes and switch stands, etc., and it is absolutely necessary, before fixing a standard rule to cover lateral clearances, that there be a maximum width established for all equipment. At the present time there are all sorts and sizes of cars, and no maximum has yet been fixed as to the width either at roof or floor, so that any rule adopted to-day may be of no value to-morrow, and the railroads themselves are far apart as to car dimensions. In order to adopt a uniform code of rules for clearances, it would seem advisable to adopt some method to establish a maximum width for all equipment used by railroads.

It has been suggested that a uniform system of accident reports to be used by the Interstate Commerce Commission and all of the states would be a further step in the right direction.

The most crying need at the present time is the control of trains, not by a time limit as is the practice of a number of roads, but by an absolute space limit carefully defined by block signals and rigidly enforced and, if necessary, further protected by an automatic train stop.

PROGRESS ON NEW 2400-VOLT KALAMAZOO-GRAND RAPIDS (MICH.) LINE

The new 2400-volt electric interurban line between Kalamazoo and Grand Rapids, Mich., is rapidly nearing completion. This new 92-mile line when completed will form a part of the Michigan United Traction Company's lines. The grading was completed about Oct. 1, and the track will be laid between the city limits of Kalamazoo and the city limits of Grand Rapids by Nov. 15, 1913. At the present time the ballasting is well under way, approximately one-third being completed. By means of an equipment of four steam locomotives the work of ballasting is being carried on as rapidly as possible. There was some delay to construction on the Grand Rapids end of this line owing to terminal negotiations. These are practically settled at this time, however, and construction work is again moving ahead. Work on the bridges over the Grand River at Grand Rapids will be commenced early in the spring, and when this is completed the rest of the line will be ready for operation. The electrical equipment for this line will include eight 500-kw, 1200/2400-volt rotary converters, four 500-kw, 1200/2400-volt motor-generator sets and twenty quadruple equipments of GE-239 1200-volt motors with multiple-unit control.

MONOGRAPH ON BERLIN RAPID TRANSIT SYSTEM

The Siemens & Halske and Siemens-Schuckert companies have recently issued an album describing the elevated and subway rapid transit system of Berlin and their important share in it as contractors. The monograph presents a map of the lines now in service and of others under construction. It gives a history of the inauguration of each project, describing briefly the constructional and equipment features of each route, the methods of operation, the amount of traffic handled and the nature of the franchise agreements. More than a hundred illustrations show fully the constructional and operating features of the several lines and of the buildings used in connection with them.

CAR-LIGHTING TESTS IN TOLEDO

During the past summer the lighting of the cars of the Toledo Railway & Light Company was made a subject of elaborate study, the results of which have now been utilized in the remodeling of the lighting equipment. The improvement is so noticeable that visitors have congratulated the citizens upon having most excellently lighted cars. The changes consist in the substitution of tungsten for carbon-filament lamps, the placing of the lighting units in order to give the best effect and the selection of reflectors which are best suited to the purpose.

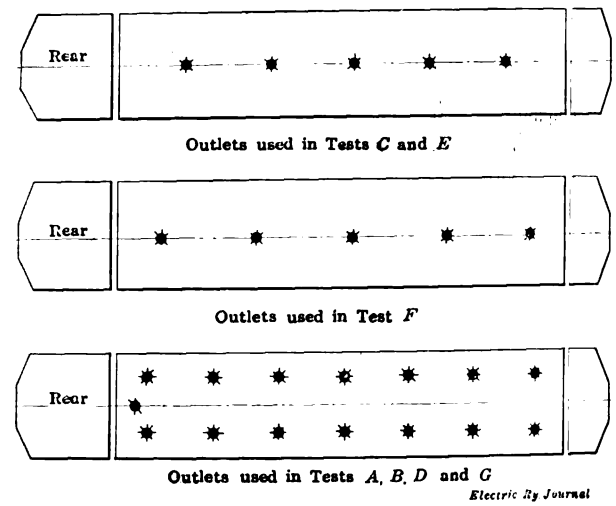


Fig. 1—Toledo Lighting Tests—Different Arrangements of Lamps Used in Tests

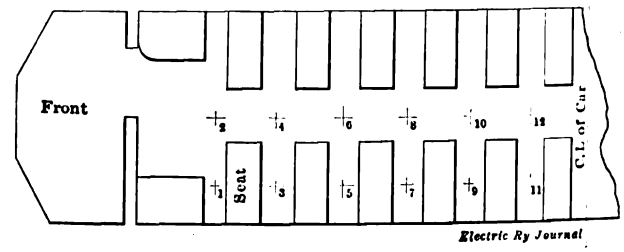
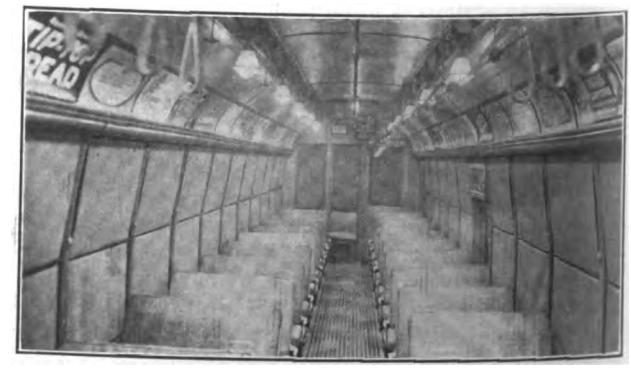


Fig. 2—Toledo Lighting Tests—Location of Test Stations



Toledo Lighting Tests—Interior View, Test A, 36-Watt Lamps with Reflectors

Before the changes were made a systematic illumination test was made by illuminating engineers from the Bryan-Marsh Works of the General Electric Company in co-operation with C. A. Brown, master mechanic of the railway company. Three cars were equipped with outlets as shown in Fig. 1, the cars being alike in size and furnishing. The inside dimensions of the cars were 34 ft. 6 in. by 7 ft.

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8 in. The tests were made at the Central Avenue carhouse in the evening, and the car shades were drawn while the measurements were made. The lighting equipment for the several tests was as follows:

Test A.—Fifteen 36-watt tungsten lamps, with small Holophane Realite fixtures.

Toledo Lighting Tests—Interior View—Test B, 36-Watt Lamps with Reflectors

Test B.—Fifteen 36-watt tungsten lamps, with Holophane Sudan 6-in. reflectors.

TABLE SHOWING INTENSITY OF ILLUMINATION IN FOOT-CANDLES FOUND AT DIFFERENT LOCATIONS IN CAR DURING SEVEN TESTS

Station Numbers	Test Designations						
	A	B	C	D	E	F	G
1	3.8	3.9	2.1	1.3	3.1	2.4	1.2
2	4.2	4.9	2.7	1.5	3.1	3.3	1.0
3	3.5	4.1	4.1	1.4	4.2	2.7	1.4
4	3.7	4.9	3.9	1.2	4.1	3.4	1.2
5	4.1	3.8	3.9	1.8	4.4	3.4	1.3
6	3.5	4.7	3.8	1.7	4.5	3.6	1.2
7	3.3	3.6	3.8	1.6	4.8	3.6	1.5
8	3.4	4.0	4.2	1.7	4.0	4.7	1.6
9	3.2	4.1	3.7	1.7	4.2	3.8	1.4
10	3.5	4.4	4.7	2.0	4.7	3.4	1.5
11	3.5	4.1	4.2	...	4.5	3.3	1.6
12	3.8	4.2	4.9	...	4.7	3.8	1.4
X-1*	3.6	3.9	2.1	1.4	3.5	2.3	0.86
X-2*	3.3	3.8	...	1.4	...	...	...
Average	3.6	4.17	3.7	1.5	4.2	3.3	1.3

*Extra tests made at stations 1 and 2.

Test C.—Five 94-watt tungsten lamps, with Holophane pearl-finish Sudan reflectors.

Test D.—Fifteen 54-watt clear-carbon lamps without reflectors.

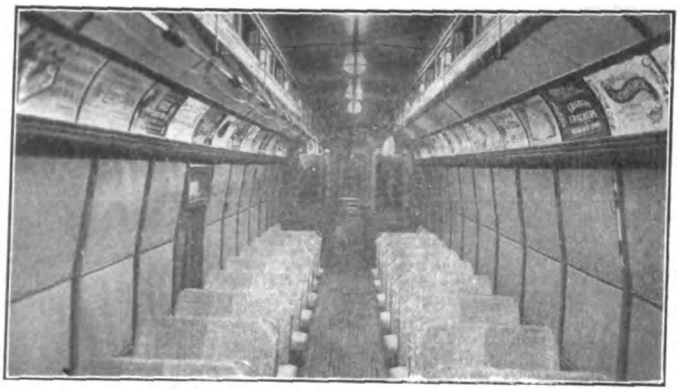
Toledo Lighting Tests—Interior View—Test D, 54-Watt Carbon Lamps Without Reflectors

Test E.—Five 94-watt tungsten lamps, with large Holophane Realite fixtures.

Test F.—Five 94-watt tungsten lamps with 12-in. Veluria semi-indirect fixtures.

Test G.—Fifteen 23-watt tungsten lamps without reflectors.

Measurements of light intensity were made by means of a Sharp-Millar portable photometer with a battery-supplied standard lamp in which the current was maintained constant with the aid of a voltmeter and regulating rheostat. The illuminometer was mounted on a tripod 34 in. above the floor. No attempt was made to correct for voltage fluctuations in the other lamps. The test stations were



Toledo Lighting Tests—Interior View—Test E, 94-Watt Lamps with Reflectors

selected as shown in Fig. 2 to yield a true average value of the illumination where it was needed by the passengers. The number of stations was sufficiently large to eliminate errors of observation.

The results of the tests are given in the accompanying table.

As a result of the tests the illuminating engineers recommended the outfit used in test B with lamp-holding fixtures made by the Safety Heating & Lighting Company. The railway company has equipped a score of cars with each of three different kinds of lighting units with a view to giving the public a chance to assist in the final decision as to which is best. The three types are an indirect fixture, a semi-indirect transmitting part of the light through the glass bowl and a semi-indirect in which there is an aperture in the bottom of the reflecting bowl allowing a part of the light to be transmitted at full intensity. The rest of the cars of the system have been fitted with ten 40-watt tungsten lamps each.

The company expects to secure through the improved lighting scheme not only more light with less power expenditure but also an excellent return on the investment

Toledo Lighting Tests—Interior View—Test F, Semi-Indirect Lighting

through the advertising value of the well-lighted cars. So far the results have justified the expectation.

An application has been submitted by P. A. Popov and A. N. Rukin for permission to form a company for constructing an electric railway, 35 miles long, from Moscow to Voznyesyensk. The cost is estimated at $3,500,000.

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Violence in Indianapolis Strike

Service of the Indianapolis City Lines Interrupted and Disorder Prevents Resumption of Operation—Statement by President Robert I. Todd on the Causes of the Outbreak

After several months of continued effort on the part of the organizers of the Amalgamated Association, who have been striving, so far unsuccessfully, to form an organization of the city trainmen of the Indianapolis Traction & Terminal Company at Indianapolis, Ind., matters were brought to a crisis when J. J. Thorpe, vice-president of the

Indianapolis Strike—Mob Blocking Car, Nov. 1, and Compelling Abandonment by Motorman

Amalgamated Association, and other outside organizers, taking advantage of the carnival conditions prevailing in the downtown sections of Indianapolis during Hallowe'en night, Oct. 31, called a mass meeting of the labor unions, together with the small number of men who had been prevailed upon to join the local union which they were attempting to form.

About 11 p. m. riotous mobs gathered in the streets and began assaulting motormen and conductors and dragging them from the cars, taking them forcibly to the Labor Hall and compelling them to sign as members of the union. Several who resisted were brutally beaten. No effort was made on the part of the police to disperse the mobs or to protect the car crews. This condition of riot prevailed during the night.

On Saturday morning, Nov. 1, the majority of the car crews reported for duty at the carhouses, and the company decided to operate about one-half of the regular schedules, being assured of protection for the men. Thousands of rioters filled the downtown streets, blocked the cars, cut trolley ropes, dragged off the crews and again marched them to the Labor Hall to sign the roll. Many of the employees signed for the second or third time in order to avoid further mistreatment at the hands of the mob.

By noon on Saturday the operation of every car had been stopped by force, and the mobs were attempting to destroy the cars and were cutting wires and committing other depredations. The company informed the police department that it had sufficient men ready to operate full schedules, if necessary, provided the crews and property would be protected. No effort was made, however, by the police department to permit the operation of cars or to prevent the destruction of property. Interurban cars entering the city were then made the object of attack, and it was necessary to stop all interurban lines at the outlying districts. Full operation of all interurban schedules is in effect on every line as far as the city limits of Indianapolis.

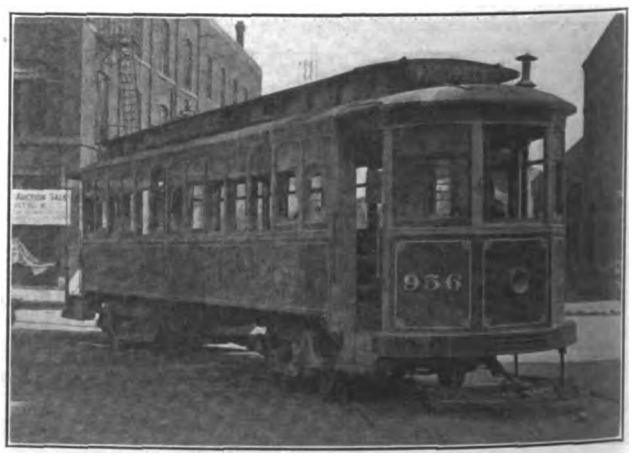
On Sunday morning, Nov. 2, another attempt was made to operate a few cars with police protection, but after several trips the police were withdrawn by the superintendent of police and the mobs were allowed to raid the cars.

The demands which had been presented by Mr. Thorpe just before the mass meeting called for the night of Oct. 31, which precipitated the riotous condition in the city, called for a flat rate of 32 cents per hour for the city men and 35 cents for the interurban men; 75 per cent of the runs on city schedules to be known as "earlies" and "lates" and to be completed within eleven consecutive hours, "swing" runs to be completed within fourteen consecutive hours; all runs of less than nine hours to pay nine hours' time; time and one-half for all time worked over the daily schedule; for the interurban men, all men discharged since the union movement was started to be reinstated; all freight trains to consist of at least one motorman, one conductor and one brakeman; all trains of more than one car to have at least one motorman, one conductor and one brakeman; the right to have grievances presented by a committee of the organization, and an arbitration clause to arbitrate all matters that cannot be satisfactorily adjusted.

STATEMENT OF ROBERT I. TODD

Robert I. Todd, president Indianapolis Traction & Terminal Company, made the following statement regarding the condition of affairs and demands presented:

"The street railway company wishes the public to understand that its employees are not on strike. The motormen and conductors are willing and anxious to run their cars and have not joined the association of their own free will. They have been dragged from their cars and marched under threats of death to the hall, where they have been forced to join the union, knowing if they did not they would be roughly treated. The company's officers wish the public, which is the real sufferer in these disturbances, to



Indianapolis Strike—Car Burned by Mob

know that the trouble is all caused by men from Detroit, Pittsburgh, Chicago and other places, who have no interest in the affairs of the city of Indianapolis, who are not taxpayers or even residents of the State of Indiana, but who are here to unionize the employees of the street railway company by brute force. If the men can get the protection

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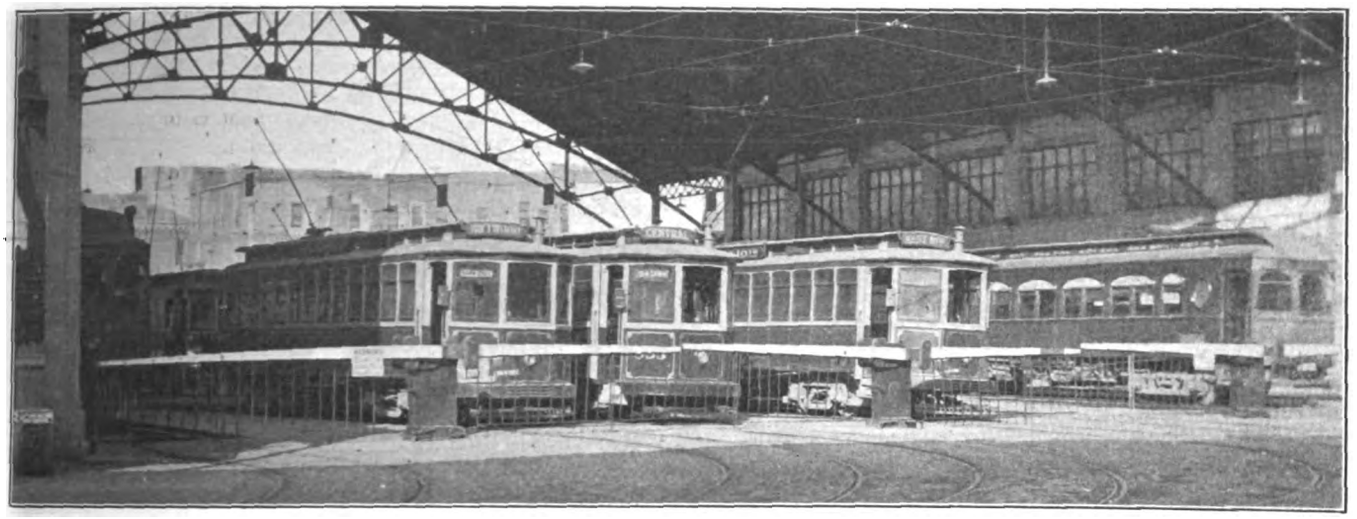
of the police, the cars will be operated on every line in the city.

"The so-called demands submitted to the company by J. J. Thorpe, of Pittsburgh, vice-president of the Amalgamated Association, are founded entirely on misrepresentation and exaggeration, without any consideration for truth

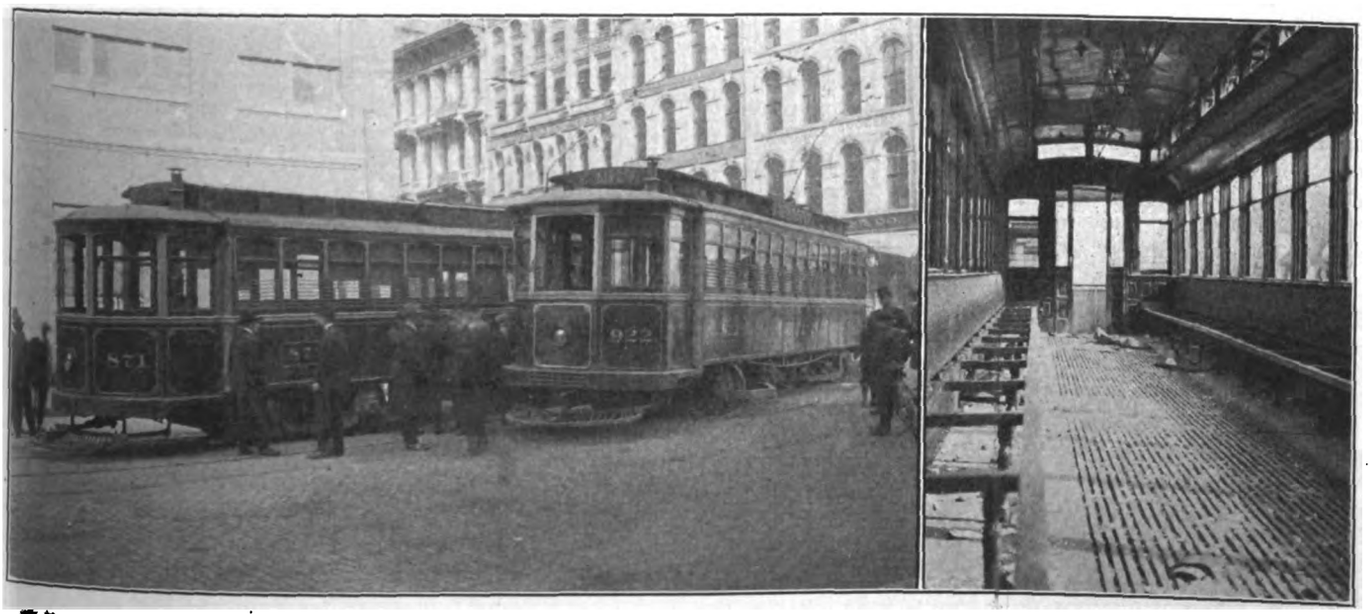


Indianapolis Strike—City Cars Stored in Traction Terminal Train Shed for Protection

or fair dealing. In reference to the demand for an increase in the rates of pay of motormen and conductors to a flat rate of 32 cents per hour, it should be known that after a state of riot and bloodshed had been brought about in Cincinnati during May of this year by the same organization which has now produced a similar condition of affairs in Indianapolis arbitration was finally agreed upon, with the result that the following wage scale was adopted for motormen and conductors: commencing at 20 cents per hour and running to 27 cents per hour for and after the tenth year, this scale to be effective to June 30, 1914. Immediately upon the award being made, W. D. Mahon, international president of the Amalgamated Association, publicly said: 'The finding of the arbitration board is one of the best I have ever known.'

"Compared with this, the wage scale of the motormen and conductors of the Indianapolis Traction & Terminal Company at the present time runs from 20 cents per hour the first year to 25 cents per hour after the fifth, and including time allowed regular crews for meal relief (which is paid for in Indianapolis but not in Cincinnati) the wage scale practically amounts to from 20 cents per hour the first year to 26 cents per hour after the fifth year. The population of Cincinnati in 1910 was 364,463; that of Indianapolis was 233,650. The rate of fare in Cincinnati is 5 cents, without any reduction for tickets. In Indianapolis six tickets are sold for 25 cents and twenty-five tickets for $1. The ticket fares are more than four-fifths of all fares. The ticket fares, on the basis of passengers carried for the year 1912, amounted to a reduction of $512,947 from a uniform 5-cent fare. Notwithstanding the fact of this low rate of fare, the wage scale of the company is among the highest in the country in cities of anything near the same population.

"As evidence of the fairness of the traction company to its employees, it is well known that their rate of wages has been increased from year to year beyond the amount which the receipts of the company justified; or, in other words, the employees have benefited more from the earnings of the company than have the stockholders or any other part of the corporation. In the year 1905 the rate of wages of the motormen and conductors began at 16 cents per hour as a minimum and went to 18 cents per hour as a maximum. The present rate of wages, as stated above,



Indianapolis Strike—Cars Derailed by Mobs at Meridian and Maryland Streets—Interior of Car Standing on Street, Showing Damage Done

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is 20 cents per hour as a minimum and 25 cents per hour as a maximum. In only one year, and that following the panic of 1907, has an increase not been made in the pay of the motormen and conductors of the company, and the present rate, as compared with 1905, shows an increase in the maximum wages paid of 40 per cent in the period of

Special Notice to Organized Labor

A Special Mass Meeting of all Organized Labor of Indianapolis and vicinity will be held Friday evening, October 31st, Labor Temple Hall, 138 West Washington St., in conjunction with Central Labor Union. It is of vital importance that all Organized Labor attend this meeting, as your future welfare is at stake. It is up to you to make this one of the greatest meetings that Indianapolis ever had. Don't fail to attend this meeting. Organized motormen and conductors are invited to attend.

By request of the Amalgamated Association of Street and Electric Railway Employees of America.

J. J. THORPE, First International Vice-President.

P. J. SHEA, General Executive Board Member.

Indianapolis Strike—Notice Issued by Organizers Calling Mass Meeting Oct. 31, Which Precipitated the Rioting

seven years, while the fare charged for transportation on the cars has not been increased.

"We believe that this showing of increased wages paid cannot be exceeded, if equaled, by any manufacturing industry or corporation in the city of Indianapolis. The demands of Mr. Thorpe were made purely for the purposes of attempting to stir up unrest and dissatisfaction among the loyal employees of the company, and not with any idea that such demands could in any way be fairly made of the company. The older residents of Indianapolis will remember the strike which occurred about 1892 against the Citizens' Street Railroad Company and the conditions in the street railway service which were brought about by the same organization which has caused the present riotous conditions, and which continued until 1899 when the Indianapolis Street Railway took hold of the property of the Citizens' Street Railroad Company; and all the people of the city will remember that from that time until the present day, a period of fourteen years, the city has had no strike by the employees of the company.

"In other cities of the State, as well as in cities of adjoining states, such strikes have been of frequent occurrence. The company believes that the citizens of Indianapolis are entitled to and should receive reliable and dependable service at all times, which cannot be given if the orders of outside foreign agitators are to be superior to those of the officers of the company who are most deeply interested in supplying good service to the public, in which outside agitators have no interest whatever. The employees of this company have always been contented with their wages and other conditions of their employment."

ATTEMPT TO GET CARS TO CARHOUSE

On Monday morning, Nov. 3, an attempt was made by the company to move to the carhouse some of the cars which were blocking the downtown streets. The police searched the carmen in the presence of a large mob, and then stepped aside, giving them no protection whatever. Later, President Todd and Superintendent Mahoney took personal charge of an attempt to move these cars, with the protection of Superintendent of Police Hyland and a squad of men. They were stoned and assaulted by a mob which had increased to between 8000 and 10,000 people. A squad of mounted police escorted them to the Traction Terminal Building, but on the way up Capitol Avenue they were struck and slightly injured by the volleys of missiles, the mob rushing the police at intervals. No effort was made on the part of the police to disperse the crowd which surrounded the Terminal Building for some time, after the officials were safely inside, and only a few arrests were made. Politics seemed to be playing into the hands of the organizers, as the city election was to be held on Tuesday, Nov. 4—the city administration being Republican, the sheriff of the county Democratic and the Governor Democratic.

Late in the afternoon of Tuesday, Nov. 4, a suit for a receiver for the Indianapolis Traction & Terminal Company was filed in the Marion Circuit Court. The suit asks that the franchise of the Indianapolis Traction & Terminal Company be forfeited on account of its failure to operate cars in the city since the strike was begun. Judge Remster informed the attorneys filing the suit that he would hear an application for receiver on Nov. 6. The parties behind the suit are identified with the labor interests of the city.

Frequent attacks were made on the Louisiana Street carhouse, which adjoins the Union Station, and on several occasions this building was fired upon by the mobs. One of the 250 car service men who have been quartered in this building for protection, awaiting an opportunity to operate cars, was shot and killed by bullets fired during one of these fusillades. On several occasions police officers turned in their badges, refusing to protect the company's property.

On Tuesday morning, Nov. 4, another attempt was made to move cars from the streets at Georgia and Capitol Avenues to the Louisiana carhouse, one block away. When the crowd gathered thirty policemen removed their badges and refused to protect the men working on the damaged cars. Between 550 and 600 ironworkers who were working on new buildings being erected in the city went out on a sympathetic strike, adding to the turbulent spirit of the crowds on the streets. Sheriff Porteus, after consultation with Superintendent of Police Hyland, deputized 200 prominent citizens for special police duty. Later that morning

The Final and Last Appeal

To the Motormen, Conductors, Barn, Shop and Power House Men of Indianapolis, Terre Haute, Anderson, Muncie, Marion, Logansport, Peru, Tipton, Bluffton, Kokomo, Fort Wayne, Lafayette, Richmond, Elwood, Lebanon, Columbus, Greenfield, Shelbyville, Rushville and all other points:

We take this means of informing you that your committee has exhausted all honorable means to avert a strike in the various cities named.

The several companies have obstinately refused to recognize you as free American citizens, thereby depriving you increased wages, shorter hours, and better working conditions, which have been granted in all cities in the United States and Canada where organizations exist.

The wages now being paid in Indianapolis are the lowest of any city in the United States. Therefore we, your committee, appeal to you in behalf of the Amalgamated Association, and organized labor, and American citizenship to take your cars in the barn at 11 o'clock to-night, Friday, October 31st, 1913.

And immediately come to the Building Trades Labor Temple, 138 West Washington street, and register your name with those now on the list—if you have not already done so. We have a substantial organization of city and interurban men, and do not believe any statements to the contrary.

Don't pay any attention to any threats the street railway officials may make to you. Come and join with the great army of organized workers, and help win the battle which you are forced to fight for recognition.

You are pledged the moral and financial support of the entire labor movement of the United States and Canada.

Remember the hour and prove yourself true to yourself, family and fellow-man.

Fraternally yours,

R. A. McDANIEL,
CLAUD KINDER,
Committee of Division 645.

Amalgamated Association of Street and Electric Railway Employees of America.

P. J. SHEA, Board Member.

J. J. THORPE, First International Vice-President.

Indianapolis Strike—Appeal to Employees of City and Interurban Lines to Join the Union and Strike, Oct. 31

Mayor Shank, after a conference with Corporation Counsel Joseph B. Kealing, issued the following statement:

STATEMENT BY MAYOR SHANK

"I do not want the impression to go out that I do not want the police to do their duty in all respects. In the last day or two, after conference with the officers of the police department, I believed the lives of all policemen who assist in running cars were in danger, and I did not want any bloodshed. Whenever the police are sufficiently rein-

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forced, and I believe that can only be done by the state militia, I will see that every policeman does his full duty, both in the protection of lives and property and the running of street cars for the public. Any officer who will not do this will be summarily dismissed. The street cars are for the use of the general public and must not be stopped in running either by the officials of the company, their employees or outsiders. I am ready to do my full part in carrying this out when I get the assistance that we ought to have."

No serious attempt was made by the mob to reach the main power station of the company at West Tenth Street, probably owing to the fact that at this point the guard of police under command of a sergeant had strict orders to use their guns at the first attempt to get within the lines.

There seems to be no dissatisfaction in any way among the motormen of the interurban lines, who were included in the call to "strike" issued by J. J. Thorpe, and all cars continue to run on regular schedule as far as concerns the outlying districts of Indianapolis.

During Tuesday, owing to the election, the crowds were scattered and no serious disturbances arose. A mass meeting of the labor sympathizers was held in front of the Court House in the afternoon, and addresses were made by clergymen urging them to refrain from further violence. A request for leave to use the lawn in front of the State House for the mass meeting had been denied by Governor Ralston. At 6 o'clock Tuesday evening ten men representing the labor organizers called on Mayor Shank and asked him to use his influence with Robert I. Todd, president of the Traction & Terminal Company, and intercede for arbitration. The Mayor informed them that he did not think he could do anything for them in the matter.

Ethelbert Stewart, chief statistician of the Department of Commerce, who was sent to Indianapolis about a week ago at the request of the labor leaders, conferred with Governor Ralston regarding the calling of the state militia, but the Governor reiterated that the police authorities of the city were able to handle the situation if the proper effort was made. Mr. Stewart then requested the department at Washington to send another man to assist him in trying to effect a conciliation that will lead to an adjustment of the conditions at Indianapolis.

On Wednesday morning, Nov. 5, another attempt was made to operate a car on the Illinois Street line. Manned by seven car service men and escorted by twenty patrolmen and a squad of mounted police, the car proceeded only two or three blocks when the crowd began to gather, and missiles were thrown, breaking windows. The crowd grew rapidly as the car proceeded, until it was surrounded by a riotous mob of 8000 men. The crisis of the riot came at Illinois and North Streets, when the police were rushed, the trolley rope was cut and the carmen were beaten down to the floor of the car by a hail of stones and bricks.

A mob of 1500 men then marched to the West Tenth Street power station, but were met by a force of police opposite the power station and compelled to return.

On the morning of Nov. 6 Governor Ralston issued orders for the assembling of the Indiana National Guard, which had been awaiting the call for two days. The militia, 2000 in number, arrived rapidly during the day on special trains and was assembled at the various armories, without many people being aware of its presence in the city. A mass meeting was called by the labor men at noon on the south lawn of the State House to protest against the mobilization of the militia. Governor Ralston made a short speech, in which he said:

"On Jan. 13, 1913, I took a solemn oath to see that the laws of my State would be executed. I am confronted by serious conditions. I have seen lives sacrificed in our streets and it is not for me to debate who was at fault. I know that life was not secure and that we must make life secure everywhere in our State. Whatever step may be taken in the future, I hope you will uphold me in the enforcement of the law."

Application for a receiver for the Indianapolis Traction & Terminal Company, which was filed on Nov. 3, was heard on the afternoon of Nov. 6. The attorneys of the company opposed the appointment of a receiver on the ground that the statute regulating such a proceeding as this required that the court hold a hearing first and that no receiver be named unless judgment was rendered against the company.

A new plan for the restoration of peace and resumption of service was submitted on Nov. 6 by President Todd of the company, through Governor Ralston and the members of the Public Service Commission, as follows:

First, Messrs. Thorpe, Wyatt, Fitzgerald, Orr, Colgan, Mahon and all other outside labor organizers shall leave Indiana and not hereafter interfere in any way in the matters covered by this communication, and all charters of the Amalgamated Association of Street & Electric Railway Employees of America for locals of street or street and interurban men shall be immediately withdrawn and annulled.

Second, all employees of the company who have not actually engaged in acts of violence to be reinstated in the positions they held on Oct. 31 under the terms which prevailed then and operation of cars to be resumed at once.

Third, after the full operation of the system for thirty days the company to consider any grievance which any employee may present and endeavor to adjust the same with him. If no mutual adjustment is made the matter thus in controversy shall be submitted to and determined by the five men who constitute the Public Service Commission of Indiana, their decision to be final.

The proposal was on Nov. 6 conveyed to the labor leaders, who went into closed session until after 11 p. m. The labor men would make no statement as to their reply, but said that arrangements had been made for another conference with the Governor at 9 a. m. on Friday morning.

It was anticipated that cars would be operated on Nov. 7 under military protection if the labor men should decline to acept the proposal of the company.

The half-tone illustration on page 1018 showing the interference on Nov. 1 with men in the employ of the company performing their regular duties was reproduced from a photograph which was made available through the courtesy of the representative of the Cincinnati *Enquirer* at Indianapolis.

METHOD OF RECORDING WEAR OF GEARS AND PINIONS

BY W. E. JOHNSON, ENGINEER OF CAR CONSTRUCTION NEW YORK MUNICIPAL RAILWAY CORPORATION

The recent introduction of various types of gearing for electric railway service, including different grades of treated and alloy steels, means that accurate records will be kept of wear and mileage, and a careful study should be made of them so that the quality and combination best suited to fulfil the requirements of the service may be determined. This is especially important because the cost of these special grades is considerably more than that of the ordinary untreated carbon steel pinions and cast-steel gears which have been used in the past.

The requirements of a system for keeping records of wear and mileage of gears and pinions are, first, that it shall be simple enough to enable the ordinary shop mechanic to obtain and report conditions as to wear readily and accurately, and second, that it shall provide for a convenient and comprehensive record of wear and mileage. To fulfil these requirements the writer devised the system herein described, and it is being successfully used by the Brooklyn Rapid Transit System in connection with extensive trials of various makes and grades of gearing now under way.

At the time of its installation one tooth of the gear or

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pinion is marked on the end with a prick-punch for indentification so that the same tooth can be selected for measurement each time thereafter. Then an impression is taken on a standard 4-in. x 6-in. filing card, specially printed for this purpose, as shown in Fig. 1, by placing the card against the end of the gear or pinion teeth and lightly hammering

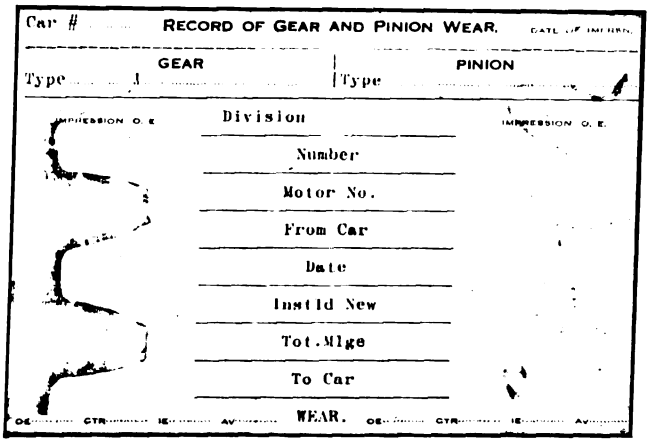

Fig. 1—Filing Card Showing Impression of Gear and Pinion Teeth

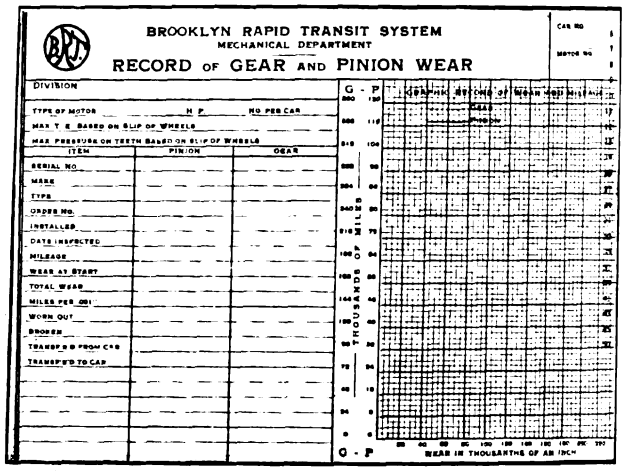

Fig. 2—Graphic Record of Wear and Mileage of Gears and Pinions

on the back of the card over the outline of the tooth with a machinist's ball-pen hammer. The thickness of the tooth on the pitch circle is then measured and recorded on the same card. This measurement is taken at three points on the tooth, namely, at the outside end, center and inside end. After the car number and other data relative to the gearing have been entered on this card, it is sent to the office of the superintendent of equipment, where the mileage of the gear from the date of its installation is entered and the wear and mileage are recorded graphically on the form reproduced in Fig. 2. This form, which bears complete information as to car number, motors, type of gearing, tractive effort, etc., is kept in a special post binder properly indexed for reference, and as it is printed on a light grade of bond paper it can be blueprinted when occasion requires. The teeth of both gear and pinion of each set of gearing are recorded on the same card and form so that the effect of one upon the other can readily be noted. Records are filed by car number, and impressions and measurements of the gearing are taken each time the car is brought into the shop for overhauling. Thus a progressive record of the wear and mileage is obtained and is always available for reference. From the measurements so taken an average is obtained, and the rate of wear and cost per car mile are computed.

Some may consider it superfluous to obtain impressions of the gear teeth in addition to the measurement of wear because it is of no particular value as a record. However, these impressions have been found very convenient as a reference. Moreover, they provide a quicker means for indicating the condition and give a clearer idea of the wear than could be obtained from the measurements alone. Graphic records of wear and mileage have advantages over other methods in that any variations in the rate of wear are discovered at once, and the results from various combinations are readily noted.

The measurement of the gear and pinion teeth is the most important part in records of this kind, for unless this is accurately done the results will be unreliable and without value in determining the best and most economical type of gearing. The standard commercial instruments for measuring gear teeth are expensive and require great care and accuracy in reading the results. For example, a vernier or micrometer scale is required in order to read to a thousandth part of an inch, and furthermore such scales measure only the thickness of the tooth, so that to obtain the wear it is necessary to deduct this amount from the original tooth thickness. The instrument devised by the writer is inexpensive and requires no knowledge of vernier or micrometer reading. As shown in Fig. 3, an ordinary sliding caliper which is provided with a stop plate to give the required distance from the top of the tooth to the pitch circle, is used to obtain the thickness of the tooth. The wear is then obtained directly by inserting a tapered gage between the jaws of the caliper. This gage, which is shown in Fig. 4, is based on the same principle as a tapered screw or wire gage. The zero point represents the new theoretical thickness of the tooth, and the gage is tapered 0.04 in. per inch of length. Full ¼-in. graduations, with intermediate partial graduations, are provided on one face of the gage, and as each full graduation represents a difference in thickness of 0.01 in., readings to 0.001 in. can readily be obtained with this gage.

The height of the jaws on the calipers will vary according to the pitch and also according to the number of teeth in gear and pinion of the same pitch. Where a comparison in wear between pinions of the same pitch but with different numbers of teeth is required it may be desirable to have a set of calipers for each type of pinion. As the difference in reading in such cases would be very slight, however, and as they would at any rate be comparative, one caliper usually is satisfactory for each pitch used.

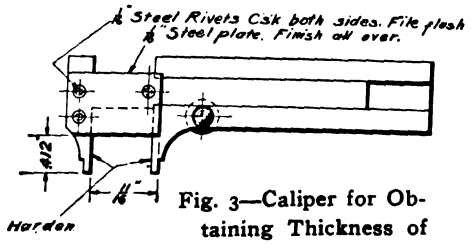

Fig. 3—Caliper for Obtaining Thickness of Gear Tooth

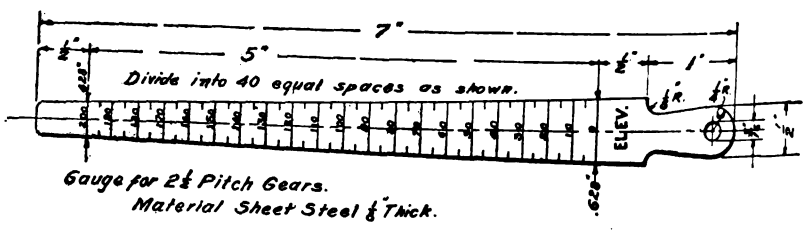

Fig. 4—Gage for Measuring Wear of Gear and Pinion Teeth

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THE STATEN ISLAND BOILER EXPLOSION

An account was published in the ELECTRIC RAILWAY JOURNAL for Oct. 25 of a boiler explosion which wrecked the power station of the Richmond Light & Railroad Company of Staten Island, N. Y. Six men were killed outright, a seventh victim dying later in the hospital. Electric lighting in the borough of Richmond together with all industrial power supplied from the station was interrupted for a period of five days, but the electric railway service was maintained, although at only about half the usual schedule, the power for the railway service being carried by an older d. c. station at Grasmere.

While the work on the rehabilitation of the station was under way as described later, the company made every effort to secure power from near-by power stations. An attempt was made to make connections from one of the nearest power stations of the Public Service Corporation across the Kill von Kull to the Richmond company's switchboard, but the town of Bayonne had in force an ordinance preventing the passage of high-tension lines, either overhead or underground, through the streets, and this in consequence blocked off any possibility of obtaining power from this source. With the help of the Public Service Commission, First District, New York, an application was also made to the federal authorities to permit the installation of a submarine cable across the Narrows to connect with the Brooklyn Edison power system. This was secured within two days, but by this time the work on the temporary rehabilitation of the power plant was so far along as to make the installation of such a cable unnecessary. The Richmond company is now negotiating for a stand-by line from one of these two companies in case of necessity.

The boiler room contained three vertical water-tube boilers of the Wickes type, of which the exploding boiler was one, and five batteries of horizontal water-tube boilers, built by the Aultman-Taylor Company. All boilers were set in a single row, with the Wickes boilers nearest the stack, a 6-ft. space being provided between the back ends of the boilers and a brick wall which separated the engine and boiler rooms. The boilers were connected to the single stack by a smoke flue under the boiler-room floor, and in consequence the work of removing the enormous pile of débris, consisting of brick, piping and twisted steel beams, which was thrown back of the boilers by the explosion was hampered by the cramped working space between the other boilers and the wall. In addition, the weakened condition of the remaining vertical boilers which were mounted on columns framed in to the boiler-room floor necessitated a great deal of shoring before even the most careful work of repairs could be begun.

The work of cleaning up the débris took two days, and three days more were required to install a new section of smoke flue, 6 ft. by 20 ft. in cross-section and about 90 ft. long, which was necessitated before any steam could be generated because the exploded boiler was between the undamaged boilers and the stack. By the time this had been completed temporary piping was installed and the plant was placed in operation under about 70 per cent of the a. c. load, d. c. power for the railway being maintained through the Grasmere plant.

The boiler which exploded had been cut in on the line to help out during the evening rush about fifteen minutes before the explosion occurred, the man who cut it in having gone to a different part of the plant afterward and thus escaping the accident absolutely. The chief engineer of the plant had gone through the boiler room about five minutes before the explosion and noted that ample water was in all boilers, and a turbine was started between the time that the boiler was cut in and the explosion. These facts support meager information available which tends to show that the boiler exploded absolutely without warning, although all the men who were in position to give any detailed description of the accident were killed. The boiler, practically complete, was blown through the roof, traveling high in the air for a considerable distance—like an aeroplane, according to one eye-witness—and landed in the Kill von Kull, a salt-water inlet on which the power station fronts. It lay submerged for several days, the only parts left in the boiler room being a circular piece comprising most of the lower drumhead and the mud drum.

During the last week, however, the boiler was raised by a wrecking crew and left on a nearby dock for inspection. The cause of the explosion was at once apparent, and although all tubes were loose not the slightest indication of low water was in evidence, some of the copper fillers remaining between the tubes and the sheet. Around the edges of the fractured bottom sheet of the lower drum were numerous cracks averaging ¼ in. in depth and cutting into the ¾-in. plate forming the drumhead which had been reduced, obviously by pitting, to a thickness of ⅝ in. The lower drum was intact except for the fact that the bottom head had been blown out completely, the line of fracture extending around the head at the bend where it was flanged in to fit the barrel of the drum. Of the four crow-foot braces holding the lower tube sheet in place only one had broken loose from the rivets. This was badly cracked at the insides of the angles where the iron was bent outward to form the crow-feet. Of the others which had the feet broken off, the fractures over most of their areas showed smooth and white with scale, the smaller part in each case showing the rusty red face of a new break. The two crow-feet at the top of the drum on the flue sheet were intact but had cracks at the inside of each bend, one crack being wide open, although the crow-foot had not been distorted. All around the fracture of the bottom head could be traced a distinct line of demarcation between the even, file-like surface of newly fractured steel and the irregular surface covered with smooth lumps characteristic of pitted steel. At one point on the circular fracture, slightly to the left-hand side of the front half of the boiler, the metal showed the lumpy surface of pitting across the full thickness of the plate. From this the width of cleanly fractured metal varied considerably. In hardly any place, however, was the width of pitted metal less than half of the original thickness of the sheet. The annular section of plate remaining attached to the barrel showed its original curved form, not the slightest distortion having taken place, and none of the rivets were started.

The feed water at the power station is known to be somewhat corrosive in action, as the railway company has renewed the horizontal drums of nine of its Aultman-Taylor boilers during the last seven years. This work was done under the advice of inspectors from time to time, but it is stated that new drums had not been ordered or installed on the Wickes boilers. The company which carried the insurance on the boilers in the plant was changed within the last year, and, according to the railway company, the Maryland Casualty Company is carrying the insurance at the present time. No definite information as to the date of the last internal inspection of the exploded boiler is available, but it is reported that an internal inspection was made both by the police and by the interested insurance company about one year ago.

The sale of American electrical machinery and supplies in Japan during 1912 was the largest in the history of this line of business in the empire. The total sales of electrical supplies for the year aggregated more than $5,000,000, the bulk of the imported products coming from America. The principal business during 1912 consisted of the extension of existing light, power and railway stations. The Tokyo Municipal Railway, for instance, purchased $300,000 worth of apparatus for transforming high-tension current in its various substations throughout the city to the trolley voltage.

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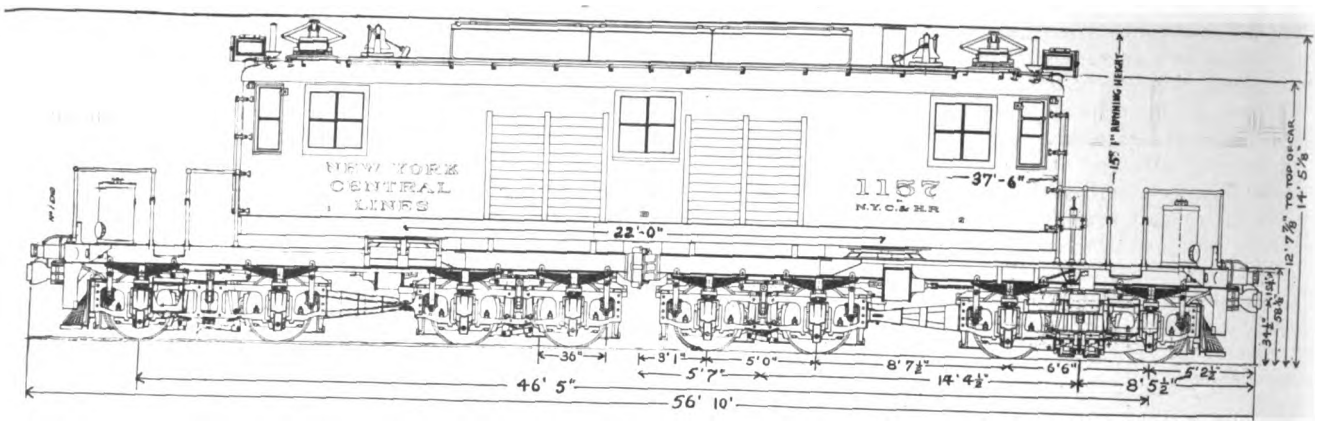
POWERFUL ELECTRIC LOCOMOTIVES FOR THE NEW YORK CENTRAL TERMINAL

The New York Central & Hudson River Railroad has recently ordered six additional electric locomotives from the General Electric Company for terminal service out of New York City. These are similar to the ten electric locomotives purchased earlier in the year and described in the Electric Railway Journal for April 12, 1913. While the new machines are of the same type and construction, they are somewhat heavier, weighing 110 tons, and owing to recent advancement in locomotive design, they have materially increased capacity for continuous service.



Side Elevation of New York Central Locomotive

The weight of trains which are being hauled out of the terminal is increasing steadily, and some of the more important trains now weigh over 1000 tons. It has therefore been deemed desirable to have engines for the maximum service with very great continuous capacity, ample overload and high momentary rating. The new locomotives are able to exert practically the same tractive effort continuously that the previous locomotives can for one hour. The 10-ton increase in weight in the new machines is accounted for mainly by the greater amount of material in the motors, which are of larger capacity. However, the speed and torque characteristics have been kept practically the same, but capacity has been provided for hauling approximately 40 per cent greater tonnage in continuous service.

The previous 100-ton locomotives have a capacity for developing 1460 hp continuously and 2000 hp for one hour, and they can develop as high as 5000 hp for short periods. This corresponds to a tractive effort of 9000 lb. at 60 m.p.h. continuously, or 13,500 lb. at 54 m.p.h. at the one-hour rating. The new engines will develop 2000 hp continuously, or 2600 hp for one hour. The equivalent tractive effort is 14,000 lb. at 54 m.p.h. continuously, or 20,000 lb. at 49 m.p.h. at the one-hour rating. They are able to haul 1100-ton trains in continual service between the terminal and Harmon, and they are capable of operating 1200-ton trains on level tangent track continuously at 60 m.p.h. in emergency service.

In point of design and construction the new machines will be of identically the same type as the former ten engines, having an articulated frame with bogie guiding trucks at each end. The cab containing the engineer's compartment and that for the operating mechanism are swung between the two parts of the frame on center pins. Each section is equipped with two-axle trucks having a driving motor mounted on each axle. All the axles are, therefore, driving axles, and the eight motors, of the bipolar gearless type, are of the same general design as the motors on all the previous New York Central locomotives.

The motors are provided with ample, forced-air ventilation, and they are electrically connected permanently in parallel in pairs, the pairs being connected in three combinations; namely, series, series-parallel and parallel. They are insulated for 1200 volts, so that if at any future time it should be desired to operate the locomotive on this voltage, the pairs of motors could be changed from parallel to series connections and the same speeds and control combinations obtained as on 600 volts.

The new locomotives are now under construction in the works of the General Electric Company at Schenectady. Compared with existing types, these machines have exceptionally great capacity and high efficiency, but the total weight, weight per driving axle and "dead weight" are, nevertheless, exceedingly low.

COMMUNICATION

PROPOSED ASSOCIATION OF PURCHASING AGENTS

Metropolitan Street Railway Company
Kansas City, Mo., Nov. 4, 1913.

To the Editors:

Having been at the last three conventions of the American Electric Railway Association, it occurs to me that some arrangements should be made whereby the purchasing agents of the different companies would meet together during one or more sessions at the convention. While the sessions might not be of sufficient importance to receive recognition similar to the Accounting, Engineering and Transportation associations, I believe informal meetings would at least be justified, under the direction of the association officials.

At the convention there are always several purchasing agents present, but they are brought together only by chance meetings. While these are, of course, profitable, I am sure, if arrangements were made in the program of the convention to cover the suggestions made above, that it would not only be agreeable to the members in attendance but the information obtained would benefit the companies represented. It seems to me the question of efficient purchases and intelligent disbursement of funds is of almost equal importance to the best methods of increasing the receipts of a company. I shall be interested in the opinion of others regarding this question.

E. E. Stigall, Purchasing Agent.

A new electric line has just been completed in Messina, Sicily, by a Belgian company. There are now three lines in Messina, and with the new line the number of cars in operation has been increased during the past year from twenty-five motor cars to thirty-five motor cars and twenty trailers. All cars are of Belgian make.

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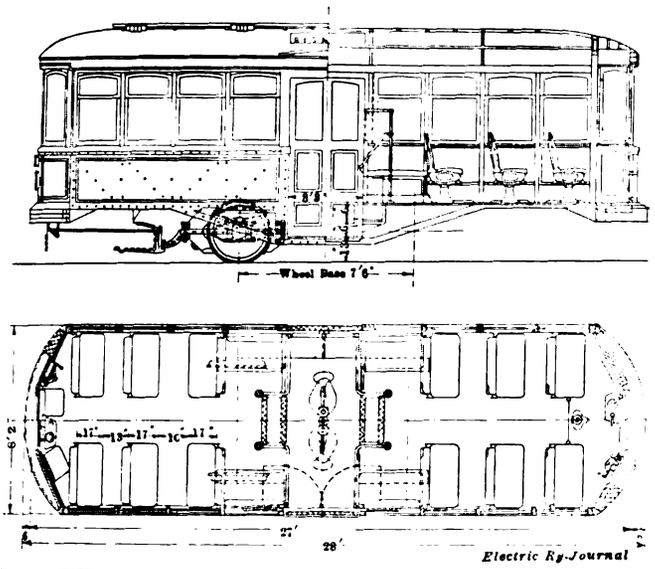
TRUCKLESS AND SINGLE-TRUCK CENTER-ENTRANCE CARS

Two ingenious adaptations of the side-girder center-entrance car for use with but four wheels instead of eight have recently been patented by Axel Ekstrom, consulting engineer Delaware & Hudson Railroad. Mr. Ekstrom has

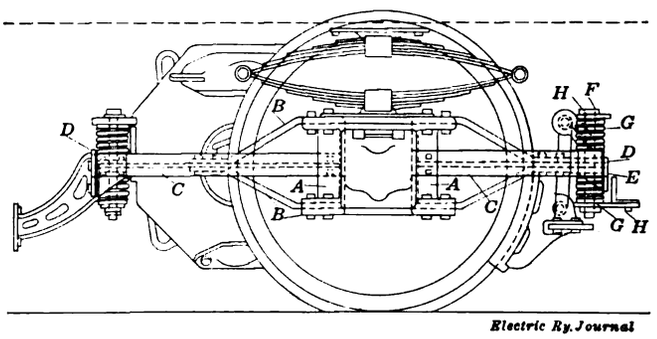


Plan and Elevation of Center-Entrance Truckless Car, 28 Ft. Over All

assigned the exploitation of this invention to Cornell S. Hawley, who is the president of the Laconia Car Company, Boston, which will build these designs under the title of the "Laconia center-entrance car." An important point about these cars is the fact that, despite their structural novelty, they are made for use with standard outside-hung motors, journals and brake rigging.

The accompanying side elevations disclose two designs, namely, a truckless car for bodies 28 ft. over all and a single truck of original design for bodies 33 ft. over all. In both the spring suspensions have been placed so as to avoid the oscillation of the ordinary single-truck car. The 28-ft. car is mounted directly on journal pedestal springs of elliptic type placed 7-ft. 6-in. centers, whereas the 33-ft. car is mounted on one truck, also of 7-ft. 6-in. wheelbase, having spiral springs at the journals but furnished in addition with elliptic springs set 14-ft. centers at the ends of the truck framing.

The truckless car arrangement is, of courses, of special interest because of the unusual construction adopted to cut down the weight per seat and to eliminate the maintenance of trucks. As shown in the accompanying drawing, the pedestals *A* and *A* are castings of the same pattern and require no machining. The top and bottom bar *B* and *B* are flat bar forgings. The two end frames consist of two straight T-bars *C* and *C*, tied across with an angle iron *D* and *D* at the ends, from which the motor and brake rigging are suspended. This underframing is bolted horizontally to the body at point *E* and made playable vertically at this point by inserting two springs *G* and *G* between the brackets *H* and *H*, fastened to the car body. It is believed that this construction will eliminate most of the lost motion which has often been observed in swivel trucks and all trucks with housed journals. It also transmits the motive force horizontally to the body instead of vertically, as is the case with bolster trucks and single trucks. The whole underframing can be removed after the body is jacked up simply by removing the bolt *F*. This could not be done,

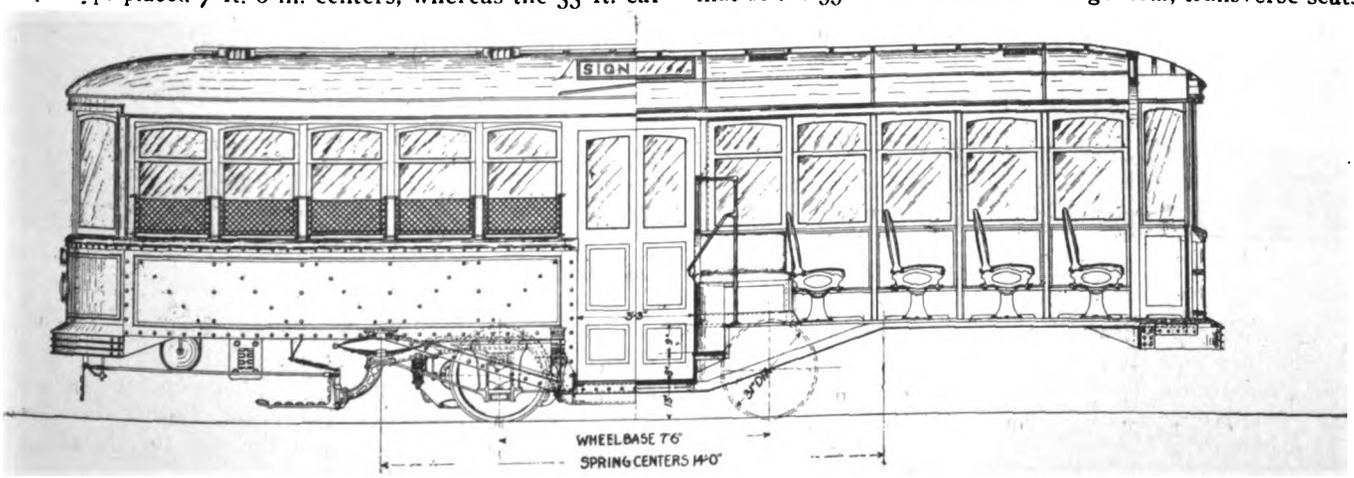


Detail of Truckless Arrangement at Journals

of course, if the motors and brakes were suspended from the car body.

The body design shows the application of side girder and arch roof construction to attain lowest weight. Both bodies have a door opening 3 ft. 3 in., and when wheels of 31-in. diameter are used the heights of the several steps are as follows: step from ground to well of car, 13 in.; two steps inside the car, 9 in. each. The double inside step naturally obviates the use of a ramp. The step heights given can be materially lowered because the wheels can project into the car if smaller motors of equal capacity, such as the Pittsburgh type, are employed.

Only the seating plan of the 28-ft. car is reproduced, as that of the 33-ft. car is similar. In general, transverse seats



Side Elevation of Single-Truck, Center-Entrance Car, 33 Ft. Over All

are used on both sides of a 24-in. aisle, but double seats are placed longitudinally at the corners nearest the well. Since the cars are operated double-ended, provision has been made for longitudinal seats opposite the doors and for single seats at the control equipment. When not in use the door seats are pushed under the adjacent seats on the upper floor level while the single seats are swung into pockets. Cabs for the motorman have not been provided, but, as the plan indicates, he can isolate himself by drawing down a

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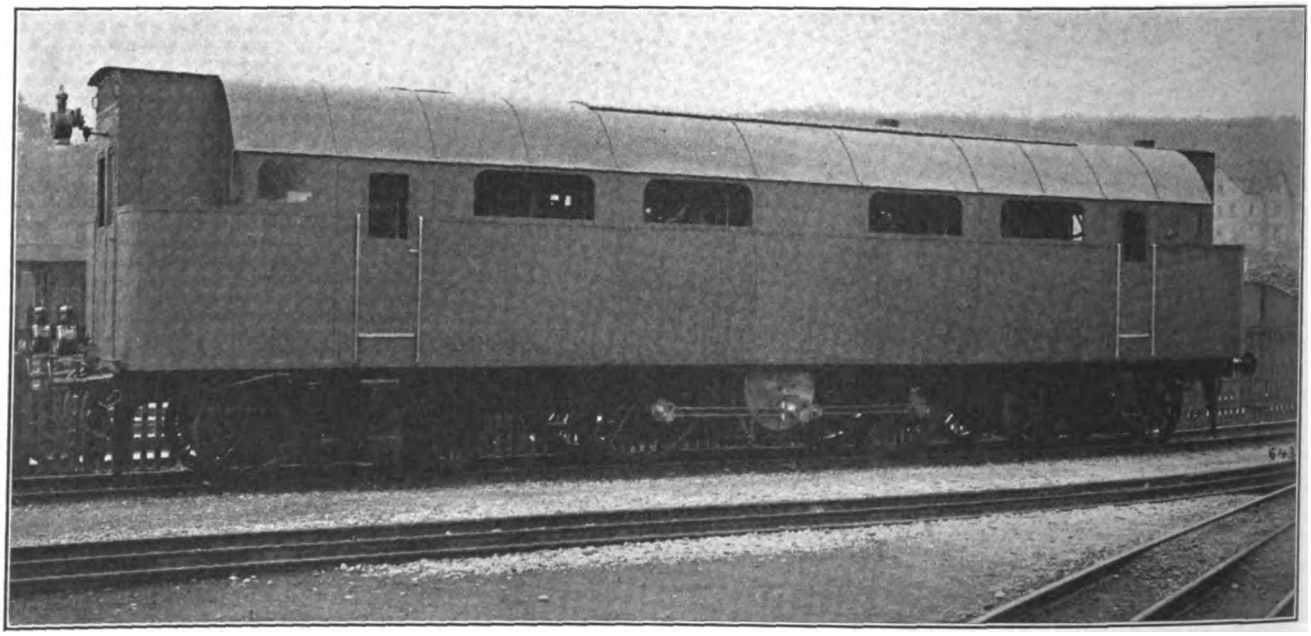
curtain placed between the last pair of transverse seats.

The high seating capacity of these cars is apparent from the fact that the permanent seats of the 28-ft. cars hold thirty-two passengers; with one-half of the temporary seats in use, the car holds thirty-six passengers, while the respective capacities of the 33-ft. cars are forty and forty-four passengers. The plan shows that railings are used only to assist passengers in going up the steps, because the shape of the conductor's reversible pedestal in the well is such as to give, in itself, the desired division of entering and departing traffic.

DIESEL LOCOMOTIVE FOR PRUSSIAN-HESSIAN STATE RAILWAYS

The first Diesel engine locomotive has been recently supplied to the Prussian-Hessian State Railways by the Gesellschaft für Thermo-Lokomotiven, Ludwigshafen, Germany, a company which was formed by Sulzer Brothers, State Construction Councilor Klose and the late Dr. R. Diesel. The locomotive was designed by Messrs. Klose and Diesel, its frame, running gear and body were furnished by A. Borsig, Berlin-Tegel, Germany, and it was assembled by Sulzer Brothers at Winterthur, Switzerland.

The locomotive embodies main four-cylinder V-engines, working on to a crank shaft coupled to the driving axles, and an independent air-compressor set of about one-fourth



General View of Diesel Locomotive for Prussian-Hessian State Railways

or one-fifth the power of the main engines. The compressor furnishes air for starting the main engines.

The locomotive illustrated is designed for fast traffic. It has a length over all of 54 ft. 6 in. and a weight of 95 tons. The driving-wheel base is 12 ft. The end trucks each have a wheelbase of 7 ft. 3 in. and they are 34 ft. 6 in. apart, center to center. The driving wheels are 68.8 in. in diameter on the tread. The driving axles have a diameter of 7.9 in., increased to 8.3 in. at the journals, which have a length of 10.2 in. The drive from the engine is transmitted to the wheels through coupling rods, from outside disk cranks on the end of the engine crank shaft.

The main engines are of the reversible two-cycle type, single-acting. There are two pairs of cylinders, inclined at 90 deg. to each other. Facing cylinders drive on to a common crank pin, with forked connecting rods. The two cranks are set 180 deg. apart. When running at 304 r.p.m. the locomotive travels at a speed of 62 m.p.h. The driving wheels and disk cranks are counterbalanced. Each cylinder cover has four valves, namely, a fuel valve, through which fuel is injected into the cylinder under a pressure of 50 to 70 atmospheres (711 lb. to 1000 lb. per square inch absolute); a starting valve for the supply of air to the cylinder at a pressure of 50 atmospheres (711 lb. per square inch absolute), and two scavenging valves for low-pressure air, at about 20 lb. absolute pressure. Between the four cylinders of the main engine there are placed two double-acting piston pumps and a multi-stage air pump. All of these are driven off the connecting rods of two of the main cylinders by means of links and rockers. The three-stage air pump acts as a reserve for the auxiliary compressor set, and if the latter should fail, the engine air pump can supply sufficient air, provided the demand on the locomotive is not too great.

The engine of the auxiliary compressor set is of the two-cycle Diesel type developing about 250 effective hp. When the locomotive is standing, or when only a little air is needed by the main engine, the auxiliary compressor supplies a battery of air cylinders. From the auxiliary compressor the air is passed through coolers. From the cooler for the high-pressure air the air can be conveyed to the cylinders for starting, stored for injection purposes or stored in an auxiliary air reservoir for starting up the auxiliary compressor set. The injection-air reservoir also communicates with the auxiliary compressor set, for which it supplies injection air. In addition to the compressors, etc., there are also pumps for lubricating under pressure all bearings inclosed within the crank chambers, pumps for the jacket water and the water circulation for cooling the pistons, and fuel pumps. There are, further, four hand-operated centrifugal pumps in the cab for charging the pipe system before starting up.

The locomotive has two pony trucks with wheels of 39.4 in. diameter, and these enable it to take curves of 590 ft. radius. The weight taken by the pony trucks is transferred to the axle through leaf springs. The coupled wheels also have similar springs while double spiral springs are provided in the hangers. The Westinghouse brake is fitted to all wheels, and hand-brake rigging is provided on the drivers. Air pressure for the brake is obtained from one of the stages of the compressor, which supplies a special brake air reservoir. Air sanders are fitted in front and behind the coupled wheels.

The fuel and circulation water are contained in four

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side tanks constructed at the corners of the engine; a silencer is provided in the roof, and the necessary radiators, etc., are also supplied. The sequence of operations is as follows: The auxiliary engine has first to be started up by admitting air to it, slowly at first, from the air reservoir. After the auxiliary has been changed over to oil fuel, the pressure in the air-storage cylinders rises and air supply is admitted to the main engine, which consequently begins to work. When a speed of about 6 m.p.h. has been reached the starting air valves are thrown out of action and the engine is changed over to oil fuel and works normally, the fuel feed and the injection air being controlled according to the speed and power required. To stop, it is only necessary to cut out the fuel valve and apply the brake. To reverse, the hand wheel in the cab is operated, locking gear preventing reversing until the fuel valves have been thrown out of gear.

The earliest trials of this locomotive were made on the Winterthur-Romanshorn line, and the engine was sent to Berlin in March, 1913. The speed on that line varied from 12 to 60 m.p.h. Further trials have been carried out on the Berlin-Mannsfeld line.

GEARED BRAKE WITH SPECIAL RELEASE FEATURE

The National Brake Company, Inc., Buffalo, N. Y., has made the following improvements in its well-known "Peacock" geared brake: lighter frame, absence of contact between frame and chain and introduction of stops to prevent the drum from unwinding beyond the point of full release. This brake is located under the platform of the car, entitrely below the floor line. The pinion, which is carried in a cup-shaped bearing at the forward end of the frame, has a square hole cored through its entire length. The fitting of the brake staff to the brake consists only of forging the end so that it will fit freely the squared hole of the pinion. Owing to the space occupied by the crown piece, there is ample room to do the forging without the necessity of removing the foot ratchet from the staff.

Gear and Pinion of New Brake

The most striking feature of the improved brake is the introduction of a stop on the pinion and a corresponding stop on the gear, as illustrated in the accompanying cut. These stops interact to form a stop motion device to prevent the drum from unwinding beyond the point of full release. They are so located as to prevent the chain from unwinding beyond a point at right angles to a line extending through the center of the drum and pinion. This is the most favorable position for a quick recovery of the chain. By this arrangement the chain begins to wind on the large part of the eccentric, thereby giving the quickest possible take-up to the slack and applying the full braking power to the shoes with a saving of a full turn of the brake handle. This improvement not only overcomes the objection that some geared brakes require too much winding of the brake handle but also obviates the power waste which otherwise is caused by motormen who are tempted to run the car with the brakes partially set. With the new brake the motorman can let the brake fly off with the assurance that it will not over-run on the release, and that when he comes to make a new application the brake will take hold as soon as he begins to turn the handle.

This brake is made with two styles of drums. The brake geared 17:47 is for single-truck cars up to 26,000 lb. in weight and for double-truck cars up to 30,000 lb. in weight. This brake has the eccentric at the top of the drum so that the chain winds from the top downward as this is the tendency in single-truck cars and many types of double-truck cars. All parts are made of malleable iron and supplied with either a 7/16-in. straight link chain or a ⅜-in. twist link chain. Like all other "Peacock" brakes this brake is equipped with roller bearings to minimize friction. The chain tension to be obtained with the use of this brake varies from 713 lb. to 1498 lb. according to the pressure applied (50 lb. to 75 lb.) and the length of the handle (10 in. to 14 in.).

The brake geared 15:49 is for double-truck cars between 30,000 lb. and 35,000 lb. in weight and single-truck cars weighing more than 26,000 lb. In this design, however, the eccentric is at the bottom of the drum so that the chain winds from the bottom toward the top. On cars with drop platforms the manufacturer has found that as the chain becomes taut when the brake is applied its tendency is to draw upward. This type of drum, therefore, allows the chain to take its natural course and prevents any possibility of its catching on the lip of the eccentric. In short, this drum is designed to secure the most direct pull on the brake rod when the tension on the brake is greatest. In this drum three places have been introduced for attaching the chain in the eccentric in order to afford a quick and easy method of adjusting the chain to suit the amount of leverage on cars of different types. The chain tension to be obtained with the use of this brake and a 7/16-in. straight link chain varies from 843 lb. to 1770 lb. When this type is geared 12:52 for double-truck cars in excess of 35,000 lb. the range of chain tensions is from 1118 lb. to 2348 lb.

TEXAS CITY STREET RAILWAY ESTABLISHES SERVICE

The Texas City (Tex.) Street Railway on Sept. 2 inaugurated service over its 3 miles of track in Texas City with two McGuire-Cummings double end, semi-convertible motor cars and two open trailers. The motor cars are of the latest type, without vestibules and with automatic door and step control. They are operated from the front end with one man. Johnson fare boxes are used.

Each car is equipped with two 30-hp Westinghouse motors operating at 500 volts. The voltage is obtained from a motor-generator set driven by a Westinghouse 350-kva steam turbine, which also furnishes alternating current for city lighting. The power house equipment is so arranged that when the capacity of the 350-kva machine is exceeded by the current demand the motor-generator set can be connected with a similar machine of 600 kva. The motor-generator set, besides furnishing current for the street cars, supplies direct current for the operation of the overhead cranes and floor conveyors that form part of the warehouse and dock equipment of the Texas City Transportation Company, owner of the ocean terminal system recently completed at an outlay of $5,000,000.

The street railway system traverses the entire length of the principal business streets, with dead ends leading to the docks, to the railway station and to a north end addition. Grooved trolley wire of 000 quality is used for the overhead work, with no feeder lines. The track, which is laid with 60-lb. rails on No. 1 cypress ties, is bonded with 0000 copper wire.

Only forty cars of the Metropolitan Street Railway, Kansas City, Mo., now are of the single-truck type. The single-truck cars are being pulled in as fast as possible and replaced with double trucks. The changes are being made in the company's shops.

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News of Electric Railways

Decision of Detroit Arbitrators in Regard to Working Conditions and Wages

The decision of the board of arbitration appointed to pass on the differences between the Detroit (Mich.) United Railway and its motormen and conductors on the question of wages and working conditions was made public on Oct. 29. The report in full filed by the arbitration board follows:

"We, the members of the arbitration board agreed upon by the respective parties on Aug. 16, 1913, and to whom was referred for the purpose of arbitration Sections 6, 15, 19 and 21 of the agreement now in existence between the Detroit United Railway and the members of the Amalgamated Association of Street & Electric Railway Employees, Division No. 26, do hereby make the following award to take effect Nov. 1, 1913:

"Section 6 of said agreement shall read as follows:

"'Section 6. That all members of the association in the active service of the railway, and the secretary and business agent of Division No. 26, Detroit, shall be given pass cards or passbooks entitling them to free transportation over all the lines owned, operated or managed by the railway, excepting on interurban lines, on which only conductors and motormen shall be allowed to ride free on their respective divisions. Transportation over all interurban lines will, upon application to the carhouse foreman, be issued to the members of the association at the option of the railway, said transportation to be under the supervision of the officers of the railway. Any abuse of this free transportation privilege shall entitle the railway upon mutually satisfactory proof to the parties hereto to discharge the person abusing it.'

"Section 15 shall read as follows:

"'Section 15. That nine to ten hours with one-half trip leeway on each respective line shall constitute a day's work on all schedules for all regular motormen and conductors to be completed within twelve consecutive hours, excepting where it is absolutely necessary in order to accommodate the service that it be completed within twelve and one-half hours. No schedule shall show less than 52 per cent regular runs nor more than 48 per cent swing runs. Regular men are to have one relief for meals, and otherwise, where compelled to swing from one relief to another, they shall be paid for such relief time.'

"'A regular run is a run on a schedule of eight hours or over completed within the time specified in the first paragraph of this section.

"'All regular runs shall pay at least eight hours' time, and the time between the early and late runs shall be divided as nearly equally as possible, and no regular motorman or conductor shall be permitted to run any tripper or other run except owing to the failure of the relief crew to report and there being no extra man available, other than his regular run, oftener than once in each seven consecutive days, and if a regular motorman or conductor is assigned or required to run the same oftener than once in seven consecutive days the railway shall allow double the time as shown on the schedule for such work, and no regular motorman or conductor who goes off duty after 12 o'clock midnight shall be required to report until the regular showing-up time for his run to go out the following day.

"'On interurban and suburban lines where regular motormen and conductors are required to perform service after and beyond the expiration of a day's work as defined in paragraph 1 of this section, they shall be paid in addition to what they now receive under this agreement an additional 10 cents per hour for all such extra time; provided that the company shall not be required to pay such additional 10 cents per hour in any case where under this agreement the conductors and motormen are entitled to double time.

"'A swing run is a run on the schedule of six hours or over, not completed within the time specified in the first paragraph of this section. All swing runs shall be made in the shortest number of hours possible, and it will be the policy of the railway at all times to reduce the percentage of swing runs and increase the percentage of regular runs wherever the traffic conditions will permit. No swing run shall pay less than six hours' time, and where motormen and conductors are compelled to swing from one relief to another, and the time between said relief is thirty minutes or less, they shall be paid actual time for such relief, and the railway agrees at any time that the association can show where swing runs can be consolidated into a regular run without interference with the demands of the traffic or the regular scheduled runs, the same will be put into effect.

"'Where men are called upon to show up for a run of any kind, and they are not used or sent out, they shall receive one hour's pay for responding to such call, and wherever motormen or conductors have been selected or detailed for runs and a portion of a run is cut off they shall receive the full schedule time that the run would have paid had the full run been completed, but nothing in this provision shall apply where runs are canceled or shortened for causes due to fires, rains, storms, snow, accidents, or other emergencies beyond the control of the railway, nor shall this apply in the case of extras who may be required to show up to protect the board.

"'All crews shall start from and get off at the same carhouse, and all men shall be paid for all the time in excess of ten minutes that is required for them to go from their reporting place to the place where reliefs are made, and where men are called upon to do any work they shall be paid from ten minutes after the time they have been instructed to report. Ten minutes shall be added to each man's run on the different timetables to cover the actual time consumed in moving cars in and out of the carhouses.

"'There shall be at least one sub-extra for every three regular cars on each line. This number of extras, if not sufficient, shall be increased by mutual consent of the parties to this agreement. No regular man shall be required to do any extra work when an extra is available.

"'The first run of less than eight hours shall be considered as first extra, and where a man misses his run he shall, at the option of the railway, lose that day; provided that he shall not be assigned during that day to take the run which he has missed. And where a man misses his run in the middle of the day he shall, at the option of the railway, lose the rest of that day and the day following, provided that he shall not be permitted on either of said days to have the run which he missed. Where he does not show up for two hours after his run goes out, he shall be placed last sub-extra for seven days, and if he misses twice in thirty days, he shall be placed last sub-extra for seven days; and if when serving as last sub-extra he misses, he shall serve seven days more for each miss. Extras to be governed in like manner when missing reporting time.

"'All runs under six hours on the timetable shall be run by sub-extras. A sub-extra is one who has no regular run assigned.

"'Whenever the cars are delayed so that a conductor or motorman cannot reach his reporting place on time, no miss shall be marked against him, but if he arrives before his car goes out he shall be allowed to take it. This provision for late cars shall not apply to men who live within one-half mile of the carhouse or reporting station.'

"That Section 19 shall read as follows:

"'Section 19. Claims for shortage shall be made within fourteen days after date of shortage, and shall be accompanied by the trip sheet of the day of said shortage. Each conductor on cars equipped with Ohmer registers will, upon request, be shown the register reporting sheet for the day of shortage. Duplex or tear tickets, or tickets having variable values, to be returned with claims for shortage to respective carhouses.'

"Section 21 shall read as follows:

"'Section 21. From and after Nov. 1, 1913, the rate of pay for all motormen and conductors who have been in the service of the company one year or more, 32 cents per hour.

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"'For all motormen and conductors who have been in the service of the company less than one year and more than three months, 30 cents per hour.

"'For all motormen and conductors who have been in the service of the company under three months, 25 cents per hour.

"'The minimum pay to each motorman and conductor for the first three months of his employment shall be at the rate of $19 for each half-month pay-roll period. In case of absence from duty, such amount shall be reduced in the proportion that the days absent bear to the number of days in the pay-roll period. Any such conductor or motorman who works more than an average of five hours per day during any pay-roll period shall be paid for such full time at 25 cents per hour.

"'No single trip shall be considered less than one hour. This shall not apply where men are required to continue on their run due to the failure of a relief man to report and there being no extra available or due to emergencies as defined in this agreement.

"'It is agreed that for the purpose of rating men as to pay who may be employed after this award goes into effect, the date on which they shall receive the next highest scale of wages shall be three months from the first day of the month succeeding the day on which they were employed.'"

Metropolitan Ordinance Introduced in Council

The ordinance granting a thirty-year franchise to the Kansas City Street Railway, which will succeed the Metropolitan Street Railway, Kansas City, was presented to the council at a special meeting recently and referred to the joint committee of the two boards. The upper house referred the ordinance to its committee on rules and committee assignment, while the lower house referred the grant to the committee on streets, alleys and grades. The joint committee is composed of seven members and will hold public meetings at the city hall, where suggestions will be received. The company has been requested to print and distribute 1000 copies of the ordinance as it now stands. The ordinance in its salient features is the same as that proposed several months ago. The only changes which have been made in the grant are of a minor nature. It is probable that others of more importance will take place before the ordinance is passed by the Council and referred to Kansas City residents for their vote.

Mayor Jost has announced the personnel of the committee of five men who will represent the city on the board of control provided by the terms of the ordinance. The men the Mayor proposes to appoint to represent the city are D. M. Pinkerton, cashier of the Gate City National Bank; William T. Kemper, president of the Commerce Trust Company; John W. Wagner, president of the German-American Bank; F. E. Gloyd, of the Gloyd Lumber Company, and John H. Wiles, of the Loose-Wiles Biscuit Company. The Metropolitan Street Railway is entitled to six representatives on the board of control.

Labor representatives are anxious to secure an amendment providing that the company shall permit its employees to organize and submit differences between the officers of the company and the men to arbitration. The delegation was referred to the Council committee by Mayor Jost. Efforts will be made to have the people vote on the ordinance before the spring election so as to keep the franchise out of politics.

P. J. Kealy, engineer for the receivers of the Metropolitan Street Railway, and T. R. Ash, engineer for the city, have prepared for general distribution a report on the future earnings and expenditures of the Kansas City Street Railway, based on the proposed ordinance.

Mayor Jost's plan provides for a valuation of $30,000,000 and for $7,500,000 to be amortized out of the surplus earnings before the company participates to any extent in the surplus earnings over the fixed return of 6 per cent upon the $30,000,000.

When the $7,500,000 is amortized out of surplus earnings, the company participates to the extent of 33 1/3 per cent and the city to the extent of 66 2/3 per cent in the surplus earnings over and above the fixed return of 6 per cent on the then capital value. On the basis of these provisions, Messrs. Kealy and Ash have calculated that the city will take control of the property subject to a bonded indebtedness of one-half of the capital value in the year 1932 or 1933.

During the remaining life of the present franchise, or "peace" ordinance—that is, within the period ending May 31, 1925—the company would pay to the city, as 8 per cent of its gross revenue, $8,919,360. The net return to the city, after payment of all taxes out of this 8 per cent, was in 1912 approximately 3 per cent of the gross revenue, i. e., three-eighths of the total payment to the city. On that basis the net amount which the city would realize under the "peace" ordinance during the next twelve years would be $3,344,760. Under the proposed new franchise, however, the engineers estimate that the city will receive within the same period an amount aggregating $12,239,716, or approximately three and seven-tenths times the amount which the "peace" ordinance would return.

The detailed estimates of the engineers are shown by the following table:

Year	Capitalization June 1	Capitalization May 31	Net Earnings 35 Per Cent	Surplus Over Fixed Return of 6 Per Cent	Accumulated City Surplus
1912	$30,000,000	.....	.....	.....	.....
1913	30,306,450	$30,760,000	$2,299,150	$453,550	$453,550
1914	30,528,037	31,066,450	2,402,400	538,413	991,963
1915	30,755,819	31,383,637	2,510,200	627,218	1,619,181
1916	30,884,568	31,610,819	2,622,900	726,251	2,345,432
1917	31,003,792	31,834,568	2,740,850	830,776	3,176,208
1918	31,006,970	31,953,792	2,864,050	946,822	4,123,030
1919	30,881,538	31,956,970	2,992,850	1,075,432	5,198,462
1920	30,617,330	31,831,538	3,124,100	1,214,208	6,412,670
1921	30,208,113	31,472,330	3,241,000	1,352,660	7,676,887
1922	30,064,004	31,063,113	3,362,450	1,498,663	8,675,996
1923	29,830,131	30,919,004	3,488,450	1,633,310	9,764,869
1924	29,499,870	30,685,131	3,619,000	1,777,892	10,950,130
1925	29,066,284	30,354,870	3,754,800	1,932,878	11,238,716
1926	28,619,935	30,016,284	3,895,500	2,094,523	12,635,065
1927	28,058,432	29,569,935	4,041,450	2,267,254	14,146,568
1928	27,373,436	29,003,432	4,193,000	2,452,494	15,781,564
1929	26,556,289	28,323,436	4,350,140	2,650,734	17,548,720
1930	25,596,998	27,506,280	4,514,300	2,863,923	19,458,002
1931	24,607,844	26,641,998	4,649,750	3,051,230	21,492,156
1932	23,486,257	25,652,844	4,789,050	3,249,880	23,658,743

One of the first estimates affecting a discussion of future earnings was that of the increase in population. On the basis of United States census reports for 1910 and prior studies in population increase the estimated population for Kansas City, Mo., in 1920 was 475,000; in 1930, 620,000; in 1940, 790,000, and in 1950, 960,000. In computing the gross earnings the following increases were allowed: 4½ per cent per annum during the first decade, 3¼ per cent per annum during the decade ending 1930, 3 per cent per annum during decade ending 1940, and 2¼ per cent per annum during decade ending 1950. These rates of increase, while somewhat higher than the rate of increase in the population, are considerably less than they would have been had the usual law of squares been followed. These increases result in gross earnings from $6,864,000 in 1914 to $22,189,000 in 1950.

The operating ratio during the years under construction was taken as 65 per cent of the gross revenue and includes not only the ordinary operating expenses but likewise taxes and depreciation. The reported operating ratio of the company for the fiscal year 1912 was 63 per cent. Net earnings are estimated to rise from $2,402,400 in 1914 to $4,789,050 in 1932.

The new capital which will be required from year to year was estimated on the basis of the additional track mileage necessary to handle adequately the expected increase in business. The appraisal of the physical property of the Metropolitan Street Railway shows that the cost per mile, excluding such items as real estate and right-of-way, averages approximately $95,000 per mile of single track. The track mileage is increased from 271 miles to 650 miles throughout the period ending in 1950. This additional mileage, on the basis of $95,000 per mile, necessitates an additional investment of $36,000,000. The cost new of the existing track is approximately $29,000,000, so that the cost of the existing system plus the additions which it is estimated will be necessary during the period ending 1050 would provide a capitalization at that year of approximately $65,000,000. On the basis of the mileage provided

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for, the earnings per mile of track will be approximately $34,000, in comparison with the present earnings of the Metropolitan System per mile of track, excluding the mileage of the Westport Belt Line, of about $26,000 per mile.

The Boston Arbitration Hearings

The arbitration board sitting in the Boston Elevated Railway investigation of labor matters heard testimony recently by various officials of the company bearing upon employment, the training of motormen and conductors, traffic requirements and wages. Alfred J. Guyon, superintendent of employment, testified that 80 per cent of the men leaving the company's service did so within two years of their acceptance. In the year ended June 30 last, 14,354 applicants for work were interviewed by the superintendent of this department, and of these 9300 were immediately rejected. After final examination 1843 were rejected, and the total number appointed to the service was 2005. Between Sept. 1, 1910, and Oct. 20, 1913, 3371 persons applied at the employment office of the company for work in the shops. Of the applications for shop work made at the shop offices the employment department had no record. The company experienced no difficulty in obtaining men for its service.

Joseph L. Webber, superintendent of Division 1, presented new statistics of interest from the traffic standpoint. To allow for misses the number of employees carried by the company is materially increased. In eight months in the witness's division there were 1940 misses by conductors, and 316 out of 422 conductors failed to report on time. Out of 430 motormen, 193 missed, the total number of misses being 939. A study of the average length of a day's work for a week for extra men showed that conductors on this list at a representative rating station worked from six hours twenty-four minutes to ten hours forty minutes, and motormen worked from four hours fifty-six minutes to eight hours fifty-two minutes. To illustrate the burden of "setback" cars which are required to maintain the schedule when regular cars are delayed, the following table was submitted, covering the year ended Aug. 31 last:

Div.	Trips Run	Setback Trips	Setbacks % of Trips	Headquarters Office
1	1,091,691	27,958	3	Dudley St., Roxbury
2	728,691	37,265	5	Tremont St., Roxbury
3	533,450	21,584	4	Field's Corner, Dorchester
4	322,348	6,193	2	East Boston
5	353,751	5,486	1.06	South Boston
6	1,006,180	31,135	3	Sullivan Sq., Charlestown
7	1,020,863	40,203	3.9	Bennett St., Cambridge
8	This division occupies down-town Boston; no car houses.			101 Milk St., Boston
9	531,296	51,107	9.6	Brighton
Total	5,588,270	220,931	3.9	

Chairman Storrow ruled during the hearings in the face of vigorous protests by the employees' organization that the company might introduce testimony showing the probable effect of the so-called nine-hours-in-eleven act upon its operations.

Prof. Albert S. Richey of the Worcester Polytechnic Institute, consulting engineer for the Bay State Street Railway and the Boston Elevated Railway upon timetable matters, explained in detail the methods of preparing schedules and the difficulties sustained in providing timetables in accordance with the foregoing act. It was brought out by counsel that the employees' organization is holding the enforcement of the nine-hours-in-eleven law over the company's head as an instrument by which to force wage increases. The act went into effect in July, but pending the decision of the arbitration board in the matter of wages, the employees' association is not requiring the company to operate its service upon the nine-hours-in-eleven basis. The schedules now in effect are those resulting from the inauguration of the ten-hours-in-twelve act of 1912, on Jan. 1, 1913. The association has offered to permit the company to operate its lines upon the latter basis if it will grant the desired increase in wages, but the company estimates that if the wage increase is not granted and the law is enforced, its operating costs will be augmented by $1,000,000 a year by virtue of the drastic terms of the act.

Prof. Richey presented curves and data showing the relation between traffic and car crew requirements on the Boston surface lines for Aug. 27, 1913. The witness said that one of the first principles of timetable making is to work every man possible during the morning and afternoon rush hours. He estimated that the enforcement of the nine-hours-in-eleven act would raise the number of motormen and conductors required for normal schedule operations from 3782 to 5294. Allowance of 10 per cent more to cover layoffs and misses and 10 per cent to include work cars, baseball extras, opera cars, etc., would have to be made to handle the traffic properly. If the new law were enforced, 2268 men would have regular runs, performing 19,827 hours of paying work per day and averaging eight hours forty-five minutes each. To handle the rest of the work, 3026 men would be needed, performing 10,624 paying hours of work on the basis of two hours fifty-one minutes per man. On the existing schedule arrangement of July 1 last there were 2146 men having regular runs, averaging nine hours seven minutes work per day; 800 swing runs, averaging eight hours fifty-one minutes per day, and 836 trippers, averaging three hours fifty-three minutes per day.

Matthew C. Brush, second vice-president, in charge of the bureau of operation, testified at length regarding comparative wages on the Boston system and elsewhere. Chairman Storrow ruled that evidence regarding wages outside Massachusetts would not be considered by the board, without full details as to working conditions. Comparisons were made between the wage scales of other companies and those in force at Boston, these being summarized according to companies connecting with the Boston Elevated system, to other Massachusetts roads and to all Massachusetts systems. The Boston Elevated Railway pays 25.6 cents per hour for first-year men; connecting companies pay 22.25 cents for the first half-year and 22.37 cents for the second half-year. Companies not connecting pay 22.16 and 22.63 cents. The Boston wage for second-year men is 26.2 cents per hour. Connecting roads pay 23.62 cents and other companies, 23.9. On the whole the Boston Elevated Railway's rates are higher than the others to about the tenth year, when all pay approximately 27.5 cents per hour. After the tenth year the other companies gradually increase to a maximum of about 27.7 cents, compared with increases to from 28.2 to 28.9 cents on the Boston system.

Advertising for Bids for Rapid Transit Work in New York

The Public Service Commission for the First District will advertise soon for bids for the construction of three sections of the new subway and elevated lines in the Bronx —one on the White Plains Road extension of the existing subway, one on the Jerome Avenue branch and another on the Southern Boulevard branch of the Lexington Avenue subway. Bids on the White Plains Road contract will be opened on Nov. 26, on the Jerome Avenue line on Nov. 28, and on the Southern Boulevard line on Dec. 1. The section on the White Plains Road line is known as Section No. 2 of Route No. 18 and lies in White Plains Road between Burke Avenue and East 241st Street. The road in this section will be an elevated railroad with three tracks. The Jerome Avenue section is known as Section No. 1 of Route No. 16 and lies mainly in Jerome Avenue between 157th Street and River Avenue and East 182d Street. The road here also will be a three-track elevated railroad and will join the subway now being constructed south of 157th Street. The Southern Boulevard section is known as Section No. 1-A of Routes Nos. 19 and 22 and lies in Southern Boulevard and Whitlock Avenue between East 147th Street and Bancroft Street. This will be a three-track underground railroad as far north as a point in Whitlock Avenue between Aldus and Bancroft Streets, where is becomes an elevated railroad and continues northerly as such.

A public hearing on the form of contract for the reconstruction of the Steinway Tunnel has been called by the Public Service Commission for the First District for Nov. 14 at 12:15 o'clock. This tunnel is already built, and under the dual system agreements was purchased by the city of New York for use in connection with the existing subway. The route covered by the tunnel has been made a rapid transit route, and the work to fit the tunnel for use in connection with the subway will be let by the commission under the usual form of subway contracts. As a preliminary to advertising for bids it is necessary to hold a hear-

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ing on the form of contract, and this will be done on Nov. 14.

During the week the Public Service Commission for the First District held public hearings on the forms of contract for the construction of Sections Nos. 1, 1-A, 2 and 3 of Route No. 12, the Flatbush Avenue-Eastern Parkway extension of the existing subway in Brooklyn. This extension runs from the end of the existing subway at Atlantic and Flatbush Avenues through Flatbush Avenue and Eastern Parkway to Buffalo Avenue as a subway,. and from that point will be further extended as an elevated railroad through East Ninety-eighth Street and Livonia Avenue. Work on the plans is being completed, and it is expected that bids for construction will be invited some time next month. This line is for operation by the Interborough Rapid Transit Company in connection with the existing subway.

The Public Service Commission for the First District has advertised for bids, to be opened on Nov. 21, for the construction of Section No. 2 of Route No. 39, the New Utrecht Avenue branch of the Fourth Avenue subway in Brooklyn. This section begins near the intersection of Tenth Avenue and Thirty-ninth Street, Brooklyn, and extends as an elevated railroad over Tenth Avenue to New Utrecht Avenue and thence over New Utrecht Avenue and other streets and private property to Eighty-sixth Street; over Eighty-sixth Street to a point near Bay Forty-first Street, and thence over Stillwell Avenue to a point just north of Avenue Y, where a connection will be made with the Sea Beach line to Coney Island. The road here will be a three-track elevated railroad. It will be operated by the New York Municipal Railway Corporation in connection with the Fourth Avenue subway in Brooklyn.

Subway Planned if Toronto Purchase Negotiations Fail

The following statement was made by Mayor Hocken on Oct. 23, in discussing the new phase of the transportation question:

"If the reports of John MacKay & Company and Mr. Couzens, of the Hydro-Electric System, do not justify the purchase of the assets of the Toronto Railway and Toronto Electric Light Company, I will immediately have a by-law prepared to submit to the ratepayers at the January elections to provide for the Yonge Street, north and south, section of the complete subway system reported upon by the former engineer of the Harbor Board."

The report which is referred to dealt with the plan to build a subway at an estimated cost of $23,000,000. The report showed that the cost per mile for a diagonal underground line would be $1,350,000, and the Mayor's proposal would be to construct the first branch of the tube north and south to serve the northern part of the city. Owing to the turn of events in connection with the proposed purchase of the railway and lighting property the Mayor thinks Comptroller Church and others who are opposing the proposal are in a rather strange position and has intimated that if the comptroller does not support the purchase he will have to support another of the Mayor's schemes, the tube system.

On Oct. 23 application was made to the Board of Control for a franchise to operate buses on the streets of Toronto. Representatives of the General Omnibus Company, London, Eng., submitted the application. The comptrollers were asked for a five-year exclusive franchise. The company guarantees to deliver twenty buses within sixty days after the order shall have been placed. It would take another two weeks to have the buses delivered in Toronto by steamer across the Atlantic, and within three months the buses could be running in Toronto. The representatives of the English company have offered to sell out at the end of the five-year grant at a valuation 6 per cent above the cost of the service. The buses will accommodate thirty-four passengers.

The Mayor said the city had no power to grant such a franchise and would not make such a grant if it had. Any promoter of a bus service could operate on the streets by getting out a license. The representatives of the English company will not operate without a franchise.

Having analyzed the reports of Messrs. Moyes and Arnold, Works Commissioner Harris, Assessment Commissioner Forman and Mr. Ross, and having no new disclosures with reference to the value or depreciation of the assets of the Toronto Railway and Toronto Electric Light Company, Mayor Hocken stated that the next important development will be the presentation of the reports of John MacKay & Company and H. H. Couzens, general manager of the Toronto Hydro-Electric System.

The Board of Trade and the Trades and Labor Council intend to call special meetings when all the information on the proposed purchase has been laid before the City Council and voice their opinions on the wisdom of supporting the project. In the meantime the majority of the members of the City Council are reserving judgment on the purchase.

Power Brake Order Modified in Ohio

The Public Service Commission of Ohio has modified as follows the order which it made some time ago requiring the Northern Ohio Traction & Light Company "to equip with power brakes, in addition to standard hand brakes, by Jan. 1, 1913, every car operated upon its lines within the city of Akron":

"Ordered, That said defendant be, and it is hereby, authorized to operate on its lines on Grant and Exchange Streets, in Akron, not more than six single-truck cars with standard hand brakes for a period of not more than six months from the date of this order. It is further

"Ordered, That said defendant be, and it is hereby, authorized to operate on what is designated as its Bowery line not more than four single-truck cars with standard hand brakes for a period of not more than six months from the date of this order. It is further

"Ordered, That said defendant be, and it is hereby, authorized to operate on its other street car lines in Akron, except its North Hill line, not more than twenty single-truck cars with hand brakes between the hours of 5 o'clock a. m. and 8 o'clock a. m. and 4 o'clock p. m. and 7 o'clock p. m., exclusive of Sundays and holidays, until the further order of this commission. It is further

"Ordered, That said defendant be, and it is hereby, authorized to operate on its said other street car lines in Akron, except its said North Hill line, not more than twenty single-truck cars with hand brakes on Sundays and holidays between the hours of 9 o'clock a. m. and 6 o'clock p. m. until the further order of this commission. It is further

"Ordered, That on days when baseball and football games are played or circus performances are given in Akron, defendant be, and it is hereby, authorized to put in service and operate on its said other street car lines in Akron, except its said North Hill line, not more than twenty single-truck cars with standard hand brakes not more than one hour before the published time of such amusement or entertainment, and also immediately at the close of such amusement or entertainment until the persons in attendance at such amusement or entertainment have been transported to their destinations, until the further order of this commission. It is further

"Ordered, That said motion, in so far as it relates to the use of cars without power brakes on defendant's North Hill line be, and the same is hereby, overruled. It is further

"Ordered, That said motion, in so far as it relates to the use of any greater number of cars without power brakes on any or all of defendant's lines in Akron than the total of thirty herein specified be, and the same is hereby, overruled."

Subway Recommended for Surface Lines in Chicago Loop District

A limited subway system for the surface railways has been recommended to the local transportation committee of the Chicago City Council in the report of the supervising engineers as a means of relieving the constantly increasing congestion in the loop district in Chicago. According to the estimates presented by Bion J. Arnold, the cost of the proposed project in its entirety would be $14,500,000. The

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plan consists of a north and south subway in Clark Street, extending from West Twenty-second Street to Chicago Avenue or North Avenue, with a northern terminus near Lincoln Park. This separate system, it was estimated, would cost $9,600,000.

The plan suggested for the West Side would cost $4,900,000. The route recommended would begin at the east end of the Washington Street tunnel, run east in Washington Street to Michigan Avenue (or south in Franklin Street to Madison Street and then east to Michigan Avenue), south in Michigan Avenue to Jackson Boulevard, west in Jackson Boulevard to Franklin Street, south in Franklin Street to the east end of the Van Buren Street tunnel. In addition to these routes other subways were recommended for the future, and among these are mentioned Halsted Street and Milwaukee Avenue, together with the opening of the present closed parts of Robey Street and Ashland Avenue. This work would cost more than $4,000,000.

All of the recommendations in the report are based upon the provisions for subways placed in the 1907 ordinance. The construction of the proposed system, if built, is anticipated to be done by using the city's traction fund and renting the subways to the companies. In building the proposed surface line subways it was asserted the tunnels could be so constructed that they would not interfere later in case a comprehensive system should be decided upon.

The report was referred by the transportation committee to a sub-committee which will be appointed later.

Bonds as Investments

In an address delivered at the annual banquet of the Investment Bankers' Association of America in Chicago on Oct. 30, 1913, James J. Hill stated that the former good standing of bonds has been considerably lowered in recent years. The main cause of such deterioration as given by Mr. Hill was that it is partly the effect of the excessive borrowing and spending of the present day and partly that of an expansion of industrial effort and an inflation of the capital of industrial enterprises which has often raised the total of bond issues, heretofore representing the value of the property under the hammer, to approximately the figure that would once have covered stocks and bonds combined. "Formerly," said Mr. Hill, "and always in any properly financed undertaking, the limit of a bond issue is the total cash value of tangible property in possession; not its value for the uses to which it is being or is to be put, but its value as an asset for immediate conversion by forced sale at any time into cash. All that the investor could lose even in case of a receivership would be the interest on his investment for the unrealized terms of the life of his bond. Now not only wildcat concerns but companies of real merit and solvency, conducted by men who would scorn to do an act commonly recognized as dishonorable, do not hesitate to bond their businesses for very much more than could be obtained from either a forced sale or a careful liquidation." Although this over-issue of bonds is true of most industrial corporations now, according to Mr. Hill, the railroads cannot be criticised on this basis, for it is impossible to place an over-issue of railway bonds. The distinction drawn is this: "If a manufacturing commercial concern liquidates, its property has only current real estate value unless some successor wishes to carry on the same or a similar business and the intangible values are reduced to nothing. The business of a railroad, however, cannot be discontinued. The road and its belongings will always remain there, and they must be operated by somebody. Therefore the security cannot altogether vanish, and experience has shown that it will eventually bring, under wise management, some return in the most desperate cases. Street railway bonds resemble those of the steam railways, except that generally a mere franchise instead of an ownership of property is the main guarantee behind them." In conclusion, Mr. Hill made the following remarks: "The country is waterlogged with bonds. Confidence cannot be restored until the name "bond" has won back something of its old standard. And that cannot happen until issues are limited by moderation, conformed to the value of the security and confined to the margin of safety and the form of credit for which the bond was originally designed."

Missouri Road to Install Block Signals.—The Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo., contemplates installing an automatic block system, with track circuit. The company has 70 miles of track and will protect it all, according to present plans. The type of signal that the company intends to instal has not yet been decided upon.

First Section of Block Signals Completed.—The Louisville & Northern Railway & Lighting Company, New Albany, Ind., has put into use its first section of block signals. The section is 4 miles long, extending north from New Albany. It is intended gradually to extend the use of signals over the whole system. The installation was tested Nov. 1 by the officers of the company and was formally put into use on Nov. 3.

Decision in Regard to the Sale of Power at Winnipeg.—The Public Utilities Commissioner at Winnipeg has denied the application of the municipal power plant of Winnipeg to sell current in St. Boniface without the consent of that city. The St. Boniface Council refused to permit another distribution system to be extended over that city. The Public Utility Commissioner held among other things that there is satisfactory provision at present for the needs of St. Boniface by the service of the Winnipeg Electric Railway, which established a system there under terms imposed by it.

Formal Opening of Hale's Bar Development.—Nov. 13 has been set as the date for the formal opening and dedication of the Chattanooga & Tennessee River Power Company's hydroelectric development at Hale's Bar on the Tennessee River near Chattanooga. To celebrate the completion of the development, the Chattanooga Chamber of Commerce has arranged a special program on that date, which in addition to other entertainments will provide a trip by river to the power house, lock and dam for the purpose of inspection. This is the largest hydroelectric power development in the South.

Progress with 1200-Volt Line in Michigan.—The Michigan United Traction Company, Jackson, Mich., expects to begin operating 25 miles of its western division between Kalamazoo and Battle Creek, Mich., with 1200-volt trolley by June, 1914. As published in the Electric Railway Journal some time ago, twenty-five B2-333 electrical equipments for 1200-volt operation were purchased from the Westinghouse Electric & Manufacturing Company. This equipment is designed to be operated on both the 1200-volt and 600-volt d.c. lines. For the present at least the lines of the Michigan United Traction Company east of Jackson will be operated at 600 volts d.c.

Twelve-Hundred-Volt Operation on the Pittsburgh & Butler Street Railway.—A party of guests of officials of the Pittsburgh & Butler Street Railway were entertained with a trip over the road on Oct. 24 in special cars in celebration of the conversion of the line to operation with the 1,200-volt direct-current system. Dinner was served in the Nixon Hotel, Butler. The guests included representatives of the city government, the Pittsburgh Industrial Development Commission, the Chamber of Commerce and other civic organizations. The road was previously operated with the single-phase system. The company operates 33 miles of line between Pittsburgh and Butler and its equipment includes thirteen cars.

Detroit's Revised Charter Adopted.—The revised charter for the city of Detroit was adopted by a vote of twelve to seven by the charter commission on Oct. 30. This is the second time the charter has been adopted, the first action having been nullified later in order that some further consideration might be given certain points. The attempt of some of the members to have the municipal ownership sections submitted to a vote of the people separately, so that women might vote on them, was defeated. Other changes consisted principally of correction of phraseology and punctuation. Corporation Counsel Lawson rendered an opinion that the charter does not require the vote of the women, as no public utility property is actually being purchased and the bond limit is not being increased. The charter merely provides for carrying out these things. Nov. 3 was the date set for presenting the draft to the

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Governor for his signature. The charter will probably be submitted to the electors of the city of Detroit for their final decision in February.

Fare Reduction Question Considered in Portland.—William J. Hagenah, expert appraiser for the Portland Railway, Light & Power Company, testified in regard to the value of the company's property and its earnings at a hearing before the City Council on Oct. 23 to determine whether the company could afford to sell six street car rides for 25 cents as proposed by Will H. Daly, commissioner of public utilities. According to the company's figures, as compiled by Mr. Hagenah, the present value of the company's physical property is $12,284,487, as compared with $11,613,733 of Dec. 31, 1912; reproduction cost new of physical property and working capital, Sept. 1, $14,126,006, as compared to $13,455,342 of Dec. 31, 1913; present value of physical property, working capital and intangible value or going cost, which is the difference between the 8 per cent profit and what was actually made during the year, Sept. 1, $18,404,383, compared to $17,733,629 of Dec. 31. As there are several points regarding the various valuations not understood by the city commissioners, President Griffith has promised to supply additional data in an attempt to clear up these points.

Commission Proposed to Control Toronto Civic Lines.—The City Council has passed a motion to instruct the Board of Control to prepare and report a by-law "covering the organization and powers of a commission to take charge of civic transportation interests." Alderman Wickett explained the need of such a commission's work being defined forthwith and suggested that the commissioners be honorary rather than salaried. Comptroller Church favored the principle but deemed the time inopportune. He thought the commission should not be created until within a year or two of the expiration of the Toronto Railway's franchise and voiced his satisfaction with the conduct of the civic car lines under the jurisdiction of Works Commissioner Harris. Comptroller McCarthy said he believed public opinion was almost unanimously in favor of the transportation interests of Toronto being intrusted to a commission outside the City Council, irrespective of the outcome of the negotiations which are now pending for the purchase of the property of the Toronto Railway and the Toronto Electric Light Company. The motion was carried.

Capitalization of American Railways.—The Railway Business Association has issued in pamphlet form a reprint of an article in the *Saturday Evening Post* by Alba B. Johnson, president of the Baldwin Locomotive Works and vice-president of the association. The paper deals with the question of the overcapitalization of American Railways. According to Mr. Johnson, too much importance has been attached to the question of overcapitalization and too little co-operation evidenced for the invigoration of railway credit through reinforcing railway revenue. Mr. Johnson states that receiverships have wiped out millions of the original capitalization of the railroads, and that since 1894 20 per cent of the railroads in the United States have undergone a wholesale scaling down in their original capitalization. The capitalization per mile of line for the United States in 1910, according to Interstate Commerce Commission statistics, was $62,557; for Germany, 1911, $113,855, or 81.7 per cent greater; for France, 1910, $144,683, or 130.9 per cent greater; for the United Kingdom, 1911, $275,156, or 339.1 per cent greater; and for England and Wales, 1911, $328,415, or 424.1 per cent greater. In reference to the relation of freight rates to capitalization Mr. Johnson states that uniform rates have no fixed relation to capitalization, owing to the fact that competition necessitates uniform rates whether the capitalization varies or not.

PROGRAM OF ASSOCIATION MEETING

International Street & Interurban Railway Association

The program for the eighteenth biennial convention of the International Street & Interurban Railway Association has just been published. The association will meet this year at Budapest upon invitation of the government of Hungary and of the city of Budapest. The sessions will begin on Monday, Aug. 31, 1914. The following subjects will be discussed:

I. The relations of the public and the local transportation system, considered under the following heads: (A) The effect of new methods of transportation on the development and extension of large cities and on their social customs. (B) Fares: (1) basis of fares and their influence on traffic; (2) transfers at reduced rates and their influence on earnings; (3) commutation tickets and methods of establishing their price.

Committee: Mr. Duval-Arnould, member of the City Council of Paris, and Dr. Kuhles, member of the City Council of Munich.

II. Corrugation.

Committee: Messrs. Busse, chief engineer of the Grosse Berliner Strassenbahn, and Resal, director of the Compagnie Française des Tramways Electriques et Omnibus, of Bordeaux.

III. Rails and tires, considered under the following heads: (A) The best form of rails and tires to obtain a minimum coefficient of track resistance and minimum wear of tires on curves and the effect of wheel gage on curves. (B) Use of special rails, both as regards shape and composition, for curves.

Committee: Messrs. Bacqueyrisse, chief engineer of the tramways of the Compagnie Générale des Omnibus, Paris, and Minorini, manager Municipal Tramways of Milan.

IV. Ball bearings and roller bearings, their application to motor cars and trail cars.

Committee: Messrs. Largiader, manager of the Municipal Railway of Zurich; Schoerling, chief engineer of the Hanover Tramways, and Tobias, superintendent of shops, Budapest Tramways.

V. Motormen, conductors and inspectors; their methods of instruction and the best method of accounting for the tickets delivered to the conductors and of taking charge of the receipts.

Committee: Messrs. Noirfalise, general manager of the Société Anonyme des Tramways Liegeois, and Roethy, chief inspector Budapest Tramways.

VI. Special methods for transshipping merchandise between narrow-gage lines and standard-gage lines.

Committee: Mr. Sapin, manager of the Central Railway & Tramway Company of Paris and of the tramway companies of Ekaterinoslaw, Russia.

VII. Operation of a railway under different franchises, divisions of the receipts and expenses.

Committee: Mr. Carnevali, chief engineer of the Turin Tramways.

VIII. Steam locomotives for light railway lines: (A) Recent improvements. (B) Covering of wheels and mechanism by casing and a platform at each end of the locomotive. (C) Use of superheat.

Committee on the first two subjects: Mr. Hamelink, formerly manager of the Netherlands Tramways; on the third subject, Mr. de Soignie, manager of the local railways system in Andenne-Namur.

IX. Underground feeders: Specifications; use of aluminum; life.

Committee: Mr. Sekutowicz, operating manager of the Lyons Railways & Tramways Company.

X. Three-wire distribution for tramways: use of a higher tension in the suburbs than in the center of the city; special arrangements necessary for the rolling stock, switchboard operation and the distribution system.

Committee: Mr. Sieber, manager Nuremberg-Furth Tramways.

XI. Conversion of alternating current to high-tension direct current; use of motor-generators, rotaries, etc.

Committee: Messrs. Dalrymple, general manager Glasgow Corporation Tramways, and Sarrat, chief engineer of the firm of E. L. J. Empain, Brussels.

XII. Facilities for loading passengers: (A) Stop signs, covered stations and refuges, use of additional motor cars and trail cars during rush hours. (B) Destination signs. (C) Publicity and its effect on increasing the gross receipts.

Committee: Rodolphe de Weck, manager of the Fribourg Railways and president of the Swiss Association of Secondary Railways.

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Financial and Corporate

Stock and Money Markets

Nov. 5, 1913.

The price advances during the first hour of trading on the New York Stock Exchange to-day were accompanied by a volume of trading considered large as compared with the standards set recently. The sales for the day totaled 225,757 shares. The market as a whole, however, was left at the close of the day a fair fraction above Monday's final average. Rates in the money market to-day were: Call, 3@5 per cent; sixty and ninety days, 4¾@5 per cent; four, five and six months, 4½@5 per cent.

The Philadelphia market moved to-day within a narrow range under very limited transactions. There was a good demand for bonds and prices showed a fractional advance.

Trading in the Chicago market to-day was broad, but the volume of transactions was small. Bonds changed little.

Trading in Boston to-day was slightly more active than it has been for some time past, but prices were irregular. The bond market was again broad and active.

The market for stocks in Baltimore to-day was very narrow and the total of sales was small. The demand for bonds continues good, the sales to-day totaling $51,300, par value.

Quotations of traction and manufacturing securities as compared with last week follow:

	Oct. 29	Nov. 5
American Brake Shoe & Foundry (common)	88½	88½
American Brake Shoe & Foundry (preferred)	128	129½
American Cities Company (common)	36	36
American Cities Company (preferred)	62¾	62¾
American Light & Traction Company (common)	330	328
American Light & Traction Company (preferred)	105	104½
American Railways Company	38⅞	38⅞
Aurora, Elgin & Chicago Railroad (common)	40	40
Aurora, Elgin & Chicago Railroad (preferred)	84	84⅜
Boston Elevated Railway	85	82½
Boston Suburban Electric Companies (common)	7	7
Boston Suburban Electric Companies (preferred)	59	59
Boston & Worcester Electric Companies (common)	a10	a10
Boston & Worcester Electric Companies (preferred)	39	39
Brooklyn Rapid Transit Company	87¾	86½
Capital Traction Company, Washington	115	114¼
Chicago City Railway	160	160
Chicago Elevated Railways (common)	25	25
Chicago Elevated Railways (preferred)	75	75
Chicago Railways, ptcptg., ctf. 1	90	a92
Chicago Railways, ptcptg., ctf. 2	29¼	28½
Chicago Railways ptcptg., ctf. 3	7¼	7
Chicago Railways, ptcptg., ctf. 4	2½	2½
Cincinnati Street Railway	107½	106
Cleveland Railway	103¾	103¼
Cleveland, Southwestern & Columbus Ry. (common)	*5½	*5½
Cleveland, Southwestern & Columbus Ry. (preferred)	*30	*30
Columbus Railway & Light Company	18	18
Columbus Railway (common)	a69½	59½
Columbus Railway (preferred)	88	88
Denver & Northwestern Railway	*111	111
Detroit United Railway	70	a80
General Electric Company	140¾	140
Georgia Railway & Electric Company (common)	119⅞	120½
Georgia Railway & Electric Company (preferred)	85½	85½
Interborough Metropolitan Company (common)	14	14⅜
Interborough Metropolitan Company (preferred)	58	57¾
International Traction Company (common)	*40	*40
International Traction Company (preferred)	95	95
Kansas City Railway & Light Company (common)	*22	*22
Kansas City Railway & Light Company (preferred)	*30	*30
Lake Shore Electric Railway (common)	*7	*7
Lake Shore Electric Railway (1st preferred)	*92	*92
Lake Shore Electric Railway (2d preferred)	*25	*25
Manhattan Railway	127	128⅝
Massachusetts Electric Companies (common)	11½	11¼
Massachusetts Electric Companies (preferred)	67	67
Milwaukee Electric Railway & Light Co. (preferred)	*100	100
Norfolk Railway & Light Company	25¼	*25¼
North American Company	72	71
Northern Ohio Light & Traction Company (common)	63½	66¼
Northern Ohio Light & Traction Company (preferred)	97	97
Philadelphia Company, Pittsburgh (common)	40	39
Philadelphia Company, Pittsburgh (preferred)	40½	39
Philadelphia Rapid Transit Company	22⅝	23
Portland Railway, Light & Power Company	56	*56
Public Service Corporation	108	108
Third Avenue Railway, New York	40	39¼
Toledo Traction, Light & Power Company (common)	30	30
Toledo Traction, Light & Power Company (preferred)	80	80
Twin City Rapid Transit Co., Minneapolis (common)	104	103¼
Union Traction Company of Indiana (common)	*13	13
Union Traction Company of Indiana (1st preferred)	*83	83
Union Traction Company of Indiana (2d preferred)	*25	25
United Rys. & Electric Company (Baltimore)	26	25½
United Rys. Inv. Company (common)	18	18
United Rys. Inv. Company (preferred)	34½	36½
Virginia Railway & Power Company (common)	56	a56
Virginia Railway & Power Company (preferred)	93½	94
Washington Ry. & Electric Company (common)	93	92
Washington Ry. & Electric Company (preferred)	88½	89
West End Street Railway, Boston (common)	70	69
West End Street Railway, Boston (preferred)	90	a89
Westinghouse Elec. & Mfg. Company	66½	66½
Westinghouse Elec. & Mfg. Company (1st preferred)	110	109

*Last sale. a Asked.

ANNUAL REPORT

Boston Elevated Railway

A summary of the business of the Boston (Mass.) Elevated Railway for the year ended June 30, 1913, follows

Gross revenue from operation:		
Passenger revenue	$16,268,607	
Parlor, chair and special car revenue	21,312	
Mail revenue	37,097	
Express rental	26,378	
Miscellaneous transportation revenue	1,695	
Station and car privileges	212,308	
Rent of tracks and terminals	65,303	
Rent of equipment	272	
Rent of buildings and other property	110,189	
Power revenue	29,399	
Miscellaneous revenue	36,349	
Total operating revenue		$16,808,909
Operating expenses:		
Maintenance of way and structures	$1,761,843	
Maintenance of equipment	1,282,656	
General expenses	1,773,598	
Traffic expenses	16,084	
Transportation expenses	6,301,400	
Total operating expenses		11,135,581
Net operating revenue		$5,673,328
Other income:		
Interest on deposits, etc.	$50,419	
Interest from securities owned	69,460	
Interest charged to construction	34,141	
Miscellaneous	5,399	
Total other income		159,419
Total income		$5,832,747
Deductions from income:		
Payments on account of leased railways:		
Tremont Street subway rental	$211,751	
Less amount charged Bay State St. Ry.	23,683	
	$188,068	
Interest on funded debt of West End St. Ry.	762,610	
Dividend on preferred stock of West End St. Ry., 8 per cent.	512,000	
Dividend on common stock of West End St. Ry., 7 per cent.	880,969	
Dividend on stock of Somerville Horse R.R., 6 per cent	9,180	
Taxes on West End St. Ry.	610,218	
Interest and taxes on leased property of Bay State St. Ry.	50,497	
Rent of Newtonville & Watertown St. Ry.	6,031	
Total	$3,019,573	
Interest on funded debt	887,806	
Interest on unfunded debt	207,700	
Taxes, Boston Elevated Railway	376,462	
Tax on earnings	141,341	
Washington St. Tunnel rental	370,256	
East Boston Tunnel rental	60,574	
Cambridge connection rental	68,408	
Total deductions		5,132,124
Balance—net income for period		$700,623
Dividend No. 25, paid Aug. 15, 1912, 3 per cent.	$598,500	
Dividend No. 26, paid Feb. 15, 1913, 3 per cent.	598,500	
		1,197,000
Deficit for the year		$496,377

William A. Bancroft, president of the company, says in part:

"During the year the company has increased its capital stock by the issue of 39,294 shares, which were subscribed for at $105 per share. This was the portion of the 40,000 shares which were authorized by vote of the stockholders on Nov. 4, 1912, and by order of the Board of Railroad Commissioners of Dec. 6, 1912, which were subscribed for. This makes the capital stock outstanding at the close of the fiscal year $23,879,400. There are 706 shares of stock, unsubscribed for, to be sold at public auction at not less than par.

"During the year the company has also issued $4,000,000 of 5 per cent gold bonds, dated Dec. 2, 1912, and running for thirty years to Dec. 1, 1942. This makes the funded debt $22,300,000.

"On July 16, 1913, the board of directors accepted Chapter 777 of the Acts of the Legislature for 1913. This act, in effect, provides that the elevated railway heretofore authorized by law (Chapter 497, Acts of 1907) is not to be built in Malden, nor in Everett beyond a point near the intersection of Broadway and the Eastern Division of the Boston & Maine Railroad. The company by the act is granted a right to build a subway from this point to a point near Malden Square. If the company does not begin to build the subway within five years from the date of the acceptance of the act, the Boston Transit Commission, if requested by the cities of Everett and Malden, may build

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such a subway, to be financed by the cities of Everett and Malden, and to be leased to the company for a period of twenty-five years at an annual rental of 4½ per cent on the net cost of the subway.

"On July 16, 1913, the board of directors also accepted Chapter 819 of the Acts of 1913. This act provides for a connection between the Boylston Street subway and the Tremont Street subway at a point near Park Square, and for the operation of both of these subways, so connected, as soon as may be. The Boston Transit Commission, the act further provides, is to investigate and to report to the next General Court whether it is desirable to alter the route of the Boylston Street subway beyond the point of connection with the Tremont Street subway.

"The company has added a net of 3.929 miles of surface track, making a total mileage of 510.988.

"The only new track put into operation during the year was that on Southampton Street between Andrew Square, South Boston, and Massachusetts Avenue, Roxbury.

"The company has ordered 100 more prepayment cars and fifty-five elevated cars. These, with the twenty Cambridge subway cars, when all are delivered, will make an addition to its rolling stock since last year of 175 large cars. Besides these the company is adapting a number of cars to be used as stepless, prepayment, middle-entrance, vestibuled cars. Of these thirty-two will soon be in operation.

"The construction of the Boylston Street subway, beginning on March 12, 1912, at a point on Massachusetts Avenue near its intersection with Beacon Street, has been prosecuted by the Boston Transit Commission. While incomplete in sections the work has reached nearly to Charles Street on Boylston Street.

"The construction of the Dorchester tunnel, which is to be an extension of the Cambridge subway from Park Street east, was begun by the Boston Transit Commission on May 30, 1912. Work has been done under Winter and Summer Streets as far as the easterly line of Arch Street.

"The commission also began work upon the East Boston tunnel extension on Nov. 29, 1912, near Scollay Square. Much progress has been made.

"It is expected that the Boylston Street Subway, as far as the Public Garden, will be in service in about a year. The use of the tunnels will not be begun until later.

"The company has nearly finished the construction of the Alford Street yard in Charlestown, made necessary on account of the extension of the elevated road to Everett, in accordance with the legislation above recited.

"On Dec. 21, 1912, the new 15,000-kw generator was put into service at the South Boston power station. This makes three units of 15,000 kw each in this station.

"On Dec. 9, 1912, Dover Street station as enlarged was put in service.

"Tentative freight and express business was inaugurated during the year. Cars of the Bay State Street Railway and of the Boston & Worcester Street Railway are run upon our tracks. These companies pay our company for the privilege, so that our company, as such, is not engaged in collecting or delivering parcels.

"The first station was opened on Oct. 28, 1912, at the company's property on Harrison Avenue. The second station, upon land leased by the company at Copps Hill Wharf, was opened Feb. 17, 1913.

"The workingmen's compensation act became law on July 1, 1912. To meet this act several courses were open to the company, but it was deemed expedient to take out a policy in the Massachusetts Employees' Insurance Association—a company created by the State. The cost to the company for the fiscal year ended June 30, 1913, because of the act, was $82,988. As an additional precaution to prevent accidents and to reduce the burden imposed by the act, safety committees—thirty-seven in all—have been formed from among the employees. There are upward of 200 members, and each carhouse, power house, shop, etc., has its committee.

"Conferences with representatives of the labor organization brought about an agreement as to twenty of the forty-eight demands which were made last April. The others, relating chiefly to wages, have been under arbitration by a board consisting of James J. Storrow, chairman; James L. Richards, representing the company, and James H. Vahey, representing the labor organization.

"From the summary of stockholders of record June 30, 1913, hereinafter printed, it appears that the total number is 5973, holding 238,794 shares of stock. Of these 5346, holding 216,893 shares, live in Massachusetts. This shows that nearly 90 per cent of the stock is held in Massachusetts. The average number of shares held by each stockholder of the company is a little more than thirty-nine shares.

"Our revenue and expenses were substantially affected by the strike, which was not settled till the latter part of July, 1912."

The traffic statistics of the company follow:

Round trips:	
Run by rapid transit passenger cars	1,159,056
Run by surface passenger cars	5,562,721
Run by U. S. mail cars	19,341
Run by express cars	3,475
Total	6,744,593
Revenue miles:	
Run by rapid transit passenger cars	11,385,787
Run by surface passenger cars	46,118,784
Run by U. S. mail cars	222,376
Run by express cars	57,372
Total	57,784,319
Revenue car hours:	
By rapid transit passenger cars	777,306
By surface passenger cars	4,552,094
By U. S. mail cars	24,964
By express cars	5,343
Total	5,359,707
Passengers carried:	
Revenue passengers on rapid transit and surface cars	326,352,863
Revenue:	
From revenue passengers on rapid transit and surface cars	$16,268,607
From parlor, chair and special cars	21,312
From U. S. mail cars	37,097
From express cars	26,379
Total revenue from car operation	$16,353,394

American Public Utilities Company, Grand Rapids, Mich.—The American Public Utilities Company has issued an attractive pamphlet giving the holders of its securities detailed information concerning the operations of the company and the conditions of its various subsidiaries. Each of the twelve subsidiaries taken up is described in full in regard to the character of the service offered, the size and construction of the plant, and the character of the city itself and the surrounding country. The Jackson Light & Traction Company, Jackson, Miss., which operates lighting, power and street railway properties in Jackson, is one of the companies described. The book is well illustrated throughout with halftones of the different properties.

Buffalo & Lake Erie Traction Company, Buffalo, N. Y.—The continued hearing on the application of the Canadian-American Power Corporation to import 46,000 hp from Niagara Falls, Ont., to supply the Buffalo & Lake Erie Traction Company and the proposed Frontier Electric Railway with energy, scheduled to be held before the Public Service Commission of the Second District of New York on Oct. 31, was adjourned for two weeks at the request of counsel for the majority bondholders of the Buffalo & Lake Erie Traction Company.

Columbus Railway & Light Company, Columbus, Ohio.—Following a conference attended by G. M. Clark, J. S. Clark and C. S. McMeen, president of the Columbus Railway & Light Company, with representatives of the various railway and lighting companies of the city, the report became current that a settlement will be reached with the stockholders of the Columbus Light, Heat & Power Company by which that company will participate in the reorganization plan. The stockholders of the Columbus Light, Heat & Power Company demanded that they be placed upon the same basis as the stockholders of the Columbus Edison Company, with respect to the reorganization.

Connecticut Company, New Haven, Conn.—Howard Elliott, chairman of the board of directors of the New York, New Haven & Hartford Railroad, made the following statement on Nov. 6 in regard to the inspection which is being made of the properties of the Connecticut Company: "Engineers from the Stone & Webster organization are making an examination of portions of the electric railway properties in order that Mr. Elliott and the committees of the directors now engaged in making a study of the electric railway problem may have some necessary detailed information. There is nothing in the story that Stone & Webster are to acquire any portion of the electric railway properties. The examination is in line with that just completed by out-

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side engineers of the entire signal system of the New Haven and like the examination now being conducted on the Boston & Maine Railroad."

Consolidated Railway & Power Company, Fayetteville, N. C.—Ernest Poindexter, representing Chicago interests, is understood to be negotiating for the purchase of the property of the Consolidated Railway & Power Company, which controls the Fayetteville Street Railway & Power Company and the Little River Power & Transmission Company.

Fort Dodge, Des Moines & Southern Railway, Boone, Ia.—The property of the Fort Dodge, Des Moines & Southern Railway was sold under foreclosure on Oct. 31 for $3,800,000 to Rollin B. Fisher, acting for the Old Colony Trust Company, Boston, Mass., trustee for the bondholders.

Idaho Traction Company, Boise, Idaho.—The Idaho Traction Company is operating the properties formerly known as the Boise Valley Railway, Boise Railroad and the Boise & Interurban Railroad.

Illinois Traction System, Peoria, Ill.—The directors of the Illinois Traction System have sent out a notice to the stockholders of the company for a meeting for the purpose of considering the purchase of the Western Railways & Light Company. H. E. Chubbuck, vice-president executive of the Illinois Traction System and the Western Railways & Light Company, who is in charge of all the properties operated by both companies, states that the deal is a purchase of the Western Railways & Light Company and not a merger and is primarily for the purpose of economy. The two companies have identical management and the principal stockholders of both are the same. According to Associated Press dispatches from St. Louis the proposed merger is to be accomplished through the purchase of the common stock of the Western Railways & Light Company by issuing one share of Illinois Traction common stock in exchange for two shares of Western Railways & Light Company common stock. The same source of information says that as the amount of common stock issued by the Illinois Traction is $9,984,900 out of an authorized issue of $10,000,000 and by the Western Railways & Light Company $4,521,800, it will be necessary to increase the common stock of the Illinois Traction Company.

Lincoln Railway & Light Company, Lincoln, Ill.—Representatives of the Commercial Club of Lincoln, Ill., who took a nine months' option on the property of the Lincoln Railway & Light Company, have in turn offered the property to a syndicate on thirty days' option.

Newell (W. Va.) Street Railway.—On Sept. 11, 1913, The Newell Street Railway, a corporation organized under the laws of the State of Ohio and the owner of a street railway in East Liverpool, Ohio, and the Newell Street Railway, a corporation organized under the laws of West Virginia but permitted to do business in Ohio, filed a joint petition praying for the consent and approval of the Public Utilities Commission of Ohio to the leasing by the Newell Street Railway of all of the property of The Newell Street Railway. On Oct. 22, 1913, the commission assented to this lease by the West Virginia corporation.

Oklahoma Railway, Oklahoma City, Okla.—Announcement has been made by John W. Shartel, vice-president of the Oklahoma Railway, of the purchase by that company of the property of the Oklahoma Traction Company. In referring to the purchase the *Oklahoman* said: "The deal means the absorption of all street car trackage and transportation by the Classen interests except 5½ miles of track owned by the Capitol Traction Company, extending from Sixteenth Street and Robinson Avenue to Northeast Park."

Public Service Investment Company, Boston, Mass.—The stockholders of the Public Service Investment Company have approved an increase in the authorized stock of 10,000 shares each of preferred and common, making total authorized capital $6,000,000, half common and half preferred.

Springfield (Ohio) Railway.—At the annual meeting of the stockholders and directors of this company, held on Oct. 29, Paul C. Martin was elected president to succeed his father, the late Oscar T. Martin. The other officers elected are all Philadelphia men, as follows: C. L. S. Tingley, first vice-president; H. J. Crowley, second vice-president; F. J. Pryor, secretary; W. W. Perkins, treasurer.

Toledo Traction, Light & Power Company, Toledo, Ohio.—Harris, Forbes & Company, New York, N. Y., have purchased $289,000 of first lien 5 per cent five-year bonds of the Toledo Traction, Light & Power Company, being 75 per cent of the amount expended for new equipment for the railway and lighting properties. This makes the total amount of the issue now outstanding $6,287,000.

Union Traction Company of Indiana, Anderson, Ind.—Judge Orbison of the Superior Court of Indianapolis has sustained the demurrer of the defendant and dismissed the suit brought by Miss Alice Norton, Cambridge, Mass., who sought to have set aside the merger of the Indiana Union Traction Company and the Union Traction Company of Indiana, perfected in May, 1912.

Winnipeg (Man.) Electric Railway.—The Winnipeg Electric Railway has bought the franchise and charters of the Manitoba Power Company, Rural Railways and the Winnipeg River Railway.

Dividends Declared

Connecticut Railway & Lighting Company, Bridgeport, Conn., quarterly, 1 per cent, preferred; quarterly, 1 per cent, common.

Massachusetts Consolidated Railways, Greenfield, Mass., quarterly, 1¼ per cent, preferred.

Ohio Traction Company, Cincinnati, Ohio, quarterly, 1¼ per cent, preferred.

Pensacola (Fla.) Electric Company, 3 per cent, preferred.

Tampa (Fla.) Electric Company, quarterly, 2½ per cent.

ELECTRIC RAILWAY MONTHLY EARNINGS

ATLANTIC SHORE RAILWAY, SANFORD, MAINE

Period			Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1 mo.	Sept.	'13	$33,077	$24,992	$8,085	$654	$7,431
1 "	"	'12	33,734	22,957	12,777	466	12,311

JACKSONVILLE (FLA.) TRACTION COMPANY

1 mo.	Aug.	'13	$55,255	*$34,537	$20,718	$12,976	$7,742
1 "	"	'12	48,856	*33,471	15,385	9,934	5,451
12 "	"	'13	607,296	*403,451	203,845	133,202	70,643
12 "	"	'12	588,981	*373,610	215,371	114,147	101,224

MONONGAHELA VALLEY TRACTION COMPANY, FAIRMONT, W. VA.

1 mo.	Sept.	'13	$60,814	$33,985	$56,829	$25,548	$31,281
1 "	"	'12	83,786	30,063	53,724	24,738	28,986
9 "	"	'13	701,438	246,265	455,174	220,293	234,881
9 "	"	'12	627,613	250,750	376,863	186,118	190,045

NEW ORLEANS RAILWAY & LIGHT COMPANY, NEW ORLEANS, LA.

1 mo.	Sept.	'13	$538,360	$288,766	$249,594	$206,634	$42,960
1 "	"	'12	512,646	274,498	238,148	188,198	49,950
9 "	"	'13	5,082,655	2,691,622	2,391,033	1,822,914	568,119
9 "	"	'12	4,878,981	2,559,039	2,319,942	1,666,730	453,212

NORTHERN TEXAS ELECTRIC COMPANY, FORT WORTH, TEX.

1 mo.	Aug.	'13	$185,886	*$105,137	$80,748	$24,166	$56,582
1 "	"	'12	147,203	*78,834	68,370	20,858	47,512
12 "	"	'13	2,078,037	*1,116,554	961,483	289,769	671,714
12 "	"	'12	1,669,796	*904,471	765,325	250,736	514,589

PADUCAH TRACTION & LIGHT COMPANY, PADUCAH, KY.

1 mo.	Aug.	'13	$26,312	*$16,325	$9,988	$7,583	$2,405
1 "	"	'12	23,954	*15,619	8,335	7,195	1,140
12 "	"	'13	290,675	*193,059	97,616	88,733	8,883
12 "	"	'12	279,833	*184,101	95,733	85,443	10,290

PENSACOLA (FLA.) ELECTRIC COMPANY

1 mo.	Aug.	'13	$24,953	*$15,470	$9,483	$7,055	$2,428
1 "	"	'12	25,905	*15,015	10,890	6,377	4,512
12 "	"	'13	285,936	*181,988	103,048	77,819	25,229
12 "	"	'12	287,450	*178,010	109,440	72,431	37,009

PUGET SOUND TRACTION, LIGHT & POWER COMPANY, SEATTLE, WASH.

1 mo.	Aug.	'13	$723,529	*$410,022	$313,507	$174,427	$139,081
1 "	"	'12	680,206	*402,668	277,537	164,809	112,728
12 "	"	'13	8,444,058	*4,910,483	3,533,575	2,045,015	1,488,560
12 "	"	'12	.....	.....	.....	.....	.....

SAVANNAH (GA.) ELECTRIC COMPANY

1 mo.	Aug.	'13	$70,985	*$46,311	$24,674	$22,800	$1,874
1 "	"	'12	64,073	*47,616	16,457	16,153	304
12 "	"	'13	803,661	*558,688	244,973	237,639	7,334
12 "	"	'12	732,185	*540,966	191,219	189,887	1,332

TAMPA (FLA.) ELECTRIC COMPANY

mo.	Aug.	'13	$71,624	*$39,665	$31,959	$4,354	$27,605
1 "	"	'12	62,981	*32,717	30,264	4,534	25,730
12 "	"	'13	796,303	*427,875	368,429	55,126	313,303
12 "	"	'12	739,140	*390,898	348,242	53,973	294,269

*Includes taxes.

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Traffic and Transportation

Opinion of New Jersey Commission Regarding Height of Car Step

Brief reference was made in the ELECTRIC RAILWAY JOURNAL of Nov. 1 to the order of the Board of Public Utility Commissioners of New Jersey to the effect that "no new cars for the transportation of passengers on the lines operated by the Public Service Railway shall be placed in service and operated by said company with an initial step exceeding 15 in. in height and a second step exceeding 14 in. in height." The opinion on which the order is based was concluded in part as follows:

"The whole question practically resolves itself into a matter of the feasibility and cost of reducing the height of car steps upon the respondent's equipment.

"The evidence before us suffices to show that a reduction in the height of car steps by means of the substitution of maximum traction trucks is not practicable.

"We accept respondent's contention that the four-motor equipment is best contrived to negotiate at proper speed the grades upon respondent's lines. We accept the evidence before us tendered to show that an additional step for entrance upon or exit from respondent's cars would not be desirable.

"Petitioner's witness, Clifton W. Wilder, agrees with the respondent that more than three steps or stages are a nuisance. A third step would lessen the standing room on the platform, would involve another distinct movement on the part of the passenger, would probably dangerously lessen the area of the treads and would impede rapidity of loading and unloading.

"We are not satisfied that a folding step would at present be feasible. Such a step could not, in certain places, protrude beyond the side of the car. It would have to be so devised as to divide the controlling distance of practically 41 in. and would consequently involve the same essential objections as attached to the third step mentioned above. We are satisfied from the evidence before us that a 33-in. wheel is required upon the respondent's ordinary four-motor truck equipment, and that the requisite clearance below and above the motor casing, together with the members of the car body and superstructure resting on the truck, make necessary a distance of not over 41 in. from the top of the running rail to the floor of the car. We are not satisfied that this distance of 41 in. is properly divided as at present by the company into steps of approximately 17 in., 14 in. and 10 in. when the car is newly constructed.

"On the other hand, we are satisfied by the testimony of the board's engineer, Winslow B. Ingham, and by the confirmation thereof of H. A. Benedict, the company's mechanical engineer, in charge of rolling stock and equipment, that it is practicable, without extra cost, when cars are in process of construction, to bend the knees supporting the platform so that the entire platform shall be lowered at least 2 in. from its present height, retain the present distance from the step to the platform, to wit, 14 in., and reduce the height of the lower step to 15 in. from the head of rail when the cars are new.

"On the same testimony and confirmation thereof by H. A. Benedict, we are satisfied that a 1-in. ramp, such as proposed by Mr. Ingham, running from the king bolt to the end of the car floor will provide satisfactorily a practicable step not over 11 in. in height from the car platform to the floor of the car. This would make the second step not over 14 in. in height.

"Upon this plan of construction for the future, the evidence is so clear and is so completely corroborated by the respondent's witness, Mr. Benedict, that we have no hesitation in ordering that hereafter the company shall install and employ no new equipment with an initial step to exceed 15 in. in height.

"The need of issuing an order of this tenor forthwith without waiting further evidence desired by the board as to extant equipment is apparent. It will prevent the augmentation of equipment not properly designed to afford the maximum of comfort and rapidity in the work of loading and unloading.

"The board, therefore, finds and determines in view of the attested feasibility of designing cars with an initial step not higher than 15 in. from the running rail, when the car is new, that the Public Service Railway in putting into operation additional equipment with an initial step higher than 15 in. and a second step higher than 14 in., will fail to furnish safe, proper and adequate service; and, except as otherwise indicated, the board will require of the Public Service Railway in order to furnish safe, proper and adequate service and to keep and maintain its property and equipment used in passenger service in such condition as to enable it to do so, to operate hereafter new equipment used in passenger service only when such new equipment shall be provided with an initial step not in excess of 15 in. in height and a second step not in excess of 14 in. in height.

"Before making an order reducing the height of steps on extant equipment, the board feels the need of some additional evidence. First of all, it will require of the company to classify the 245 cars unlisted with reference to the height of the first step, so that the height of the first step on these 245 cars may be known. Second, it will require of the company, and it will seek to obtain from outside experts, additional evidence of the cost of reconstruction necessary to lower the height of the initial step of the existing equipment.

"If, as suggested by the company, but not specifically pointed out by it, there exists any exceptional case where an initial step higher than 15 in. is required because of territory traversed or peculiar conditions under which the cars are operated, an opportunity will be given the company in the supplementary hearing to adduce evidence on these matters."

Conscience Money Letter

A letter was received recently by A. F. Elkins, auditor Columbus, Delaware & Marion Railway, inclosing a postal order made payable to him for 40 cents conscience money. The letter read as follows:

"To the C. D. & M. Co.

"By peculiar circumstances, the C. D. & M. Co. were cheated out of the price of one passenger fare, $.40, between Cols. and Del. in Aug., 1912.

"It seems strange that such a long time should pass by before those who did the defrauding should realize that they were so shamefully guilty of theft, and rectify the error. As tickets are sold to strangers continually by the C. D. & M. it is not necessary to disclose this passenger name. But the guilty party is very anxious to right this error, not alone for the sake of the C. D. & M., but much more to acknowledge and rectify the error—for their own guilty sake in the face of the fact that they desire to stand for absolute honesty and uprightness.

"Boarding the car in Columbus with a properly purchased ticket, at the C. D. & M. station, this passenger offered his ticket to the conductor who came thru the car. But the conductor was evidently not taking tickets for he refused the ticket and went about fixing the windows as the car stood by the station. Later the car was stalled, half way out of the city by a car disabled ahead, the car filled up till it was crowded in every aisle and corner and platform, and confusion generally reigned for some little while. Then the conductor came for the tickets and this passenger with the only half complete memory of having once handed the conductor his fare, innocently and conscientiously said, 'I have paid my fare.' And the fact of his mistake did not occur to him at all, nor did he think of the circumstances again, until much to his surprise he found his ticket in his purse after reaching home.

"Oh the *shame* of this rest!!! He had the ticket now in his possession and he thought it could be used. And as he was not himself going to Cols. he gave it to a friend who often made the trip. And he used it.

"Passes and free tickets may be issued by the Co. and used by persons who have not paid for them, but that has no concern with this affair. That passenger should have destroyed the ticket on finding it, as it had been used. It is horrible to realize how long it has taken for this person to see his guilt, to the extent of $.40 indebtedness to the C. D. & M. for a passenger trip never paid for. He must answer to God for the theft, and watch vigilantly for honesty in himself henceforth."

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Near-Side Stops in Paducah.—The Paducah (Ky.) Traction Company has adopted the plan of stopping on the "near" side of the street. The change was put into effect on Oct. 27.

Milwaukee Mayor Dedicates New Cross-Town Line.—Mayor Bading of Milwaukee, Wis., dedicated on Oct. 21 the new Twenty-seventh Street cross-town line and the Sixth Street route of the Eighth Street-Muskego Avenue line.

Fatal Wreck in Indiana.—One man was killed and many persons were injured on Oct. 23, when an eastbound Indiana Union Traction car left the track and upset at a curve just west of Yorktown, a village 6 miles west of Muncie.

Albany Southern Changes Rates.—The Albany Southern Railway, Hudson, N. Y., has filed with the Public Service Commission, Second District, State of New York, changes in local commutation fares from Albany to certain stations.

B. R. T. Employees Entertain.—The first monthly entertainment of the season given under the auspices of the Brooklyn Rapid Transit Employees' Benefit Association was held at its clubhouse, Jamaica and Alabama Avenues, on Oct. 30, with over 900 persons in attendance.

Express Service in Discontinued Interurban Cars.—It is understood that the Wells Fargo & Company express will be brought to Tonawanda and North Tonawanda from Buffalo, N. Y., on interurban cars after the discontinuance of passenger train service on the Niagara Falls branch after Nov. 15. Express from Lockport is now transferred from train to trolley at Tonawanda. This arrangement has been in effect since the Lockport branch of the Erie Railway was electrified by the International Railway Company, of Buffalo.

Improving Montreal Service.—The construction of lines and the improvement of the permanent way have resulted in bettering the service of the Montreal (Que.) Tramways. This relates mainly to the central district and the City Council is desirous of securing better accommodation in the outer wards. At an informal conference between the Council and the comptrollers the latter were asked to report on the extension of the service of the company and on the opening of new routes to meet the demands of the outside wards.

Re-routing in Los Angeles.—The first step in the plan for through routing the cars of the Los Angeles (Cal.) Railway, in order to relieve congestion in the downtown districts of the city, was taken on Oct. 27 when the schedule approved by the Board of Public Utilities of Los Angeles some weeks ago was put into effect. An additional change will be made in January, when the proposed curve at First and Spring Streets is constructed and the Temple Street line is brought downtown and connected with the new West Sixth Street line.

Hallowe'en Pranks in Kansas City.—Despite the efforts of the Metropolitan Street Railway, Kansas City, Mo., backed by the police, the usual number of tricks were played on Hallowe'en. A dozen bricks were placed on the tracks at Twenty-fifth Street and Grand Avenue. Fortunately, they failed to stop or derail the cars. One individual threw a stone through a window of a car on the Swope Park line. The track was greased in several places and it was found necessary to have men sand the rails to prevent accidents. A favorite trick seemed to be to stretch wires across the streets so as to throw the trolleys off the wire.

Complaint Regarding Unloading of Near-Side Cars.—Complaint has been made to the Public Service Commission of the Second District of New York against the new order of the International Railway, Buffalo, N. Y., with reference to the unloading of passengers from the near-side cars. Formerly at down-town stops and transfer points and at the end of the line both entrance and exit doors were opened to allow speedier exit to the passengers, this practice being in force particularly in the morning and late afternoon. Notice of the complaint has been sent to the company and the matter will be taken up by the officials with the commission before a hearing is held.

Dismissal of Complaint Against Pacific Electric Railway.—The Railroad Commission of California has dismissed the complaint by the Long Beach Chamber of Commerce against the Pacific Electric Railway alleging unjust rates and inadequate service on the part of this company within the city limits of Long Beach; also that the defendant refuses to issue transfers and to pave the streets adjacent to its tracks as required. The Railroad Commission held, as ground for dismissing the complaint, that the charter of the city of Long Beach invests the power of control over its utilities in the city itself, the commission having no jurisdiction therein.

Traction Line Rates Held Unreasonable.—Declaring that "no rate can be said in its final analysis to be reasonable unless it is clearly not in excess of the service," certain citizens filed a brief Oct. 25 with the Interstate Commerce Commission against the Washington & Old Dominion Railroad. This case is the outcome of new rates put in effect by the railroad in September, 1912, and the complainants are asking the commission to readjust them. The inability of the carrier to make a profit with a reasonable rate, the brief contends, is the misfortune of the carrier, and the public cannot be amerced in order that profit shall be made by the carrier and dividends paid.

Benefit Association Organized by Employees of Missouri Road.—The Kansas City, Clay County & St. Joseph Railway Company Mutual Benefit Association has been formed by employees of that road. According to the by-laws, the association will be composed of "white male employees of the company, or the successors thereof, or other companies which may be controlled in its interest." Membership in the association will cease with the date at which employment with the company terminates. J. R. Harrigan, president, and other officers assisted in the formation of the organization and will take an active interest in it. The dues are 40 cents a month, and the road itself pays $1 every three months for every member in good standing. Sick and death benefits are provided.

Fare Between Oakland and Ashland Reduced.—The Railroad Commission of California has ordered the monthly commutation rate between Oakland and Ashland, which lies between San Leandro and Hayward, reduced from $4.50 to $3.75. The case came before the commission on the complaint of J. P. Ramos against the San Francisco-Oakland Terminal Railways. The complaint asked that the present $4.50 rate, which is identical with the rate to Hayward, be reduced to $3, which is the rate between Oakland and San Leandro. The commission held that it would be inequitable to blanket the San Leandro rate as far as Ashland, and held also that the practice of requiring passengers to Ashland to pay the same commutation fare as the passengers to Hayward was also inequitable. The rates become effective in thirty days.

Hearing in New York in Regard to Abandonment of Line.—The Public Service Commission of the Second District of New York held a hearing in Batavia recently in regard to the abandonment of the Buffalo & Williamsville Electric Railway, Williamsville, N. Y., into the city of Batavia. Loran L. Lewis, president of the company, and Godfrey Morgan, secretary, expressed their desire at the meeting to sell the road for the net value of the equipment, but refused the offer of Mayor Wiard of Batavia of $1 for the line free from all encumbrances. If the company fails to sell the road soon another hearing will be held before the commission and the company will have to await the decision of the commission on the application to abandon the line. There is indebtedness of $127,500 against the company, of which amount $117,000 was incurred in building the line into Batavia and $10,500 in extending the Williamsville line to the Transit road. There are also $30,347 in notes outstanding.

Results of Illinois Traction System's Slogan Contest.—Prior to the opening of the Illinois State Fair at Springfield, Ill., in October, the Illinois Traction System offered a series of prizes to patrons making a round trip to the State Fair by its lines for the best slogan containing three words the initials of which would be I. T. S. More than 300 suggestions were made by the patrons of the company's lines. At the close of the State Fair judges were appointed to award the honors. The first prize, $25, was

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divided among five persons who offered the same phrase, namely, "Ideal Train Service." The second prize, $15, was divided among four contestants who offered the phrase "It's Time Saved," and the third prize, $10, was divided among three contestants who submitted the phrase "It's the System." The contest was widely advertised through the local papers in the cities served by the Illinois Traction System, and much interest attached to the results of the contest. The prize awards were also published in all the local newspapers.

Lockport Resumes One-Man Street-Car Service.—After a two-days' tie-up, street car service in Lockport, N. Y., was resumed on Nov. 3 by the International Railway. The company had withdrawn its cars from the streets upon receiving a notice from the Common Council of Lockport that two men instead of one must be placed in charge of the near-side cars recently put in operation in Lockport, or else the company would be forced to pay a penalty of $25 for each day every car was operated without two men. The International Railway at once withdrew its service and the company's attorney secured an injunction which was served on the Mayor, Chief of Police, City Clerk and Aldermen restraining them from interfering with the operation of the one-man cars. This injunction enabled the company to resume its service with one man performing the duties of motorman and conductor. Superintendent J. W. Andrews of the Lockport traction lines says that since one man has been taken off the near-side cars the service has been increased and that the public has benefited by the change. Lockport merchants and individuals favor the frequent service with one man on each car.

Progress of Ontario Safety League.—The Ontario Safety League, which aims to teach the public in general and school children in particular how to avoid being hurt in street accidents, is gradually taking shape. A meeting was held recently at the City Hall, Toronto, Ont., with sixteen persons present, at which a constitution was adopted, standing committees were appointed and fees of membership fixed. The question of appointing a secretary at $1,800 a year was left over for further consideration, the name of J. F. H. Wyse being recommended. James L. Hughes was elected president, and Sir John Gibson was chosen honorary president. It was decided to have an executive committee consisting of the president, vice-president, chairmen of the three standing committees and one representative each from the Ontario Railway Board, the City Council, Board of Education and Separate School Board. There will also be an advisory council, composed of nominees of the various public bodies to be connected with the league. This council may be called for conference purposes by the executive. The annual fee for ordinary members of the league was fixed at 25 cents, and the fee for patrons is to be a minimum of $5. "Safety First" buttons will be sold at cost to members of all classes.

"The Red Car of Empire."—A tribute is paid to the Pacific Electric Railway by Rufus Steele in a descriptive article entitled "The Red Car of Empire," which appeared in the *Sunset Magazine* for October. The following sample day's program was outlined to the author by a shoe merchant and orange grower living 12 miles outside Los Angeles: "I got out of my outdoor bed at 6, thrust my feet into slippers and went in my pajamas to get the morning paper that was caught in the rose tree by the front gate—the same rose tree in which at this season the male mocker sings all night to his nesting mate. Milk and cream were at the gate and also a parcel of merchandise ordered the afternoon before. At 7:30 I got up from the breakfast table and left home for business. At 8 my eldest daughter left to go to the art institute. At 8:30 the two kids departed for their grammar school 3 miles away. At 9 my wife received a note in the mail that made her wish to do a little shopping, and she came in to the heart of the city. She got home in time to prepare lunch for three ladies who didn't start out to our place until after 11. In the afternoon all of them ran over to a swimming tank 15 miles away. When I got home from the store the whole family was on the tennis court and we had a lively hour before dinner. . . . A red interurban electric car seems always to be waiting at the door when you want to go anywhere, and it gets you there and back in no time."

Personal Mention

Mr. N. W. Patterson has been appointed chief inspector of the Regina (Sask.) Municipal Railway.

Mr. W. H. Rupp has been appointed chief engineer of the Sumpter Valley Railway, Baker, Ore.

Mr. T. W. Ralph, associated with the Canadian Northern Railway, has been appointed auditor of the Chatham, Wallaceburg & Lake Erie Railway Company, Chatham, Ont.

Mr. N. I. Garrison, auditor of the Western States Gas & Electric Company at Stockton, Cal., has been appointed auditor for the Fort Smith Light & Traction Company, Fort Smith, Ark.

Mr. W. E. Sexton, formerly in charge of the Kaw River power station of the Metropolitan Street Railway, Kansas City, Mo., has been appointed chief engineer of the water and light department of Kansas City, Kan.

Mr. W. C. Sharp has resigned as general superintendent of the Helena Light & Railway Company, Helena, Mont. Mr. Sharp was formerly electrical superintendent of the Eastern Pennsylvania Railways, Pottsville, Pa.

Mr. W. C. Callaghan has been appointed general superintendent of the Helena Light & Railway Company, Helena, Mont., as successor to Mr. W. C. Sharp, resigned. Mr. Callaghan was formerly superintendent of transportation of the city lines of the New York State Railways (Rochester Lines).

Mr. Charles E. Mann, until recently clerk of the Massachusetts Railroad Commission and acting secretary of its successor, the Massachusetts Public Service Commission, has been appointed executive secretary of the board and will take charge of the records of the commission's proceedings and have the custody of the documents belonging to that body.

Mr. Andrew A. Highlands has been appointed secretary of the Massachusetts Public Service Commission, with headquarters at 20 Beacon Street, Boston. Mr. Highlands is a native of Fall River, Mass., and was graduated from the Harvard Law School in 1898. He will have general charge of the correspondence and office work of the Public Service Commission.

Mr. A. Norman, formerly manager of the Freeport Railway & Light Company, Freeport, Ill., has been appointed manager of the Eugene division of the Oregon Power Company with headquarters at Eugene, Ore., effective on Nov. 15. In this capacity he succeeds Mr. R. M. Jennings, who becomes manager of the Oregon Power Company at Marshfield, Ore.

Mr. H. C. Hoagland has been appointed general manager and treasurer of the Fort Smith Light & Traction Company, Fort Smith, Ark., vice Mr. J. W. Gillette, resigned. Mr. Hoagland will also retain his position as general manager of the Muskogee Gas & Electric Company, Muskogee, Okla. In 1886 Mr. Hoagland entered the employ of the Thomson-Houston Company. He has been connected with public utility companies continuously since then. He was formerly chief electrical and mechanical engineer of the Illinois Traction System.

Mr. Thomas Fitzgerald, for some years assistant general manager of the Cincinnati (Ohio) Traction Company, has been promoted to the position of general manager. In this office he succeeds Mr. Dana Stevens, who has been both vice-president and general manager of the Cincinnati property. Mr. Stevens continues in his official connection as vice-president, but becomes actively identified with the operation of the Cincinnati Car Company as vice-president. Mr. Stevens is also vice-president of the Ohio Electric Railway, and the promotion of Mr. Fitzgerald was made on account of Mr. Stevens' increased duties as vice-president of these several companies. Mr. Fitzgerald, the new general manager of the Cincinnati Traction Company, was graduated from Johns Hopkins University in 1898. His first position was as an apprentice in the shops of the Baltimore & Ohio Railroad. On leaving this position he successively held positions as inspector with the Third Avenue Railroad, New York; wireman with the Sprague

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Electric Company; superintendent of the Fairmont & Clarksburg Electric Railway & Light Company, Fairmont, W. Va.; general superintendent of the Norfolk, Portsmouth & Newport News Company, and general manager of the Lexington (Ky.) Railway. He resigned from the last-named position to become assistant to Vice-president Stevens of the Cincinnati Traction Company.

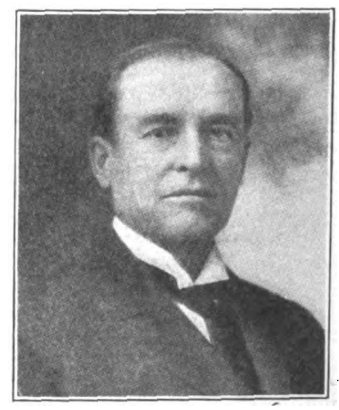
Mr. C. V. Wood, who has been traffic manager of the Springfield (Mass.) Street Railway, general freight and passenger agent of the Interstate Consolidated Street Railway, North Attleboro, Mass., and traffic manager of the Attleboro Branch Railroad, has been elected vice-president in charge of the operating and traffic departments of the Worcester (Mass.) Consolidated Street Railway, Springfield Street Railway, Milford, Attleboro & Woonsocket Street Railway, Interstate Consolidated Street Railway and the Attleboro Branch Railroad. Mr. Wood was born at Woodstock, Vt., on June 8, 1863. He was graduated from the Woodstock high school in 1881 and entered railway service in that year as telegraph operator with the Grand Trunk Railway. From March 22, 1882, to March 16, 1886, he was freight cashier, agent and yard master at various points on the New York & New England Railroad. From Jan. 16, 1888, to Oct. 1, 1897, he was passenger agent of the Pittsburgh & Lake Erie Railroad at Pittsburgh, Pa. From Oct. 1, 1897, to July 5, 1899, he was chief clerk to the general manager of the Bessemer & Lake Erie Railroad at Pittsburgh, Pa. From July 5, 1899, to Oct. 1, 1902, he was general manager of the electric freight line at Pittsburgh, Pa. From Oct. 1, 1902, to June 1, 1905, he was superintendent of the West Side Belt Road at Pittsburgh. From June 1 to Sept. 25, 1905, he was superintendent of terminals of the Wabash Pittsburgh Terminal Railway at Pittsburgh. He next became superintendent of the Pittsburgh and the Cleveland divisions of the Wheeling & Lake Erie Railroad, the Pittsburgh Terminal Railway and the West Side Belt Railroad at Canton, Ohio. Up to 1905 Mr. Wood's work had with one exception been all in the steam railroad field. About 1900 he retired from steam railroad work temporarily at the request of Judge James H. Reed, president of the Philadelphia Company, to develop freight traffic on the Pittsburgh Railways, Pittsburgh, Pa. In 1905 Mr. Wood resigned from the Wabash Lines to become connected with various electric railways in Springfield, Mass., and vicinity for the purpose of organizing and developing the passenger and freight traffic. Mr. Wood has accomplished a great work in this field not only in the cities but in the rural districts in which the companies with which he is connected operate. The Springfield Street Railway and the Worcester Consolidated Street Railway control all the lines in Springfield and Worcester respectively. The systems embrace over 500 miles of track and operate more than 1000 cars.

C. V. Wood

Mr. Thomas W. Ryley has resigned as superintendent of the Norwich & Westerly Traction Company, Norwich, Conn. Mr. Ryley has been connected with the Groton & Stonington Street Railway, now part of the system of the Norwich & Westerly Traction Company, ever since ground was broken for the construction of the road. He was first employed ten years ago on the survey, and when the road was opened between Groton and Westerly he became a conductor and later a motorman on the new line. He was also employed in the office of the company at Mystic. At the end of two years he was made superintendent of the road, a position which he held for eight years. When the Groton & Stonington Street Railway was taken over by the Norwich & Westerly Traction Company Mr. Ryley was promoted to the position of superintendent of transportation of all the lines under the control of the Norwich & Westerly Company. The duties of superintendent of equipment were the next to devolve upon him.

Mr. Henry A. Blair, chairman of the board of directors of the Chicago (Ill.) Railways, has been elected president of the company to succeed Mr. John M. Roach, resigned. Mr. Blair was born at Michigan City, Ind., in July, 1852. He was educated at Williston Seminary, Easthampton, Mass. He began his business career in the Merchants' National Bank, Chicago, of which his father was founder. Subsequently he was elected vice-president of the bank, continuing in that capacity until 1902, when the bank was consolidated with the Corn Exchange National Bank. Mr. Blair is vice-president of the Illinois Trust & Savings Bank, director of the Union Trust Company, Calumet & Chicago Canal & Dock Company, Elgin National Watch Company and the Commonwealth Edison Company. Mr. Blair's active connection with the railways of Chicago dated from his appointment as the receiver of one of the constituent properties of the present Chicago Railways. It is stated unofficially that under the plan for the unified operation of the Chicago Railways and the Chicago City Railway Mr. Blair will be chairman of the board of control and Mr. Leonard A. Busby, now president of the Chicago City Railway, will be president in charge of operation subject to the approval of the full board. As previously stated in the Electric Railway Journal, it is proposed under the plan for unified operation to place the two properties in the control of a board to consist of seven representatives, four of whom will be appointed in the interest of the Chicago Railways and three of whom will be appointed in the interest of the Chicago City Railway.

Mr. John M. Roach has resigned as president of the Chicago (Ill.) Railways, but at the request of the board of directors he will remain a director and continue active connection with the company in the capacity of adviser to the management. Mr. Roach was born in 1852 in Jackson County, Ohio, and was educated at Beverly and Athens, Ohio. Mr. Roach's parents removed to DeKalb, Ill., when he was ten years old. Five years later they returned to Ohio and Mr. Roach entered college at Beverly, where he spent two years. He then went to Helena, Mont., where he did newspaper work and became interested in mining. He traveled thence on horseback to Walla Walla, Wash., Portland, Ore., and down the Pacific Coast to Los Angeles, from which point he turned east to Salt Lake City. He continued east from Salt Lake to Chicago and entered the service of the North Chicago Street Railway in 1872 as a conductor. He advanced rapidly in the service, and was in succession appointed cashier and purchasing agent, and also served in various other capacities through successive changes in the management. In 1887 he was appointed assistant superintendent and in 1890 superintendent. In 1893 came his appointment as second vice-president and general manager, and in 1897 he was appointed to the position of general manager of the West Chicago Street Railway, in addition to the other positions which he held, and thus had his jurisdiction extended over the entire system of street railways in Chicago then owned and controlled by the late Charles T. Yerkes. In 1897 Mr. Roach was elected president of the Cicero & Proviso Street Railway and the Suburban Railroad in addition to the positions which he held previously, and on July 1, 1899, when the Chicago Union Traction Company assumed control of the North Chicago and West Chicago lines he was made vice-president and general manager of the entire system embraced in the Chicago Union Traction Company. After the purchase by the Chicago Union Traction Company in May, 1900, of the Chicago Consolidated Traction Company, Mr. Roach was elected president and general manager, succeeding Charles T. Yerkes. From May, 1900, to 1908 Mr. Roach served as president of the Chicago Union Traction Company, in addition to performing the duties of general manager of the



J. M. Roach

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Chicago Consolidated Company, in which position he succeeded Mr. Jesse Spaulding. When the Union Traction Company was reorganized in 1908 as the Chicago Railways Mr. Roach was elected president and general manager of the company. In 1912 Mr. Roach relinquished the duties of general manager to Mr. Williston Fish.

Mr. C. Nesbitt Duffy has resigned as vice-president and comptroller of The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., to become vice-president and general manager of the Manila Electric Railroad & Light Company, Manila, P. I. The promotion of Mr. Duffy is a recognition of his wide general knowledge of the industry and his experience and ability as an administrative official. What is more noteworthy in these times, it is a recognition of the sound principles of enlightened public policy for which Mr. Duffy stands. An accountant in his early days, Mr. Duffy has grown as the industry has developed. In the great changes of the last few years he has been one of the leaders in helping to give proper direction to the thought of the industry and the methods of public service corporations so that the important problems of public relation should be settled satisfactorily. He has advocated an attitude of publicity and of frank discussion of problems to the end that the public might become more familiar with the gravity of the issues confronting operating managers. He has practised his doctrine of cultivating the public and has tried to show that the utility company, like every other business, is an organization struggling against handicaps, but that its particular problems are a little more serious than those of most other forms of industry. It is primarily his work along lines of this character that brought Mr. Duffy the well-earned promotion to the office he is now to take. Apart from his activities in the American Electric Railway Association and his regular duties in the Milwaukee system his connection with two other important movements involving large issues contributed to his understanding and interpretation of present problems. One was his leading part in the preparation of the case of the company in the fare suit and the other was his position as a member of the board of arbitration in Cleveland this year when issues between the company and the city were settled. These helped to equip him still more effectively. In his new work Mr. Duffy will find large opportunities for the use of the abilities which he has developed, and in spite of the great distance of his new home he will still keep many warm friendships and will have the same personal interest in the local issues with which he has concerned himself for so many years. Mr. Duffy expects to leave Milwaukee about Nov. 15 for St. Louis and will go from there to San Francisco, from where he will sail on the *Manchuria* on Nov. 27. He is due to arrive in Manila on Christmas Day. Mr. Duffy entered the Milwaukee Electric Railway & Light Company as comptroller on Oct. 1, 1906, succeeding Mr. H. C. Mackay. In May, 1912, he was elected a vice-president of the company in addition to the position of comptroller. Mr. J. D. Mortimer, president of the Milwaukee Electric Railway & Light Company, in announcing the plans of Mr. Duffy, said: "The opportunity presented to Mr. Duffy in his new position as vice-president and general manager of the Manila Electric Railroad & Light Company is one which he could not overlook. While deeply regretting the loss of Mr. Duffy's services to the Milwaukee company, it is my confident belief that his acceptance of this new position will prove most advantageous for both himself and the company which is now so fortunate in counting him among its officers. Mr. Duffy leaves with the most sincere wishes of all the officers and employees of the Milwaukee company. I have no immediate plans looking toward the filling of the position made vacant by his resignation from the company."

C. N. Duffy

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Minnesota Union Electric Railway, Minneapolis, Minn.**—Application for a charter has been made by this company in South Dakota to build an electric railway between Minneapolis and St. Cloud. Capital stock, $2,000,000. Incorporators: Theodore A. Chadwick, Eugene G. Garwood, Achile Pouliot, Minneapolis, and G. M. Lawrence, Huron, S. D.

***Gull Lake Lumber Company, Gravenhurst, Ont.**—Incorporated in Ontario with headquarters at Gravenhurst to operate electric railways and other public utilities in Gravenhurst.

***Ottawa (Ont.) Traction Company, Ltd.**—Incorporated in Ottawa with a capitalization of $10,000,000 to operate electric railways and other public utilities in Ottawa. Headquarters, Ottawa.

***Germantown Loop Railway, Philadelphia, Pa.**—Application for a charter has been made by this company in the interests of the Philadelphia Rapid Transit Company to build a loop on Musgrave Street and Slocum Street to provide access to the Pelham carhouse. The route over which the new company is to operate the cars will be northwest over Musgrave Street, southwest on Slocum Street to Germantown Avenue and back to the starting point. Incorporators: Boyd Lee Spahr and Ellis Ames Ballard.

North Anderson Street Railway, Anderson, S. C.—Chartered in South Carolina to build and operate an electric railway and a gas and electric light plant in Anderson. Capital stock, $15,000. Officers: John W. Lindley, president and treasurer; M. M. Mattison, vice-president, and J. H. Anderson, secretary. [E. R. J., Oct. 25, '13.]

FRANCHISES

Pasadena, Cal.—The Pacific Electric Railway has asked the Council for an extension of its franchises so as to complete the improvements on South Raymond Avenue in Pasadena.

Riverside, Cal.—The Railway commission of California has granted the Pacific Electric Railway authority to construct its main line at grade across twenty-one streets or highways extending from the junction of Main Street, Fourteenth and Magnolia Avenue, in the city of Riverside, to the junction of Magnolia Avenue, Palm Avenue and Arlington Avenue, also in the city of Riverside.

San Diego, Cal.—The Los Angeles & San Diego Beach Railway has asked the Council for extensions of its franchises to operate steam trains to La Jolla and an electric line on C Street and Sixth Street to M Street in San Diego.

Stockton, Cal.—The Stockton Terminal & Eastern Railway has received a franchise from the Council to abandon portions of its franchise in Stockton. A drawbridge franchise over Miner Channel was also abandoned, and a new right-of-way for a trestle across the channel will be sought from the War Department. Later a franchise for a single track will be sought along Miner Avenue.

Aurora, Ill.—The Aurora, Elgin & Chicago Railroad has asked the Council for a franchise in Aurora.

Rockford, Ill.—The Rockford City Traction Company will ask the Council for a franchise to double-track on the Harlem and North Main loop in Rockford.

Rock Island, Ill.—The Rock Island Southern Railroad has asked the Council for a franchise in Rock Island.

Indianapolis, Ind.—A committee of taxpayers representing the citizens of the southeastern section of Indianapolis will ask the Board of Public Works within the next few days for an extension of the Shelby Street line on Minnesota Street from Shelby Street to Churchman Avenue in Indianapolis.

Muscatine, Ia.—The Davenport-Muscatine Railway has received a franchise from the Council for an extension on Mulberry Avenue and Washington Street in Muscatine.

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Independence, Kan.—The Independence, Neodesha & Topeka Traction Company has received a franchise from the Council in Independence. It will now be submitted to the voters. This 17-mile line will connect Independence, Neodesha, Altoona, Fredonia and Topeka. W. N. Ness, Independence, general manager. [E. R. J., Oct. 18, '13.]

Oswego, Kan.—The Kansas Central Traction Company, Topeka, has received a franchise from the Council in Oswego. This line will connect Coffeyville and Parsons, via Edna and Altamont, with a branch from Altamont to Oswego. Philip Strack, Parsons, president. [E. R. J., Nov. 1, '13.]

St. Louis, Mo.—The United Railways of St. Louis has received a franchise from the Mayor and Council over Florissant Avenue from Calvary Avenue to Robins Avenue in St. Louis.

Sandusky, Ohio.—The Lake Shore Electric Railway has received a franchise from the City Council to move its track from the boulevard to the center of the streets in Sandusky. The work will cost $100.000.

Montreal, Que.—The Montreal & Southern Counties Railway has received a franchise from the Council for certain extensions to its lines in Montreal.

Jackson, Tenn.—The Jackson Railway & Light Company has received a fifty-year franchise from the Council in Jackson. The company agrees to build several short extensions to suburban points. S. S. Bush, Columbia Building, Louisville, manager.

Richmond, Va.—The Richmond & Rappahannock River Railway has asked the Council for an amendment to its city franchise, relieving it, in the event of failure to secure a renewal of its county franchise in 1918, from the obligation to operate its car line along the Nine-Mile Road from Twenty-ninth Street to whatever may at that time be the corporate line.

TRACK AND ROADWAY

***Birmingham, Ala.**—Surveys are being made to build an electric line from Birmingham up Thaddex Mountain. About 4 miles of track are proposed from a connection with the Avenue F line in Birmingham. Daniel Hale, Birmingham, is interested.

Little Rock & Hot Springs Electric Railway, Little Rock, Ark.—This company has awarded a contract to the Arkansas Interurban Construction Company, Little Rock, to build 54 miles of its line. The contract will be sublet. L. Garrett, Little Rock, general manager.

***Vancouver, B. C.**—Plans are being considered by Edward Bath and associates to build an electric railway from Bella Coola, B. C., to Red Deer, Alta. Application for a charter will be made at the next session of the Dominion Parliament.

Clovis, Cal.—Surveys have been begun for the proposed railway between Clovis and Fresno. F. S. Granger is the promoter. [E. R. J., Oct. 25, '13.]

Pacific Electric Railway, Los Angeles, Cal.—Private right-of-way has been secured by this company through the eastern section of Glendale and work will soon be begun on the construction of the new electric railway to be built to that section.

Petaluma & Santa Rosa Railway, Petaluma, Cal.—This company is asked to consider plans to extend its line to tidewater in Marin County.

Geary Street Municipal Railway, San Francisco, Cal.—On the recommendation of the Public Utilities Commission, the Supervisors have adopted a resolution declaring in favor of the construction of a branch of this company's line from Geary Street to Turk Street along Masonic Avenue in San Francisco, to connect with the proposed new baseball park.

Northwestern Pacific Electric Railroad, San Francisco, Cal.—Work has been begun by this company on its line from Fairfax to Manor.

United Railroads, San Francisco, Cal.—Work on the extension of the San Bruno Avenue line from its present westerly terminus at Dwight Street in San Francisco to Railroad Avenue and the county line will be begun by this company at once.

Southern Traction Company of Illinois, East St. Louis, Ill.—This company will begin at once laying rails on Fourth Street, East St. Louis.

Hillsboro, (Ill.) Railway.—This company has been dissolved.

Oil Belt Railway, Martinsville, Ill.—A special meeting of the stockholders of this company will be held Dec. 9 at Oblong, Ill., to vote upon the proposition to execute a mortgage on its properties and franchises to secure a bond issue of $2,500,000. [E. R. J., Sept. 20, '13.]

Chicago, Peoria & Quincy Traction Company, Quincy, Ill.—A special meeting of the stockholders of this company will be held Dec. 6 at Quincy to consider the question of raising the capital stock from $200,000 to $3,000,000. This line will connect Quincy and Peoria. E. A. Van Ness, secretary. [E. R. J., Sept. 13, '13.]

Independence, Neodesha & Topeka Traction Company, Independence, Kan.—This company has awarded a contract for the construction of bridges across all the intervening bridges for this line between Independence and Neodesha to the Blodgett Bridge & Construction Company, Kansas City. T. Blarksley, Neodesha, president. [E. R. J., Oct. 18, '13.]

Arkansas Valley Interurban Railway, Wichita, Kan.—This company's extension from Halstead to Hutchinson will be financed by the Kansas Gas & Electric Company. Surveys have been completed.

Owingsville & Olympian Springs Railway, Owingsville, Ky.—This company, recently incorporated in Kentucky for the purpose of operating a 5-mile railway from Owingsville to Olympia, will not build an electric railway, but will operate gasoline cars. W. W. Hubbard, Owingsville, president and general manager, is in charge of the construction.

Michigan United Traction Company, Lansing, Mich.—This company plans to replace old rails over its entire system in Battle Creek with new 100-lb. rails.

Springview, Neb.—Plans are being considered to build an electric railway between Springview and Ainsworth, 25 miles. Power will be secured from the Ainsworth Light & Power Company, Ainsworth. No names are yet given of those interested in this project.

St. John (N. B.) Railway.—It is expected that within two months this company will have its line extended for one mile along the Marsh Road and thence to Kane's Corner and in again, making a circuit. Surveys are now being made by this company for an extension from St. John to Loch Lomond, 14 miles, and for a portion of the line from St. John to Rothesay. It is also planned to build an extension from St. John to Westfield and Milledgeville.

New York Municipal Railway Corporation, Brooklyn, N. Y.—This company has secured the consents of property owners on Fulton Street, between Tillary Street and Williams Place, Brooklyn, to the third-tracking of the elevated railroad between those points.

***London, Ont.**—Negotiations are being entered into with business men of Aylmer and Belmont and residents of townships intervening for the construction of a radial railway between Belmont and London. Some time ago a proposition was submitted to the Board of Trade in London by those interested in a proposed railway in this territory, but the deal fell through. The promoters are now to be offered the use of the London & Port Stanley Railway, with its terminals in London, at a nominal cost, and it is probable that the line will be built north out of Aylmer to Belmont and west from there to a point on the London & Port Stanley Railway about 5 miles south of London, where the junction will be effected.

Imperial Traction Company, Ottawa, Ont.—This company has decided not to extend the proposed Smithville line to Bridgeburg and from Hamilton to Toronto this year; construction will be begun next spring. A prospective route will be from Smithville to Hamilton, where it will branch to Bridgeburg, across the Niagara River from Buffalo.

***Owen Sound, Ont.**—At a meeting of the Board of Trade on Oct. 28 a resolution was adopted requesting the

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Town Council to appeal to the Ontario government through the Hydro-Electric Power Commission of Ontario to investigate the question of constructing a radial railway from Owen Sound to Guelph. The government will be asked to furnish estimates of the cost.

Forest Hill Electric Railway, Toronto, Ont.—This company is asking the Ontario government for permission to proceed with the construction of its line, and it is expected work will begin shortly. [E. R. J., Oct. 25, '13.]

Metolius, Prineville & Eastern Railway, Prineville, Ore.—Most of the right-of-way, the terminals in Metolius and Prineville and a bonus of $60,000 have been secured and construction will be begun within the next month by this company on its 30-mile line between Prineville and Metolius. Application for a charter will soon be made in Washington. Power will be secured from Metolius from the Deschutes Power Company. Henry S. Cram, Prineville, is interested. [E. R. J., Aug. 9, '13.]

Conestoga Traction, Lancaster, Pa.—Surveys are being made by this company along the river to McCall's Ferry, via Willow Street, Lancaster, New Danville, Rawlinsville, Mount Nebo and Pequea.

Mahoning & Shenango Railway & Light Company, New Castle, Pa.—Plans are being made by this company for an extension from New Castle to Erie, via Mercer, Meadville and intervening places.

Pittsburgh, Harmony, Butler & New Castle Railway, Pittsburgh, Pa.—Work has been begun by this company on its line from Ellwood to Morado.

Chambersburg & Shippensburg Railway, Shippensburg, Pa.—Plans are being considered by this company for a 20-mile extension to Carlisle, via the Walnut Bottom Road.

Williamsport (Pa.) Passenger Railway.—Plans are being made by this company to extend its West Fourth Street line in Newberry from Diamond Square to Poplar Street.

***Three Rivers (Que.) Traction Company.**—Shawinigan water and power interests are identified with a project to build an electric railway in Three Rivers, Que., and to construct a line to connect Three Rivers with Berthier in the west and Portneui in the east. The incorporators of the company are J. Aldred, T. McDougall, H. Murray, J. C. Smith, W. S. Hart, of Montreal, and D. Murphy, Ottawa, Ont.

Chattanooga Railway & Light Company, Chattanooga, Tenn.—This company has placed in operation its new Vance Avenue line in Chattanooga.

Nashville Railway & Light Company, Nashville, Tenn.—Work has been begun by this company on the extension of the Woodland line from Eastland to Greenwood Avenue in Nashville.

Nashville (Tenn.) Traction Company.—Plans are being made by this company to begin surveys on its line in Nashville. This company plans to build 34 miles of track in Nashville. Walter O. Parmer, Nashville, is interested. [E. R. J., Oct. 11, '13.]

Bryan & Central Texas Interurban Railroad, Bryan, Tex.—During the next thirty days this company will award contracts to electrify 6½ miles for the Bryan & College Interurban Railway and for trolley wire, bonds for rails, poles and all material for an electric line.

Minneapolis, Merrill & Marinette Railway, Merrill, Wis.—This company states that its 26-mile line between Merrill and Athens will be a steam line. F. W. Kubasta, Marinette, secretary. [E. R. J., Oct. 18, '13.]

SHOPS AND BUILDINGS

Edmonton (Alta.) Interurban Railway.—Plans are being made by this company to begin soon the construction of its new carhouse on Algonquin Avenue in Edmonton.

Northern Electric Railway, Chico, Cal.—Bids are being asked by this company to build a joint passenger and freight station at Meridian, on the Marysville & Colusa branch. The structure will be of mission architecture and is estimated to cost about $5,000.

Northwestern Pacific Electric Railroad, San Francisco, Cal.—Plans are being considered by this company to build a new reinforced concrete depot in Manor.

Illinois Traction Company, Peoria, Ill.—This company, which recently purchased the People's Traction Company, plans to build a new freight and passenger station in Abingdon.

Paducah (Ky.) Traction Company.—This company has practically completed the construction of a new brick carhouse at a cost of $30,000.

Jersey Central Traction Company, Keyport, N. J.—This company is now building a new carhouse and four new stations along its lines.

Dominion Power & Transmission Company, Ltd., Hamilton, Ont.—This company has received a permit to build a new freight depot. The cost is estimated to be about $5,000.

Toronto (Ont.) Railway.—Plans are being made by this company to build a carhouse in Bracondale to accommodate the cars on its St. Clair Avenue line. The cost is estimated to be about $14,000.

Aberdeen (S. D.) Railway.—This company is building an addition to its carhouse for storing two transformers.

POWER HOUSES AND SUBSTATIONS

Lewiston, Augusta & Waterville Street Railway, Portland, Maine.—This company will place in operation in its substation at Lisbon Falls a 300-kw motor-generator set and switchboard. The apparatus was purchased from the General Electric Company.

Winnipeg (Man.) Electric Railway.—It is stated that this company plans to build another power plant at Grand Bonnet Falls, 12 miles down from its present plant at Lac du Bonnet. J. G. White & Company, Inc., New York, contractors.

Union Street Railway, New Bedford, Mass.—This company has placed an order with the General Electric Company for a 700-hp. 2300-volt induction motor and a 500-kw, 550-volt generator with 10-kw exciter, switchboard and accessories.

Houghton County Traction Company, Houghton, Mich.—This company will add to its station equipment a 400-kw rotary converter, two 100-kw, 11,000/370-volt transformers and a switchboard. The apparatus has been purchased from the General Electric Company.

City Light & Traction Company, Sedalia, Mo.—This company expects to purchase a condenser and cooling tower and a voltage regulator and to build soon an ice-storage room.

Elmira Railway & Light Company, Elmira, N. Y.—Additional substation equipment will be installed by this company in its power station at Elmira, consisting of a 1000-kw rotary converter, three 350-kva, 2200/6600 water-cooled transformers, switchboard and accessories. The contract for the apparatus has been placed with the General Electric Company.

Jamestown (N. Y.) Street Railway.—An addition to this company's power house in Jamestown is under construction. The structure will be 50 ft. x 75 ft. A new 7500-kw turbo-generator is to be installed. This power house will supply current to run both city and interurban car lines, the Jamestown commercial lighting plant and the electric lighting at Mayville, Stow, Ashville, Lakewood, Celeron and Falconer.

Rochester & Sodus Bay Railway, Rochester, N. Y.—This company's power house at Ontario was destroyed by fire on Nov. 1. The loss is estimated to be about $40,000.

Toledo Railways & Light Company, Toledo, Ohio.—This company will install in its power house three 300-kw, 3300/440-volt transformers, switches and accessories which have been ordered from the General Electric Company.

Hummelstown & Campbellstown Street Railway, Hershey, Pa.—This company is building a new power house in Hershey. It has purchased two Worthington engines and two generators.

Northwestern Pennsylvania Railway, Meadville, Pa.—This company has under construction a substation at Richley's Grove Station and has just begun the construction of a combination substation, waiting station and freight depot at Edinboro. The company has purchased substation equipment for these new substations.

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Manufactures and Supplies

ROLLING STOCK

Brandon (Man.) Municipal Railway expects to purchase nine new cars.

Brooklyn (N.Y.) Rapid Transit Company has recently purchased two 55-ton locomotives from the General Electric Company.

Louisville (Ky.) Railway has completed and placed in operation ten of its new trailers. The cars have no platforms, exits and entrance being provided at the center. The space heretofore taken up by the platforms is occupied by semi-circular seats, holding five or six people each. The total seating capacity of the car is forty-two. Stoves are used in heating the cars, a fan system distributing the heat. Vents in the roof assist in the ventilation. The doors are operated by compressed air. The side entrance is divided into three sections, the outer ones being used for exits and the center for entering. This prevents crowding and saves time. The cars were designed by the Louisville Company.

TRADE NOTES

John O. Powers Company, New York, N. Y., advertising agent, has moved to 11 West Twenty-fifth Street.

Edward J. Hunt, Newark, N. J., has received an order from the Lynchburg Traction & Light Company, Lynchburg, Va., for a large amount of transformer-oil drying apparatus.

Railway Utility Company, Chicago, Ill., has appointed Charles A. Eggert sales engineer, with headquarters in Chicago. Mr. Eggert has been with this company for the past twelve years.

Steel City Electric Company, Pittsburgh, Pa., has appointed the Ohio Distributing Company, Hearst Building, Chicago, as its sales representative in the Central Western States, the previous contract with the I. A. Bennett Company having expired.

Keystone Lubricating Company, Philadelphia, reports that the United States District Court for the Northern District of Illinois has declared that it has the sole right to use the word "Keystone," as applied to greases and lubricating oils. The case was decided under the trademark law.

Ottawa (Ont.) Car Manufacturing Company, Ltd., has been incorporated with a capital stock of $3,000,000. This company will manufacture all kinds of vehicles and will make a specialty of passenger and freight cars for steam and electric railways, continuing the business of the Ottawa Car Company.

Johnston & Jennings Company, Cleveland, Ohio, has taken over the manufacturing and selling rights of the Ludlow track drill. This company is prepared to make shipments of new machines and repair parts from stock. The Ludlow drill has been on the market for nine years and is now being effectively used in rebuilding track in all parts of the world.

Birmingham Car & Manufacturing Company, Birmingham, Ala., has been placed in the hands of a receiver, John S. Cox. The petition for receivership alleged that the concern committed an act of bankruptcy last September when it transferred a portion of its properties to the Hill & Griffiths Company at Cincinnati, making it a preferred creditor.

General Electric Company, Schenectady, N. Y., has received orders for motor car equipments from the Charleston-Dunbar Traction Company, Charleston, W. Va.; the Interurban Railway, Des Moines, Ia.; the Philadelphia Rapid Transit Company, and the Pacific Electric Railway. Five type M control equipments have been ordered by the New York State Railways.

Flexible Railway Supply Company of Canada, Ottawa, Ont., has recently been formed with factory and offices in Ottawa. Charles Forth, Boston, Mass., is the promoter and manager of the new company. Railway supplies of all kinds will be manufactured by the company, which is a limited liability corporation of Ottawa men, with the exception of Mr. Forth.

George W. Gano, who has been electrical inspector in the office of Marsh & McLennon, fire insurance brokers of Chicago, and whose work has been principally in connection with the rating of street railway properties for insurance purposes, has been appointed superintendent of the electrical department of the Kentucky Actuarial Bureau at Louisville, Ky. The department has just been organized and will cover the entire electrical field in that State for the fire underwriters.

Pyrene Manufacturing Company, New York, N. Y., has appointed E. J. Waring, formerly treasurer and general manager, as vice-president and general manager of the company, in place of E. M. Davidson, resigned. Mr. Davidson will still retain an interest to the company and will continue in an advisory capacity to it. The company has recently received orders for its fire-extinguishers from the New York, New Haven & Hartford Railroad, the Albany Southern Railroad, New York Edison Company, Housatonic Power Company and the Pittsburgh Railways.

ADVERTISING LITERATURE

Philadelphia Commercial Museum, Philadelphia, Pa., has issued in pamphlet form a tabulation of foreign weights, measures and moneys and their equivalents in the weights, measures and moneys used in this country.

Johnston & Jennings, Cleveland, Ohio, have issued a catalog describing their electric mono-rail hoists and jib cranes for foundry, machine and forge shops. Another catalog describes Ludlow track-drilling machines for any gage track.

Pettingell-Andrews Company, Boston, Mass., has issued a pamphlet entitled "Juice," which marks the twenty-seventh year of this company and the twenty-fifth anniversary of the present management, and describes the personnel and organization of the company.

General Electric Company, Schenectady, N. Y., has recently issued data sheets on its new automatic sectionalizing switch for railway feeder systems, the application of which to the lines of the San Diego (Cal.) Electric Railway was described in the ELECTRIC RAILWAY JOURNAL for April 26, 1913. The company announces that it will also issue a bulletin on the subject at an early date.

Pressed Prism Plate Glass Company, Morgantown, W. Va., has issued a catalog describing and illustrating its special designed imperial prismatic glass and imperial prism-plate ornamental glass for railroad and steamship use. This glass is especially suitable for both exterior and interior Gothic windows, and has artistic appearance from the standpoint of design as good leaded glass, but is manufactured in one single light of polished plate glass, thus giving it greater strength and lowering maintenance cost.

Ohio Brass Company, Mansfield, Ohio, has issued a catalog describing and illustrating the various types of its catenary system of line construction used on the following railways: Chicago, Lake Shore & South Bend Railway, Fort Worth Southern Traction Company, Galveston-Houston Electric Railway, Great Northern Railway, Montreal & Southern Counties Railway, New York, New Haven & Hartford Railroad, Northern Ohio Traction Company, Oregon Electric Railway Company, Pacific Northwest Traction Company, Piedmont Traction Company, Rock Island Southern Railway, Southern Traction Company, Syracuse, Lake Shore & Northern Railroad, Washington, Baltimore & Annapolis Electric Railway, Waterloo, Cedar Falls & Northern Railways and other railways. These systems of catenary construction are classified into four general types: (1) steel messenger and copper trolley wire; (2) copper messenger and copper trolley wire; (3) copper messenger and steel trolley wire; (4) steel messenger cable, steel contact wire and auxiliary copper feeder trolley, for (a) single construction or (b) compound catenary construction. Developments in recent years have been along the lines of greater flexibility in the catenary system. A collector, whether pantograph or trolley wheel traveling along a contact wire, should meet with no obstructions or "hard spots" and in order to accomplish this the latest types of hangers are made flexible. This result is obtained by forming the upper end of the hanger rod or strap into a loop which engages the messenger. As the collector travels under the hangers they are lifted slightly so that the collector carries practically the weight of the trolley wire only.

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Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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SETTLEMENT IN INDIANAPOLIS

Settlement of the Indianapolis strike means more to the public than it does to the company or its employees. The public is always the main sufferer, but it or its representatives usually want to take their own time and way about interfering in the labor difficulties of public utilities. In the present case it appears that a representative of the Department of Labor of the United States government and the Governor of Indiana are signatories to the agreement of settlement. They assume great responsibility by such an act. An even more unusual feature of the arrangement is that by which the Public Service Commission of Indiana is to serve as arbitrator. The public authorities in both high and minor places refused to give the Indianapolis company such protection by police or militia as would have enabled it to operate its cars in spite of violent assaults on its employees and property. That was a form of interference which the Indiana authorities were unwilling to undertake. It is to be hoped that the settlement of the strike will result in an arbitration that will not fail to protect the rights of the company, which is as deeply concerned in the outcome as the employees can possibly be.

MR. MELLEN PREDICTS GOVERNMENT OWNERSHIP

Of the many startling statements that may be culled from the recent interview in the Boston *Post* with Charles S. Mellen, perhaps the most interesting is the one to the effect that all railroads will ultimately go under government ownership. According to him, the regulation by the government during the last ten years has tended to lower the value of railroad stocks as investments, and private capital is gradually finding the field unprofitable. If Mr. Mellen's predictions are true, we shall probably then see before long a realignment of forces on the question of municipal or government ownership of public utilities. Its advocates will include discouraged investors in railway properties who realize that the courts will insist upon a fair appraisal of these properties if taken over for municipal operation, while its opponents will include union labor, which will see no more opportunity for organization under civil service rules than in the police or fire departments or among the letter carriers. Such a result seems as incongruous as a futurist painting, but we have heard several street railway presidents recently express the opinion that they would be glad to sell out to the city and get the cash which they and their friends had invested in their railway undertaking. We sympathize with this position, but it is more creditable from the standpoint of financial acumen than from that of civic duty. Electric railway officials of all men best know the difficulties of electric railway operation and management and the tremendous waste and injury which would come from municipal ownership and operation, and it is a matter of public duty with them to maintain an attitude of absolute hostility to the idea.

SMOKING ON CITY CARS

One result of the general adoption of prepayment operation has been the practical abolition of smoking on all parts of a closed city car. We say "practical" because in a few cases smoking has been permitted in the rear seats when the windows are open in summer. It is also still allowed in one or both end compartments in cars of the California type which are used on the Pacific Coast, but these cars are practically open cars, although often fitted with longitudinal seats. It is natural that these changes should have caused complaints on the part of those smokers who formerly were allowed to congregate on the front or rear platform, but they have been welcomed by a very large part of the non-smokers of the community. The question in New York, as well as in some other cities, is now an active one. The New York companies have very wisely left the adjudication of the matter to the Public Service Commission, contenting themselves only with showing the undesirability from an operating standpoint of any plan of designating certain cars, say every second or third car, as has been proposed, as a smoking car. While the matter is largely a question of local habit and custom, we confess that we have not any great sympathy for those who think that it is necessary to provide smoking accommodations on city cars. The ride, as a rule, is short, and we do not think it should involve a very great deprivation to ask a person to refrain from making a nuisance of himself to others during this time. The conditions may be different on the long runs, but on city cars with short runs there is not much use or place for the smoker.

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THE LÖTSCHBERG LOCOMOTIVE

The 2500-hp locomotive for the Bern-Lötschberg-Simplon Railways, Switzerland, which is described elsewhere in this issue, adds one more to the large number of designs already developed for heavy electric traction. Briefly, the machine is of the geared jackshaft type with a drive composed of a double herringbone gear, two jackshafts, a joint triangular yoke and crank connections to five pairs of driving wheels. This drive differs greatly in appearance from the 2000-hp machine first built for this service, which had two trucks each with three pairs of coupled driving wheels and no pony wheels. However, the principle of the geared jackshaft is common to both designs. It is significant that the always-cautious Swiss engineers had such confidence in the new combination that the present locomotives were placed in regular service without any preliminary tests, and this confidence has so far been fully justified by the results in practice. The experience of the builder indicates that the geared jackshaft offers the most economical arrangement, at least for moderate speeds. It is interesting to note that the same principle, but in simplified form, is to be applied to one of the latest American electrifications where mountain conditions also obtain. There is no immediate likelihood, however, that either the gearless or straight jackshaft types will be superseded in high-speed work.

Nothing could illustrate better the diverse tendencies of electric locomotive design in the United States and abroad than the complex drive of the new Lötschberg locomotive. The American designer has worked toward the greatest simplicity even at some sacrifice of efficiency because neither in the erecting plant nor in the maintenance shop could he command the highly skilled but leisurely labor characteristics of countries like Switzerland. For example, one American expert, who has studied the new type, pronounces it "exquisite" but believes that its attempted duplication here would cost about 75 per cent more than a gearless locomotive of equal output, and he despairs utterly of its proper maintenance in many a United States roundhouse. Yet he has no doubt that in Switzerland the locomotive will fulfil the intentions of its designers and operators. This frank comment brings out the point that in questions of design the mechanism which is best theoretically may not be best in practice until the user has been educated to maintain it properly. Nevertheless, this view of the case is rather pessimistic when one bears in mind that the American steam locomotive has been developed to a high degree of reliability despite the rough and ready maintenance conditions on many lines. There are indications also that the standard roundhouse practices of steam railroads will be widely altered to suit electric operation.

With regard to the capacity of the Lötschberg locomotive, a few words are not out of place. A machine which can haul a 341-ton train up a 2.7 per cent grade at 31 m.p.h. for one and one-half hours continuously is very far from being a toy. In fact, it compares favorably with many of the American electric locomotives now in service. A comparison with the New York Central locomotive which was described in the Nov. 8 issue of this journal shows that the Swiss type is only 4 ft. 4 in. shorter than the 56-ft. 10-in. over-all length of that machine and that its weight of 117 tons exceeds the American type by 7 tons. Although a horse-power rating of locomotives is notoriously misleading, it is of interest to observe that the one-hour horsepower rating of the New York Central machine is 2600 hp, while that of the Lötschberg locomotive is 2500 hp on a one-and-one-half-hour basis. Presumably, the unusual basis of one and one-half hours was chosen because the ordinary single trip on the tunnel division is approximately 47 miles long. For the time bases named, the tractive effort of the Swiss machine is 29,700 lb. on 53-in. drivers, and of the American machine 20,000 lb. on 36-in. drivers. Thus the Lötschberg locomotive is a very respectable machine indeed, and one that might be even bigger were it not for the fact that draft rigging limitations do not permit a greater drawbar pull than 22,000 lb.

TRAIN OPERATION IN CITY SERVICE

An unusual degree of interest has been expressed with regard to the new tests on two-car trains which the Public Service Railway of New Jersey is preparing to carry out and which were outlined in our issue for Oct. 25. Among the communications on the subject which have been received since the announcement is one from a correspondent who was very much impressed with the advantages of center-entrance trailers after seeing their use in St. Louis. No doubt the center-entrance trail car is less liable to the congestion involved when all passengers enter and leave a car at one end, the motor car of the train avoiding it because it has a front exit controlled by the motorman. Indeed, this is one of the primary causes for the extended use of center-entrance trailers in Pittsburgh and other cities. On the other hand, the trail car with front-end entrance permits the use of existing cars in train service, and what is more important, it keeps the two entrances to the train close together so that no time is lost by intending passengers going from one entrance to the other. We should be glad to see some comparative figures on the length of time consumed at stops by both classes of trail cars, although the matter is of less importance than the general question of the value of train operation itself as compared with single cars.

Both questions, indeed, depend upon the effect which each method of operation has upon the schedule speed. Thus, as we explained in our issue of Oct. 25, it ought to be possible in considering the relative economy of single cars and two-car trains to determine for each road the point where the slower schedule of a two-car train will just balance in cost of operation its gain from a reduction in platform expenses. We find that we were in error, however, in quoting the engineers of the Public Service Railway in estimating this figure at 4 per cent. They believe that 10 per cent is probably more nearly correct, but will know more definitely at the conclusion of the tests which they are to conduct. It is not a simple matter to determine, from a theoretical analysis, the factors in the case. On the one hand, the two-car train makes a reduction in platform expense of 25 per cent, equivalent to a reduction in total operating expenses of about 8.5 per cent. Against this must be equated the expenses which increase with a slower

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schedule. Thus, if a greater number of cars are required to handle the same traffic, the platform and carhouse expenses go up as do the fixed charges on the first cost of both cars and carhouses. There should also be some allowance for additional maintenance and general expenses, and possibly some for power, provided the number of stops per car is greater. Two-car train operation, however, is being tried on a large scale in a number of cities now, and it should not be long before exact figures will be obtainable.

THE TORONTO VALUATION REPORT

The advocates of city ownership for electric railways and light companies in Toronto are now confronted with figures showing that to fulfil their plans will necessitate an expenditure of almost $29,000,000. This sum, reached by Bion J. Arnold and J. W. Moyes, as stated elsewhere in this issue, approximates quite closely the $30,000,000 originally asked by Sir William MacKenzie for the transfer of the companies to the city. The problem of valuation did not present any great difficulties, and it is absolutely unlikely that the price already asked by the company had any influence upon the minds of the valuators. The figure was reached by a very simple, yet careful, method of appraisement. The valuing of the physical assets was only a matter of stock taking, with depreciation sufficiently written off at standard rates, and the ascertaining of the intangible value of the unexpired franchises of the companies was almost altogether a matter of estimating the companies' net earnings, earnings of past years affording the most essential part of the criteria.

Of course, the Toronto companies are perfectly justified in demanding payment for future profits when negotiating for the surrender of their franchises before termination. Some of the opponents of the policy of privately owned utilities, however, have looked upon this intangible valuation as "a ransom" to be paid for freedom from the companies' toils before the franchises automatically expire about seven and a half years hence. But the fact is that in spite of this comparatively short period of franchise life yet remaining, the appraisers determined that $10,713,553 was a conservative estimate for the present worth of the franchises and contractual rights of the Toronto Railway.

Certain peculiar conditions in the agreement between the city and the Toronto Railway limit the area in which the company must build its tracks and in which it has the right to charge the full rates of fare agreed upon. What transportation in this limited area has meant to the company may be judged from the fact that the population per mile of track, according to a comparative table in our issue of Oct. 25, is 3109, a figure surpassed in that table only by the systems in Greater New York. Moreover, the company's gross revenue per mile of track is $45,781, which exceeds by $10,000, in round numbers, the gross revenue per mile of track for such companies as the Chicago Railways, the Brooklyn Rapid Transit Company, the Philadelphia Rapid Transit Company and the United Railroads of San Francisco, and which is more than three times greater than the gross revenue per mile of track on the Denver City Tramway and the Detroit United Railway. The franchise of the Toronto Railway also confers such unusual exemptions from taxation and maintenance that its operating ratio for 1912 was 53.4 per cent, while the operating ratios of the above-mentioned lines, with the exception of the Brooklyn Rapid Transit Company and the Denver City Tramway, range from 64 per cent to 69 per cent. There is no doubt that the Toronto property has been profitable to its owners, and that on account of the past and future opening up of new suburban areas for which it furnishes the final transportation link in the old city area it would make ever-increasing earnings during the remainder of the franchise period.

In the calculation of the monetary value of these future earnings, however, the company was by no means favored, as the operating ratio adopted was 55 per cent, or 1.6 per cent higher than that which the company had shown itself capable of obtaining, and a large allowance was made for depreciation. Finally, in the estimates for the future gross earnings, not even the full application of the law of squares was allowed, and the lessened percentages thus obtained were further reduced for the later years on the contingency of possible subway construction, the final increases allowed being 10 per cent for three years, 8 per cent for the succeeding three years and only 6 per cent for the remaining life of the franchise. From 45 per cent of the gross receipts of 1912, increased by the above percentages each year, there was deducted the franchise tax, and the present value of the net profit for each year was obtained by discounting at 5 per cent the net profit for that year to July 1, 1913, which gave a total present value of $15,701,106. From this, however, the appraisers discounted and deducted interest on the investment at 5 per cent, computed not only on the present investment but also on that needed to meet future needs, leaving a net intangible value of $10,713,553.

It may be noted here that the appraisers did not allow the company anything for the appreciation of its real estate holdings at the close of the franchise period, although this increase is estimated by Mayor Hocken himself at $627,035. Furthermore, in connection with the future earnings for each year no recognition was given to the interest this amount would draw from that time until the end of the period, which, if discounted also, would make an appreciable addition to the estimated present value of the properties. Inasmuch as some appraisers hold that the present value of a franchise right is the summation of the present values of all residual net income accruing to the company year by year together with interest compounded to expiration, such amounts might have been added. These omissions, however, serve to show that the estimate reached by the appraisers is a conservative one.

The submission of the valuation report to Mayor Hocken has now brought the question of municipal ownership in Toronto to the stage of strict negotiations. The city now knows how much it must pay for the property, but the really serious question is not that of first cost. There is a very large Scotch element in the population of Toronto and the Scotch have a very high reputation for business ability, but we trust that even under these favorable conditions the citizens will consider the plan from all aspects before they vote in favor of municipal ownership.

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The 2500-Hp Lötschberg Locomotives

The Locomotives Are for Single-Phase Operation at 15,000 Volts, Fifteen Cycles, Over an Alpine Trunk Railroad and Are Notable for a New Form of Drive with Helical Gearing and Side Rods

Several articles* have appeared in previous issues of the Electric Railway Journal on the Lötschberg Railway and its 9-mile tunnel, which was opened for traffic on June 28, 1913. These articles also included a description of the 2000-hp single-phase locomotive which had been ordered in 1908 by the "Berner Alpenbahn Gesellschaft Bern-Lötschberg-Simplon" from the Maschinenfabrik Oerlikon upon the recommendation of its consulting engineer, L. Thormann, of Bern, for trial service on the Spiez-Frutigen approach line.

Other firms were invited to compete, and they also delivered locomotives for trial. As the Oerlikon locomotive, however, proved most desirable, the railway decided in the year 1911 to order for the Spiez-Brig high-speed passenger and freight traffic thirteen other locomotives of a similar type but of larger capacity.

The contract stipulated that the electrical equipment of all locomotives should follow the plans and construction data of the Oerlikon company regardless of the companies which might be selected to assemble the locomotive. On this basis six of these equipments were made by Brown, Boveri & Company, Baden, and seven by the Oerlikon company. All mechanical parts were manufactured by the Schweizerische Lokomotiv & Maschinenfabrik, Winterthur, Switzerland.

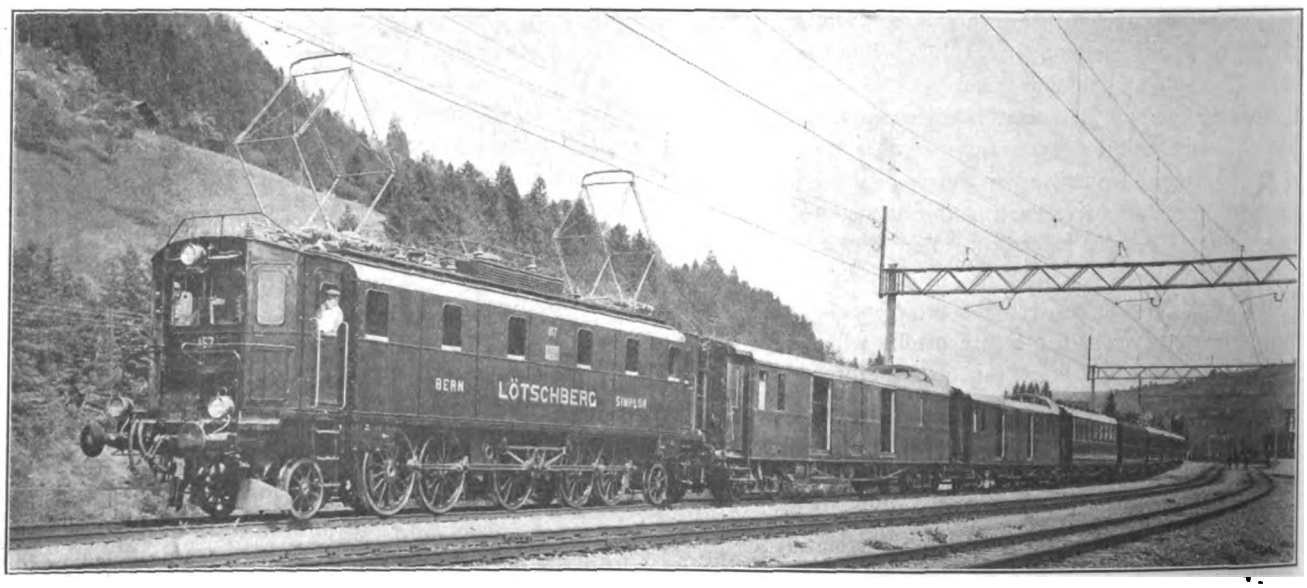
The opening of the railway as far as Brig took place on July 15, 1913, without any trial runs being considered necessary. Apart from a few natural disturbances at the commencement, such as the breaking of defective insulators with the well-known consequences of high-frequency overloading, all the locomotives proved satisfactory from the first day of operation, so that no alterations whatever of a technical nature had to be introduced. The change to electric service has already produced an extraordinary increase of traffic. Some locomotives have made not less than 325½ miles a day, which is equivalent to seven single trips over the mountain.

GENERAL FEATURES

The new locomotives are designed for a working capacity of 2500 hp for one and one-half hours at 31 m.p.h. They are of the 1-E-1 type, namely, five intercoupled driving axles and two pony-axles. At normal speed they develop a drawbar pull of 22,200 lb. and consequently draw a train of 310 metric tons on a grade of 2.7 per cent. The possible drawbar pull at starting is 30 per cent greater than that stated. The total tractive effort on a 1½-hour basis at the circumference of the driving wheels of 53-in. diameter amounts to 29,700 lb. The maximum train speed is 46½ m.p.h.

MECHANICAL CONSTRUCTION

The superstructure carries the two railway motors in the center, and the transformers, control, etc., are placed between the motors and the motorman's cabs. For convenience in maintenance and repair, the roof over the motor room is fitted with two detachable trap doors, and the sides of the section are also removable. End and side doors are built in as shown in the side view of a locomotive.



Lötschberg Locomotives—A Train in Service, Showing Also Catenary Overhead Construction

In order to obtain perfect flexibility on curves, the following axle arrangement has been adopted: The middle axle (driving axle) is reported to have the extraordinary side play of 0.98 in. (25 mm). The two adjacent axles are fitted without play into bearings fixed to the frame. The two end driving axles are said to have 1.57 in. (40 mm) side-play and are connected with the adjacent pony axles of the Krause-Winterthur pony trucks with sliding center pins and reaction springs. The pony axles therefore have even greater play, so that, notwithstanding the relatively great length of the locomotive, curves of but 364-ft. radius may be taken without difficulty. A special arrangement was devised to make possible the removal of pony axles without disturbing the springs. The middle axle was provided with spiral springs; laminated semi-elliptic springs were furnished for all other axles, but the ends of the locomotive were interconnected with equalizers.

The braking and signal equipment comprises Westinghouse automatic brakes, handbrakes, air sanders and air signal whistle. Compressed air is employed for the current collectors and for a part of the safety appliances such as door bolts and ladders. The compressed air is produced by two compressor sets with a common governor.

*July 29, 1911; Nov. 20, 1909; Oct. 7, 1911, and Sept. 6, 1913.

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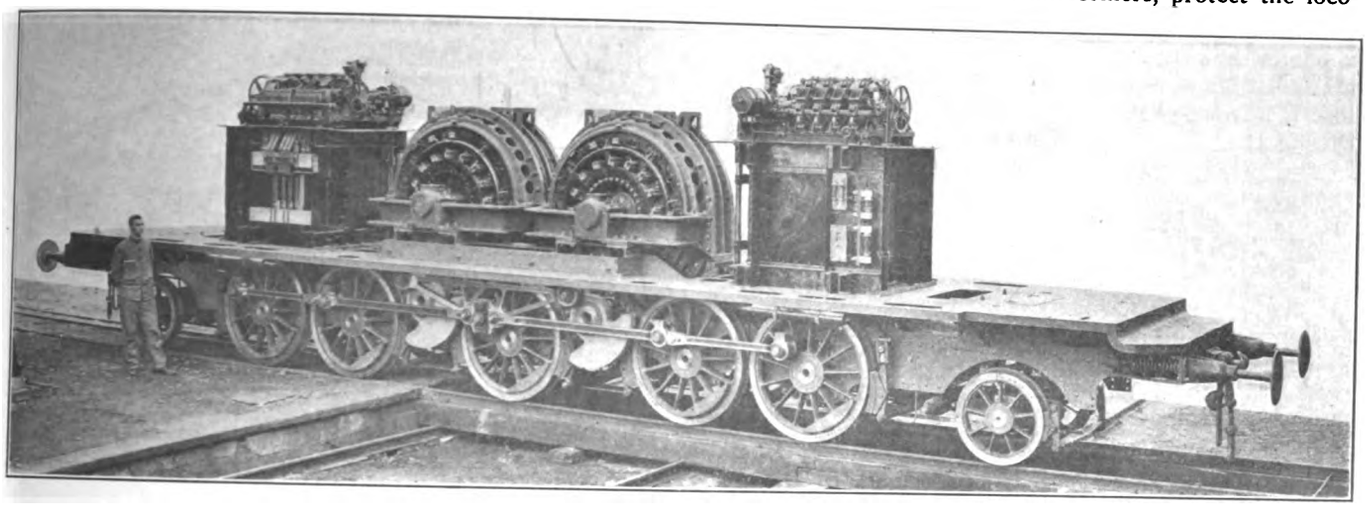
Ordinarily the compressor nearer to the cab under service is used only to feed the brake reservoir, in which event a two-way valve in the cab allows the other compressor to feed the miscellaneous apparatus. A supplementary hand-operated air pump is provided for the initial lifting of the pantograph collectors.



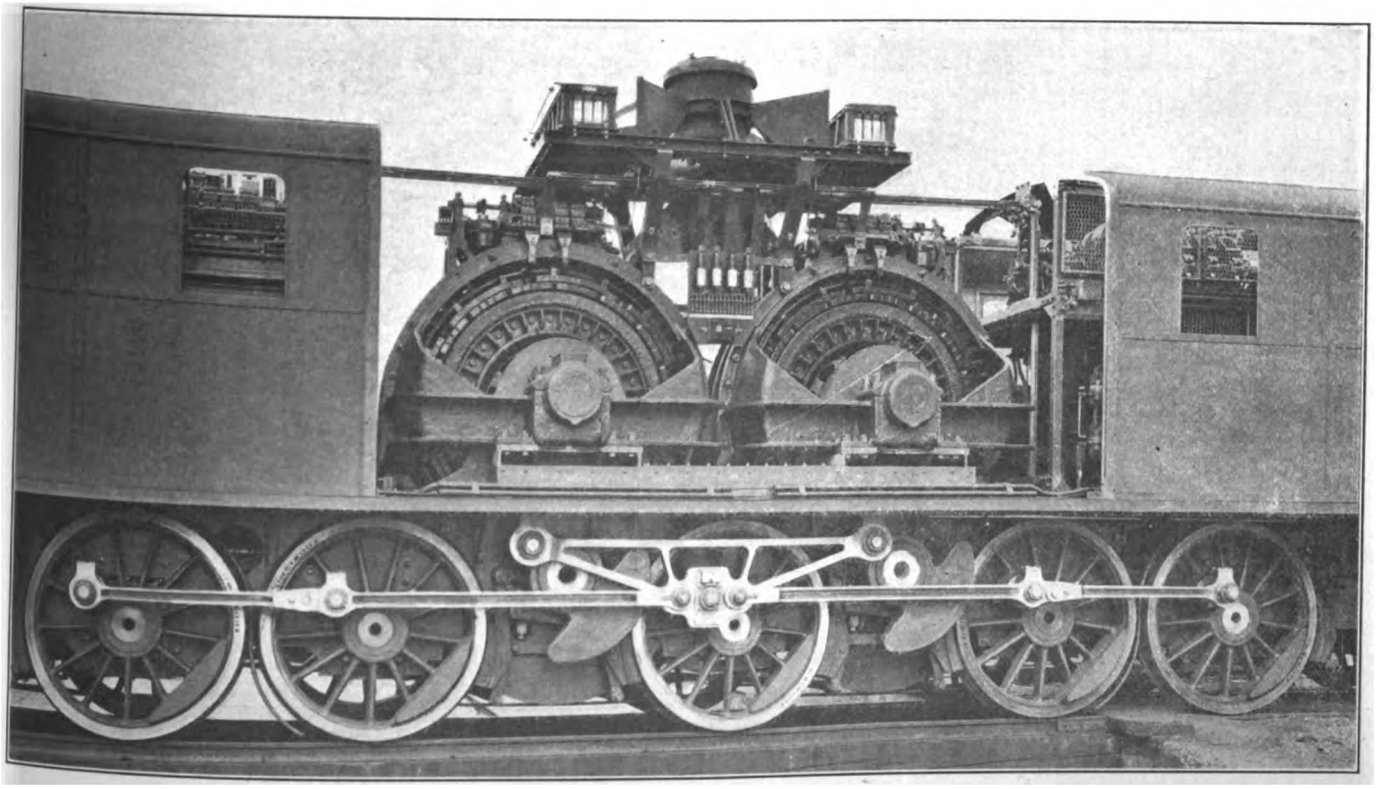
Lötschberg Locomotives—All Covering Removed, Showing Motors, Transformers, Control, Etc.

ELECTRICAL EQUIPMENT

The railway company required the electrical equipment to be divided into distinct duplicate sections, each half set being complete in itself. It is therefore possible to run with one-half of the equipment. Both equipments may also be run simultaneously either in series or in parallel. Moreover, both motors may be served individually by either of the two transformers. The locomotive is capable of developing full drawbar pull and speed continuously with one transformer, one controller and the two motors coupled in series.

Single-phase alternating current of 15,000 volts is taken from the line by two pantograph collectors and conducted to the two halves of the electrical equipment through two choke coils. The current flows through the high-tension oil switches to the two transformers, thence through the shunts and to two grounding slip rings fitted to the fixed axle in the driving mechanism and so to the rails.

The choke coil and a condenser group, which are connected in parallel with the transformers, protect the locomotive against overloading. The two high-tension switches are constructed as oil switches for distant and hand-operated control. They have maximum and minimum current cut-outs and are provided with rheostats to prevent heavy shocks when the transformers are switched into the circuit. The transformers are of the air-cooled type with the two high-tension coils connected in parallel. The coils of the low-tension side are connected in series and have twelve different steps of about 45 volts each for speed regulation from 90 volts to 520 volts. Each transformer is cooled by a fan. At full load with 420 volts at the terminals the motors take 2700 amp. The transformers supply current at 118 volts for the auxiliary motors and at 325 volts for the heating apparatus.



Lötschberg Locomotives—Roof and Sides Removed to Show Motors and Accessibility for Inspection; View of Jack-Shaft and Scotch-Yoke Drive

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Each transformer carries integral therewith the voltage step switch, the contact points of which are directly connected with the low-tension steps of the transformer. In accordance with its position for the time being, the main cylinder connects two consecutive pressure stages with the two sides of an auto-transformer, the center of which is connected by way of its corresponding low-tension switch to one of the motor cables. On the 2000-hp locomotive No. 121 this voltage control was in service for 3720 miles before it became necessary to clean and adjust the contacts. During this run the locomotive had to perform very extensive switching service which required much hard usage of the switches. The actual breaking of the circuit is limited to a few carbon contacts of the auxiliary cylinder which is fitted with magnetic blow-outs.

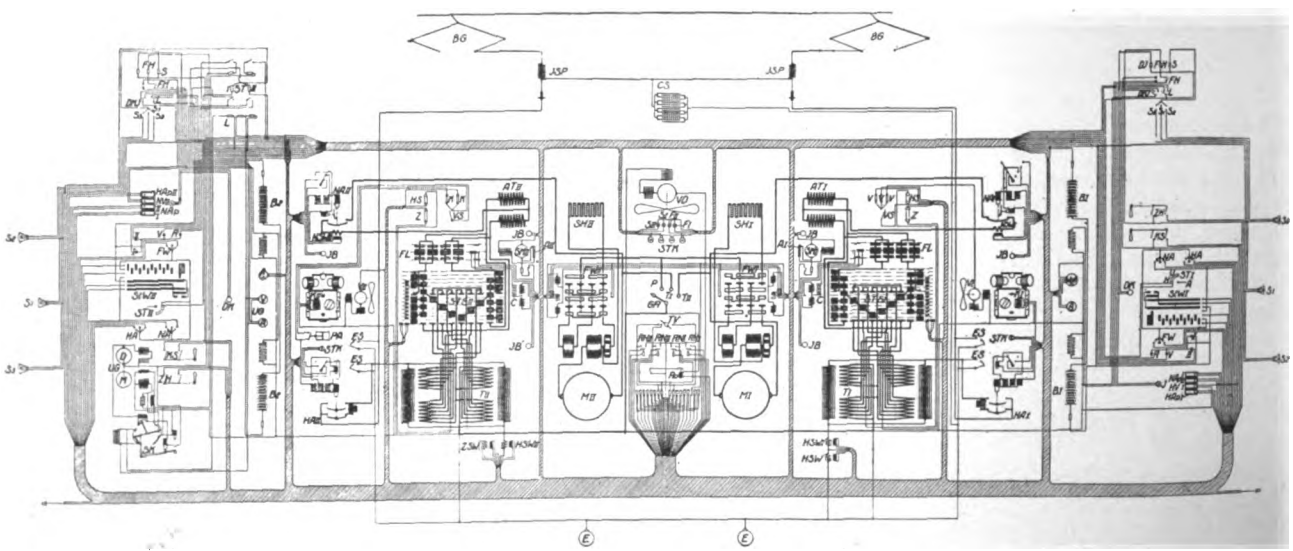
The step switches of the controller are constructed for distant and hand operation. They consist principally of a main cylinder, auxiliary cylinder and driving gear. The main cylinder, which, as already mentioned, is connected with the voltage taps of the transformer, connects the corresponding currents on the auto-transformer. The auxiliary cylinder has a magnetic blow-out and effects the making or breaking of one or the other of the auto-transformer circuits so that the changing over of the circuit, which is effected by the main cylinder, may be carried out while the current is cut off. The driving gear consists of a small d.c. servo-motor which by the aid of a worm gear with crank drive sets a contactor mechanism into swinging motion. The contactors themselves are controlled by small magnets which can be excited from the engineer's stand. According as one or the other of the contactors is actuated, the controller cylinder revolves in the one or the other direction; that is to say, it is switched to a higher or lower voltage stage.

The controllers and the low-tension oil switches, already mentioned, are constructed for a maximum motor current of about 3600 amp. They can be switched on or off by hand as well as electrically from the engineer's stands. Between each of the low-tension oil switches and the motors a shunt is inserted to feed the maximum cut-out of these switches and the ammeter of the motors.

The two motors, which are rated at 1250 hp each on a one-and-one-half-hour basis, are of the compensated-series type with interpoles. Their weight, including the gearing, is 14 tons each. The motor drives by means of a double helical cut gear of 1:2.23 ratio a counterbalanced jack-shaft. The cranks on both ends of these jack-shafts are coupled to the cranks of the driving wheels by means of a triangular yoke. In this drive non-spring-mounted masses are almost entirely avoided. The vertical play between the jack-shafts and wheels is absorbed at the middle driving axle by a vertical sliding block or Scotch yoke.

TABLE I—SUMMARY OF THE GENERAL WIRING DIAGRAM

	High-tension Equipment
BG	Current collectors
CS	Condensers
ES	Grounding switches
JSP	Induction coil
HA I & II	High-tension switches
T I & II	Main-current transformers
HSW I & II	High-tension shunts
HSW	High-tension shunt to the wattmeter
E	Grounding sliding rings
	Low-tension Equipment
STS I & II	Controller
AT I & II	Auto-transformer
NSW I & II	Low-tension shunts
NA I & II	Low-tension switches
M I & II	Driving motors
SH I & II	Shunt to the driving motors
FW I & II	Driving direction reversers
GR	Group switch
	Instruments
UG A & V	Voltmeter and ammeter for the motor generator group
A	Ammeter for train heating
WATT	Wattmeter for total capacity
NAP I & II	Ammeter for traction motor current
HAP I & II	Voltmeters for high tension
	Auxiliary Machinery
UG with M & D	Motor generator group with motor and generator
SK	Automatic starting switch box



Lötschberg Locomotives—Diagrammatic Scheme of Connections

B 1 & 2	Battery groups and fuses
K I & II	Compressors
PA	Automatic compressor device
V I & II	Transformer fans
VD	Ceiling fan
SM I & II	Servo-motor for the controller
A I & II	Starter for the servo-motors
K	Fuse for compressors
V	Fuse for fans
HS	Fuse for 118-volt auxiliary service
KS	Compressor switch
VS	Fan switch
C	Shunt resistances
	Control Equipment
STW I & II	Controller drum of the step controller.
ST	Controller current main switch and fuse
ST I & II	Controller current switch with current collector valve with positions "Off," "Down," "Up"
HA	Auxiliary switch for high-tension switch
NA	Auxiliary switch for low-tension switch
FW	Switch for reverser
V & R	Signal lamps for "Forward" and "Backward"
TV	Door lock of the motor room
RH 1 & 2	Maximum relay for high-tension switch
RN 1 & 2	Maximum relay for low-tension switch
RO	Zero pressure relay
	Heating and Lighting Equipment
Z	Fuse for train heating
ZSW	Shunt for train-heating fuse
ZH	Train-heating switch
FH	Engineer's cab heater and fuse
L	Main lighting fuse and switch
STK	Coupling plugs with fuse
I B	Interior lighting with fuse
S, S1, 2 & 3	Signal lamps with fuse
D K I	Reverser for ceiling and instrument lamp
DK	Ceiling lamp
I	Instrument lamp

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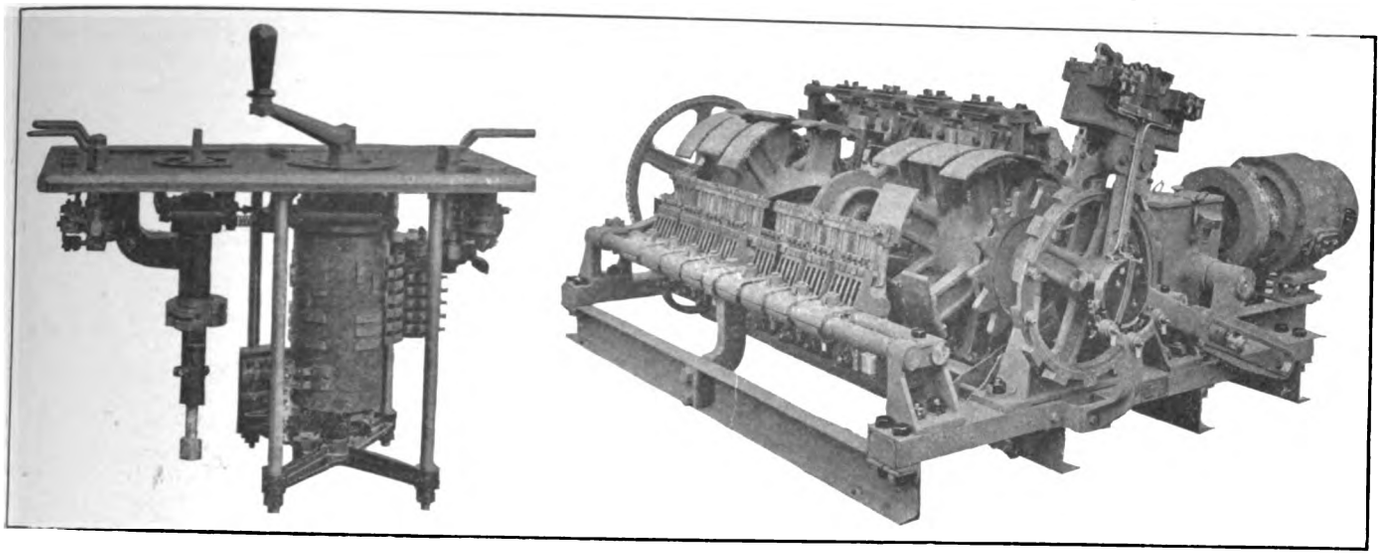
The motors have sixteen poles and are of open construction so that they are practically self-ventilating. Their auxiliary fields give sparkless running even without resistances. The air gap between armature and stator is 0.15 in. (3 mm). All the windings of the stator and rotor are made of mica-insulated copper strap. The brush holders are set on a revolving ring to permit easy inspection of the lower brushes. The motors are built for a maximum voltage of 500 volts and take about 3000 amp at their maximum capacity. The motor room is ventilated by a ceiling fan which is placed above the motors. This fan drives the discharged air through the commutating pole shunt resistors, which are likewise built into the roof in order to cool them thoroughly by constant air circulation.

Aside from the favorable starting conditions which make this locomotive desirable for switching as well as for regular service, it offers a further advantage by its practically complete independence of periodicity and of any speed limitation on account of synchronous speed. The normal speed of the locomotive is obtained at four times the synchronous motor speed. The tractive effort and speed of the motor also ranges within wide limits independent of the line voltage, for on one hand care has been taken to compensate by suitable transformer taps any considerable decrease of line voltage, while on the other hand the motor can develop its full torque at a third of its normal voltage. Owing to this fact the motors also possess an enormous overload capacity at normal voltage.

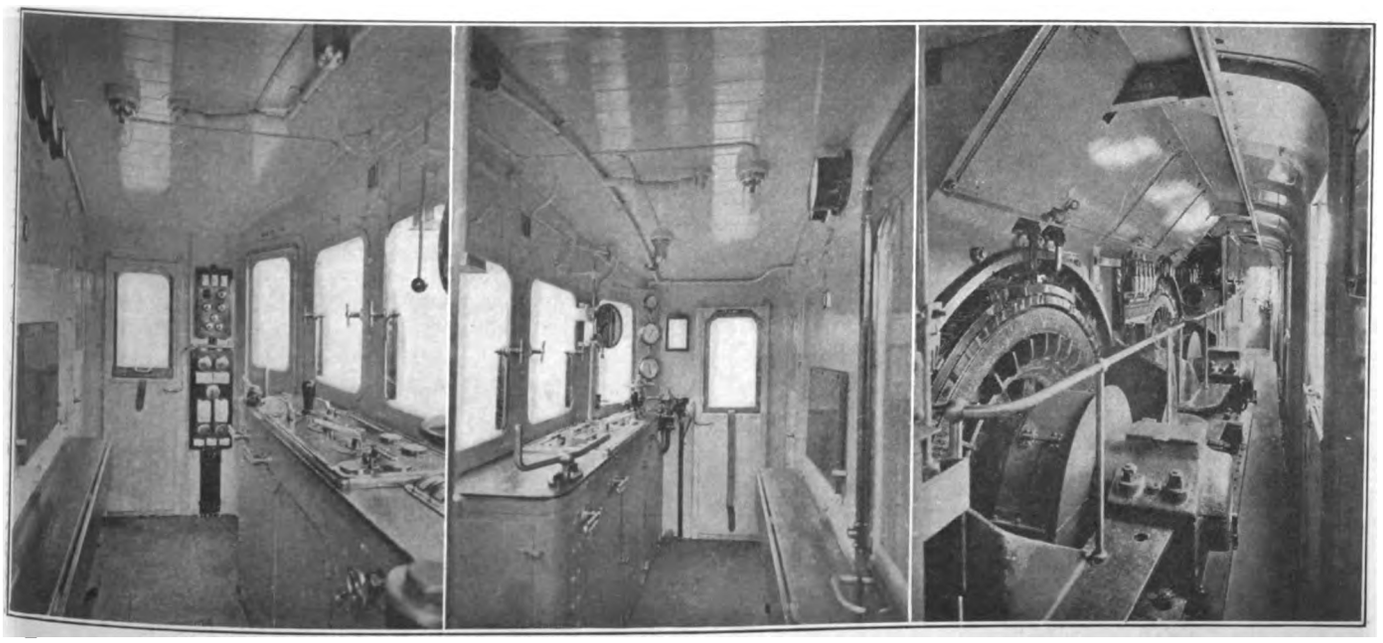
The power factor ($\cos \theta$) of the motors at all normal speeds is about 95 per cent. During trial runs the efficiency of the locomotive proper (transformer, motor, gearing) up to the wheel circumference has been found to be as high as 88 per cent. The characteristic curves of one of these motors are presented in an accompanying illustration on the next page.



Lötschberg Locomotives—Motorman's Master Controller and Main Controller

The reverser is directly connected mechanically and electrically. The reverser drum alters the direction of the flow of the current in the exciter winding and is operated by d.c. magnets from the engineer's stand. In exceptional cases these magnets as well as all other contrivances can be operated by hand. The group switch is installed above the motors and between the two reversers. This switch permits the instantaneous connections of the two halves of the electrical equipment without any tools whatsoever.

A motor-generator set jointly with four ordinary train-lighting batteries supplies the direct current for distance control and lighting. After the motor and generator switches have been cut in by the engineer, all further



Lötschberg Locomotives—Views of Engineers' Cabs and of Main Motors

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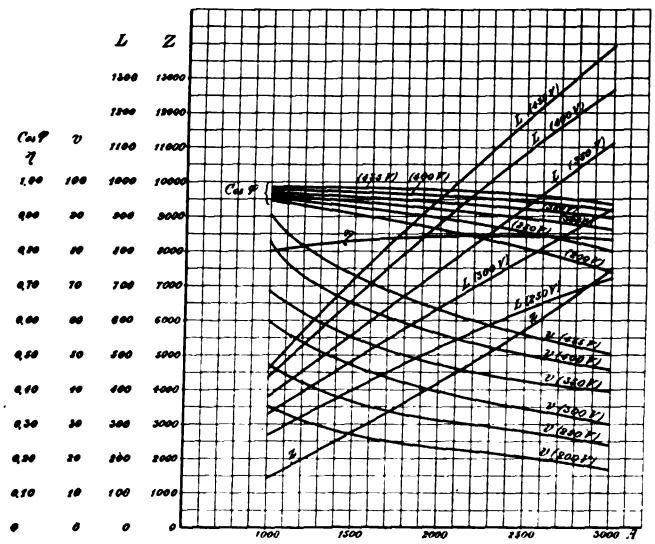
alterations in the connections, such as paralleling with the batteries, are made by an automatic starter.

MOTORMAN'S CABS, HIGH-TENSION ROOMS, ETC.

Each motorman's cab contains the air-valve mechanism for operating the current collectors, two switches for operating the high-tension and low-tension oil switches, main controller handle by means of which the step contacts are manipulated, reverser at the right of the controller, signal lamps which show the engineer the running direction of the machinery, and two lamps which light up as soon as the contactors stand in the zero position. All switches are so interconnected, either electrically or mechanically, that wrong manipulations are possible. The cabs are also fitted with numerous measuring instruments, those over the engineer's benchboard being of the profile type.

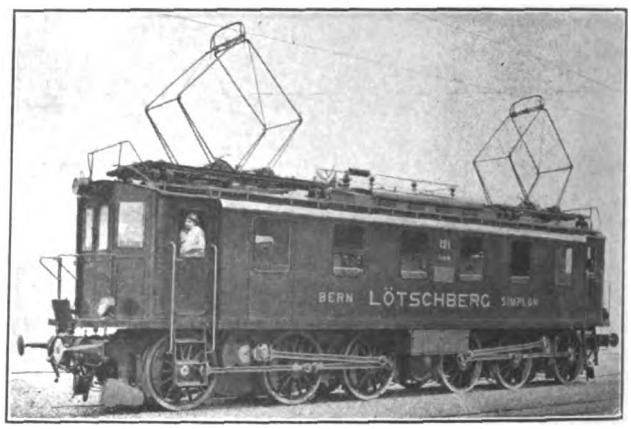


Z = tractive effort in kg; v = speed; L = horse-power.

Lötschberg Locomotives—Performance Curves of 1250-hp Single-Phase Motor

The two high-tension compartments in the motor room are shut off by doors of wire netting. These doors are so locked that prior to their being opened the high-tension conductor before and behind the high-tension oil switches must be grounded. The key which is necessary for the release of this lock is attached to the current collector valve conduit in such fashion that it can be taken off only when the collector valve is open, thus compelling the escape of any air in the conduit. With this key all the doors of the individual high-tension compartment can be unlocked, but it can be taken out of the lock only when all the doors are closed. This arrangement renders it impossible to open the high-tension compartment while the equipment is alive.

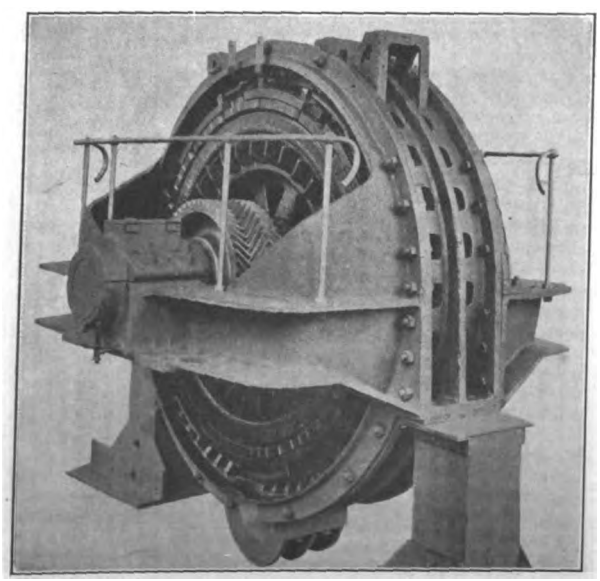
The door of the fan chamber attached above the motor is also locked, but it must be opened if the reversers or the group switches have to be operated by hand. In this event, the door can be opened only when the bar, which also serves as a switch, has been turned. As this switch closes the circuit of the four oil switches, reversing by hand is possible only when the current is switched off. The cab signal lamps are duplicated here to guide the operator in case it is necessary to operate by hand.



Lötschberg Locomotives—Original 2000-hp Design, in Service Since 1911

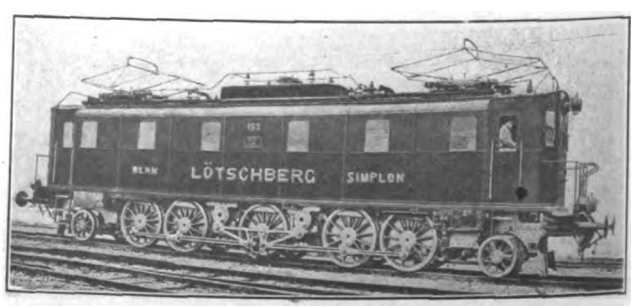
TABLE II—TABULATED DATA

Current system	Single-phase alternating current
Normal line voltage	15,000 volts
Periodicity	15 cycles per second
Rail gage	4 ft. 8½ in.
Maximum grade	2.7 per cent.
Total length of locomotive measured over buffers	52 t. 6 in.
Total length of wheelbase	37 ft. 2 in.
Fixed wheelbase	14 ft. 9 in.
Diameter of driving wheels	53 in.
Diameter of pony wheels	33 in.
Diameter of crank circle	24 in.
Ratio of tooth gear	1:2.23
Weight of the mechanical part	47.3 metric tons
Weight of the electrical part	59 metric tons
Total weight	107 metric tons
Weight available for adhesion	78.2 metric tons
Maximum pressure on axle	16.6 metric tons
Capacity on 1½-hour basis	2500 hp
Tractive effort at the wheels on 1½-hour basis	29,700 lb.
Speed on 1½-hour basis	31 m.p.h.
Maximum speed	46.5 m.p.h.
Maximum tractive effort at starting	39,600 lb.



Lötschberg Locomotives—1250-hp Single-Phase Motor with Helical Gearing

The folding ladder which is used to obtain access to the roof has been fitted with an alarm whistle which blows if any compressed air should be left in the current collector conduit when the ladder is being let down.



Lötschberg Locomotives—One of the Thirteen 2500-hp Single-Phase Locomotives

The accompanying Tables I and II present the key to the wiring diagram and the principal mechanical and electrical data of these locomotives.

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Valuation of Toronto Public Utilities

Report of Bion J. Arnold and J. W. Moyes Regarding Franchises and Other Assets of Toronto Railway and Radial Lines Submitted to Mayor Hocken

In the ELECTRIC RAILWAY JOURNAL of Oct. 18, 1913, and Oct. 25, 1913, brief mention was made of the progress of negotiations in regard to the purchase of the Toronto Railway by the city of Toronto and also of the reports of Bion J. Arnold and J. W. Moyes, experts appointed to appraise the railway property. The complete reports presented by Mr. Arnold and Mr. Moyes dealt with the following properties: (a) the Toronto Railway; (b) the Toronto & York Radial Railway, and (c) the Toronto Suburban Railway. All of the street railway property of the Toronto Railway was considered in the appraisal. With respect to the other two railways, however, the valuations determined included the property of those companies lying in or upon the streets within the present city limits of Toronto and covered solely those portions of the track and electrical distribution system so situated. The work of the appraisers consisted mainly of an investigation of the cost new and present value of the physical property of the railway considered as of July 1, 1913, together with a study of the operation of the properties with the view of determining other elements of value, such as the companies' contractual rights under existing franchise ordinances expiring in general on Sept. 1, 1921.

DEFINITIONS

The "cost to reproduce new" as used in the report represents the cost that would be incurred in replacing as of July 1, 1913, the physical property as found with new property of similar character. The "present value" of the physical property, or the "depreciated value," as used in the report, means the cost to reproduce new less the accrued depreciation on a straight-line basis. The "intangible value" is intended to signify those other elements of value which attach to the physical properties in view of the contracts now existing between the city and the company, or to represent the monetary value to the railway of its right to continue its operation until its existing franchise agreements, with the various stipulations thereof, shall terminate.

In arriving at the value of the properties their extent, character and present condition were considered, together with their earning power, past and prospective, the amount of operating expenses and the character of their service. The fact that they are operating in the limited territory which the major company is required to serve under its existing franchise was also considered, as well as the character and facilities of the property for rendering the class of service to which the public is entitled both now and in the future.

After full consideration of the above elements, the value of the properties, including the remaining operating rights and attached business, was found to be as shown in Table I.

REPRODUCTION COST NEW

In arriving at the cost to reproduce new a complete physical examination and general inventory were made of all the properties. Appropriate unit prices were used to arrive at the construction cost of the property as found and were checked by means of prices paid by the street railway, prices paid by the city for its municipal railway property and also prices quoted by manufacturers.

To the base cost of the various items of property there were added varying percentages to cover the expenses of organization, engineering and incidentals. The percentage added for organization covers the cost of general office expenses, securing bids, preparing contracts, purchase of materials, salary of officials chargeable to construction and general superintendence and legal expenses chargeable to construction. The percentage added for engineering covers the cost of preparing working plans, specifications and contracts, supervision, progress reports, estimates for payment, together with expense of shop inspection, tests and field engineering. The percentage added for incidentals covered all incidental construction expense to the company that was outside of the contract cost, such as extras in the contract price, due to small changes in design, additional expense due to interference with construction for various causes, the cost of trial operation, the cost of insurance and operating expense during construction.

The percentages included under organization, engineering or incidentals or their equivalents vary from a minimum of 5 per cent in certain exhibits to a maximum of 15 per cent in other exhibits, and for the whole property the average amounts to 6.4 per cent. The total obtained after adding these percentages to the physical value represents the actual cash that would be required in reproducing the property new but does not include the cost of obtaining the money necessary to finance the property, such as brokerage, bond discount or the carrying charges during construction, including taxes and interest, or legal expenses not properly chargeable to construction incurred in initiating the enterprise. The overhead percentage allowed for these items was 5 per cent, of which 3 per cent represents the carrying charges and 2 per cent the general legal and financing expense. The total cost thus determined includes no development expense or promoter's profit.

TABLE I, SHOWING APPRAISED VALUES

(a) The Toronto Railway:	
Present value of the physical property as of July 1, 1913	$9,894,483
Intangible value of the property as of the same date	10,713,553
Total value of Toronto Railway	$20,608,036
(b) Toronto & York Radial Railway:	
Present value of the physical property of the Metropolitan Railway division	$64,304
Present value of Toronto & Scarboro Railway division	27,300
Total present value of the physical property	$91,604
Intangible value of the Metropolitan Railway division	193,694
Total value of the Toronto & York Radial Railway	$285,298
(c) Toronto Suburban Railway:	
Present value of the physical property	$51,144
Total value of the Toronto Suburban Railway, including light, heat and power franchise	$51,144
Total value of Toronto Railway and those portions of the radial railways within the present city limits	$20,944,478

PRESENT VALUE

The present value of the physical property was determined by depreciating the cost to reproduce new of all the various items of property. Varying rates of depreciation, such as were mentioned in detail in the ELECTRIC RAILWAY JOURNAL of Oct. 25, 1913, page 942, were applied to various classes of physical property with a proper consideration of salvage value. Certain exhibits, such as stores and the land value of real estate, were not depreciated, the cost new value being considered the present value. The present value of the cost of securing money was obtained by depreciating its original value in the ratio of the elapsed life of the franchise. Legal expenses, carrying charges and incidentals were not depreciated, since in rehabilitation such expenses would be charged to operation.

INVENTORY

For the purpose of making an inventory the property was divided into the following general divisions: (1) track; (2) electrical distribution system; (3) rolling stock; (4) power plant equipment; (5) shop equipment and tools; (6)

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furniture and fixtures; (7) real estate and buildings, and (8) stores. Each exhibit was in turn subdivided into various parts as needed.

INTANGIBLE VALUE

In arriving at the intangible value of the properties examined, the following facts were considered. Under the terms of the franchise agreement the railway company has a practical monopoly until Sept. 1, 1921, to operate a street railway system upon and along the streets within the city limits of Toronto as they existed Sept. 1, 1891. Under this agreement the city does all paving and furnishes the track foundation, the company furnishing only ties, rails and fastenings. For the use of this track foundation the company pays the city $800 per mile of single track per year. Moreover, under the existing agreement the railway company is required to pay to the city a certain per cent of the gross receipts from railway operation. After deducting these payments and the usual operating expenses, the net receipts are decreased further by a 5 per cent charge on the capital investment. The net amount represents the profit of the company. The present value of this amount each year for the remaining term of the agreement was taken by Messrs. Arnold and Moyes as the intangible value of the property.

Certain conditions in the agreement between the city and the Toronto Railway tend to reduce materially the expense of operation, so that the unusually low operating ratio of 53.4 per cent for 1912 was found. This ratio is exclusive of the payment to the city for taxes and for pavement charges, both of which items would be included in the operating ratio of the average company. If these two items, amounting to $143,000, are added to the reported operating expense of $2,866,550, the operating ratio becomes 55 per cent. The payment of the Toronto system to the city of Toronto for taxes, independent of franchise taxes on gross earnings, is but 0.95 per cent of the gross income, whereas the report states that the average percentage of the gross income paid by fifteen of the largest traction companies of the United States is 6.35 per cent. The expenditure of the company for damages and injuries is approximately 2 per cent of its gross revenue, whereas the average amount is stated to be 5.35 per cent of the gross revenue. The payment of $800 per single-track mile to the city of Toronto for the maintenance of the paving and paving foundations is less than the actual cost of maintaining and renewing the work. Estimates made by the appraisers based on a city report show a yearly expenditure of $1,150 for depreciation of paving and paving foundations and $104 for maintenance, meaning a saving of approximately $450 per mile per year, or approximately 1 per cent of the gross earnings. Then, too, the Toronto Railway Company has accumulated its renewal fund by charging it against surplus rather than including it as an item of operating expense. For the year 1912 approximately $200,000, or about 4 per cent of the gross revenue, was thus set up. The total of these four adjustments is 13.7 per cent of the gross revenue, giving an operating ratio comparable to that of the average company of 68.7 per cent. In view of these facts, the appraisers deemed it proper under the existing franchise conditions to use the modified operating ratio of 55 per cent in determining the net receipts from operation.

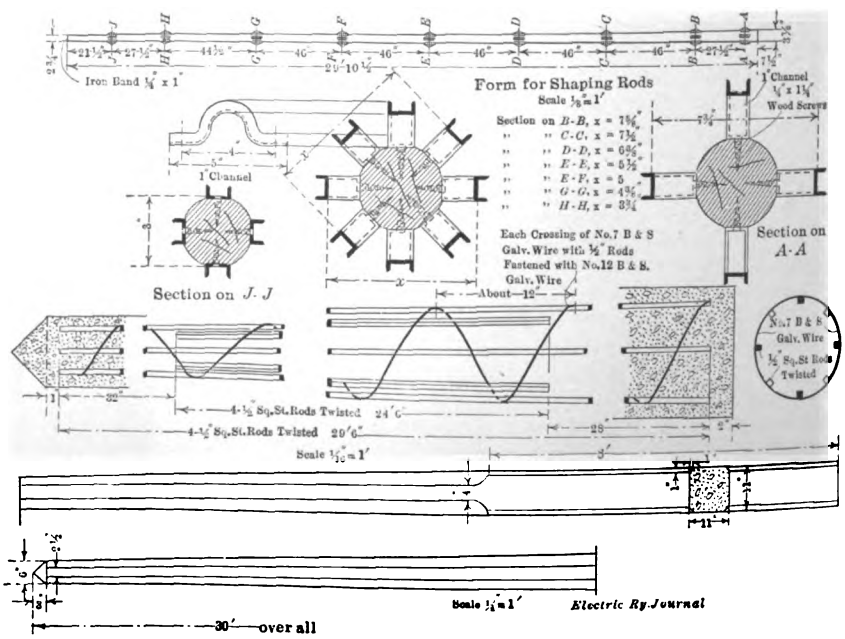
After a study of population conditions in Toronto, Messrs. Arnold and Moyes determined upon a rate of population increase of 5 per cent compounded for the five years from 1913 and 4 per cent compounded for the remaining years of the franchise. On the basis that the ratio of the gross earnings in given years is proportional to the square of the ratio of population in the same years, the increase in earnings for the next five years is 10 per cent and for the remaining years of the franchise 8 per cent. In view of the fact, however, that if the city does not purchase the Toronto Railway, a competing subway may be built, the rate of increase in earnings was decreased by the investigators to 10 per cent for the first three years, 8 per cent for the succeeding three years and 6 per cent for the remaining life of the franchise.

By using these percentages the gross profit was determined for each year, the franchise tax deducted, and the net profit was then discounted from each given year to July 1, 1913. The sum of these present values of future earnings was found to be $15,701,106. Estimating then the additional cars, power plant and substation apparatus and track needed during these years, Messrs. Arnold and Moyes computed an average investment of $887,500 per year. An amount of $4,987,553 was then determined by discounting the interest on the investment paid at the end of each year, leaving a net intangible monetary value of $10,713,553 for the right of the Toronto Railway to do business during the unexpired period of the agreement.

In a message to the Council on Oct. 13 Mayor Hocken expressed his satisfaction with the exhaustive examination made by the experts and stated that he was not prepared to say what the citizens of Toronto would do about the question of municipal ownership, but that when he had received a report concerning the financial outlook for the proposition he would submit the matter in full to the Council.

CONCRETE POLES FOR OAKLAND

The Oakland Traction Company has built a number of reinforced poles with satisfactory results. The pole has an over-all length of 30 ft., with square butt 8 ft. in length and 11 in. square. The reinforcement consists of eight ¼-in. square twisted steel rods. Four of these are carried for a length of 24 ft. 6 in. in the pole and the other four for a length of 29 ft. 6 in. The accompanying diagram shows the construction of the pole as well as that of the form on which the reinforcing rods are assembled before they are placed in the mold.



Reinforced Concrete Poles—Oakland Traction Company

The cost of manufacturing these poles is $12.31 each, including labor and material.

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Approximate Predetermination of Train Energy

This Method Is Based Upon Simple Dynamical Principles, Using a Series of Empirical Factors Which Vary According to the Speed, Number of Stops and Character of Service

BY W. A. DEL MAR AND D. C. WOODBURY

The predetermination of energy consumption by cars or trains is usually effected by means of a method which conceals the simple dynamical principles involved. Such a method is necessary where great accuracy is required, as it is only by dealing in electrical units that the characteristics of a particular electrical equipment can be brought to bear upon the solution of the problem. The following method neglects the peculiarities of the electrical equipment by assuming that it has certain average characteristics computed from the results of actual runs and expressed as dynamical rather than as electrical factors.

This method depends upon the fact that the energy required to propel a train is made up of three parts:

(1) That required to overcome inertia.

(2) That required to overcome friction, i.e., train resistance.

(3) That required to overcome gravity on grades. With this latter quantity is usually associated the extra frictional energy consumed on curves.

If the maximum speed v and the mass m of the train are known, the first element of energy may be calculated by the dynamical equation,

$$\text{Energy} = \tfrac{1}{2}\, mv^2.$$

If the distance L_p traveled with power on and the train resistance r are known, the second element of energy may be calculated by the dynamical equation

$$\text{Energy} = rL_p.$$

If the height, h, the train is lifted while power is on, and its weight, w, are known, the third element of energy may be calculated by the dynamical equation

$$\text{Energy} = hw.$$

The sum of these elements of energy is the total energy required to run the train, disregarding the losses between the current collector and the rim of the drivers.

Thus far only simple dynamical principles have been stated. They are difficult to apply in practice because the maximum speed and the distance traveled with power on are usually unknown. The quantities usually known are the average speed and the total length of run. The peculiarity of this method consists in the use of a series of factors which give the maximum speed and distance run with power on, in terms of the average speed and total length of run respectively. These factors have been derived from a large series of actual and calculated runs on street railways, interurbans and trunk lines, both passenger and freight. A practical application follows:

Let V = Average running speed, excluding stops, in m.p.h.

V_m = Maximum speed, in m.p.h.

L = Distance between stops, in miles.

L_p = Distance traveled with power on, in miles.

$n = \frac{1}{L}$ = Number of stops per mile including one terminus.

r = Average train resistance, in pounds per ton. (Say that corresponding to a speed of 10 to 20 per cent greater than the average speed.)

G = Average equivalent grade, in per cent.

g = Average curvature, in degrees.

e = Average motor and controller efficiencies as a decimal, which is usually about 0.7.

$K = \frac{V_m}{V}$. (See table below.)

$Q = \frac{L}{L_p}$. (See table below.)

The average equivalent grade, in per cent, may be obtained by the following formula, which assumes only one-half the gravitational energy on down grades to be saved, the remainder being consumed in braking. Other assumptions may be found necessary in certain cases:

$$G = \frac{100}{D}(H_1 - \tfrac{1}{2}H_2)$$

where

D = distance between stops, feet = 5280 L;
H_1 = summation of rises in feet;
H_2 = summation of falls in feet.

TABLE I—OUTPUT AT WHEEL RIM AND INPUT TO CAR IN WATT-HOURS PER TON-MILE

	Actual Energy Output at Wheel Rims of Cars	Approximate Electrical Energy Input to Cars
Due to kinetic energy.....	$\frac{V^2_m}{36.2L}$	$\frac{K^2nV^2}{25}$
Due to train resistance.....	$\frac{1.99rL_p}{L}$	$\frac{2.85r}{Q}$
Due to grades	$\frac{39.8GL_p}{L}$	$\frac{57G}{Q}$
Due to curves.....	$\frac{1.99gL_p}{L}$	$\frac{2.85g}{Q}$
Total	Sum of above	Sum of above

In this table the first column gives the exact mechanical energy required at the wheel rims, except in the case of that required to overcome curves, and the second column the approximate electrical input. The difference is partly due to an allowance of 70 per cent for the efficiency of the motors, gears and control. The formulas in the first column furthermore make use of the fundamental quantities V_m and L_p, while those in the second column employ the approximate factors K and Q from Table II. In cases where V_m and L_p are known, more accurate results can be obtained by using them.

TABLE II—VALUES OF K AND Q

Stops per Mile n	K: Locomotive Passenger Trains	K: Single Cars, Multiple-Unit Trains and Freight Trains	Q: All Trains
0	1.00	1.00	1.00
0.1	1.18	1.10	1.11
0.2	1.35	1.18	1.24
0.3	1.48	1.25	1.38
0.4	1.60	1.31	1.52
0.5	1.68	1.36	1.67
0.6	1.75	1.40	1.78
0.7	1.82	1.44	1.89
0.8	1.86	1.47	1.99
0.9	1.90	1.50	2.07
1.0	1.93	1.52	2.15
1.2	1.93	1.56	2.24
1.4	1.93	1.59	2.34
1.6	1.94	1.62	2.44
1.8	1.94	1.65	2.52
2.0	1.95	1.68	2.58
2.5	1.95	1.75	2.71
3.0	1.96	1.80	2.81
3.5	1.96	1.85	2.87
4.0	1.97	1.90	2.91
4.5	1.97	1.94	2.95
5.0	1.98	1.97	3.00
Over 5.0	2.00	2.00	3.00

The values of K, the ratio of the maximum to the average speed, depend upon the shape of the speed-time curve. If the run is very short, consisting only of an acceleration period and a breaking period, as shown by Curve A, Fig. 1, the speed-time curve is triangular and $K = 2.00$. On the

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other hand, if it were possible for the speed-time curve to be rectangular, as with instantaneous acceleration and braking, the value of K would be 1.00, as may be seen from Curve B, Fig. 1. All values of K lie between these limits.

The values of K for locomotive passenger trains are higher than those for single cars, multiple-unit trains and freight trains because the speed-time curve of the former is more triangular than that of the latter. The locomotive

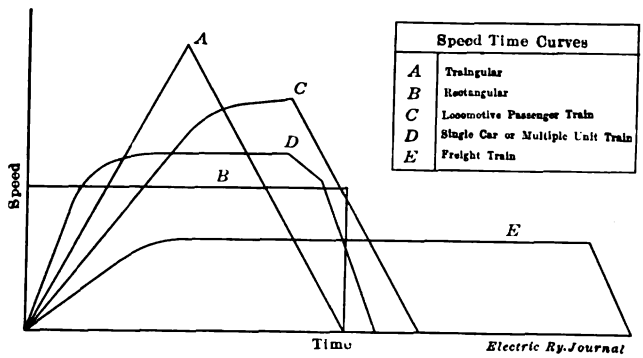

Fig. 1—Calculation of Train Energy—Characteristic Speed-Time Curves

passenger train has a rather low acceleration which continues to a high maximum speed, as shown by Curve C, Fig. 1. The run at maximum speed is comparatively short before braking, which is accomplished at a moderate rate, so that the general shape of the speed-time curve approaches a triangle. Single cars and multiple-unit trains have a high acceleration, a comparatively long run at a moderate maximum speed and a quick stop, as shown by Curve D, Fig. 1, which gives a more nearly rectangular speed-time curve. The freight trains have a low acceleration, but get the rectangular characteristic of their speed-time curve by running for a considerable portion of the run at a low maximum speed, as shown by Curve E, Fig. 1.

The values of Q, the ratio of the distance between stops to the distance run with power on, do not lend themselves so well to discussion. Obviously Q cannot be less than 1.00, and it seems to be limited, by observations of actual and calculated runs, to a maximum of about 3.00. This means that for very short runs the acceleration period covers one-third of the distance, the coasting and braking periods covering the other two-thirds. The variation in Q for

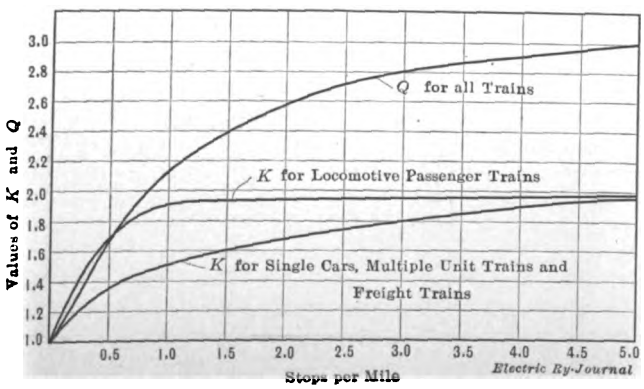

Fig. 2—Calculation of Train Energy—Values of Factors K and Q

actual runs is likely to be greater than in K, but Q is of less importance under average conditions of grade, as it enters only the less important items and is used only in its first power, while K is squared and enters into what is usually the largest item, that is, the kinetic energy. Plots of K and Q are shown in Fig 2.

The authors lay claim to no finality in the table of values of K and Q. On the contrary, it is very likely that with a greater amount of data on train runs more complete tables may be prepared, taking into account a greater variety of service and equipment.

EXAMPLE:

A multiple-unit train makes an average speed, while running, of 30 m.p.h., making a stop every 2 miles. The average train resistance is 7 lb. per ton, the average equivalent grade 0.05 per cent and the average curvature 0.75 deg.

Then $V = 30$

$r = 7$

$G = 0.05$

$g = 0.75$

$n = 0.5$

$K = 1.36$, $Q = 1.67$ } from Table II.

Then,

Watt-hours per Ton Mile

$$\text{Kinetic energy} = \frac{1.36^2 \times 0.5 \times 30^2}{25} = 33.3$$

$$\text{Train resistance energy} = \frac{2.85 \times 7}{1.67} = 12.0$$

$$\text{Energy for grades} = \frac{57 \times 0.05}{1.67} = 1.7$$

$$\text{Energy for curves} = \frac{2.85 \times 0.75}{1.67} = 1.3$$

$$\text{Total energy input at train} = 48.3$$

In calculating runs by the step-by-step method, since the values of V_m and L_p will be known, the formulas in the column of Table I headed "Actual Energy Output" will be found useful for checking the results. The difference between the energy by the two methods will then represent the losses in the electrical equipment and should be of reasonable magnitude, say 20 to 40 per cent. If the losses are either excessive or unusually low, there is likely to be an error in the complicated step-by-step calculation.

This method has been found very useful in making electrification estimates, as it enables load diagrams to be plotted from given schedules before the exact details of the motor equipment are settled.

There are usually so many indeterminate factors in a train run that the accuracy of the step-by-step method is often wasted. The new method is very simple to use, as all the formulas are adapted to slide-rule calculation, using only such fundamental quantities as train weight, distance run and time of run.

FIRST FALL MEETING OF NEW ENGLAND STREET RAILWAY CLUB

The first fall meeting of the New England Street Railway Club was held at the American House, Boston, on Oct. 30 with President Wilde in the chair. After the usual dinner, which was enjoyed by about 100 members and guests, twenty new members were elected. Louis D. Gibbs, superintendent of advertising of the Boston Edison Company, then delivered an address, "Public Service for Public Comfort." The speaker sketched the possibilities of closer relations with employees and the public, emphasizing the opportunities in the direction of cultivating public sentiment by giving a more ready ear to complaints and by affording patrons the opportunity to become personally acquainted with company officials. Friends are made by a proper reception of complaints and suggestions. In closing, the speaker voiced the value of cleanly and courteous employees. He stated that labor troubles never arise from such sources and urged the cultivation of a high-class operating personnel as a factor in making over public sentiment.

The rest of the evening was devoted to an informal discussion of the recent Atlantic City convention of the American Electric Railway Association.

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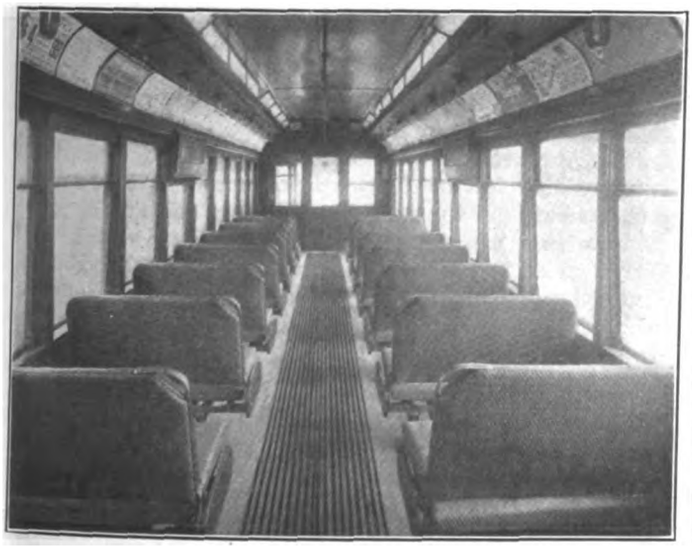
Electric Railway Car Lighting

The Writer Outlines the Requirements for Good Illumination in Electric Cars, Discusses the Advantages of Reflectors and Considers the Possibilities of Indirect Lighting

BY J. R. CRAVATH

In view of the attention which has been devoted in the last few years to the lighting of rooms and streets, it is rather notable that so little study has been given to the lighting of electric railway cars. In fact, the lighting of steam railroad cars has received, on the whole, more scientific thought than has been given to illumination in electric cars. One reason for this has probably been the comparative cheapness of electric energy for lighting on electric railway cars. Most electric railway officials have probably considered that there is no special problem connected with electric railway car lighting except to get enough lamps and maintain them at a voltage that will keep the car sufficiently lighted at all times during its operation at night. In fact, on many interurban roads the problem of maintaining sufficient voltage to prevent serious fluctuations in the light is so great that it has overshadowed all others. Interurban managers have rightly felt that it was useless to give much consideration to the fine points of car lighting until the problem of voltage fluctuations was answered. This problem has not been satisfactorily solved at the present time for interurban roads which have insufficient feeder capacity, because all of the methods for overcoming this difficulty appear to involve too much expense or complication to make them popular.

It is the purpose of this article to state some of the principles which must be followed in the artificial lighting of electric railway cars if the illumination is to be made comfortable for the passengers. Right here it is in order to call attention to the fact that considerable money and thought have been expended on the details of interior equipment and arrangement of electric cars to make them as comfortable as possible as to seats, ventilation, etc., and it is certainly just as important to make the illumination adequate. Ideas of what constitutes adequate and satisfactory interior illumination have advanced very rapidly in the past five years. Passengers who have become accustomed to proper interior lighting arrangements in homes and offices will not be satisfied much longer with the crude methods in use on most electric railway cars.



Electric Railway Car Lighting—Interior of Car with Lamps Over Seats

Electric Railway Car Lighting—Typical Unsatisfactory and Inefficient Lighting Arrangement

QUANTITY OF LIGHT

The first requirement is to provide the passenger with sufficient light for reading a newspaper in almost any position in the car without annoying shadows. To do this, the common practice of spacing lamps at frequent intervals, with one row over each row of seats, as in the accompanying diagram, answers the requirements better than anything else yet proposed. It not only takes care of the passengers in the seats but of those who may be standing in the aisles. The frequency of lamp spacing now commonly employed is sufficient to avoid troublesome shadows. In a cross-seat car this frequency of spacing should be not less than one lamp for every two seats.

TYPE OF LAMP

The next question is as to the kind of lamp and its equipment. To many electric railway men, doubtless, the only problem in the illumination of electric railway cars has been that of the kind of lamp to adopt; that is to say, whether to retain the old carbon-filament lamp or to adopt some recent lamp with a metal filament, such as tungsten. While this is a problem in economical operation, it has very little to do with passengers' comfort, provided an equal total flux of light or candle-power of lamps is used in each case.

THE QUESTION OF REFLECTORS

Common practice is to place a row of lamps over each seat, as shown in one of the accompanying views, or perhaps some over the aisles, as shown in the other view. These lamps have clear glass bulbs and are equipped with no globes or effective reflectors of any kind, as the flat reflector in the car with center illumination is of little use. Electric railway men have generally fought shy of reflectors, for various reasons. Among them may be enumerated the following: The reflectors or shades have frequently been of a kind which were difficult to keep clean and if not properly cleaned gave the car a very unkempt appearance. The reflectors used have frequently been of poor design so that they did not direct the light down in the car as they should. Frequently they have been of thin glass, easily broken and a constant source of annoyance and expense through break-

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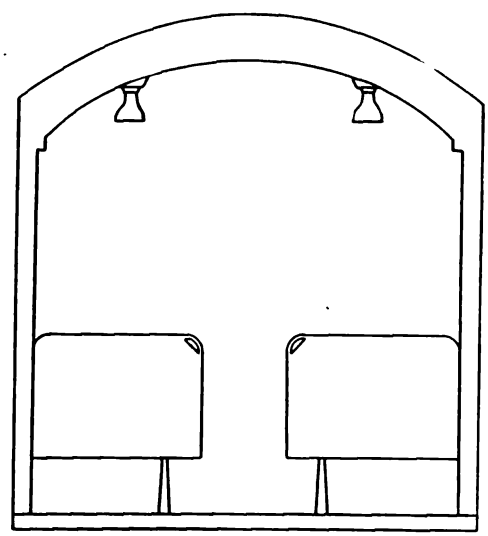
age. The shade holders used to hold the reflectors have frequently been flimsy and of improper design to hold the reflectors rigidly, with the result either that the reflectors in the cars would usually be found tipped at various angles or, if the shade holders were fastened directly to the lamp sockets, the weight of the shade would pull the socket to pieces on account of the constant jar. All of these are real troubles which the operating man has experienced, and it is not surprising that he raises objections to the use of reflectors, especially when one considers what has been offered him for use in the past.

Nevertheless, with proper design of reflectors, so that they really accomplish what is wanted in distributing the light, together with proper mechanical design of the reflector holder, and with a reflector having a surface which is easily cleaned, all of these objections can be overcome, and there are substantial advantages in the use of reflectors.

ADVANTAGES OF REFLECTORS

These advantages in the use of proper reflectors relate both to economy in the use of light and to the comfort of the passengers. A properly designed reflector will direct downward toward the passengers and their newspapers a



Electric Railway Car Lighting—Diagram Showing Correct Arrangement of Lamps

considerable amount of light which would otherwise be wasted against the walls and ceilings of the car or by shining out of the windows. All of the ordinary types of incandescent lamps are so constructed that a very large percentage of the light flux—that is, the total light emanating from the lamp—is given off in directions within 30 to 40 deg. above and below the horizontal when the lamp is hung in a vertical position. This being the case, it will be seen that lamps placed nearly vertical, as they usually are in an electric car, throw a large percentage of the light against the upper walls and windows of the car. Of course, some of this light is reflected toward the surfaces which it strikes, but all these surfaces absorb considerable light, and the waste in the aggregate is large. By the use of reflectors of proper design much of this waste can be utilized.

A still more important reason for the use of reflectors, however, is the comfort of passengers. The type of reflector which should be used in car lighting of this kind will be deep enough, as shown in the diagram, so that the tip of the lamp comes about even with the bottom of the reflector. The reflector will be of opal or other glass which is dense enough to prevent an undue amount of light going through the reflector but at the same time will be sufficiently translucent to light up the upper part of the car cheerfully. The greater part of the light, however, will be directed down. The effect of such reflectors will be to diffuse the light so that passengers looking the length of the car will see no lamp filament but will see only the soft, diffused light coming through the reflectors. In other words, the reflectors will shade the lamps comfortably and send the light down in the car where it is most needed.

THE NEED FOR A GOOD REFLECTOR

The electric railway manager should not accept the popular impression that any reflector to which a scientific or catchy trade name is given and which is pushed by enterprising salesmen is the thing to use in an electric car. The fact is that at the present time there is a remarkable scarcity of reflectors and holder equipment which can be considered suitable for use on electric cars. This may seem remarkable in view of the activity of many glass and metal manufacturers during the past five years in catering to the wants of the users of interior lighting equipment. However, some excellent designs of holders have been recently brought out for use in steam railroad cars, and these holders are well adapted to electric railway cars.

The art in the design of suitable reflectors is just now suffering from the lack of initiative and understanding on the part of the larger electric railway companies. The writer has said many times that it is difficult at the present day to introduce any good new article unless the article is patented so that it is to some particular company's interest to advertise and push it. We are so accustomed to use only the things that are forced upon our attention by enterprising manufacturers, advertisers and salesmen that we forget that there may be many unpatented devices which are worthy of attention. When we apply this principle to reflectors thoroughly suitable for use on electric railway cars at the present time, we have the rather remarkable situation that few of them are produced. Electric railway requirements call for something so plain and simple that no manufacturer can get out any very distinctive ornamental design which he can call his own. Consequently nothing is done. Doubtless, also, manufacturers have met little encouragement in bringing out such designs for electric railway cars from the electric railways themselves, because of the old objections to reflectors already given.

What is needed is a correct scientific shape combined with a plain design which can be easily cleaned. Such designs can be obtained by any electric railway company which would use sufficient quantities to justify the expense of the design and the mold. It is not likely to be pushed by manufacturers, however, for the reasons already given. When electric railway companies arrive at the point where they are sufficiently interested to work the matter out, it will be a comparatively easy problem.

INDIRECT LIGHTING

Considerable development has taken place recently along the lines of indirect lighting for interiors, and this type of lighting is generally found where the most thorough study has been given to the illumination. However, this type of lighting is not suitable to electric railway cars, or at least will not be until electric railway companies are prepared to give much more attention to the cleaning of reflectors and will keep car ceilings clean and of lighter color than at present.

Such an indirect lighting system, however, would unquestionably be more comfortable for the passengers than a direct system. As a general principle, the larger the area from which the light comes to the eye, the more comfortable the system of illumination. Thus, in the system of direct lighting, with opal reflectors over each lamp, as outlined in this article, there is more comfort for the passengers than with the bare shaded lamps, because, first, there is less light entering the eyes of the passengers, and, second, the light which enters the eyes comes from and through the diffusing reflectors rather than from intensly bright lamp filaments.

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Settlement of Indianapolis Strike

Operation of Cars Resumed After Agreement Is Made to Have Differences Arbitrated by the Public Service Commission of Indiana—Effort to Involve Interurban Lines Is Unsuccessful

A settlement of the strike which practically prevented street railway operation in Indianapolis for seven days was brought about with remarkable expedition on Friday, Nov. 7. The general conditions of the strike were in themselves unusual and may be summarized as follows:

Only a very small number of men had been organized when the strike was called. The city and county officials absolutely failed to give any protection to life or property when the remaining motormen and conductors, who constituted a majority, started to operate cars in the city the morning after the notice to walk out. Riotous mobs, practically controlling the city, dragged men from the cars and forced them to join the union, without any restraint from the authorities. The turbulence lasted for several days, police officers resigning rather than protect the property or employees of the company. State troops were called by the Governor on Thursday morning, Nov. 6, after committees of the most prominent business men of the city had assured him of their hearty approval of this course, and this resulted in a change in the attitude of the labor men, who then indicated willingness to recede from former demands. Finally, as in the case of the Cincinnati strike, a suit for receivership against the company as a means of forcing concessions was commenced. It was generally reported that, while the company was absolutely solvent and living up to the terms of its franchise, if a receiver were appointed he would at once recognize the union and cause the company endless future trouble, in addition to the interruption in business and impairment of credit which usually follows legal complications of this kind.

The suit for appointment of a receiver for the Indianapolis Traction & Terminal Company, filed on Nov. 3 by A. C. Pearson, was annulled on Friday morning, Nov. 7. The company filed a demurrer to the complaint, which was sustained by Judge Remster on the ground that the law provides that such a proceeding should be brought either by the prosecuting attorney or by some citizen who has a special interest in the franchise and property of the company besides the interest of other citizens, and that the plaintiff did not show he had such special interest

In the meantime the Governor was making every effort to bring about some mutual adjustment of the difficulties before declaring martial law and putting in action the three regiments of the State militia quartered in the city. The labor leaders had refused to consider the proposition prepared by the Governor, the Public Service Commission and officials of the Traction & Terminal company, which provided, in brief, that the outside labor agitators should leave the city, that all local charters should be annulled, and that all men should go back to work under the terms of their former employment and after thirty days submit their grievances to the company, and, if not settled, then the matters should be submitted to the Public Service Commission, whose decision should be final. The labor men still held out for recognition of the Amalgamated Association by the company, and the company refused to recede from its position that it would not treat with any union but would treat with the men themselves simply as employees of the Traction & Terminal company.

Additional pressure was brought to bear on the company by the filing of another suit for appointment of a receiver and asking for cancellation of the lease under which the Indianapolis Traction & Terminal Company took over the property of the Indianapolis Street Railway. This suit, in order to overcome the points of invalidity under which the earlier suit was dismissed, was brought by William Dobson, secretary of the Bricklayers, Masons & Plasterers' International Union, as the owner of five shares of stock of the Indianapolis Street Railway. Action in this suit was deferred until Saturday, Nov. 8, and on Monday, Nov. 10, the matter of the appointment of a receiver was indefinitely postponed by the court on the ground that the company was then in full operation of all lines.

In the meanwhile Governor Ralston and the Public Service Commission, in conference with officials of the company, prepared a final proposition, providing in general that any grievances not settled between the employees and the company should be decided by the Public Service Commission and be binding for three years, the intent of the agreement being that the company would not treat with or recognize any union, but would not discriminate between union and non-union men in its employ, and that all adjustment and arbitration should proceed only in the name of the committee of employees. The proposition of agreement in full was as follows:

TEXT OF THE AGREEMENT

"1. That the Indianapolis Traction & Terminal Company agrees that all men who went out on the strike declared Oct. 31, 1913, shall return to work with full seniority rights and without prejudice and all men who were discharged on account of becoming members of a labor organization or contemplating the same shall be reinstated without prejudice, but the company shall not be required to reinstate any employee who has taken part in acts of violence against its property. Any employee whose reinstatement is refused shall have the right to be heard by the Public Service Commission of Indiana and if its decision is in his favor shall be reinstated.

"2. That all grievances of every kind and character as to wages and conditions shall within five days from the resumption of the service by the company be presented to and taken up by the company, and if not satisfactorily adjusted within ten days thereafter shall be referred to the Public Service Commission of the State of Indiana for final decision. All members of the commission shall sit upon hearing and participate in the decision, said decision to be for a period of three years and to be binding upon all parties thereto.

"3. This tentative agreement shall be signed by a committee of the employees of the Traction & Terminal company, by Ethelbert Stewart as a representative of the United States government, Samuel M. Ralston, Governor of the State of Indiana, and the proper officials of the Traction & Terminal company.

"4. That all men shall return to work within a period of twelve hours from the time of signing this agreement under the conditions formerly obtaining in their employment, and there shall be no further interference with the operation of any cars on the lines of the Traction & Terminal company or with any property or employees of said company.

"5. Said Public Service Commission, if the matter be referred to it, shall take up and hear evidence of all parties interested on said grievance as to wages, hours and conditions, and service, and render decision concerning same within a period of thirty days from the first date of meeting, said decision in effect to relate back to the time of resumption of work.

"6. The above-mentioned adjustment and arbitration shall proceed only in the name of the committee of employees.

"It is also agreed that any employee who asks to be rein-

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stated and is refused reinstatement but is returned by decision of the Public Service Commission shall receive pay from the date of first application for work."

This was signed Friday afternoon, Nov. 7, by Ethelbert Stewart, chief statistician Bureau of Labor Statistics, Department of Labor, for the United States government; Samuel M. Ralston, Governor of Indiana, and Robert I. Todd, president Indianapolis Traction & Terminal Company, and then submitted to the committee of employees of the company, who finally signed the agreement without modification about 6 o'clock Friday evening, thus ending the strike. The labor men were reluctant to permit an outside body (the Public Service Commission) to pass on their demands for higher wages and better hours, but the form of agreement was finally adopted by them.

When the operation of cars was resumed Saturday morning, Nov. 8, there were some little differences on account of a misunderstanding of the terms of the agreement, brought about entirely by the wearing of buttons by men who belonged to the union. These men at first refused to take out a car if the other member of the crew was a non-union man, and attempts were made to prevent the resumption of operation of interurban cars into the city on the grounds that the crews did not display union buttons.

Governor Ralston at once made a very positive statement in regard to the matter, saying that he would absolutely not permit any interruption of service of the interurban cars, and that the question of whether the men as individuals wished to become members of an organization was not for his consideration, but that all interference with these men must cease at once. To be assured that everything would proceed to the full letter and spirit of the agreement, he said that he would indefinitely postpone the departure of the troops quartered in the city. An effort was made by J. J. Thorpe to call a strike of the men of the various interurban companies operating into Indianapolis, but this attempt failed, as the men refused to leave their cars, and full schedules were operated on all the interurban lines entering Indianapolis.

On Monday morning, Nov. 10, Mr. Todd, as president of the Terre Haute, Indianapolis & Eastern Traction Company, and Arthur W. Brady, president of the Union Traction Company of Indiana, held a conference with Governor Ralston and informed him that they had just come from a meeting with employees of their interurban lines who had called upon them to express their satisfaction with their working agreements with the companies and their desire to be left alone by outside agitators. The matter of having some form of agreement between the interurban companies and their employees which would in the future give the trainmen the right to submit to the Public Service Commission any matters which might not be adjusted between themselves and the companies was suggested, and forms of such agreements are being prepared by the companies for execution between them and their employees.

By Tuesday evening, Nov. 11, an agreement between the Indianapolis & Cincinnati Traction Company and its employees had been completed and signed by fifty-four trainmen. The plan was worked out personally by Charles L. Henry, president of the Indianapolis & Cincinnati Traction Company, and the form of agreement was personally submitted to each employee. The agreement practically obviates any further trouble from strikes or walkouts and provides for the reinstatement by the company of all men who had been discharged since the labor troubles began. Grievances which cannot be settled by the officials of the company may be referred to the Public Service Commission for arbitration and final decision. In announcing the execution of the agreement between the Indianapolis & Cincinnati Traction Company and its employees, Mr. Henry made the following statement:

STATEMENT OF CHARLES L. HENRY

"During the last week I have been frequently quoted in the public press regarding the position of our company and its trainmen. The quotations have been more or less misleading and have frequently been conversations of other persons reporting what I should have said. I have on all occasions asserted that none of this company's men responded to the strike call when the city street car men went out, that none of them had quit work, and that the cars were being operated regularly with the regular men. I have, moreover, stated that since the strike on our line, Aug. 23 to 25, 1913, when the men went back to work in a body, there had been no complaints or disturbances of any kind among our men, and that if our men had anything to say about being dissatisfied they were ready and willing to take up the question with us and that we should be able to agree among ourselves.

"As evidence of the correctness of these statements, I am pleased to state that after a full personal conference with each of the fifty out of fifty-four of our trainmen, the other four being away on vacations, we have agreed among ourselves, without conference with or suggestions from anybody outside, to take up and settle among ourselves any questions of complaint or grievance that the trainmen or any of them may want to present, and that if upon any point we do not agree we will submit the same to the Public Service Commission for a decision. This understanding arrived at has been reduced to writing, executed by me on the part of the company, and by each one of the trainmen."

Governor Ralston expressed himself as being highly pleased with the form of agreement executed by Mr. Henry and the employees of his line and said he believed that such agreements, when arranged between the other interurban companies and their employees, would prove most satisfactory in adjusting any future disputes.

The time specified in the contract between the Indianapolis Traction & Terminal Company and its employees for presenting grievances expired at midnight Nov. 12. About noon of that day a committee of employees waited upon officials of the company and presented to them a paper which purported to be the grievances of the men, but as a matter of fact proved to be a form of agreement between the traction company and the Amalgamated Association of Street & Electric Railway Employees of America. This new contract so presented to the company was the usual form of agreement used by the Amalgamated Association, and besides containing the most prohibitive payment and working conditions for motormen and conductors, also included provisions for other men in the service of the company who had not been affected by the recent labor trouble. The contract also provided that the traction company should meet and treat with the properly accredited officers and committees of the Amalgamated Association and contained provisions for arbitration of disputes between the company and the union. The company refused to consider the document, on the ground that the new contract was not in any way a presentation of grievances within the meaning of the contract entered into Nov. 7, which was signed by the Governor, representatives of the Department of Labor, the traction company and a committee of its employees. That contract provided that all grievances should be presented to the company within five days from resumption of operation and if not settled by the company within ten days should be submitted to the Public Service Commission for final decision; also that the decision of the commission should be binding for three years and that the matters should be taken up only in the name of a committee of the employees. The traction company took the position that the new contract was an effort to avoid arbitration by the Public Service Commission and to repudiate the contract of settlement.

On the evening of Nov. 12 Robert I. Todd, president of the company, sent the following letter to the committee of employees who had signed the original agreement:

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"You and each of you are hereby notified that this company does not regard the paper left at our office to-day by Albert H. Brown et al. as a presentation of grievances within the meaning of and as provided by the contract heretofore entered into on Nov. 7, 1913, and signed by you respectively, but rather as presenting a new contract. We desire to give you this immediate and prompt notice in order that you may before the expiration of the day, if you so desire, present grievances, if any exist, in accordance with the existing contract. This company does not desire to avail itself of any technical advantages, nor does it seek any advantage from the lapse of time. Therefore, so far as we are concerned, the time for presenting grievances may be considered extended five days, our time for consideration to remain ten days after the actual receipt of the grievances. We therefore desire you to consider carefully whether you have complied with the existing contract in attempting in this wise to present an entirely new contract, which would of course have the effect of abrogating the present contract. Please do not infer that we impute any bad faith in the act of presenting the paper left with us to-day. We think, after further consideration, you will also conclude that you have not, in fact, presented your grievances as agreed."

Messrs. Wyatt and Clawson, of the American Federation of Labor, in conference with Governor Ralston and with Ethelbert Stewart, of the Department of Labor, admitted that the contract drawn by J. J. Thorpe was in direct violation of the agreement signed by the employees of the company. They informed the Governor that Thorpe had written the proposed new agreement and that the men had practically nothing to do with it. Mr. Clawson stated that they were at work drafting a proposal of grievances for the men to present to the company and assured the Governor that it would not violate any of the sections of the agreement which had settled the strike. This paper, it was expected, would be handed to the company on Friday, Nov. 14, for consideration.

Robert I. Todd stated Thursday evening that 180 interurban trainmen of the Terre Haute, Indianapolis & Eastern Traction Company, being all but five men on leave of absence, had signed an agreement with the company substantially the same in form as that just signed by the trainmen of the Indianapolis & Cincinnati Traction Company. This agreement affords them the right to submit to the Public Service Commission any matters that might not be adjusted between the employees and the company. It is believed that these agreements will prevent the interference of labor agitators on the interurban lines and avoid future disturbances.

PAPER ON STREET CAR ILLUMINATION

A feature of the meeting of the Chicago Section of the Illuminating Engineering Society, Nov. 12, was a paper on the illumination of street railway cars by L. C. Porter and V. L. Staley. An abstract will be published next week.

The paper was discussed by J. R. Cravath, Chicago; A. J. Sweet, Milwaukee; H. H. Adams, Chicago Railways, and Dr. M. L. Lloyd, chairman of the section. The points brought out were that reflectors should be of a simple design so that they can easily be cleaned and that the glassware should be heavy enough to withstand railway service. It was also shown that suitable reflectors double the efficiency of lamps for car lighting. Opinion favored the center-deck arrangement of lamps unless, possibly, where longitudinal seats are used.

Mr. Adams said that in the Chicago arch-roof cars a change in the inside finish of the ceiling from pea-green to light buff had increased the illuminating efficiency of bare lamps 50 per cent. Mr. Staley, one of the authors of the paper, said that an estimate of 1200 hours per life of tungsten lamps in car lighting was conservative.

In connection with the meeting there was a small exhibit of reflectors, car-lighting fixtures and fittings. Those exhibiting were: Holophane Works, Macbeth Evans Glass Company, National X-Ray Reflector Company, Adams & Westlake Company, Safety Car Heating & Lighting Company, Appleton Electric Company and Crouse-Hinds Company.

BRAKESHOE HEARING IN NEW YORK

The hearing in regard to the use of brakes and brakeshoes on street cars, with the object of arriving at means to mitigate noises, begun before the Public Service Commission for the First District of New York on Oct. 22 and described in the ELECTRIC RAILWAY JOURNAL of Oct. 25, 1913, was continued on Nov. 5, 1913.

W. G. Gove, superintendent of equipment for the Brooklyn Rapid Transit Company, testified that his company had for the last five or six years been experimenting with devices for the reduction of street car noises. In his opinion the "squealing" is caused by the brakeshoes, wheel and rail, but about 75 per cent of the noise commonly attributed to the brakeshoe comes from the friction between the flange of the wheel and the ball of the rail. More than three years ago the Brooklyn Rapid Transit Company began experimenting with a composition-filled shoe.

In reply to questioning on the part of Commissioner Eustis, Mr. Gove stated that the composition brakeshoes are being used at present on the Prospect Park South line and the Montague Avenue line. The usual brakeshoe used by the company is a gray-iron brakeshoe, which, on account of its greater softness as compared with brakeshoes used by other roads, does not in itself cause so much "squealing." These brakeshoes on the driving wheels last about three months. The composition brakeshoe, however, while not more expensive as far as first cost is concerned, wears out more rapidly and necessitates as much of an increase as 65 per cent in maintenance charges.

The composition brakeshoe is manufactured by the American Brakeshoe & Foundry Company. One of the chief objections against the universal use of this shoe, Mr. Gove stated, is the fact that it must be bought across the counter. The Brooklyn Rapid Transit Company buys its brakeshoes on contract on a mileage basis, but the manufacturing company refuses to sell the composition shoe in this manner because it is as yet uncertain in mileage and life as well as final cost, and because the company does not as yet feel that it can guarantee the shoe on a mileage basis for universal use. Mr. Gove said that his company is desirous of adopting any efficient means of mitigating street noises, but that it is the general opinion that the composition shoe is still in an experimental stage not justifying full adoption.

Frank Hedley, vice-president and general manager of the New York Railways, said that the composition shoe being used experimentally by this company on 100 cars of the Madison Avenue line is the same as the shoe used by the Brooklyn Rapid Transit Company, and seems no more efficient than composition shoes tried out by him eighteen or twenty years ago in Chicago. In Mr. Hedley's opinion the composition brakeshoe by virtue of its lubricating the wheel flange lowers the pitch of the "squealing."

The last witness before the commission was Chief Engineer Sargent of the American Brakeshoe & Foundry Company, who testified that "squealing" is due to the sliding of the wheel on the track during braking and the rubbing of the wheel flange against the rail. Mr. Sargent's testimony agreed with that of Mr. Gove on this point that his company could not sell the composition brakeshoe on a mileage basis and that it would not as yet recommend the shoe for universal use. The experiment would be continued, however, and more improvements were hoped for. The hearing was postponed until Nov. 26 to allow the Third Avenue Railway time to complete its experiments.

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ST. LOUIS CENTER-ENTRANCE MOTOR CAR

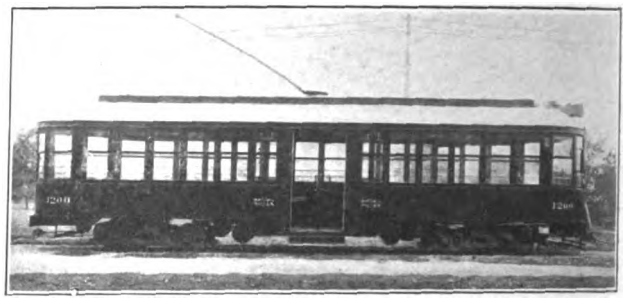
The United Railways of St. Louis has recently constructed in its shops three center-entrance motor cars which are now in operation experimentally on the Page Avenue line of that system. The car is modeled along the same general lines as that of the center-entrance trail car described on page 251 of the issue of this paper for Aug. 17 but modified so as to provide for electrical equipment. Thus maximum traction trucks are used with a 33-in. driving wheel, although on the trail car 22-in. wheels are employed. This increase necessitates a different arrangement of step and well. However, the over-all dimensions and the number of seats are the same. The side posts are 30 in. apart. The seating capacity is sixty-four, or four less than the trail car, because of the space left at the forward end of the car for the controller and brake. All of the passengers face forward except that there are short longitudinal seats for two passengers each placed at the forward end of the car.

The car is entered by the two steps, one of which is 12 in. in height and the other 11 in. high. The lower step is folding. These steps lead to a well or depressed portion in the center of the car which is 6 ft. in length but does not extend across the full width of the car, as the cross-seats opposite to the door are on the level of the floor. There is standing space in this well for eight passengers, so that this number can be loaded, the door closed and the car started before any fares are collected.

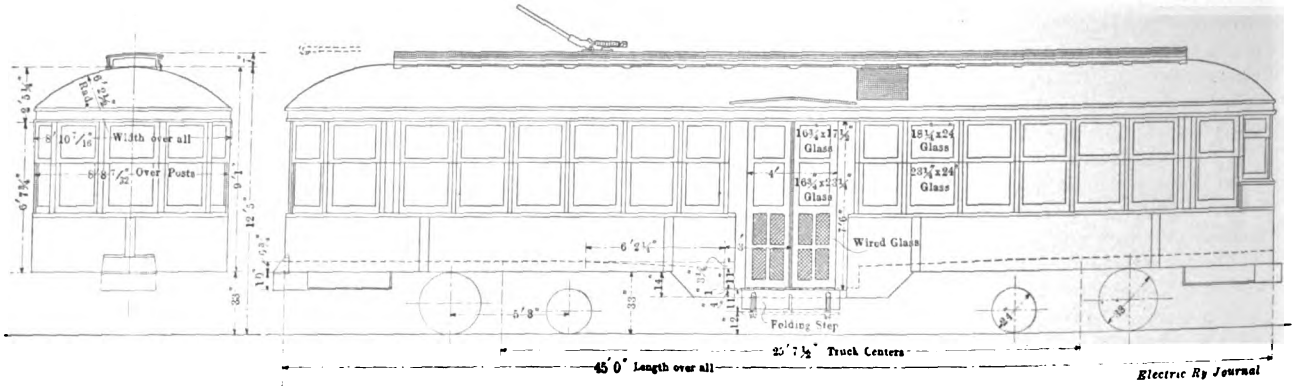
The conductor is stationed behind the fare box, which is directly opposite to the door. He has in front of him a semi-circular railing. The entrance door is opened and closed by a hand lever back of the fare box and operated by the conductor. An automatic arrangement is provided, however, so that the sliding doors operate a contactor in series with the main motor circuit. This makes it impossible for the motorman to start the car until the doors are completely closed. Moreover, if the conductor should open the doors while the car is in motion, the current is cut off from the controller. The folding step is arranged to operate in conjunction with the doors so that when the doors are closed the step is always folded.

To enter either end of the car from the well there is a step of 11 in. There is then a slight ramp amounting to 3½ in. extending back each side of the well for a short distance, but the rest of the car floor is level. There is also a rise of 1 in. at the entrance vestibule or well so that the height of the well is 24 in. above the rail, although it is reached by two steps of only 12 in. and 11 in. respectively.

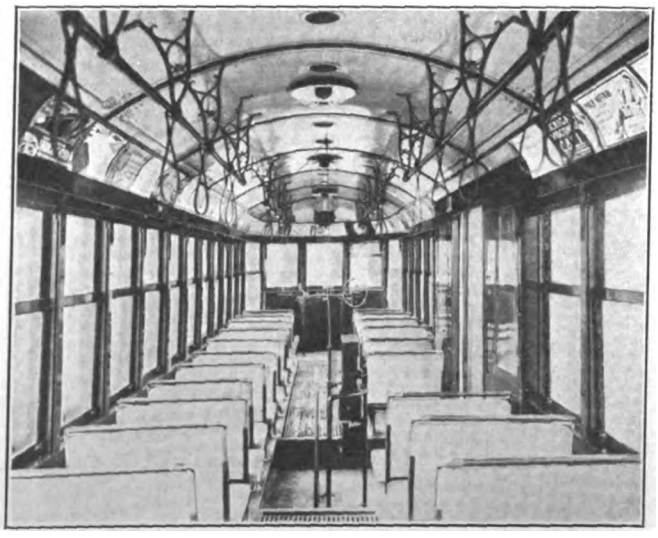
The weight of the car completely equipped is 38,700 lb., the electrical equipment consisting of two Westinghouse No. 56 motors with K-11 controllers, and the brakes being



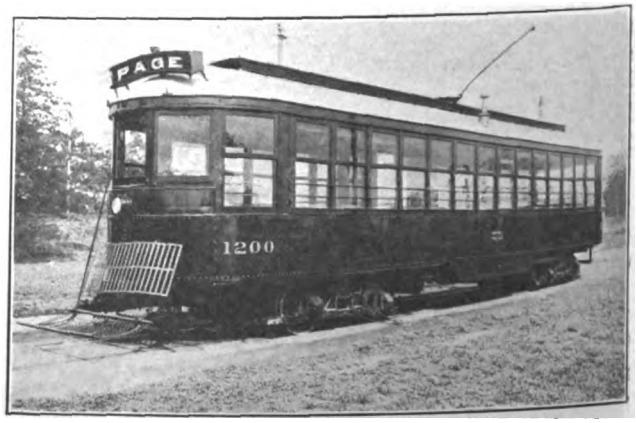
Center-Entrance Motor Car—Side View Showing Door Open



Center-Entrance Motor Car—End and Side Elevation



Center-Entrance Motor Car—Interior View



Center-Entrance Motor Car—General Exterior View

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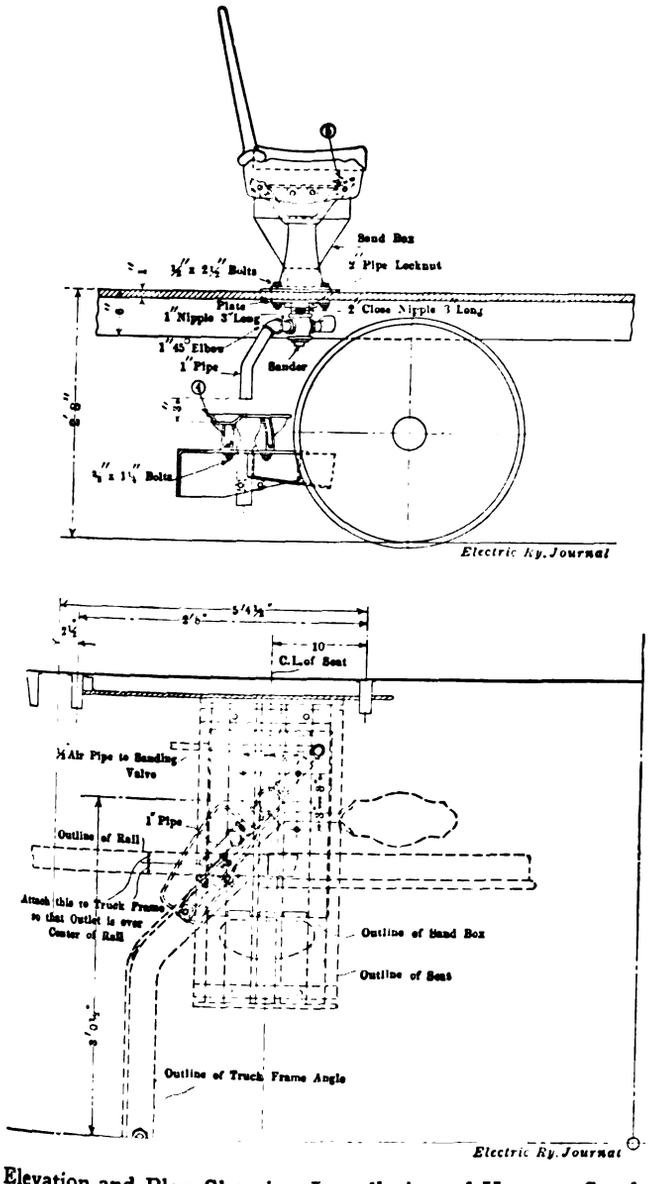
of the storage-air type. A Peter Smith hot-air heater is installed and ventilation is effected by twelve ventilators which consist of 6-in. openings in a longitudinal duct extending over the full length of the car roof.

VACUUM SANDERS FOR BROOKLYN

The Brooklyn Rapid Transit System has recently placed an order for 1128 Wyoming vacuum sanders made by the Railway & Traction Supply Company, Chicago. This requisition for sanders is probably the largest ever given at one time for a device of this character. Previous to the adoption of this sander for Brooklyn, the mechanical department of the Brooklyn Rapid Transit System had studied its operation on the surface railways of Chicago and other cities. In March, 1912, the first equipment was ordered for installation on the Brooklyn sample center-entrance car. Following its satisfactory experience with



Elevation and Plan Showing Installation of Vacuum Sander

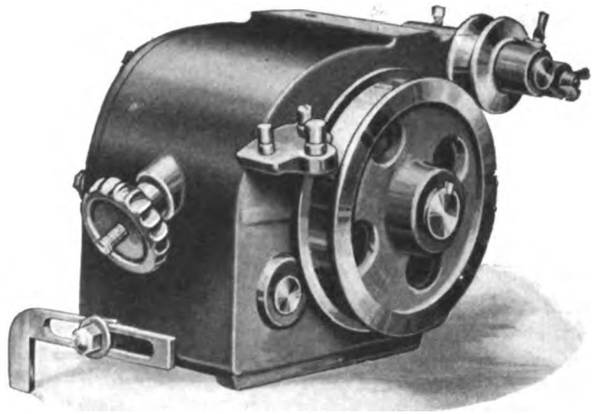
this outfit the company then ordered in the fall of 1912 200 equipments for 100 center-entrance cars, and these were installed as shown in the accompanying drawing. The last and largest order is for use on surface cars of drop-platform type which are now being equipped with air brakes.

In this device the vacuum principle is applied to insure the free delivery of sand to the rail. The sanders which have been installed in Brooklyn are of the manufacturer's standard type with two additional fittings. The first of these additions, as illustrated, is a funnel-shaped casting which is attached to the truck frame. This attachment permits the sanding of the rail on slight curves as well as on tangents, and it also protects the sand pipe against such distortion as occurs when an attempt is made to run the pipe down to the rail without an intermediate fitting of this kind.

The second addition to the sander is the instalation of a screen at the bottom of the sand box. This use of a screen followed from the experience that some motormen in attempting to break up caked sand would poke their switch irons through the box far enough to break a small adjusting plunger in the valve. The mesh of the screen is of sufficient strength to prevent trouble from this source in the future. The practice of the Brooklyn Rapid Transit System is to sand one rail only.

ARMATURE BAND-WIRE TENSION MACHINE

A new band-wire tension machine of the Peerless type has recently been placed on the market by the Electric Service Supplies Company to meet the demand for a light, portable device which can be used to advantage in connection with an ordinary lathe and which will make lathe banding as efficient as any other method of rotating the armature. It is applied to a lathe by removing the tool post and inserting a bolt which clamps the machine to the cross



Band-Wire Tension Machine

slide. The armature which is to be banded is then mounted on the lathe centers and rotated at one of the low speeds available with the lathe.

This device, with a lathe, provides a banding machine of greatest precision from the fact that the tension can be regulated from that proper for the smallest band wire to the breaking strain on the heaviest wire used. By means of this adjustment the exact tension found suitable can be established at any time. The tension remains constant and uniform throughout the banding operation without the slightest injury to the band wire or the generation of any heat.

Each pound of pressure applied at the brake drum is multiplied by means of gearing to 3 lb. at the band-wire drum, which is tapered to compensate for the tendency of the wire to crowd up against the flange. On account of this gear reduction, a comparatively small braking effect produces a very great tension on the band wire, and any change in tension can be instantly secured by regulating a hand nut directly in front of the operator.

The Peerless portable band-wire tension machine weighs 40 lb. complete, making it easy to handle and to adjust in a lathe. The gears, brake bearings, etc., are of ample strength, with large bearing surfaces, and are totally inclosed within a casing which protects them and eliminates possibility of injury to the operator. All bearings are readily lubricated from the outside by oil holes through the shaft.

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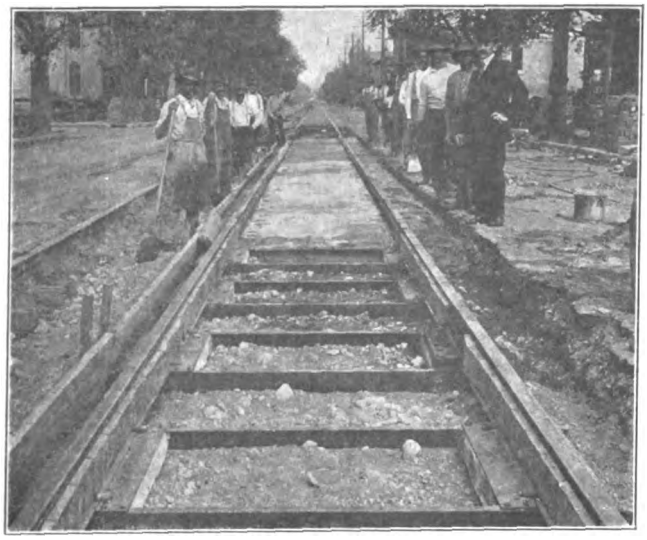
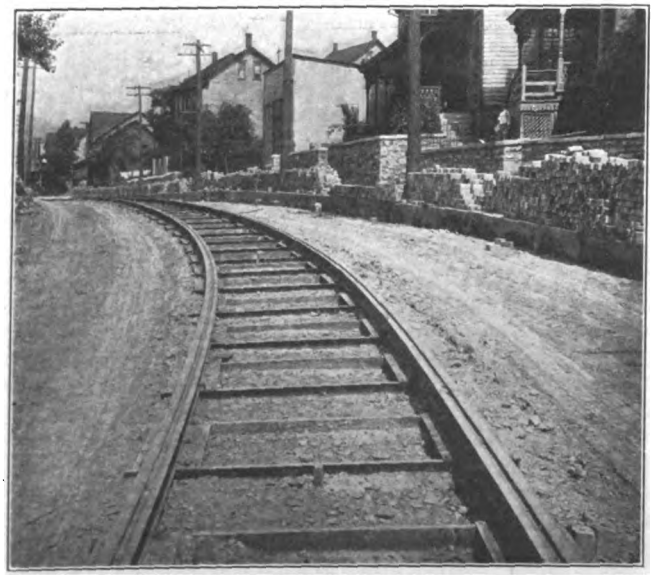
SOME INSTALLATIONS OF TWIN-TYPE STEEL TIES

In an article published in the ELECTRIC RAILWAY JOURNAL for Oct. 25, 1913, entitled "Cast-Weld Joints and Steel Ties in Brooklyn," an illustrated description was presented of box-girder or twin steel ties furnished by the International Steel Tie Company, Cleveland, Ohio. The installation of this tie, however, has not been confined to Brooklyn. It has been put into use on some twenty-five other properties representing all classes of traffic. The following paragraphs will describe the diverse practices followed to meet different conditions on a few of these railways:



Dayton Installation, Where Ties Were Concreted at the Yard and Tamped to Line

The Altoona & Logan Valley Electric Railway has been using this tie for three to four years and was one of the first companies to apply it on curves. An example of the latter work is shown in an accompanying halftone. The Altoona company has now made this construction standard. Its tie spacing is usually 6-ft. centers.



Installation of Twin-Type Steel Ties on a Curve on the Altoona & Logan Valley Electric Railway

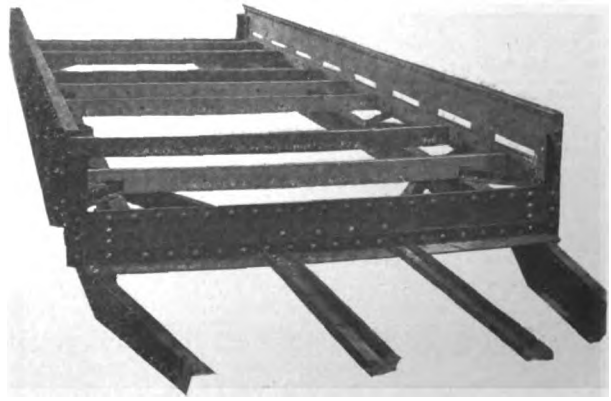
The construction adopted by the City Railway of Dayton, Ohio, differs in an important particular from that at Altoona. At Altoona the concrete is grouted in and about the tie structure and is left to set. At Dayton the concrete is cast in the ties at the yards, brought out and placed in position and tamped up to line and grade on a stone ballast foundation. Finally, as illustrated, concrete is grouted in to carry the pavement and also to distribute the load on the ballast. This method is the one recommended by the tie manufacturer, as it is believed that it will give a smooth riding track and require the least time and trouble.

The application of these ties at Lorain, Ohio, was made in April, 1913, by the Cleveland, Southwestern & Columbus Railway. The installation comprised 600 twin ties in concrete ballast for 1800 ft. of track, partly of 7-in., 70-lb. T-rail and partly of 9-in., 90-lb. girder rail. Tie rods were used on the 9-in. girder rail only. The division including this installation has a twenty-minute service with 35-ton cars. On this installation there are four steam railroad crossings.

The Cleveland Railway installed about 1 mile of these ties in 1910 in open track. The ties, which had a longitudinal bearing of 32 in., were placed 46-in. centers. The tracks, composed of rails 8 ft. to 33 ft. long, were lifted about 2 ft. from the old bed and filled in with stone ballast. It is reported that not a single clip has loosened. The Cleveland Company is also using these ties in closed track, employing them entirely for joint work. In the more recent construction on concrete foundations the ties have been placed 6-ft. centers. Still another installation is that of the Union Traction Company of Indiana, which operates cars as heavy as 50 tons on ties spaced 6-ft. centers and laid in paved streets.

PAY-AS-YOU-ENTER CARS FOR LONDON, ONTARIO

The London (Ont.) Street Railway has recently received six single-truck, single-end, pay-as-you-enter cars with 21-ft. bodies from the Preston Car & Coach Company, Preston, Ont. The cars have no bulkheads, and the floor of the car body is carried out into the front vestibule to give room for two extra passengers. Seats are also placed around the inside of the rear vestibule, which is exceptionally large and roomy, thus further adding to the seating capacity. The seats are stationary, upholstered in rattan, with pressed-steel pedestal and parts. A steel underframe, as shown in the accompanying illustration, is used. The door of the front vestibule is under the control of the motorman; the entrance and exit doors in the rear vestibule are controlled by the conductor. The outside of the car body is finished in natural cherry up to the belt rail, and above that in corn color. The interior finish of the cars is natural cherry with painted headlining. The cars are mounted on Brill 21-E trucks of 8-ft. wheelbase and 33-in. cast-iron wheels. Westinghouse 101-B-2 motors furnish the traction equipment.



Steel Underframe of Pay-As-You-Enter Car for London, Ont.

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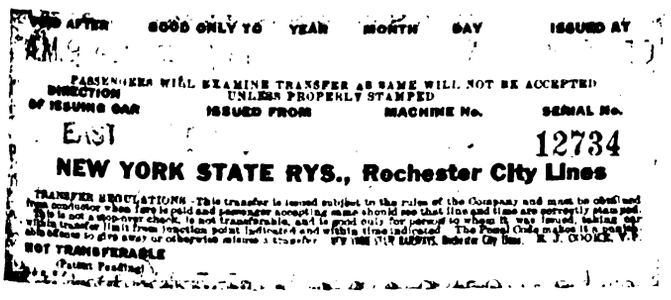
NEW INSULATING MATERIAL

The Electric Service Company, Cincinnati, Ohio, has placed on the market a new non-brittle insulating material, known as Formica, in the form of commutator rings to replace mica V-rings, bushings, taper rings, etc. It is asserted that the new material is not only better but cheaper than the usual types of mica insulation. One characteristic is the exceptionally high dielectric strength of approximately 1000 volts per mil under all atmospheric conditions. The material is non-hydroscopic and impervious to moisture so that atmospheric conditions cannot alter its insulating properties. An average commutator with V-rings and bushings of this material should have a breakdown resistance of 20,000 volts to ground. This material is said to withstand without softening 155 deg. C. (311 deg. Fahr.) continuously, or 265 deg. C. (509 deg. Fahr.) momentarily. It will not warp at any temperature and after breakage it is infusible even up to the temperature of carbonization. It is said to form freely into the sharpest angle of a V-ring, so that the edge is as strong as the rest of the ring. The ultimate tensile strength of this material is placed at 20,000 lb. per square inch and its ultimate strength under compression at 20,000 lb. per square inch in its weakest position, namely, end to end.

TRANSFER ISSUING AND RECORDING MACHINE

A marked departure in the method of issuing transfers has been made possible by the transfer issuing and recording machine which the Champion Recording Machine Company, Chicago, Ill., now has for sale. This machine prints, records and issues transfers to passengers on street cars. The printing and recording mechanism includes elements which will print time to the minute, a directional indication, date, lines to and from which transfers are issued, the number of machine, the number of each transfer, the company rules and regulations and a record of all transfers issued. Each transfer is printed and issued almost instantaneously from the machine direct to the passenger by a single pressure on a pedal. As shown in one of the accompanying illustrations, the machine resembles the ordinary fare box on prepayment cars but is somewhat smaller, consisting of a box 8 in. square and 15 in. high mounted on a pedestal. Where a fare box is employed, the transfer device is placed just beyond it, so that a passenger first deposits his fare and then moves forward to receive a transfer.

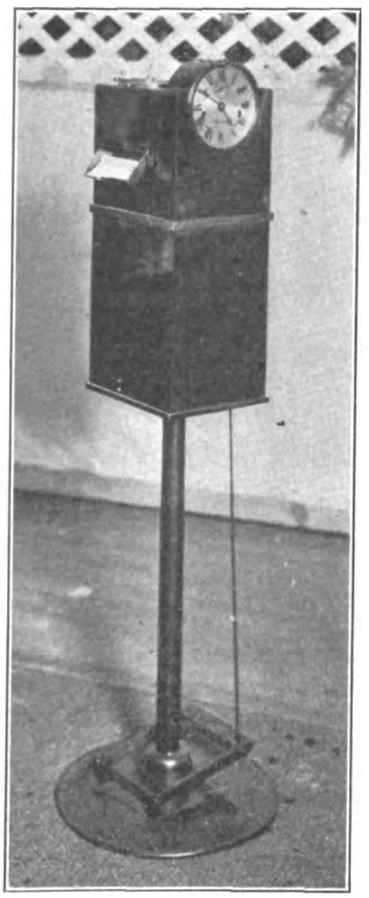
The operation of this machine requires that an indicator be set separately for each intersecting line to which it is desired to issue one or more transfers. The time indication changes automatically. A second indicator, which adjusts


GOOD ONLY TO YEAR MONTH DAY ISSUED AT
A.M.
PASSENGERS WILL EXAMINE TRANSFER AS SAME WILL NOT BE ACCEPTED UNLESS PROPERLY STAMPED
DIRECTION OF ISSUING CAR ISSUED FROM MACHINE No. SERIAL No.
EAST 12734
NEW YORK STATE RYS., Rochester City Lines
TRANSFER REGULATIONS
NOT TRANSFERABLE

Reproduction of Transfer Issued by Recording Machine

the printing mechanism for the maximum time of the validity of each transfer, is set at the time the car turns back from the end of the line. A cyclometer attachment totals the transfers issued. The side of the box has a directional indicator which permits the direction of car movement to be printed on the transfer. This indicator may also be set at the end of the line or whenever the car turns back on its trip. The master movement, which controls the time element in the transfer issuing machine, is a Seth-Thomas eight-day lever clock, such as is used on high power steam locomotives. The clock requires practically no attention in actual service and is wound only when new rolls or transfers are installed in the removed case. The printing mechanism is also said to be of substantial construction.

The forms used in this machine are printed in lots of 2000 to 3000 each, depending on the quality and thickness of the paper. These are furnished in perforated rolls, and the printing includes such standard rules and information as are generally used on the ordinary transfer forms. As shown on the transfer form reproduced, spaces are left for the various data which are printed at the time each transfer is issued.



Transfer Issuing and Recording Machine

It is believed that this device will materially decrease the time of issuing transfers at crowded transfer points, reduce misuse of transfers by passengers and prevent waste of transfers through improper punching. Only the exact transfer requirements of each day are printed, and the company receives a complete record of the transfers issued. In actual service this machine has been found also to serve as a check on the arriving and departing time of crews at the end of the line because the changing of the directional lever and pressing of the pedal cause the issuance of a final transfer with a directional indication opposite to the one in which the car is about to run. This transfer is put with the canceled transfers collected on the trip just completed, and all are inserted in an opening at the base of the box. From time to time an authorized representative of the company removes the canceled transfers. A check of the uncanceled transfers in each lot representing a trip gives the car's arriving and departing time at the end of the line. One man stationed at some central point can very readily load a large number of machines with ten to thirty days' supplies without delaying traffic. Tests of this device are being made by the Detroit United Railway, the Cleveland Railway, the United Railways of St. Louis, Mo., the New York State Railways, Syracuse, N. Y., and the Public Service Railway, Newark, N. J.

Large cards were recently placed in the railroad stations of the Long Island Railroad inviting patrons to bring their complaints or suggestions to the office of General Superintendent Thornton, at the new Jamaica station, on the first and third Wednesdays of the month. Mr. Thornton, when interviewed, said: "The company wants to get in touch with its patrons, the same as a department store would. We have arranged for these 'kick' conferences to bring this about. Any patrons is urged to call us up or write or bring his suggestion or complaint direct to me."

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News of Electric Railways

Chicago to Advertise for Proposals to Construct, Equip and Operate Rapid Transit Subways

The City Council of Chicago has authorized an advertisement for proposals to construct a comprehensive system of passenger subways, within the city limits, that will be operated independently of existing surface and elevated transportation lines, and that will ultimately be municipally owned, through the amortization of the construction debt out of earnings. The ordinance authorizing these invitations specifies routes that approximate 57 miles in extent, or approximately 135 miles of single track, for which the construction estimates approximate $96,000,000 for subway construction and $34,000,000 for equipment, or an estimated total of $130,000,000.

The ordinance further specifies the form in which proposals for construction and equipment are to be made, the object being to secure competitive bids on the proportion of estimated gross receipts from the operation of subways that contracting parties may consider a necessary return for their investment.

The bids are also to specify: (1) What proportion of gross receipts shall be applied to a sinking fund to amortize the construction debt. (2) Rate of division between company and city of the remaining gross receipts, after providing for operating expenses, interest on investment and sinking fund.

As the city's grant of operating privileges is limited, by statute, to twenty years, it follows that a liquidation of the construction debt will be based on the prospective subway earnings during the twenty-year operating period.

The City Council has further directed that if any proposal is deemed acceptable it shall be incorporated in a second ordinance, containing the detailed requirements of the first or preliminary ordinance, and that the second ordinance shall be submitted to a referendum vote of the citizens of Chicago in April, 1914, to give the citizens an opportunity to express their preference for one of three alternative plans for beginning the construction of passenger subways in Chicago, as follows:

1. For a comprehensive system of through-route, high-speed passenger subways, extending approximately to the city limits on three sides, to be built by private capitalists, named in the ordinance, on such terms of partnership with the city as will secure the gradual liquidation of the construction debt out of earnings, leaving the actual subways municipally owned and providing for the future transfer of operating equipment to the city, or a new lessee, at the end of a twenty-year operating period.

2. For a limited system of passenger subways, in the downtown district, to be built by the municipality itself, out of present and future accumulations in the "traction fund"; such city-owned subways to be leased to the present owners of Chicago's elevated railroad, for the latter's exclusive use, as a downtown clearing house for the elevated railroad system.

3. For a limited system of passenger subways in the downtown district, to be built by the municipality, out of the "traction fund," possibly supplemented by direct financial aid from the surface car companies, as suggested in the 1907 traction ordinances; the said downtown subways to be used exclusively for the routing of a proportion of surface car traffic.

It is expressly provided, in the first ordinance, that the second ordinance, when submitted to the voters at the April election, shall become a law only, (1) if it secures a majority of the votes cast thereon, (2) if it secures a greater number of votes than the votes cast in favor of the elevated road subway ordinance, and (3) if it secures a greater number of votes than the votes cast in favor of the surface car subway ordinance.

In the last two plans mentioned for beginning subway construction there is no necessity for competitive proposals, and the operating terms to be arranged, if either plan is chosen by the voters, are confined to the elevated railways in one case, and to the surface railways in the other case.

This leaves the first-mentioned alternative plan—that of a comprehensive citiy-wide system of subways—as the only plan in which competitive proposals are invited.

Further, such competitive proposals must be received by the Chicago City Council in ample time to permit the canvassing of the same and the drafting of a second ordinance for submission to the voters in April, 1914.

The Boston Arbitration Hearings

Before the arbitration board sitting in the Boston (Mass.) Elevated Railway labor investigation during the last few days, Charles H. Hile, chief of maintenance, set forth the differences between street railway and industrial shop practice and conditions and reviewed wages in Boston as compared with other companies in Massachusetts. Exclusive of officials,, foremen, clerks, stenographers and others engaged in occupations not classed as trades there are 2570 employees included in the bureau of maintenance. Of these 21.26, or 83 per cent, are engaged in eleven trades, and the remaining 444 represent other trades, in each of which the company employs a small number of men. In the bureau are 420 laborers and others, 392 mechanics and helpers, 316 trackmen, 269 car cleaners, 183 pitmen, 176 woodworkers and helpers, 113 painters and helpers, 73 carpenters and helpers, 66 blacksmiths and helpers, 64 pavers and 54 wiremen and helpers.

Mr. Hile presented tables comparing the wages paid by the Boston Elevated Railway with those of employees in the same lines of trade on the New York, New Haven & Hartford Railroad, the Boston & Maine Railroad, the Boston & Albany Railroad, and the Bay State, Worcester Consolidated, Boston & Worcester and Middlesex & Boston street railways, confining himself, in accordance with the ruling of the board, to conditions in Massachusetts. The basis of comparison was the average hourly rate of wages. The table presented showed that the Boston Elevated Railway paid its carpenters, pavers and trackmen higher average hourly wages than any of the other companies for which figures were given; that the Boston company paid next to the highest average hourly wages to laborers, pitmen and wiremen; that two companies paid higher average hourly wages to car cleaners, mechanics, painters and woodworkers, and that three companies paid higher average hourly wages to blacksmiths. The average hourly wages paid by the company in each of the eleven principal trades in the bureau of maintenance and the numbers of other companies for which corresponding figures were available and admissible for comparison that were higher or lower are shown in the following table:

Trade	Boston Rate	Others Higher	Others Lower
Blacksmiths	31.1	3	5
Car cleaners, surface	19.3	..	..
Car cleaners, elevated	20.1	2	5
Carpenters	31.8	0	1
Laborers	20.1	1	5
Painters	28.5	2	5
Mechanics	28.5	2	4
Pavers	37.5	0	2
Pitmen	26.5	1	4
Trackmen	22.8	0	3
Wiremen	30.4	1	4
Woodworkers	28.5	2	6
		14	44

J. Henry Neal, general auditor, testified that for the fiscal year ended June 20, 1913, the company had a deficit of $496,377 after paying fixed charges, cost of operation and dividends. During the year the company carried 326,352,863 revenue passengers and about 272,000,000 free transfer passengers. Provided the company is able to maintain dividends at an average rate of 6 per cent, it will be paying a return of about 4.94 per cent on the amount received for both stock and bonds. The stock of the Boston Elevated and West End companies is held mainly by small stockholders. Further testimony concerning the obligations of the company was given by Mr. Neal as outlined in the opening statement abstracted in the ELECTRIC RAILWAY JOURNAL of Nov. 1, page 993. If dividends are paid on the stock at the present rate of 6 per cent the company will have to meet an increase in fixed charges and dividend allowances of $315,764 in the present year. An interesting table presented

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by Mr. Neal gave the weekly wages paid to all regular and regular extra motormen and conductors listed Aug. 1, 1913, showing the range of compensation and number of each class receiving it.

ANALYSIS OF WEEKLY PAY, REGULAR AND REGULAR EXTRA MOTORMEN AND CONDUCTORS

Range in Pay		Conductors	Motormen
$8 but under	$9	1	0
9	10	0	2
10	11	4	1
11	12	2	1
12	13	13	5
13	14	25	5
14	15	38	23
15	16	73	58
16	17	120	99
17	18	186	194
18	19	20	71
19	20	71	146
20	21	29	33
21	22	13	12
22	23	3	7
23	24	1	2
24	25	1	4
25	26	0	2
26	27	0	1
		729	872

The company now pays one and one-ninth times the rate per hour that it paid prior to Jan. 1, 1913.

In response to questions by the company's counsel, Mr. Neal stated that total wages paid in the maintenance of way on surface lines had increased 7.3 per cent in the past five years; 25 per cent in the elevated road department; 14.67 per cent in the armature shop; 17.7 per cent in the Bartlett Street shop; 11.69 per cent in the Albany Street machine shop; 14.4 per cent in the Sullivan Square and Guild Street shops; 16.7 per cent for carhouse pitmen; 17.1 per cent for car cleaners: 3.78 per cent for the Albany Street yard crew; 8.6 per cent in the department of wires and conduits; 18.3 per cent in emergency crew service; 14.79 per cent in the building department, and 7.6 per cent in the stores department.

Mr. Snow then questioned the witness as to the cost of granting the requests of the employees' organization for increases in wages at the Bartlett Street shops, the machine shops and for the general maintenance crews. Mr. Neal said that 310 men were affected at the Bartlett Street shops, and that the proposed increase would cost $56,001 annually; that to increase the wages of 176 machine shop employees would cost on the proposed basis $44,850 per year, and the proposed increase of emergency crew wages applying to 53 employees would total $9,876, making a total of $110,728. This does not represent the total cost of the proposed wage increase, as the employees' organization includes in its memorandum only 79.7 per cent of the total payroll, or about 72.6 per cent of the number which the company would have in service under normal conditions.

Mr. Neal stated on cross-examination that he estimated the loss of revenue to the company during the strike of 1912 at $250,000, and added that payments were also made to strike-breaking organizations, bonuses to men who remained loyal to the company, meal and lodging expenses and other items which possibly totaled $1,000,000. Heavy losses were sustained from uncollected and improperly retained fares. Free passes are issued to lessees of bootblack stands, news stands and vending machines on the rapid transit lines, but the company issues practically no passes permitting persons to ride free of charge on its system as a whole. Police officers and firemen in uniform are carried free, as are uniformed employees. Letter carriers ride on 5-cent tickets purchased for their use by the government. The company derives a revenue of $37,097 for the carriage of mails. Mr. Neal said that careful analyses of this service showed that its return was entirely inadequate to the company. Efforts are being made at Washington to secure about $20,000 per year more for this service. The company sets aside 3.5 per cent of its receipts to meet the cost of legal services and tracing in case of accidents.

Notwithstanding that the Leicester (Eng.) Town Council obtained the necessary parliamentary powers to run motor omnibuses over certain routes, it has decided to extend its tramway system over these same routes. The committee reports that the P. A. Y. E. system is a satisfactory one, and it has been decided to provide ten additional cars on the P. A. Y. E. principle.

Cleveland Hard Hit by Lake Region Storm

An extremely severe snowstorm struck Cleveland on the night of Nov. 9 and as a result both street car and railroad traffic was almost completely tied up on Monday, Nov. 10. The storm began with rain. This was followed with a heavy fall of snow accompanied by a high wind which caused huge drifts to accumulate in many places.

The tracks of the Cleveland Railway were coated with ice and slush in addition to the snow, and electric light, telephone and telegraph poles and wires were blown across the railway lines in many places. The sections along St. Clair Avenue, Superior Avenue, 105th Street and the Collinwood addition on the East Side suffered most, although the damage also was great on Broadway, Cedar and Woodland Avenues and East Fifty-fifth Street. On the West Side Detroit Avenue suffered most, but the Lorain Avenue, West Twenty-fifth Street and Clifton boulevard lines were tied up also. The company succeeded in operating a few cars on Euclid Avenue on the morning of Nov. 10 and later in the day Cedar Avenue was opened for a portion of the distance. A heavy snow continued to fall through the day and the united efforts of the sweepers were required to keep these lines open.

About 1500 men were employed to shovel snow from the other tracks and aid in getting the lines into operation, but on Nov. 11 only five or six lines had been opened. On the afternoon of Nov. 12 the following report in regard to service was made: Intermittent service on Euclid, Wade Park, Superior, Scovill, Woodland, Kinsman, West Fourteenth, Central, West Twenty-fifth, Lorain and East Fifty-fifth between Broadway and the lake; East 105th, no service for two days; Scranton, service late Wednesday; Broadway, line open from Corlett to Public Square; Clifton, line to be open late Wednesday; Detroit, uncertain schedule of cars being operated in section between Public Square and Rocky River; Shaker Heights, South Brooklyn and Corlett, service late Wednesday evening; Fulton, line to be opened Wednesday afternoon; Payne, line open east from Fifty-fifth Street; St. Clair, cars operating between Public Square and East Fifty-fifth Street and entire line to be open by Wednesday night.

Operation on all interurban lines reaching Cleveland was stopped Sunday night. The Lake Shore Electric Railway resumed service on Wednesday morning and the Cleveland, Southwestern & Columbus Railway arranged to resume service on Wednesday afternoon. All the other lines expected to have cars in operation late Wednesday evening.

The engineer in the Street Railway Commissioner's office estimated the damage to the Cleveland Railway at between $100,000 and $125,000.

Additional Rapid Transit Bids in New York

The Public Service Commission for the First District of New York opened bids on Nov. 10 for seven additional portions of the new subways. The bids were for the construction of Section No. 3 of Routes Nos. 4 and 38, the Seventh Avenue Subway in Manhattan. This will be a branch of the existing subway from Times Square south through Seventh Avenue and other streets to the Battery and Brooklyn, and will be operated by the Interborough Rapid Transit Company as part of the existing subway. Section No. 3 covers that portion of the line in the Varick Street and Seventh Avenue extension between Beach and Commerce Streets. These three lowest bids were Degnon Contracting Company at $2,185,063. Rodgers & Hagerty at $2,563,787 and the Oscar Daniels Company at $2,576,476.

Bids for Section No. 2, immediately south of this section, were opened on Oct. 1, but the commission has not yet awarded the contract. Bids for Section No. 5, which covers that portion of the line in Seventh Avenue between Sixteenth and Thirtieth Streets, were opened on Nov. 12. The three lowest bidders for this work were Canavan Brothers Company at $2,401,000, Rapid Transit Subway Construction Company at $2,531,000 and MacArthur Brothers Company at $2,670,000.

On Nov. 18 bids will be opened for the construction of the Steinway tunnel extension from its present terminus in Queens to the Queensboro Bridge. On Nov. 21 bids will be opened for the construction of the proposed elevated rail-

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road, to be operated by the New York Municipal Railway Corporation, in New Utrecht Avenue. This will be a branch of the Fourth Avenue subway in Brooklyn. On Nov. 26 bids will be opened for the construction of the northern half of the proposed elevated railroad in White Plains Road, the Bronx. This line will be an extension of the existing subway from Bronx Park north through White Plains Road to 241st Street, near the northern city line. The section on which bids are being asked extends from Gun Hill Road to 241st Street. On Nov. 28 the commission will open bids for the construction of the southern half of the proposed elevated railroad in Jerome Avenue, the Bronx. This line will be a branch of the Lexington Avenue subway, now under construction, and also will be used as an extension of the present West Side elevated railroad system, now terminating at 155th Street and Eighth Avenue. The section on which bids are being asked lies between 157th Street on the south and Burke Avenue on the north. On Dec. 1 bids will be opened for the construction of the middle section of the Southern Boulevard and Pelham Bay branch of the Lexington Avenue subway. The section on which bids are being asked lies in Southern Boulevard and Whitlock Avenue between 147th Street and Bancroft Street, and the construction will be almost entirely underground work. The first section of this subway, running under 138th Street and Southern Boulevard to 147th Street, is already under construction.

The Public Service Commission for the First District has approved the form of contract for the construction of Section No. 6 of Routes Nos. 4 and 38, the Seventh Avenue subway in Manhattan. Section No. 6 covers that portion of the subway under Seventh Avenue between Thirtieth and Forty-second Streets. As this line is being built with the money contributed by the Interborough Rapid Transit Company, the form of contract was ordered sent to that company for approval, in accordance with the dual system agreements. The company has ten days within which to return the same with its criticisms and suggestions.

Financing of Electric Service Properties

Samuel Insull, president of the Commonwealth Edison Company and the Middle West Utilities Company, Chicago, addressed the convention of the Investment Bankers' Association of America in that city on Oct. 30. His subject was "Electrical Securities."

Mr. Insull made the point that there are two classes of engineering influencing the electric-service industry. One is the mechanical and electrical engineering—that is, the engineering construction—and the other is first-class selling engineering. He spoke of his work of the last ten years in relation to the wholesaling of energy in very large quantities, and he described the effort that has been made and is still being made to fill up the valleys in the load curve. The problem is to keep the investment working for as many hours of the day and as many days of the week as is possible. In the production of electrical energy the greatest item of expense is the cost of money. First-class selling engineering makes it possible to get useful work from the dollar of investment for the longest possible time. Mr. Insull said he thought that if he had to choose between first-class construction engineering and first-class selling engineering he would select the latter, as it would give him the use of more money on the dollar invested with which to make up for possible mistakes made in constructing engineering. The item of paramount importance in the financial aspects of the electric service industry is not the replacement value of the central station or the distribution system, but it is the assurance that the selling organization of the company under consideration is of the highest possible order.

Mr. Insull gave statistics showing that in 1898, when the Commonwealth Edison Company had something over 5000 customers, the investment per customer was $1,579. In 1912 the number of customers was nearly 180,000 and the investment per customer had dropped to $417. In 1898 the annual gross income per customer was $210, and in 1912 it had dropped to $87. Elucidating these figures, Mr. Insull said, "We have produced a greater saturation of the dollar with energy." The income in 1898 was 13.5 per cent of investment. In 1912 it was 21 per cent of the investment.

Mr. Insull then considered the diversity factor to show the advantages of concentration of production in supplying a large area with different demands, as, for instance, the State of Illinois. If the lighting business, local and interurban railways, ice-making plants, coal-mining, water-works pumping, drainage pumping and so on were supplied from the same source of energy, striking economies could be effected.

In relation to holding companies, Mr. Insull said that the great danger here is the multiplication of securities and the creation of so-called prior-lien securities of the holding company, based upon the junior securities of the operating company or companies. If the deed of trust underlying the collateral trust securities is rigid enough to protect the purchaser against the creation of a large floating debt by the operating company, there is no reason why the stocks of operating companies should not be put up as security for collateral trust bonds of holding companies. The mere creation of paper securities, however, does not add anything to the actual cash invested in the companies.

Mr. Insull quoted from his presidential address of 1898 to the National Electric Light Association, in which he advocated public control as the proper safeguard of the interests of consumers, taxpayers and investors. Generally speaking, the creation of state public utility commissions has been for the good of the industry and for the good of the securities based on the industry, as well as the good of the people in the communities served. In the principal cases where regulation has seemed to be unfriendly it will no doubt often be found that the men in control of the property have not had a proper appreciation of the underlying principles governing the business. If an administrative board is made up of honest men, it will give the utilities a fair return on the money invested provided that money has been judiciously spent and the business judiciously conducted.

Mr. Mellen Discusses New England Trolleys

In an interview published in the Boston *Sunday Post* of Nov. 9, 1913, Charles S. Mellen, former president of the New York, New Haven & Hartford Railroad, declared himself in part as follows:

"The New Haven, long before I took charge, had been in the electric railway business because the electrical lines are natural feeders of traffic to the main road, and in acquiring additional lines I stepped on the toes of the people who control the Boston Elevated Railway, the Massachusetts Electric Companies and the Boston & Worcester Street Railway. They raised the cry of monopoly against the New Haven, although at the same time they were trying to monopolize the field for themselves. The New Haven policy met with no opposition in Rhode Island or in Connecticut, or in Massachusetts, for that matter, outside of Boston and vicinity.

"The electric railways owned by the New Haven have been, with one exception, as profitable as the Boston Elevated Railway. If the electric railways are held they will prove big money makers for the New Haven. The fact is that the electric railway interests of New England and even those outside of New England are anxious to get the electric railway lines for themselves. Even now some of the trolley lines are being investigated by the Boston interests for the purpose of placing a valuation upon them. When their value has been thus determined, the same interests will try to take them over at their own valuation. They are anxious to remove this source of weakness from the New Haven system. When they have acquired the electric railways they will push through their Boston to Providence electric road scheme and be direct competitors of the New Haven. This is the way they are planning to help the poor New Haven stockholder.

"The New York, Westchester & Boston Railway was purchased prior to the panic of 1907. It is generally known that I was not in favor of this purchase. If I had had that money without the Westchester I could have four-tracked the road from Boston to Providence, could have taken out curvature and revised alignment which would have saved 5 miles between Providence and New London, and I could have electrified the entire New Haven road between New York and Boston.

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"The stockholders' protective committee was formed in Boston in the interest of the fiscal agents and dominated by them. It was simply a blind behind which my work was supposed to be investigated and condemned. As a matter of fact, I was condemned in advance. While I was the operating head, the house of Morgan absolutely dominated the New Haven policies. J. P. Morgan is dead; but control is just as absolutely with that house to-day, and the second generation is working hand in glove with the Boston bankers. The stockholders' committee, with all its imposing names, is nothing more than a marionette wiggled from the back by the Boston Machiavelli."

According to Mr. Mellen no corporation official is worth a salary of more than $25,000 per year. He himself, he states, would have worked as hard for the New York, New Haven & Hartford Railroad for $25,000 a year as he did for $60,000 or $75,000.

Mr. Mellen sees government ownership ahead. He said: "The railroads will all go under government ownership. It is coming quickly. The regulation by the government during the last ten years has tended to lower the value of railroad stocks as investments. There will not be any great opposition to government ownership when the time arrives, because private capital will find the field unprofitable."

Howard Elliott, chairman of the board of directors of the New York, New Haven & Hartford, made the following reply to Mr. Mellen:

"As to the electric railways, the Boston & Maine Railroad, the steamships and any other outside purchases, I desire to state again that all of these matters are under the most careful investigation by committees of the directors and by technical experts who will give to the directors information independent of the officers.

"I have no opinion to express as to the wisdom or the unwisdom of any purchase or policy in the past. All of these matters must be passed upon by the board, which will give full consideration to the special reports to be made, to the report of the Interstate Commerce Commission, to the views of the Department of Justice, and to the interests of the stockholders and the bondholders.

"It may be of interest to state here that of the board as it is now constituted a majority have been elected since the last electric railway purchases and since the last steamer line purchases except in the case of the New Bedford and Martha's Vineyard line."

William A. Gaston, president of the National Shawmut Bank and identified with Morgan interests in Boston, took exception to Mr. Mellen's statement about Boston bankers, saying he believed they had sustained instead of hindered Mr. Mellen in his work. Mr. Gaston said:

"I am sure that the trolley interests of Boston had no desire to monopolize the field. They have all the trolleys they want."

Charles A. Stone, of Stone & Webster, stated that the interests connected with them were in no way responsible for the conditions which exist on the New York, New Haven & Hartford Railroad.

A member of the firm of J. P. Morgan & Company denied emphatically that a contest between the New York and Boston bankers over the control of the New York, New Haven & Hartford Railroad had in any way contributed to the difficulties of the railroad, as was alleged in the statement made by Mr. Mellen in the interview with him which appeared in the *Post*.

Suit Regarding Couplers at Buffalo

Whether or not electric railways doing an interstate business or operating over an interstate line shall be forced to equip their cars with automatic couplers will be decided within the next two weeks by Judge John R. Hazel of the United States court for the western district of New York, sitting in Buffalo. The case is that of the government against the International Railway charging nine violations of Section 2 of the safety appliance act of the interstate commerce laws. It is alleged in the complaint filed with the court that the International Railway operated nine passenger cars from Lockport to North Tonawanda on Feb. 10, 1913, equipped with link and pin couplers, instead of automatic couplers as required under the federal statutes. Nine violations are charged in the test case and the government seeks to recover a penalty of $900 from the company.

In its answer filed with the court, counsel for the International Railway asserted the cars in question were operated wholly within one state and asked that the complaint be withdrawn with costs for the defendant. The motion to this effect was denied by the court.

The United States district attorney will contend that the cars were being operated over the Erie Railway between Lockport and North Tonawanda and that the Erie Railway is an interstate railroad. The federal authorities also contend that the International Railway comes under the jurisdiction of the government in such matters because it has a line running into Canada at Niagara Falls, Ont.

Making Good the Deficit in Cleveland

Discussing the street railway situation as it exists at present, the Cleveland *Leader* in its issue of Nov. 7 stated that a 1 cent charge for transfers would have to be put into effect on March 1, 1914, by the Cleveland Railway to meet a deficit of about $1,560,000 which must be made good by the end of the ordinance year to comply with agreements entered into between the city and the company. The paper says that the deficits arise from $360,000 that must be charged off for worn-out cars, $800,000 that the arbitrators said should be charged off immediately, and an indicated deficit in the maintenance fund that railway men say will amount to $400,000. J. J. Stanley, president of the company, is said to be willing to allow the $800,000 to stand until the end of the ordinance year. It is estimated that the charge of 1 cent each for transfers will yield $700,000 in one year, based on past experience. It may, however, also be necessary to increase the allowance for maintenance and operation to make up the deficits. The *Leader* asserts that the company and the city will probably be able to reach an agreement without the necessity of resorting to arbitration if new questions arise.

Decision in Chicago Car-Heating Case.—The Appellate Court at Chicago has sustained the decision of the municipal court to the effect that the elevated railroads of Chicago are organized under the general railroads act of the State and that the city ordinance in regard to the heating of passenger cars applies only to street railways.

Final Argument in Toronto Deviation Case.—The argument was concluded in the Privy Council, London, Eng., on Oct. 28 in the case of the Toronto & York Radial Railway versus the city of Toronto concerning the right to deviate the railway. The Privy Council, after hearing the appeal of the railway, intimated that it would be unnecessary for the city to present its case, thus indicating its intention of confirming the finding in favor of the city.

Portland, Eugene & Eastern Operation.—Announcement has been made by the Southern Pacific Company that pending the complete electrification of the Portland, Eugene & Eastern Railway the parent company will handle all operating and traffic matters connected with the proposed electric line. Steam service will be operated on the new lines until electrification is completed, when traffic and operation control will be resumed by the Portland, Eugene & Eastern Railway.

Chicago Unification Ordiance Passed.—At the meeting of the City Council of Chicago, Ill., on the evening of Nov. 13, the ordinance providing for the unification of the systems of the Chicago Railways and the Chicago City Railway was passed with unimportant amendments. The ordinance was before the Council previously on the evening of Nov 10, when action was postponed on motion of Alderman Cullerton, who stood out for an expression of opinion from the Corporation Counsel in regard to the status of the employees of the company under the proposed re-arrangement.

Work Begun on Pennsylvania Electrification at Philadelphia.—Work has been begun at St. Davids on the electrification of the main line of the Pennsylvania Railroad between Philadelphia and Paoli. The announcement was made by President Rea last March that the company would electrify its line from Philadelphia to Paoli and

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that the work would be completed in 1914. Other steps in the general plan of electrification improvements are the enlargement of Broad Street station, the Girard Avenue bridge over the Schuylkill and track improvements at North Philadelphia and on the company's Chestnut Hill branch.

Mayor Jost Recommends Approval of Franchise Ordinance.—Mayor Jost of Kansas City, Mo., has recommended that the franchise ordinance as it now stands be accepted by the City Council, which is now considering the ordinance granting a franchise to the Metropolitan Street Railway. The Council committee will hold daily sessions after it has fully digested the ordinance and its provisions. At that time any Kansas City resident who desires to bring some new feature to the attention of the committee will gain a hearing. W. F. Brown has been elected chairman of the special committee from the two boards of the Council.

Municipal Ownership Proposals Defeated.—On Nov. 4 the voters of Grand Junction, Col., rejected three separate proposals for municipalizing the local public utilities. One proposition was for the purchase or construction of an electric plant, another was for the purchase or construction of a gas plant, and a third was for the purchase of all the properties of the Grand Junction & Grand River Valley Railway Company, including gas, electric and railway departments. The largest vote against municipal ownership was on the question involving the municipalization of the property of the Grand Junction & Grand River Valley Railway Company.

New York's Study of London and Paris Bus Service.—Under date of Nov. 5, the Board of Estimate and Apportionment, City of New York, presented to Mayor Kline through Chief Engineer Nichols a report on bus operation in London and Paris as made by John A. McCollum, the special representative of the board. The report reviews at length the conditions under which motor buses are operated in the cites named, compares the burdens borne by buses and by electric railways, and points out the desirable limitations of bus service for a city like New York. A more extended review of this report will appear in a later issue of the ELECTRIC RAILWAY JOURNAL.

Extension to Michigan Central Depot in Detroit.—The city administration of Detroit issued an ultimatum recently to the effect that the Detroit United Railway must build extensions from both Michigan Avenue and Fourteenth Street and build them at the same time, but fixed the fare for the Fourteenth Street extension at eight tickets for 25 cents or on the basis of the old 3-cent fare lines. The company was to be permitted on the Michigan Avenue extension to collect fares at the seven-for-a-quarter rate. The company refused to meet these conditions and the Mayor has agreed that the company may build the Michigan Avenue extension at this time under the contract made last August and to charge the same fare as on the other lines. The extension is intended to provide accommodations to the new Michigan Central depot.

Washington-Virginia Railway Resists Fender and Wheel-Guard Order.—The Washington-Virginia Railway, Washington, D. C., has asked for an injunction against the Public Utilities Commission to prevent the carrying into effect of an order that it equip its cars with automatic projecting pick-up fenders and automatic wheel guards. The railway company questions the authority of the commission to pass the order on the ground that it is identical with one which the Interstate Commerce Commission refused to require to be enforced. Owing to its interurban traffic, where is maintained a much greater speed than allowed in the District, the company claims it would be dangerous to equip its cars with the required fenders, as they would likely become displaced. Such displacement would possibly result in the derailment of the cars, it is suggested, with consequent loss of life and property.

Way Cleared for Construction of Twin Peaks Tunnel, San Francisco.—The resolution levying assessment in the matter of the construction and completion of a tunnel with approaches and appurtenances thereto and of the acquisition of lands and easements therefor under the Twin Peaks Ridge has been passed by the Supervisors of San Francisco. This action clears the way for commencing construction work on the $4,000,000 subway which is to give rapid transportation facilities to the section west of Twin Peaks. On the recommendation of the Public Utilities Committee the Supervisors adopted a resolution declaring in favor of the construction of a branch of the Geary Street Municipal Railroad along Masonic Avenue from Geary to Turk Street to connect with the proposed new baseball park.

Philadelphia Loan Bill Passed.—At the election in Philadelphia on Nov. 4 the voters approved the proposed $8,600,000 loan by the city. This loan, with other things, commits the city to the construction of a Broad Street subway, with elevated branches, and the other rapid transit improvements projected by Transit Director Taylor. Mr. Taylor is quoted as follows: "The passage of the loan bill means much to the city. It marks another important step toward securing improved transit facilities. With real rapid transit, via routes properly located, the physical and commercial expansion of the city will be accelerated along proper lines." T. E. Mitten, chairman of the executive committee of the Philadelphia Rapid Transit Company, is expected to return from Europe about Dec. 1. He will probably report soon thereafter on the question of the company operating the proposed Broad Street line under lease from the city.

Electrical Day in Dallas.—In connection with the electrical parade which was held in Dallas, Tex., on the night of Oct. 31 the Dallas (Tex.) Consolidated Electric Street Railway displayed a 10-ft. body box car, a relic of the nineties, drawn by a pair of mules and driven by a former employee of the company who drove the same car in the early days. This old car was received by the spectators with much applause, particularly by those old-timers who recalled the days when the car was one of several that operated on what is now the Ervay line. The car was followed by two modern street cars operating in a train with multiple-unit control. The ornamental lighting system was discontinued along the line of march during the progress of the parade so the temporary lighting effects might appear to the best advantage. The parade proved very successful, and it is probable that an "electrical day" will hereafter become a permanent feature in connection with the annual state fair.

Plans for Railroads at Manhattan Approach to Queensboro Bridge.—Arthur J. O'Keefe, bridge commissioner of New York, has completed plans for the Manhattan approach of the Queensboro Bridge, which is built over the East River between Fifty-ninth Street, Manhattan, and Long Island City. They provide for surface, underground and overhead transit lines and they occupy four blocks between Fifty-ninth and Sixtieth Streets, Second and Third Avenues. This area is assessed at $933,000 for the land and $1,217,000 for buildings. The approach to the bridge will begin at Third Avenue, thus connecting with the elevated at that point. The Lexington Avenue subway will pass it a block away. The surface car lines crossing the bridge from Queens and Brooklyn will enter a sub-surface station which will take the place of the present station. The subway trains from Long Island crossing the bridge will run westward to Seventh Avenue, south to Forty-second Street, down Broadway to Vesey Street, and thence to a new tunnel under the East River from Whitehall Street in Manhattan to Montague Street in Brooklyn.

Report in Regard to Interurban Entrance to New Orleans.—Consulting Engineer Coleman, who was employed by Mayor Behrman and the Commission Council of New Orleans, La., to investigate and report on the routes under consideration for the entrance of the interurban road into its proposed terminus in University Place, has reported to the Mayor and the commissioners. Mr. Coleman's conclusions are that the most dangerous and unacceptable route of the eight which were submitted to him is what is known as the "straight route," extending from Gasquet Street straight across Elk Place and across South Rampart Street to the terminal. He commends as the most safe and feasible route that which was suggested by Commissioner of Public Property E. E. Lafaye, as a modification of the Carroll plan, by cutting out the portion running through University Place to Common Street and on Common Street to South Rampart Street. Mayor Behr-

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man, City Attorney I. D. Moore and District Attorney Marrero have been named by the Jefferson Police Jury as a committee to look into the interurban railroad project with the view of reaching some amicable route and settling other details.

Leased Companies File Suit to Recover Excise Tax.—Four railway companies whose properties are operated upon a rental basis by the Ohio Electric Railway have brought suit against Andrew C. Gilligan, collector of internal revenue, in the Common Pleas Court at Cincinnati, Ohio, to recover the special excise tax paid to the federal government for 1912 and 1913. The claim is made that the Ohio Electric Railway has paid the excise tax on its net income and that this covers the net income of the four roads it operates on a rental basis. The net income of these companies goes to the Ohio Electric Railway, they claim, and the only return they receive is the rental paid by that company. The amounts claimed are as follows: Indiana, Columbus & Eastern, $1,201.36 for 1912 on a net income of $120,136 and $1,387.50 on a net income of $138,750 for 1913; the Fort Wayne, Van Wert & Lima Traction Company, $450 for 1912 and $450 for 1913 on a net income of $45,000 for each year; the Dayton & Western Traction Company, $823.50 for 1912 and $823.50 for 1913 on net incomes of $82,350 for each year, and the Columbus, Newark & Zanesville Electric Railway, $339.88 for 1912 on a net income of $33,988 and $400.77 on a net income of $40,077 for 1913.

Hearing in Regard to Abandonment of Road.—Efforts are being made by Batavia (N. Y.) citizens to buy the Buffalo & Williamsville Electric Railway, which has petitioned the Public Service Commission of the Second District of New York for permission to abandon its Batavia line on the ground that it is a losing financial proposition. A hearing was held in Batavia on Nov. 10 on the company's petition to abandon the road. Several individuals asserted they were ready to join a company to buy the railway, but an agreement could not be reached with the company regarding the value of the line. Loran L. Lewis, Jr., and Godfrey Morgan, of Buffalo, officers and part owners of the line, at first estimated that they should receive $14,000 for the road. An adjournment was taken in order to give the railway officials and those interested in the purchase an opportunity to agree on terms. The railway officials offered to refer the matter of fixing the value of the road to Judge Haight, of Buffalo, as a disinterested party, but Devoe P. Hodson, public service commissioner, who presided at the hearing, decided that the company must sell at salvage value and not take the company's franchise and good-will into consideration. Mr. Lewis then offered to sell the road for $10,000.

Necessity for Increasing Electric Railway Fares.—*Financial America* quotes a member of the firm of E. W. Clark & Company, Philadelphia, Pa., in part as follows in regard to the question of fares on electric railways: "If street railways are to prosper and investors and the general public are to be protected, reasonable rates must be maintained. In fact, fare advances are imperative in many sections if the general demand for extensions and improvements to urban, suburban and interurban lines are to be carried out. Experts have found that the Cleveland Railway, which has a 3-cent rate, is operating at a loss; that its service is far from satisfactory, that extensions and improvements are impossible because of revenue losses, and that ultimately the rates of fare must be increased. Cheap electric railway fares have aided most in the development of the country suburbs and rural districts. The tendency nowadays is to live in the suburbs. This countryward development has been made possible by a single electric railway fare from the crowded sections. There is no desire to interfere with the growth, but the companies very naturally cannot continue these extensions unless they have the necessary capital. Reduce the income of the companies by lowering their rates of fare, and how will they finance the necessary extensions and improvements?"

Celebration by Lehigh Valley Transit Company.—On Nov. 17 the Lehigh Valley Transit Company will open what is said to be one of the largest reinforced concrete bridges ever erected by an interurban electric railway. The bridge is more than half a mile in length and cost approximately $500,000. It connects Allentown and South Allentown and is one of many improvements which the Lehigh Valley Transit Company has accomplished recently. Of the 43 miles of road north of Norristown, Pa., more than 50 per cent has been rebuilt, practically all of the new track being on private right-of-way, reducing the distance more than 3 miles and eliminating several sharp curves and heavy grades. The saving in time accomplished will enable the company to reduce its running time between Philadelphia and Allentown eighteen minutes. The company's Philadelphia division has also been protected, the entire distance, by automatic semaphore block signals, thus insuring safety and expediting the movements of trains. Steel cars are used exclusively on its high-speed interurban equipment. Among those invited to attend the opening are Mayor Blankenburg and his cabinet, of Philadelphia, and well-known Philadelphians who have been identified with the road. The party will leave the Sixty-ninth Street terminal, Philadelphia, on a special train over the Lehigh Valley Transit lines at 10.40 a. m. Nov. 17.

PROGRAMS OF ASSOCIATION MEETINGS

American Society of Mechanical Engineers

The annual meeting of the American Society of Mechanical Engineers will be held in the Engineering Societies Building in New York, Dec. 2-5. Papers will be presented on the following subjects, among others: "Boilers and Their Operation," "Cement." "Fire Protection, with Special Reference to Turbo-Generators, Oils and the Novel Use of the Sprinkler Systems," "Gas Power Engineering," "Lineshaft Bearings," "Machine Tools" and "Steel Railway Cars." A very interesting program of entertainments has been arranged. Excursion trips will be made by those in attendance at the meeting to many of the plants of the public service corporations and the large industrial establishments in the metropolitan district.

American Railway Association

The fall session of the American Railway Association will be held at the Hotel Blackstone, Chicago, Ill., on Nov. 19, 1913, at 11 a. m. Reports will be presented by the following committees: Executive committee, committee on transportation, committee on maintenance, joint committee on automatic train stops, committee on relations between the railroads, committee on the safe transportation of explosives and other dangerous articles, committee on electrical working, and committee on nominations. Three members of the committee on the safe transportation of explosives and other dangerous articles, two members of the committee on electrical working and two members of the committee on nominations are to be elected at this meeting.

Central Electric Railway Association

The following program has been announced for the meeting of the Central Electric Railway Association which is to be held at the Hotel Severin, Indianapolis, Ind., on Nov. 20 and 21, 1913:

Thursday, Nov. 20, 9 a. m.

Business session and reports of committees.

Paper, "The Permanent Security of Bolted-up Construction," by John B. Seymour, Western Manager of the National Lock Washer Company, Chicago, Ill.

Paper, "Forged Steel Wheels and Steel-Tired Wheels," by E. F. Berger, of the Midvale Steel Company, Chicago, Ill.

Paper, "Chilled-Iron Wheels for Electric Railway Service," by W. A. Bennett, representative of the Griffin Wheel Company, Chicago, Ill.

Friday, Nov. 21, 9 a. m.

Business session and reports of committees.

Paper, "The Relation of the Traffic Department to the Company," by J. F. Starkey, general passenger agent of the Lake Shore Electric Railway, Sandusky, Ohio.

Paper, "Industrial Arbitration," by Thomas Duncan, chairman of the Public Service Commission of Indiana, Indianapolis, Ind.

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Financial and Corporate

Stock and Money Markets

Nov. 12, 1913.

The early trading on the New York Stock Exchange to-day showed pronounced activity and strength, but from early afternoon until the close trading was slow and fluctuations of the majority of the issues were confined within fractional limits. Rates in the money market to-day were: Call, 3½@4 per cent; sixty and ninety days, 4½@5¼ per cent; four, five and six months, 4½@5 per cent.

A strong tone was displayed on the Philadelphia Stock Exchange to-day. Philadelphia Rapid Transit closed at 19¼@19½.

The trading in the Chicago market to-day was narrow, but the volume of transactions was large. Chicago Railways bonds sold to the amount of $10,000, and participation certificates, series 2, to the extent of 220 shares.

Fractional advances were recorded on the Boston Stock Exchange to-day, but dealings were small. The tone at the end was steady.

Business was almost at a standstill in the stock market in Baltimore to-day.

Quotations of traction and manufacturing securities as compared with last week follow:

	Nov. 5	Nov. 12
American Brake Shoe & Foundry (common)	88½	88½
American Brake Shoe & Foundry (preferred)	129½	128
American Cities Company (common)	36	36
American Cities Company (preferred)	62¾	63
American Light & Traction Company (common)	328	332
American Light & Traction Company (preferred)	104½	105
American Railways Company	38⅞	38⅞
Aurora, Elgin & Chicago Railroad (common)	40	a42
Aurora, Elgin & Chicago Railroad (preferred)	84⅛	83
Boston Elevated Railway	82½	82
Boston Suburban Electric Companies (common)	7	7
Boston Suburban Electric Companies (preferred)	59	60
Boston & Worcester Electric Companies (common)	a10	6½
Boston & Worcester Electric Companies (preferred)	39	38
Brooklyn Rapid Transit Company	86½	86½
Capital Traction Company, Washington	114¼	112
Chicago City Railway	166	160
Chicago Elevated Railways (common)	25	25
Chicago Elevated Railways (preferred)	75	75
Chicago Railways, ptcptg., ctf. 1	a92	a92
Chicago Railways, ptcptg., ctf. 2	28½	26
Chicago Railways, ptcptg., ctf. 3	7	7
Chicago Railways, ptcptg., ctf. 4	2½	2½
Cincinnati Street Railway	106	105
Cleveland Railway	103¼	103½
Cleveland, Southwestern & Columbus Ry. (common)	*5½	*5½
Cleveland, Southwestern & Columbus Ry. (preferred)	*30	*30
Columbus Railway & Light Company	18	18
Columbus Railway (common)	59½	59½
Columbus Railway (preferred)	88	88
Denver & Northwestern Railway	111	111
Detroit United Railway	a80	a80
General Electric Company	140	140½
Georgia Railway & Electric Company (common)	120½	119
Georgia Railway & Electric Company (preferred)	85½	85
Interborough Metropolitan Company (common)	14⅜	14⅛
Interborough Metropolitan Company (preferred)	57¾	58
International Traction Company (common)	*40	*40
International Traction Company (preferred)	95	*95
Kansas City Railway & Light Company (common)	*22	*22
Kansas City Railway & Light Company (preferred)	*30	*30
Lake Shore Electric Railway (common)	*7	*7
Lake Shore Electric Railway (1st preferred)	*92	*92
Lake Shore Electric Railway (2d preferred)	*25	*25
Manhattan Railway	128⅝	129⅞
Massachusetts Electric Companies (common)	11¼	11
Massachusetts Electric Companies (preferred)	67	66
Milwaukee Electric Railway & Light Co. (preferred)	100	100
Norfolk Railway & Light Company	*25¼	*25¼
North American Company	71	70
Northern Ohio Light & Traction Company (common)	66¼	66¼
Northern Ohio Light & Traction Company (preferred)	97	97
Philadelphia Company, Pittsburgh (common)	39	39¾
Philadelphia Company, Pittsburgh (preferred)	39	39
Philadelphia Rapid Transit Company	23	19⅞
Portland Railway, Light & Power Company	*56	*56
Public Service Corporation	108	107
Third Avenue Railway, New York	39¾	39¼
Toledo Traction, Light & Power Company (common)	30	30
Toledo Traction, Light & Power Company (preferred)	80	80
Twin City Rapid Transit Co., Minneapolis (common)	103¾	104
Union Traction Company of Indiana (common)	13	*13
Union Traction Company of Indiana (1st preferred)	83	*83
Union Traction Company of Indiana (2d preferred)	25	*25
United Rys. & Electric Company (Baltimore)	25½	25½
United Rys. Inv. Company (common)	18	18
United Rys. Inv. Company (preferred)	36½	35
Virginia Railway & Power Company (common)	a56	a56
Virginia Railway & Power Company (preferred)	94	93¼
Washington Ry. & Electric Company (common)	92	92
Washington Ry. & Electric Company (preferred)	89	89
West End Street Railway, Boston (common)	69	70
West End Street Railway, Boston (preferred)	a89	89
Westinghouse Elec. & Mfg. Company	66½	65¾
Westinghouse Elec. & Mfg. Company (1st preferred)	109	110

*Last sale. a Asked.

ANNUAL REPORTS

Columbus, Delaware & Marion Railway

The report of Eli M. West, receiver of the Columbus, Delaware & Marion Railway, Cincinnati, Ohio, presented to the Court of Common Pleas of Franklin County, contains the following statement of earnings and expenses of the company for the fiscal years ended June 30, 1912, and 1913:

Income from operation:	1913	1912
Passenger earnings	$222,042	$209,382
Package and baggage	725	721
United States mail	250	271
Express	7,620	8,091
Milk	6,220	6,707
Freight	23,996	25,441
Rent of tracks and terminals	2,518	3,368
Advertising	688	605
Rent of land and buildings	808	427
Income from other sources	16,522	11,035
Delaware city railway	14,563	14,869
Marion city railway	74,031	62,652
Marion light and power department	71,046	59,065
Gross income from operation	$441,029	$402,634
Operating expenses:		
Maintenance—way and structures	$39,792	$38,363
Maintenance—equipment	20,397	20,391
Operation of power plant	62,679	60,000
Operation of cars	79,989	74,957
General expenses	47,354	41,333
	$250,211	$235,044
Net income from operation	$190,818	$167,590
Fixed charges:		
Bond interest	$124,050	$124,425
Deferred interest	2,843	2,784
Power company sinking fund	5,000	5,000
Taxes	14,677	12,586
Excise tax (Ohio)	5,286	4,828
Federal excise tax	227	43
Other deductions:		
Eli M. West, receiver (on account)	$6,500	$3,100
Receiver's expense account	400	500
Receiver's legal expenses	3,186	4,149
	$162,169	$157,415
Surplus to profit and loss	$28,649	$10,175

Mr. West says in part:

"The unprecedented flood of last March 24 destroyed property of the approximate value of $20,000, and, in addition, entailed a great increase of operating expenses. The operation of the property was almost wholly suspended for several days, and through traffic was not resumed until April 19. During this time the loss of earnings was at least $20,000.

"Work has been begun on the building of a new carhouse for the carpentry and painting department, the old carhouse having been almost entirely destroyed by the flood. The coal bins have been entirely rebuilt and greatly enlarged. The improvement at Summit Street and Mock Road in the city of Columbus has been completed, and the Motz Bridge, the second largest on the line, has been filled.

"Work has been started on the construction of the new Fourth Street viaduct in the city of Columbus, and car traffic will not be suspended during the construction of this viaduct. The lease for the station building on West Gay Street in the city of Columbus, which expired during the year, was renewed under an option in the lease.

"To meet the growing demand for service between North Columbus and Clintonville a street car has been placed in service between these points on a fifteen-minute schedule. The permanency of this service will depend upon its success from an earning standpoint. Two miles of main line track were ballasted during the year, and all of the bridges overhauled at great expense. The expense for bridge renewals is large, but these expenses must continue until some arrangement is made for the filling of the bridges. During the year a deed was procured for the fee of the Glenmary Park property, which is one of the very best assets of the road. A new dam was constructed in the park during the latter part of the fiscal year.

"Additional condenser pumps were purchased for the power plant at Stratford, together with an additional rotary armature and an additional transformer, at a total cost of $5,000.

"Almost the entire right-of-way of the company in Prospect is being paved at a large expense to the property. New switches and double track have been installed at the Court House Square on Center Street in Marion, Ohio, and the right-of-way repaved.

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"The contract for the lighting of the streets and public places and buildings of Marion has been renewed for a period of five years, ending Sept. 1, 1918, and a new schedule of rates for electric current has been filed and approved by the Public Utilities Commission. During the year consent was obtained for the borrowing of money to install a new generating plant in Marion, and the work of installation is well advanced. When completed this auxiliary plant will be a 750-kw turbine plant, which will permit active soliciting of additional power business in the city of Marion.

"Permission was also granted during the year to borrow $20,000 to aid in meeting the interest due on the first mortgage bonds of the Columbus, Delaware & Marion Electric Railroad, due May 1, just subsequent to the flood. While this money went directly to the payment of bond interest, it was in fact used to replace funds expended to take care of flood loss.

"In spite of the flood loss, the State Tax Commission increased the valuation for taxation purposes from $1,207,210 to $1,514,350. This will increase the annual general taxes approximately $2,500, and for the coming year the company will pay an approximate total of $17,000 for taxes, against a total of $8,500 three years ago. In addition to this a percentage of 1.2 on the gross earnings must be paid to the State."

The report also contains the following comparative traffic statistics:

	1913	1912
Main line (interurban):		
Total car mileage	845,789	880,218
Total revenue passengers carried	1,451,491	1,314,260
Average fare, revenue passengers	$0.153	$0.159
Operating revenue per car mile	.333	.302
Operating expenses per car mile	.194	.181
Ratio—expenses to earnings	.582	.599
Delaware city railway:		
Total car mileage	206,768	196,685
Total revenue passengers carried	297,263	305,926
Total transfers from main line	16,294	15,382
Operating revenue per car mile	$0.070	$0.076
Marion city railway:		
Total car mileage	413,065	360,605
Total transfers from main line	9,664	9,216
Operating revenue per car mile	$0.179	$0.174

Pacific Gas & Electric Company

The statement of income, profit and loss of the Pacific Gas & Electric Company, San Francisco, Cal., for the year ended Dec. 31, 1912, is as follows:

Gross earnings		$14,473,525
Deduct:		
Maintenance	$1,085,959	
Operating, distribution and administration expenses	7,345,602	8,431,561
		$6,041,964
Add:		
Profit on merchandise sales and miscellaneous income		271,127
		$6,313,091
Deduct:		
Interest on floating debt	$11,752	
Interest on bonds outstanding	3,464,326	
Interest on bonds in hands of trustees of sinking funds	92,865	
Proportion for year 1912 of discount and expenses of general and refunding bonds sold and premiums on general mortgage and collateral trust bonds and debentures redeemed	127,872	3,696,815
Net income for year before providing for depreciation		$2,616,276

According to a report submitted by A. F. Hockenbeamer, vice-president and treasurer, the following is a comparison in condensed form of the earnings, expenses, fixed charges, etc., of the company during the last six years:

Year	Gross Revenue	Operating Expenses	Taxes	Net Earnings	Interest	Balance
1907	$11,342,140	$5,978,967	$247,262	$5,115,911	$2,854,264	$2,261,647
1908	12,657,305	6,517,930	274,789	5,864,586	3,021,722	2,842,864
1909	13,491,288	7,211,517	320,059	5,959,712	2,988,522	2,971,191
1910	14,044,596	7,538,461	382,880	6,123,255	3,006,256	3,116,999
1911	14,604,609	7,697,370	516,702	6,390,537	3,254,133	3,136,404
1912	14,744,651	7,808,592	622,969	6,313,090	3,568,943	2,744,147

An analysis of the gross revenue of the company for the past six years shows that the amounts and percentages of the whole attributable to street railway sources are as follows: 1907, $431,800, or 4 per cent; 1908, $414,326, or 3 per cent; 1909, $452,396, or 3 per cent; 1910, $509,152, or 4 per cent; 1911, $533,520, or 4 per cent; and 1912, $547,187, or 4 per cent.

The gross earnings during 1912, compared with 1911, increased $140,042, notwithstanding rate reductions. Charges for maintenance, operating expenses and reserves for uncollectible accounts, casualties, etc., increased $111,222; taxes increased $106,267; net revenue decreased $77,446, and interest charges increased $314,810. The company made a net gain of 33,886 consumers during the year. This is an increase of almost 12 per cent and, based upon the average gross return per consumer during 1912, represents a permanently increase gross earning capacity of between $1,200,000 and $1,400,000 per annum.

During the year there were purchased and deposited in the various mortgage sinking funds of the company bonds of the par value of $344,200, and in addition bonds of the par value of $670,000 were purchased from sinking funds and canceled by the trustees under the mortgages, making a total of $1,014,200 par value of bonds retired through sinking fund operations during the year. The sinking funds held at the close of the year $60,300.41 of uninvested cash.

The following table shows the condition at the close of the year 1912 of sinking funds established under various mortgages as compared with the condition of sinking funds at Dec. 31, 1911:

	1912	1911
Par value of bonds held in sinking funds	$2,056,200	$1,712,000
Bonds canceled under sinking fund provisions	4,042,490	3,381,490
Uninvested cash on hand at close of year	60,300	7,671
Total	$6,158,990	$5,101,161

During the year the expenditures of the company for the acquisition of the properties of other companies amounted to $290,948 in cash and $60,000 in stock, and it expended directly upon its own properties for additions, improvements and betterments the sum of $7,470,763, making its total capital expenditures during the year $7,821,712.

John A. Britton, vice-president and general manager, says in part:

"On March 23, 1912, the activities of the company came under the California Railroad Commission, excepting in the matter of rates to be charged for service, the authority of the commission in this respect extending only to territory without the limits of incorporated cities and towns. The cities still retaining and exercising that power, there is a dual authority, awkward and unsatisfactory, as but approximately 4 per cent of our entire consumers affected by rate regulation are under the commission. It is to be hoped that future legislation will change this condition.

"The company has adopted the policy of carrying its own fire insurance, and through the department having the care of perishable property has instituted safeguards and precautions to prevent fires. With what excellent results this has been done may be indicated by the minimum of loss in 1912, the total losses being $310, the number of fires 24. The total insurance carried on all properties aggregates $400,053 and premiums $6,987.15.

"The average number of employees during the year was 6111, a gain of 1784 over 1911, the total pay roll amounting to $5,845,939.

"It is worthy of note that this company has secured the exclusive contract to furnish light, heat and power to the Panama-Pacific International Exposition Company, 'pre,' 'post' and exposition periods, at a remunerative figure. The installation at the exposition will call for a maximum demand of 20,000 hp."

New Officers Elected for Manhattan Railway

At the annual meeting of the stockholders of the Manhattan Railway, which is leased to the Interborough Rapid Transit Company, New York, N. Y., J. D. Rockefeller, Jr., Edgar L. Marston, Starr J. Murphy, Jerome D. Greene, E. G. Snow, Alvin W. Krech and Henry C. Phipps were elected directors to succeed Kingdon Gould, J. H. McClement, Jay Gould, Frank Jay Gould, Howard Gould, Alfred Skitt and John T. Terry, deceased. Edgar L. Marston was elected president of the company to succeed George Jay Gould. The following officers and committees were elected: President, Edgar L. Marston; vice-president, John McClement; secretary and treasurer, D. W. McWilliams; counsel, Murray, Prentice & Howland. The following executive committee was appointed: Edgar L. Marston, ex officio; George Jay Gould, Edwin Gould, William A. Day and Starr J. Murphy.

Messrs. Gould and Messrs. Jeffery and Gallaway repre-

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sent the holdings of the Gould estate, Mr. Rockefeller the holdings of the Rockefeller family and of the University of Chicago; Messrs. Marston, Murphy and Greene represent respectively the General Education Board, the Rockefeller Foundation and the Rockefeller Institute for Medical Research, of which they are severally members; Judge Day the Equitable Life Assurance Society, of which he is the president; Mr. Snow the Home Insurance Company, of which he is president; Mr. Krech the Equitable Trust Company, of which he is president; Mr. Slocum the holdings of Mrs. Russell Sage, whose brother he is, and Mr. Phipps the holdings of the Bessemer Investment Company.

Last July Mr. Rockefeller and Mr. Gould, representing the two largest stockholding interests in the Manhattan Railway, agreed that they would co-operate in inviting to seats in the board the representatives of the principal stockholding interests, asking them so far as possible to select their chief executive officers for these positions.

Mr. Gould, who served the company for twenty years as its president, expressed a desire to retire at the end of his term of office, and in view of the fact that the next largest stockholding interest outside of Messrs. Gould and Rockefeller is the general education board, of whose finance committee Edgar L. Marston of the banking firm of Blair & Company is chairman, it was decided to recommend to the new board the election of Mr. Marston as president.

At the meeting of stockholders, which was held on Nov. 12, the resolution calling for the creation of a second mortgage to secure $5,490,000 of second mortgage 4 per cent bonds was ratified. In compliance with the provisions of the lease of 1903 the bonds secured by the new mortgage will be turned over to the Interborough Rapid Transit Company for expenditures for improvements and betterments.

Changes in American Cities Company

Ford, Bacon & Davis, formerly operators of the American Cities Company and its subsidiaries, have disposed of their holdings in the company and will terminate their connection as operators of the properties on Dec. 1. In the future the United Gas & Electric Corporation, in which Ford, Bacon & Davis are interested, will operate the American Cities Company. George W. Bacon has been elected a director of the United Gas & Electric Corporation.

At a meeting of the directors of the American Cities Company, in New Orleans, Hugh McCloskey was elected president, succeeding George H. Davis, resigned. Mr. McCloskey was also elected chairman of the board of directors of the New Orleans Railway & Light Company. J. S. Pevear, formerly vice-president of the International Railway, Buffalo, has been elected vice-president of the New Orleans Railway & Light Company. The changes will take effect on Dec. 1.

Early in October the stockholders of the United Gas & Electric Corporation ratified the plan providing for the acquisition of the common stock of the American Cities Company. It was proposed to create a new class of stock, second preferred, and to issue $12,500,000 of this, increasing the corporation's capital from $45,000,000 to $57,500,000. The cumulative preferred dividend on this stock is to be 2 per cent for 1914, the rate being increased annually by 1 per cent until a rate of 6 per cent is reached, at which it will be continued. The purchase of American Cities stock is understood to have been made by the exchange of seventy-five shares of the new second preferred stock and twenty-five shares of the common stock of the United Gas & Electric Corporation for each 100 shares of the common stock of the American Cities Company.

The United Gas & Electric Corporation has large holdings of securities in public utilities furnishing principally electric lighting and gas service, but including several operating street railways. Among the railway systems which it controlled prior to the acquisition of the American Cities Company common stock were the Lancaster County Railway & Light Company and the International Railway. The American Cities Company controls among other companies the New Orleans Railway & Light Company, Birmingham Railway, Light & Power Company, Little Rock Railway & Electric Company, Memphis Street Railway, Knoxville Railway & Light Company and the Houston Lighting & Power Company.

American Water Works & Guarantee Company, Pittsburgh, Pa.—According to the *Wall Street Journal* it is proposed in the plans which are being made for the reorganization of the American Water Works & Guarantee Company to keep the irrigation properties under the present corporation, arrange for funds to carry on the work of completing the developments now under way and to take up the work of securing settlers for the irrigated lands. The engineers selected by the protective committee are said to have completed their reports on the condition, earnings and future possibilities of the water supply, the electric railway, electric light and power irrigation properties. These are now in the hands of the committee.

Augusta-Aiken Railway & Electric Corporation, Augusta, Ga.—The entire holdings of the North Augusta Land Company and the Hampton Terrace Hotel property have been sold to James U. Jackson and Ernest E. Floyd, of Chicago, and associates. The North Augusta Land Company and the Hampton Terrace Hotel property have been owned by the Augusta-Aiken Railway & Electric Corporation. Mr. Jackson, who is a member of the purchasing syndicate, was at one time vice-president of the Augusta Railway & Electric Company, which was succeeded by the Augusta-Aiken Railway & Electric Corporation.

Belt Line Railway Corporation, New York, N. Y.—The Belt Line Railway Corporation, operating the Fifty-ninth Street and Belt Line street railroads, has been authorized by the Public Service Commission for the First District of New York to increase its capital stock from $600,000 to $750,000. The company had already issued, under authority of the commission, $481,000, and recently applied for permission to increase the total amount of stock in the sum named and also for authority to issue $269,000 of stock to pay for the acquisition of seventy-nine storage battery cars. This amount, with the amount already issued, would make a total of $750,000. The company had already expended $128,090 for the purchase of forty storage battery cars, the money being borrowed from the Third Avenue Railway. The Belt Line Corporation wants to buy thirty-nine additional cars of the same type, and the cost is estimated at about $3,200 a car, or $124,800. These two amounts make a total of about $253,000, and the commission's order authorizes the company to issue capital stock to that extent. The order also authorizes the Third Avenue Railway, which owns all the bonds and stock of the Belt Line Corporation, to acquire and hold all of the new capital stock of the latter corporation authorized.

Bowling Green (Ky.) Railway.—The Court of Appeals of Kentucky has upheld the movement to throw the Bowling Green (Ky.) Railway into the hands of a receiver. The administrator of Herman Lewis secured a judgment for $6,000 against the company, and the directors, by resolution, declared the company to be insolvent and ordered that a receivership be applied for. The Fidelity & Columbia Trust Company, Louisville, Ky., representing the holder of $19,000 of mortgage bonds of the railway, was a party to the receivership proceedings and entered a motion that a receiver be appointed. The administrator for Mr. Lewis demurred, but his demurrer was overruled both in the Circuit Court and by the Court of Appeals. The receivership will now be authorized.

Caldwell (Idaho) Traction Company.—It is reported that the Oregon Short Line Railroad has purchased the holdings of the Caldwell Traction Company, which include about 20 miles of electric railway.

Chicago (Ill.) Railways.—The Chicago *Economist* says that the protective committee of stockholders of the Chicago Railways has advised those who gave the committee proxies for the annual election to vote for the unification of the Chicago Railways and the Chicago City Railway as it is to be submitted to the certificate holders. The *Economist* says: "The argument of the members of the protective committee is that Mr. Blair as head of the two systems will see that the certificate holders of the Chicago Railways, his old company, will receive equitable consideration. However, their support seems to be a matter of indifference to the management." As stated in the ELECTRIC RAILWAY JOURNAL of Nov. 1, 1913, page 998, the protective committee marshalled proxies for 41,567 participation certificates out of a total of 212,523 at the recent annual meeting of the company.

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Chicago & Milwaukee Electric Railroad, Highwood, Ill.—The argument before Judge Geiger at Milwaukee on the petition of John Griffith, owner of $200,000 of the $10,000,000 bonds issued by the Chicago & Milwaukee Electric Railway, for an order enjoining the reorganization committee from bidding at the resale of the road has been completed and the court has taken the petition under advisement.

Columbus, Urbana & Western Electric Railway, Columbus, Ohio.—The receiver of the Columbus, Urbana & Western Electric Railway has applied to the courts at Columbus for an order of sale of the property.

Cumberland County Power & Light Company, Portland, Me.—The Cumberland County Power & Light Company has obtained control of the York Power Company. When the necessary transmission lines can be completed it is the intention to supply the territory previously served by the York Power Company from the water-power plants of the Cumberland County Power & Light Company, using the steam station of the York Power Company for reserve only.

Denver (Col.) City Tramway.—Claude K. Boettcher, chairman of the board of directors of the Denver City Tramway, has issued a statement, in part, as follows: "Whatever financing or refinancing has been necessary in the affairs of the Denver City Tramway has been accomplished. Reports to the effect that changes in ownership or control of the property are imminent at this time are without foundation. All interests concerned in the ownership of the company are working in harmony and with complete understanding. No radical changes in the affairs of the company are contemplated."

Fayetteville Street Railway & Power Company, Fayetteville, N. C.—The Fayetteville Street Railway & Power Company, which is controlled by the Consolidated Railway & Power Company, has been placed in the hands of H. L. Brothers, Fayetteville, N. C., as receiver, by Judge C. C. Lyon of the Superior Court at Fayetteville on application of the Kalby Frog & Switch Company, Birmingham, Ala.

Halifax Electric Tramway, Ltd., Halifax, N. S.—The Public Utilities Commission has authorized the Halifax Electric Tramway to issue 6000 shares of ordinary stock at par. The additional capital will provide funds for extensions and to retire outstanding bonds.

Idaho Railway, Light & Power Company, Boise, Idaho.—The Idaho Railway, Light & Power Company is reported to have purchased the property of the Beaver River Power Company for about $500,000.

Interborough Rapid Transit Company, New York, N. Y.—The Stock Exchange has been informed by the Interborough Rapid Transit Company that all but 121 of the old Metropolitan Street Railway refunding 4 per cent bonds have been acquired by the Interborough-Metropolitan Company under the reorganization plan, and by the Farmers' Loan & Trust Company that there are outstanding only $210,000 of certificates of deposit for these bonds. For this reason the committee on listing of the exchange has struck these bonds and certificates from the list.

International Railway, Buffalo, N. Y.—The International Railway has applied to the Public Service Commission of the Second District of New York for permission to issue $1,464,161 of additional refunding and improvement 5 per cent bonds. The proceeds of the issue is to be used to refund the $600,000 of Niagara Falls Park & River Railway first mortgage 5 per cent bonds due Jan. 2, 1914, and for capital expenditures during 1914.

Joliet & Southern Traction Company, Joliet, Ill.—Judge Duane J. Carnes, of the Kane County Circuit Court, sitting at Sycamore, has refused to pass on the valuation by Master in Chancery Sears of the terminal properties of the Joliet & Southern Traction Company. As a result, the sale of the railroad will be postponed. The sale was to have been held at Geneva on Nov. 17.

Kansas City Railway & Light Company, Kansas City, Mo.—The committee of holders of the first lien refunding 5 per cent bonds of the Kansas City Railway & Light Company which matured on May 15, 1913, announces that it has arranged for the payment by the company at the office of the New York Trust Company, New York, N. Y., of the interest due on Nov. 15, 1913, on certificates of deposit as well as on the bonds.

Mexico Tramways, Mexico City, Mex.—The Mexico Tramways has decided to issue $6,000,000 of 6 per cent three-year notes convertible during this period into stock at par. All of the authorized capital stock of the company being now outstanding, it is proposed to increase the stock by $10,000,000, of which $6,000,000 will be devoted to the conversion of the notes and the remaining $4,000,000 will be reserved for future needs, none thereof to be issued at present. The stockholders will vote on Nov. 20 on increasing the capital stock of the company from $20,000,000 to $30,000,000.

New York Municipal Railway Corporation, Brooklyn, N. Y.—The Public Service Commission of the First District of New York has granted the New York Municipal Railway Corporation an extension of time until Nov. 30 for the issuance of $400,000 of capital stock, which has already been authorized.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—President Bush of the Western Pacific Railroad, accompanied by representatives of the New York banking houses of Speyer & Company, Blair & Company and Salomon & Company, arrived in San Francisco on Nov. 6 after an inspection of the Oakland, Antioch & Eastern Railway, which operates between San Francisco and Sacramento. Another purchase said to be contemplated by the Western Pacific Railroad is the Nevada County Narrow Gage Railroad, which will connect with the Oakland, Antioch & Eastern Railway when the latter is extended to Colfax. The Oakland, Antioch & Eastern Railway has been authorized to purchase from the Northern Electric Railway for $11,403 a half interest in certain tracks of the Northern Electric Railway. These lie on M Street in Sacramento between the point where the single track of the Northern Electric Railway leaves the M Street bridge and a point between Second and Third Streets, which point is the beginning of a curve of 165 ft. radius leaving the track at that point and turning northerly upon Third Street. The only condition is that the price to be paid for the half interest shall not be used before the commission or any other public authority as representing, for rate fixing or other purposes, the true value of a half interest in the property.

Poland (Ohio) Street Railway.—The Poland Street Railway, which is building a line between Youngstown and the village of Poland, has asked the Public Service Commission of Ohio to permit it to lease the tracks and property, when completed, to the Mahoning Valley Railway for a term of twenty years. The leasing company is to pay the interest on bonds outstanding, taxes, insurance, maintenance, special government charges and keep the line in repair.

Puget Sound Traction, Light & Power Company, Seattle, Wash.—A circular has been sent out to stockholders of the Puget Sound Traction, Light & Power Company offering holders of record Nov. 3 the right of subscription to $2,686,200 of the authorized but unissued capital stock of the company. Stockholders recently authorized the issue of this stock. Each stockholder may subscribe at $100 per share for one-eleventh of a share of new preferred for each $100 of preferred or common of record Nov. 3. For purposes of subscription, fractional share warrants aggregating eleven rights and multiples thereof should be presented at the office of the transfer agent and exchanged for whole share warrants. Subscriptions will be payable on or before Dec. 8, 1913. Certificates for full-paid shares will be ready for delivery on Dec. 18, which shares will carry dividends after that date.

Salt Lake & Ogden Railway, Salt Lake City, Utah.—The Salt Lake & Ogden Railway has sold to New York bankers $200,000 of first mortgage 5 per cent escrow bonds. This is part of an authorized issue of $2,000,000, of which $1,150,000 had been previously issued and $650,000 are held in the treasury. The proceeds of the bonds will be used to pay part of the cost of double tracking which has been made necessary by increased traffic. The bonds are a first lien upon all the company's properties and franchises and the $65,000 treasury bonds may only be issued for 75 per cent of the cost of permanent extensions and additions to the property, provided the net earnings of the company for the twlve months preceding have equaled twice the annual bond interest charge.

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United Properties Company, Oakland, Cal.—R. G. Hanford and William H. Tevis have placed before the trustees of the United Properties Company and F. M. Smith the plan for the refinancing of the traction and lighting companies controlled by the United Properties Company and Mr. Smith. Under the plan Mr. Hanford and Mr. Tevis propose to pay Mr. Smith $1,000,000 in cash for his stock in the United Properties Company, to pay off the loan made by N. W. Halsey & Company to the Oakland Terminal Railways of $2,500,000 and the Oakland Terminal Company note of $1,125,000, to pay the floating debt of the railways, to take care of the collateral trust notes of the United Water & Light Company on which the interest is due Dec. 1, to pay all other debts of the United Properties Company and its subscribers, amounting, with the above, to about $5,200,000, and to furnish $750,000 in cash for immediate development of the water and light companies.

Dividends Declared

Central Arkansas Railway & Light Company, Hot Springs, Ark., quarterly, 1¾ per cent, preferred.

Federal Light & Traction Company, New York, N. Y., quarterly, 1½ per cent, preferred.

Norfolk Railway & Light Company, Norfolk, Va., 3 per cent.

Pacific Gas & Electric Company, San Francisco, Cal., quarterly, 1½ per cent, preferred.

Rochester Railway & Light Company, Rochester, N. Y., quarterly, 1¼ per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

BANGOR RAILWAY & ELECTRIC COMPANY, BANGOR, MAINE.

Period			Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m.,	Sept.,	'13	$68,457	*$28,780	$39,677	$17,356	$22,321
1 "	"	'12	66,175	*26,274	39,901	16,620	23,281
12 "	"	'13	749,593	*342,103	407,490	207,134	200,356
12 "	"	'12	682,795	*308,278	374,517	188,967	185,550

BERKSHIRE STREET RAILWAY, PITTSFIELD, MASS.

1m.,	Sept.,	'13	$91,591	$71,763	$19,828	$4,896	$14,932
1 "	"	'12	88,256	77,482	10,774	5,423	5,351
3 "	"	'13	306,361	213,518	92,843	13,929	78,914
3 "	"	'12	289,229	217,145	72,084	16,124	55,960

CHATTANOOGA RAILWAY & LIGHT COMPANY, CHATTANOOGA, TENN.

1m.,	Sept.,	'13	$117,882	*$64,686	$53,196	$25,327	$27,869
1 "	"	'12	94,808	*56,265	38,543	22,596	15,947
12 "	"	'13	1,190,488	*704,035	486,453	289,280	197,173
12 "	"	'12	1,028,582	*612,554	416,028	258,569	157,459

CONNECTICUT COMPANY, NEW HAVEN, CONN.

1m.,	Sept.,	'13	$694,281	$468,623	$225,658	$46,557	$179,101
1 "	"	'12	680,273	403,375	276,898	36,489	240,409
3 "	"	'13	2,367,316	1,425,326	941,990	139,669	802,321
3 "	"	'12	2,222,565	1,273,171	949,394	109,465	839,929

CUMBERLAND COUNTY POWER & LIGHT COMPANY, PORTLAND, MAINE.

1m.,	Sept.,	'13	$218,398	*$126,466	$91,932	$63,659	$28,273
1 "	"	'12	190,630	*100,872	89,758	56,960	32,798
12 "	"	'13	2,278,877	*1,268,738	1,010,139	692,916	317,223
12 "	"	'12	2,097,982	*1,219,883	878,099	626,856	251,243

EAST ST. LOUIS & SUBURBAN COMPANY, EAST ST. LOUIS, ILL.

1m.,	Sept.,	'13	$238,547	$141,429	$97,118	$49,748	$47,370
1 "	"	'12	217,962	116,893	101,069	48,556	52,513
12 "	"	'13	2,646,837	1,511,369	1,135,468	587,738	547,730
12 "	"	'12	2,374,432	1,312,497	1,061,935	570,767	491,168

NEW YORK (N. Y.) RAILWAYS.

1m.,	Sept.,	'13	$1,241,633	$739,528	$502,105	$366,348	$135,758
1 "	"	'12	1,204,264	698,443	505,821	374,335	131,486
3 "	"	'13	3,659,125	2,210,695	1,448,430	1,116,127	332,303
3 "	"	'12	3,585,774	2,139,373	1,446,401	1,127,149	319,252

NEW YORK & STAMFORD RAILWAY, PORT CHESTER, N. Y.

1m.,	Sept.,	'13	$32,686	$24,423	$8,263	$1,477	$6,786
1 "	"	'12	33,446	25,190	8,255	1,570	6,685
3 "	"	'13	134,095	80,783	53,312	4,491	48,821
3 "	"	'13	127,661	94,473	33,188	4,633	28,555

NEW YORK, WESTCHESTER & BOSTON RAILWAY, NEW YORK, N. Y.

1m.,	Sept.,	'13	$34,479	$35,972	$1,493	$16,229	†$17,721
1 "	"	'12	22,098	39,689	17,592	8,000	25,592
3 "	"	'13	102,380	113,016	10,635	35,629	†46,264
3 "	"	'12	47,534	117,011	69,478	24,062	93,539

RHODE ISLAND COMPANY, PROVIDENCE, R. I.

1m.,	Sept.,	'13	$454,747	$291,483	$163,263	$38,500	$124,763
1 "	"	'12	458,383	265,746	192,637	31,500	161,137
3 "	"	'13	1,563,225	914,883	648,342	115,500	532,842
3 "	"	'12	1,509,582	817,728	691,854	94,500	597,354

WESTCHESTER STREET RAILROAD, WHITE PLAINS, N. Y.

1m.,	Sept.,	'13	$23,799	$20,534	$3,266	$1,034	$2,232
1 "	"	'12	22,366	20,199	2,166	804	1,362
3 "	"	'13	76,492	62,725	13,766	3,157	10,609
3 "	"	'12	71,536	58,552	12,984	2,422	10,562

*Includes taxes. †Deficit.

Traffic and Transportation

Prize to Conductor for Paper on Elimination of Boarding and Alighting Accidents

The following paper, submitted by D. P. Simpson, conductor, won the first prize in a contest conducted recently under the auspices of the claim department of the Portland Railway & Light Company, Portland, Ore., in which the company offered $15 for the first prize and $8 for the second prize for the best papers on the prevention of accidents to passengers boarding and alighting from moving cars, the papers to be written by platform men:

"It is difficult to tell where to begin on this subject as a person might cite all of the 'dont's' with which all of the men who have been in the company's employ for at least one year are familiar.

"I believe that the frame of mind in which a man goes to work has much to do with the elimination of this class of accidents, or any class of accidents, with the exception of the accidents which happen even where the utmost precautions are taken. I think that if a man begins his day's work full of confidence in himself and determined to concentrate his mind on his work and give his undivided attention during the period of time he is on duty, he will reduce accidents to a minimum.

"We do our utmost to eliminate boarding and alighting accidents when we give our best thought, ability and power to the performance of our duty and do not look on our work as drudgery. No work is drudgery that is entered into in the right frame of mind. A person whose heart and soul are in his work and who is thoroughly interested, both in the work itself and in the final results, is doing his part in the elimination of such accidents.

"I think many carmen might be classed as mechanical men, performing their duty (probably) 'O. K.' with their mind and thought on some other subject. This is a poor policy to follow, as the mind should be on our work while we are on duty.

"We all know that we divide our attention and become absent-minded if we think of one thing while we are doing something else. To prevent this tendency, we should make it a rule under every circumstance to give our work our undivided attention.

"The result will be better pleased patrons, a better pleased company and the reduction of accidents."

The company proposes to hold a series of these contests. The next papers to be written by the platform men will be on the best way of preventing accidents where passengers alight from a car, walk around the rear end of the same and in front of car on the opposite track. The papers are judged by the five division superintendents.

New York Hearing on Smoking

On Nov. 6, 1913, there was continued before the Public Service Commission for the Fifth District of New York a hearing begun on Oct. 23 in reference to a petition from 72,000 smokers asking for the installation of smoking cars or compartments for smokers in the elevated and surface car lines of New York City.

Frank Hedley, general manager of the Interborough Rapid Transit Company and the New York Railways, was the principal witness. Mr. Hedley said that while he was employed on the elevated roads in Chicago the experiment of separate arrangements for smokers had been tried, but that it proved unsatisfactory for the reason that fires were started in vehicles passing the elevated on account of lighted cigars and cigarettes having been dropped by passengers. He cited the experience of the Kings County elevated line in Brooklyn, which was similar to that of the Chicago company, and also mentioned some correspondence with Fire Commissioner Joseph Johnson, who objects to the use of smoking-cars.

Mr. Hedley stated that the terminal facilities and housing accommodations of his company were not sufficient to take care of additional cars necessitated by such a move. He explained that his company had been obliged to increase its fire-fighting equipment, and if quarters were to be required for new smoking cars, more apparatus would be

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needed. He would not advise the commission to issue definite orders with regard to smoking on elevated lines or surface lines. He declared that the question was one which ought to be left to the company to determine.

Mr. Hedley then said that 176 of the new stepless type of cars were soon to be added to the service, with an improved ventilating apparatus. If feasible, smoking would be permitted in a part of those cars, but any change was opposed in so far as the elevated lines were concerned.

John J. Dempsey, superintendent of the Brooklyn elevated lines, gave evidence similar to that of Mr. Hedley. William Siebert, superintendent of the surface lines of the Brooklyn Rapid Transit Company, said that the proposal to operate one car in five as a "smoker" was also impracticable, on account of the terminals and the necessity of using the smoking cars at times in the regular service.

Cleveland Interurbans Will Do Freight Business.—At the city election in Cleveland on Nov. 4 the voters approved the ordinance giving the interurban railways the right to haul freight through the streets at night.

Commissioners of Denver Opposed to Skip-Stop.—The Commissioners of Denver, Col., have authorized City Attorney Stevens to draw an ordinance forbidding the "skip-stop" system of tramway schedules on the Colfax lines of the Denver City Tramway.

International Railway Changes Rates.—Changes in one-way, round-trip and commutation fares between certain points were recently filed with the Public Service Commission of the Second District of New York by the International Railway, Buffalo, effective on Dec. 1, 1913.

Two-Car Trains in Buffalo—Two-car trains are being equipped by the International Railway, Buffalo, N. Y., and will soon be put in service on several of the cross-town lines to facilitate traffic during the rush hours. P-A-Y-E cars will be used as motor cars with near-side cars as trailers.

Traffic Agreement Suggested at Rock Island.—The City Commissioners at Rock Island, Ill., have suggested to E. C. Walsh, Jr., of the Rock Island Southern Railway that his company seek a traffic arrangement into the city over the tracks of the Tri-City Railway. Mr. Walsh agreed to open negotiations with this end in view.

Inquiry Into Service in Brooklyn.—The Public Service Commission of the First District of New York has called for hearings to be held Nov. 26 and 27, before Commissioner Williams to investigate the service on the Brighton Beach and Fulton Street elevated lines, and on all the surface lines of the Brooklyn Rapid Transit Company.

Police Powers of Railway Employees in Illinois.—A justice of the peace at Belleville, Ill., acting upon the advice of the Attorney General of the State, decided recently that conductors on electric and steam railways in Illinois have no right to carry weapons although clothed by the law with power to make arrests on their cars or trains.

Plan to Ask Fare Increase.—The Chicago & Joliet Electric Railway, Joliet, Ill., has informed the City Council of Lockport, Ill., that when its present franchise expires it will ask to be permitted to charge a 10-cent fare between Lockport and Joliet. The company declares that since the 5-cent fare was inaugurated operating expenses have so increased as to make the raise necessary.

Railway Superintendent Urges Courtesy of Employees to Public.—The superintendent of the Jacksonville Railway & Light Company, Jacksonville, Fla., has issued a letter to all the employees of the company in which he lays down a number of maxims of courtesy for daily use in the treatment of customers. As the public pays the salaries of all employees, the superintendent points out that courtesy to the public is the surest way to bring to pass the successful operation of a public utility.

Electric Competition Too Keen for Steam in Maine.—Because of the inroads which the suburban line of the Bangor Railway & Electric Company, Bangor, Me., has made into the business of the Maine Central Railroad, between Bangor and Old Town, the latter has abandoned its local steam train service between those points. The territory is served exclusively now by the Bangor Railway & Electric Company, which has equipped the line with automatic block signals. The resulting 20 per cent increase in passenger traffic has necessitated the addition of new steel cars.

Order Regarding Use of Wooden Cars on Electric Lines.—The use of wooden passenger cars on any trains in which steel cars are operated has been forbidden to the Long Island Railroad Company by the Public Service Commission of the First District of New York and the company has been instructed that it must not use wooden cars on any electrically driven trains unless it is absolutely necessary in order to maintain the schedule. After Sept. 15 next the company must not use wooden cars on any electric passenger train under any circumstances. At present the company is operating twenty-four wooden cars.

Laws Restricting Transportation of Intoxicating Liquors.—The Central Electric Traffic Association has issued a freight circular covering the laws and regulations of the various states and of the United States governing the transportation of intoxicating liquors. Indiana and Ohio railroads are forbidden to transport intoxicating liquors under false names. In prohibition localities of Michigan the railroads are required to keep a close record of all shipments of liquor, including a statement of the special purpose allowed by law, such as medicinal purposes, under which the liquor is intended to be used. The regulations in regard to interstate shipments make it unlawful for railroads to transport intoxicating liquors from one state to prohibited areas in any other state.

St. Augustine Street Cars Resume Schedule.—The St. Johns Electric Company, St. Augustine, Fla., resumed its street schedules on Nov. 8 on the strength of an order enjoining Mayor Corbett from interfering with the traffic of the company. The case has grown out of a controversy as to the payment of the percentage of the gross receipts of the company to the city. It was claimed that these payments had not been made in accordance with the terms of the franchise. Mayor Corbett ordered the car service to be stopped with the object in view of bringing about a settlement. Officials of the traction company state that they have been ready to make the right settlement with the city, but that the city officials had never appointed an auditor to go over the company's books to arrive at a settlement.

Award of Worcester and Springfield Arbitration Board.—The decision of the arbitration board, composed of William P. Hayes for the employees; Bentley W. Warren for the Springfield Street Railway and the Worcester Consolidated Street Railway, and Henry V. Cunningham, the neutral member, made its finding public on Nov. 10. The board was called upon to interpret the nine-hours-in-eleven law. In the case of 20 per cent of the men the runs will provide for a day's work of nine hours completed within eleven as provided for in the new act. In the case of another 20 per cent the runs will remain as under the old agreement, nine and one-half hours completed within twelve. The arbitration board has arranged that the rest of the runs shall either be nine hours completed in eleven and one-half hours, nine hours completed in twelve hours, or nine and one-half hours completed in eleven hours, each separate class being 20 per cent of the whole. Provision is made for excess payment and for allowing any man who so desires to work additional hours for compensation.

Re-routing of Chicago Elevated Trains.—The proposed re-routing of the elevated trains in Chicago was carried out on Nov. 3 under the plan outlined at length in the ELECTRIC RAILWAY JOURNAL of Nov. 1, 1913, page 1001. The re-routing is in accordance with the provisions of the ordinance passed by the City Council on July 21, 1913, which provides for universal transfers and a single 5-cent fare throughout the city. The change in the method of operating the trains was attended with comparatively little confusion or delay when the magnitude of the undertaking is taken into account. E. C. Noe, assistant general manager of the Chicago Elevated Railways, is quoted as follows: "I believe this change is the most colossal one that has ever been attempted by any traction company in the world. We have changed over night the entire system of four railroads, running one train a minute. Not only have we changed the system, but three of the roads are running on the loop in an entirely different way from that in which they have been running hitherto. Only the Metropolitan trains are running as they formerly did."

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Personal Mention

Mr. Paul C. Martin has been elected president of the Springfield (Ohio) Railway to succeed his father, the late Oscar T. Martin.

Mr. Charles K. Wheeler, attorney for the Paducah Traction & Light Company, Paducah, Ky., has been elected chairman of the board of directors of the company.

Mr. Charles Madden has been appointed assistant secretary and assistant treasurer of the West Virginia Traction & Electric Company, Wheeling, W. Va., and affiliated companies.

Mr. C. D. Junkens has resigned as treasurer of the City Railway and the City & Suburban Gas Company, Wheeling, W. Va., and as assistant treasurer of the Wheeling Traction & Electric Company.

Mr. F. R. Hanson has resigned as master mechanic of the Sterling, Dixon & Eastern Electric Railway, Dixon, Ill., to accept the position of general superintendent of the Northern Illinois Electric Railway, with headquarters at Amboy, Ill.

Mr. F. E. Cole, for several years superintendent of the Louisville & Northern Railway & Lighting Company and the Louisville & Southern Indiana Traction Company, New Albany, Ind., has become connected with the Northwestern Elevated Railroad, Chicago.

Mr. Edgar L. Marston, of the banking firm of Blair & Company, New York, N. Y., has been elected president of the Manhattan Railway, New York, operated under lease by the Interborough Rapid Transit Company. Mr. Marston succeeds Mr. George J. Gould as president of the company.

Mr. A. P. Campbell, private secretary to Mr. Franklin T. Griffith, president of the Portland Railway, Light & Power Company, Portland, Ore., has resigned from the company to act in the capacity of private secretary to Mr. B. S. Josselyn in connection with Mr. Josselyn's new duties in the East.

Mr. B. J. Jones, formerly general manager of the Ohio Electric Railway, Cincinnati, Ohio, has been appointed general manager of the Tri-State Railway & Electric Company, East Liverpool, Ohio, as successor to Mr. W. R. W. Griffin. Mr. Jones has had a wide experience in the installation and operation of large electric railway and lighting systems. He supervised the installation of some of the early electric railways from 1889 to 1894.

Mr. George J. Gould, who for twenty years has been president of the Manhattan Railway, New York, N. Y., the property of which is leased to the Interborough Rapid Transit Company, resigned from the company at the annual meeting of the stockholders on Nov. 12. Mr. Gould's retirement from the company as president was in accordance with his desire expressed some time ago to be relieved of the responsibility connected with the office.

Mr. A. N. Dutton, who has been vice-president of the West Virginia Traction & Electric Company and manager of the City Railway, Wheeling, W. Va., has been elected president of the City Railway and the City & Suburban Gas Company, Wheeling. He succeeds Mr. H. R. Warfield as president of the City Railway and Mr. J. B. Taylor with the City & Suburban Gas Company. Mr. Taylor becomes vice-president of the City & Suburban Gas Company.

Mr. J. Gerry Dobbins has been appointed auditor of the Hudson & Manhattan Railroad, New York, N. Y., to succeed Mr. F. H. Sillick, who has been appointed comptroller of the company. Mr. Dobbins was graduated from Amherst College. When the Hudson & Manhattan was placed in operation in 1908 Mr. Dobbins became an assistant paymaster and clerk in the accounting department. He later was appointed successively chief clerk of the accounting department and assistant auditor.

Mr. A. B. Coryell has been appointed general superintendent and purchasing agent of the Moncton Tramway & Electric Light Company, Moncton, N. B., in full charge of maintenance and operation, succeeding Mr. H. N. Price, resigned. Mr. Coryell has been engaged in the railway and lighting business for twenty-two years. He supervised the construction of the street railway systems at Greenville, Tex., and Waycross, Ga., and was manager of the companies at both of these places. The property at Moncton is owned by Pittsburgh capitalists.

Mr. Albert H. Stanley, managing director of the London Electric Railway, London United Tramways, Ltd., the Metropolitan District Railway and the London General Omnibus Company, Ltd., London, Eng., is planning to make a visit to this country this winter. He expects to sail from England on the *Lusitania* on Nov. 22. It is probable that he will be accompanied by Sir Guy Granet, general manager of the Midland Railway; Mr. Thomas Jowett, a prominent steel manufacturer in England, and others. They will remain in this country some time.

Mr. Richard Yates has been appointed a member of the Railroad & Warehouse Commission of Illinois. This board will be succeeded on Dec. 31, 1913, by the State Public Utilities Commission of Illinois, and Mr. Yates will probably be appointed a member of the new commission. It is provided in the law that not more than three of the five members of the Public Utilities Commission shall belong to any one political party. The present administration of the State of Illinois is Democratic, so it is assumed that Governor Dunne will appoint three Democratic members. Mr. Yates is a Republican. He was Governor of Illinois from 1901 to 1905.

Mr. N. B. Rhoads, until recently editor of the Waycross *Morning Herald,* has been appointed general manager of the Waycross Street & Suburban Railway, Waycross, Ga., a new position created by the directors, the position of superintendent having been abolished. Mr. Rhoads has filled positions from motorman to manager since he started in the railway business a number of years ago with the Richmond Traction Company. From Richmond he went to Savannah, where he was assistant superintendent of the Savannah Electric Company. In Key West, Fla., Mr. Rhoads was superintendent of transportation, and at Beaumont, Tex., he was manager.

Mr. D. C. Peck, whose appointment as general freight agent of the Shore Line Electric Railway, Norwich, Conn., was noted recently in the ELECTRIC RAILWAY JOURNAL, entered railway work some twelve years ago with the Central Vermont Railway in Norwich, Conn., in a clerical position. He served the company as billing clerk, cashier and acting agent for about four years. He next entered the employ of the Norwich & New York Propeller Company, operating steamboats between New York and New London, as New York agent. After serving in that capacity for two years he was transferred to New London, Conn. During Mr. Peck's six years' work at New London as agent for the Norwich & New York Propeller Company the business of the company was more than doubled.

Mr. Fletcher H. Sillick has been appointed comptroller of the Hudson & Manhattan Railroad, New York, N. Y., in place of Mr. Hamilton S. Corwin, resigned. Mr. Sillick began his business career in 1896, when he became associated with the Cooke Locomotive Works, Paterson, N. J. When this company was merged with the American Locomotive Company in 1900, he was employed as shop accountant at the Dickson Works, Scranton, Pa. Between 1902 and 1905 he was connected with the Pittsburgh Works of the American Locomotive Company. At the end of that time he became accountant for the Hudson Companies, the builders of the Hudson tunnels. When the Hudson & Manhattan Railroad was formed in 1907 Mr. Sillick was made auditor, and he remained in that capacity until his present appointment.

Mr. C. Nesbitt Duffy, whose retirement as vice-president and comptroller of The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., to become vice-president and general manager of the Manila Electric Railroad & Light Company, Manila, P. I., was noted in the ELECTRIC RAILWAY JOURNAL of Nov. 8, 1913, was the guest at a banquet given by members of the Round Table at the Milwaukee Athletic Club on the evening of Nov. 6. Mr. Duffy was presented with a gold watch, the gift of the organization. In accepting the gift Mr. Duffy said that he had enjoyed his connection with the company at Milwaukee more than any other period of his life. The work had been pleasant and he had taken a great interest in it. Best of all had been

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the kindred feeling of the Milwaukee people, the friendships which he had made similar to those with the gentlemen at the dinner. Mr. Duffy explained that he was leaving Milwaukee because he was a victim of the wanderlust, and cited his periods of service in different parts of the United States and in Mexico and South America. The *Evening Wisconsin* said editorially of Mr. Duffy in its issue of Nov. 3, 1913: "Milwaukeeans who have come into touch with Mr. Duffy during the seven years of his residence in this city will not wonder at the call he has received to go higher in the profession to which he has devoted his unusual talents, but they will be sorry that his advancement takes him away from Milwaukee. This city will lose a whole-souled, genial gentleman and public-spirited citizen." Mr. Duffy was the guest of honor at a banquet at the Hotel Pfister on Nov. 7. More than seventy-five friends of Mr. Duffy were present. Mr. S. F. Bower acted as chairman. Among those who expressed their regrets at the departure of Mr. Duffy were Messrs. Patrick T. Bowler, Hans J. Meyer, R. B. Stearns, George Allison and S. B. Way. A farewell address to Mr. Duffy, written by Mr. Ernest Gonzenbach, who found he could not be present, was read by Mr. S. S. Tatium. Mr. Duffy reached New York on Nov. 9 for a final conference with officials of the J. G. White Management Corporation before commencing his journey to Manila. He returned to Milwaukee on Nov. 13 and planned to leave there for St. Louis on Nov. 18. After a few days at St. Louis and Mexico, Mo., he will go on to San Francisco, reaching that city on Nov. 25 or two days before sailing. According to the present plan Mr. Duffy expects to reach Manila before Christmas.

Mr. Henry A. Blair, whose election to the position of president of the Chicago (Ill.) Railways in addition to that of chairman of the board was noted in the ELECTRIC RAILWAY JOURNAL of Nov. 8, 1913, will, it is expected, under the plans for the unified operation of the systems of the Chicago Railways and the Chicago City Railway, be elected chairman of the board of control of seven members which will have charge of the operation of the properties. Under the unification scheme as now proposed the board of control will consist of four representatives of the Chicago Railways and three representatives of the Chicago City Railway. These two companies are the only surface railways which operate in the city proper. Mr. Blair has long been connected with the Chicago Railways as chairman of the board of directors. He is one of the trustees and a member of the governing and the executive committees of the Chicago Elevated Railways, a voluntary association formed in 1911 to acquire control of the South Side Elevated Railroad, Metropolitan West Side Elevated Railway, Northwestern Elevated Railroad and Chicago & Oak Park Elevated Railroad. The Chicago Railways and the Chicago City Railway, of which companies it is expected Mr. Blair will become chairman of the board of control under the unification, operate together about 775 miles of track and 3320 cars. As stated in the ELECTRIC RAILWAY JOURNAL of Nov. 8, 1913, Mr. Blair was born at Michigan City, Ind., in July, 1852. He was educated at Williston Seminary, Easthampton, Mass. He began his business career in the Merchants' National Bank, Chicago, of which his father was founder. Subsequently he was elected vice-president of the bank, continuing in that capacity until 1902, when the bank was consolidated with the Corn Exchange National Bank. In addition to his railway connections Mr. Blair is vice-president of the Illinois Trust & Savings Bank, director of the Union Trust Company, Calumet & Chicago Canal & Dock Company, Elgin National Watch Company and the Commonwealth Edison Company, Chicago.

H. A. Blair

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Electric Short Line Railroad, Phoenix, Ariz.**—Application for a charter has been made by the Electric Short Line Railroad in South Dakota to sell its stock in that State.

***Tampa, Charlotte Harbor & Northern Railroad, Tampa, Fla.**—Application for a charter has been made by this company to build an interurban railway from Tampa to Charlotte Harbor, via Ruskin and the Manatee River section and thence east across the Everglades to a terminal not yet determined upon. Surveys have been begun. Capital stock, $3,000,000. Officers: W. J. Epperson, Bronston, president; W. J. Boling, St. Louis, vice-president; T. C. McEachin, Meredith, secretary and treasurer, and J. B. Walker, New York, chief engineer.

***Tri-City Railway of Illinois, Davenport, Ia.**—Incorporated in Illinois to operate electric railways and other public utilities on the Illinois side of the Mississippi River. Capital stock, $2,500. The ultimate capitalization will be $2,000,000 or $3,000,000. Incorporators: Joseph F. Porter, Davenport, president of the Tri-City Railway & Light Company, Davenport, Ia.; H. E. Weeks, secretary of the Tri-City Railway & Light Company, Davenport, and J. G. Huntoon, Davenport.

FRANCHISES

Fairfield, Conn.—The Connecticut Company has asked the Council for permission to relay track at all curves on its line between Grasmere and Southport.

Idaho Falls, Idaho.—The Idaho Electric Railway has received a fifty-year franchise from the County Commissioners in Bingham County for a double-track line across all county highways.

Belleville, Ill.—The East St. Louis & Suburban Railway has asked the Council for a new twenty-year franchise in Belleville. The local franchise will expire in five years. The company asks a renewal for twenty years, for which it offers to extend the local lines to given points, build a $3,000 waiting room on the public square and put the tracks of the line in the rock road strip in the center of the road under the boulevard type of construction.

Centralia, Ill.—The Centralia & Central City Traction Company has received a twenty-year franchise from the Council in Centralia. The franchise was granted on the condition that the line shall be extended to Sandoval.

Mount Vernon, Ill.—The Mount Vernon Traction Company has received a sixty-day extension of its franchise in which to begin the construction of its line at the east end of Broadway in Mount Vernon.

Neodesha, Kan.—The Independence, Neodesha & Topeka Traction Company has received a twenty-year franchise from the Council in Neodesha. This 17-mile line will connect Neodesha, Independence, Altoona and Topeka. W. N. Ness, general manager. [E. R. J., Nov. 8, '13.]

Chicopee, Mass.—The Holyoke Street Railway has asked the Council for a franchise for an extension on Sheridan Street.

Westfield, Mass.—The Springfield Street Railway has asked the Council for a franchise to double-track its line on the Springfield highway from the town line to the Lee turnout.

Greenfield, Mich.—Robert Oakman and Leroy M. Gilbert have received a thirty-year franchise from the Council in Greenfield to connect the Hamilton Boulevard extension and the Grand River line. Construction will be begun within a year. It is believed that this crosstown line will eventually be acquired by the Detroit United Railway.

Rochester, N. Y.—The New York State Railways has asked the Common Council for a franchise to double-track Parsells Avenue from a point west of Chamberlain Street and Stout Street in Rochester.

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Middletown, Ohio.—The Dayton, Middletown & Cincinnati Electric Railway has asked the Council for a franchise in Middletown.

Quincy, Ohio.—R. O. Marsh, Warsaw, representing the Tri-State Traction Company, Steubenville, has received a franchise from the Council in Quincy. The company also received a franchise from the Council in Hamilton. This is part of a plan to build a 75-mile line between Quincy and Burlington, via Warsaw, Hamilton, Nauvoo and Niota.

***Oregon City, Ore.**—Stephen Carver, Gladstone, has asked the Council for a twenty-five-year franchise in Oregon City.

Portland, Ore.—The Portland Railway, Light & Power Company has asked the Council for a franchise for a cross-town line on the East Side in Portland.

Montreal, Que.—The Montreal & Southern Counties Railway has received permission from the Council to extend its line in Montreal.

Temple, Tex.—The Temple, Northwestern & Gulf Railway has received a franchise from the Council in Temple for entrance to its terminals at Seventh Avenue and A Avenue, in the western part of Temple.

Seattle, Wash.—An ordinance providing for the construction of a second division of the Seattle Municipal Street Railway will be asked at the next meeting of the Council in Seattle. The route will be from Fourth Avenue south to Dearborn Street, thence to Rainier Avenue and paralleling the tracks of the Seattle, Renton & Southern Street Railway to Columbia City.

Seattle, Wash.—The Puget Sound Traction, Light & Power Company has asked the County Commissioners for franchises for extensions of its lines north and south of Seattle. The company has applied to the Board of Public Works for permission to remove and relay tracks in West Forty-fifth Street, Ninth Avenue, N. W., and West Forty-seventh Street between Eighth and Fourteenth Avenues, N. W.

Ceredo, W. Va.—The Ohio Valley Electric Railway has asked the Council for a franchise to double-track its lines in Ceredo and to build a double-track line on Beech Street in Ceredo.

TRACK AND ROADWAY

Fresno, Cal.—Surveys are being made to build an 8-mile line beyond Clovis. Most of the right-of-way has been secured from Fresno to Clovis and 8 miles beyond Clovis to the foothills of the Sierra Nevada Mountains. F. S. Granger, Clovis, is the promoter. [E. R. J., Oct. 25, '13.]

Pacific Electric Railway, Los Angeles, Cal.—Authority has been granted this company to construct its double-track main line at grade across ten streets or public highways between Strawberry Park and Gardena.

Petaluma & Santa Rosa Railway, Petaluma, Cal.—An extension into Occidental is being planned by this company.

Sausalito, Cal.—W. Wesley Hicks, 320 Market Street, San Francisco, Cal., states that he is in no way connected with the San Rafael & San Anselmo Valley Railway, as stated in the ELECTRIC RAILWAY JOURNAL of Oct. 4, 1913, page 667. Mr. Hicks is acting as engineer for a proposed 10-mile electric railway which is to extend through and between the towns of Sausalito and Mill Valley. It is proposed to lay 70-lb. rails and install a 1200-volt overhead trolley system. Double-pole construction will be used within the town limits and single-pole and bracket-arm construction between the towns. The franchises which have been secured extend over a period of fifty years. The owners of this new line are business men of San Francisco and Marin County.

Washington Railway & Electric Company, Washington, D. C.—Plans are being made by this company to begin work in the spring on its new line west of Wisconsin Avenue in Washington.

Palatka-Hastings Interurban Railway, Palatka, Fla.—This company states that it has not yet begun work on its 15-mile line between Palatka and Hastings. F. J. Von Angelken, East Palatka, secretary. [E. R. J., March 15, '13.]

Rock Island Southern Railway, Rock Island, Ill.—The Council of Aledo has opened a street in Aledo to be known as Sixth Street, which will make it possible for the company to enter Aledo.

Hutchinson (Kan.) Interurban Railway.—This company announces that it will extend its line into Carey Park in Hutchinson if the city takes over the park, as is contemplated. The extension will follow the river for 1 mile.

Wichita Railroad & Light Company, Wichita, Kan.—This company is asked to consider plans to extend its line to the Orient shops in West Wichita.

Southwestern Traction & Power Company, New Orleans, La.—This company plans to extend its line from New Iberia so as to reach St. Martinsville by Jan. 1.

Detroit (Mich.) United Railway.—This company is asked to consider plans to build a new cross-town line on Forest Street and Warren Street and to extend across the lower section of Detroit.

***Flint, Mich.**—S. O. Landis, Flint, and associates plan to build an electric line between Flint and Long Lakes.

Houghton County Traction Company, Houghton, Mich.—This company is asked to consider plans to extend its lines from the present terminus at Scott Street, Red Jacket, to a point in front of the site of the Colosseum on Red Jacket Road.

Electric Short Line Railroad, Minneapolis, Minn.—This company, which plans to build a line west from Minneapolis, via Marshall, Minn., entering South Dakota and terminating at Brookings, is considering plans to extend the line from Brookings to Madison. W. L. Luce, Minneapolis, president.

Minnesota Central Railway, Minneapolis, Minn.—Surveys will soon be begun by this company through Brainerd and on the Cuyuna Range. E. G. Potter, Minneapolis, president. [E. R. J., Sept. 6, '13.]

Helena Light & Railway Company, Helena, Mont.—This company is asked to extend its East Helena line across the valley to the lake.

New York State Railways, Rochester, N. Y.—Work has been begun by this company double-tracking in Hudson Avenue between Clifford Avenue and Norton Street in Rochester. Stone ballast and wooden ties will be used in place of concrete and steel ties.

Fayetteville Street Railway & Power Company, Fayetteville, N. C.—This company plans to extend its lines to the mill district and the Cape Fear River.

Brantford & Hamilton Electric Railway, Hamilton, Ont.—Plans are being considered by this company to double-track its line between Brantford and Hamilton in the near future.

Ottawa (Ont.) Electric Railway.—In January, 1914, the residents of Eastview will vote upon the question of extending this railway into Eastview. To perfect the scheme, Eastview is prepared to offer the company a bonus of $25,000.

Sandwich, Windsor & Amherstburg Railway, Windsor, Ont.—Plans are being considered by this company to relocate 1 mile of its line and eliminate some of the curves.

Portland, Eugene & Eastern Railway, Portland, Ore.—It is stated that this company, subsidiary of the Southern Pacific Railway, has succeeded in negotiating a loan for the construction of the proposed line from Portland to Salem through Woodburn. The new line will not be built until spring. Robert E. Strahorn, president.

Montreal & Southern Counties Railway, Montreal, Que.—This company has awarded a contract to John Ross, of the Ross & McComb Company, to build a concrete substructure of a bridge to be constructed over the Yamaska River at St. Césaire. The bridge will have four piers and two abutments. It is understood that the Dominion Bridge Company will erect the superstructure.

***Jackson, Tenn.**—Plans are being considered to build an electric railway between Bemis and Jackson. Among those interested are John Williams, John Wisdom and Aaron Tuchfelds.

Nashville Railway & Light Company, Nashville, Tenn.—New rails are being laid by this company on Dederick Street from Third Avenue, North, to the bridge in Nash-

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ville. The ties will be embedded in concrete and 105-lb. rails will be laid. Work will soon be begun laying new rails on Cedar Street from Fourth Avenue to Tenth Avenue. Work has been finished on the renewal of the St. Cecilia line in Nashville.

Nashville (Tenn.) Traction Company.—This company has awarded a contract to Westinghouse, Church, Kerr & Company, New York, N. Y., to make surveys and prepare estimates for its projected lines. The company proposes to expend about $250,000 for grading and equipment within the next eighteen months. Walter O. Parmer, Nashville, president. [E. R. J., Nov. 8, '13.]

Nueces Valley, Rio Grande & Gulf Railroad, Belleville, Tex.—This company is in the market for construction equipment to build its 25-mile line along the Nueces River through Simmons and Live Oak. W. A. Malthaei, Belleville, president. [E. R. J., Oct. 18, '13.]

Northern Texas Electric Company, Fort Worth, Tex.—This company plans to double-track its entire line between Fort Worth and Dallas and build a concrete viaduct to span the Trinity River.

Galveston (Tex.) Electric Railway.—Extensions of its lines in Galveston are being planned by this company.

***Temple, Tex.**—Preliminary surveys are being made by S. D. Hanna, Marlin, engineer, to build an electric railway between Marlin and Temple.

Uvalde & Leona Valley Interurban Railway, Uvalde, Tex.—This company will extend its lines east on Main Street to the freight depot of the Galveston, Harrisburg & San Antonio Railroad freight depot in the western part of Uvalde.

Ogden (Utah) Rapid Transit Company.—This company plans to extend its recently completed Twenty-seventh Street line in Ogden.

SHOPS AND BUILDINGS

Southwestern Gas & Electric Company, Texarkana, Ark.—Announcement has been made by this company that work will be begun at once on its new machine shop in Texarkana. The company plans to do all repair work in this shop in the future.

Big Four Electric Railway, Tulare, Cal.—The offices of this company are being moved from Tulare to Visalia.

East St. Louis & Suburban Railway, East St. Louis, Ill.—Work will be begun at once by this company on its new office building on Collinsville Avenue and Main Street in East St. Louis. The headquarters of the East St. Louis Light & Power Company, a subsidiary of the railway company, will also be in the new building.

Evanston (Ill.) Traction Company.—This company has recently purchased a tract of land on Central Street in Evanston on which it plans to build a carhouse. The structure will have a capacity of sixteen cars and will contain a small office.

Illinois Traction System, Peoria, Ill.—This company has renewed its lease for ten years on the Chisholm Building at Bloomington, which is used for a passenger station. Some improvements will be made soon.

Indianapolis & Cincinnati Traction Company, Indianapolis, Ind.—This company has been asked to consider plans to build a new passenger station at Gwynneville.

Hattiesburg (Miss.) Traction Company.—This company has opened its new office building on West Pine Street in Hattiesburg.

Toledo, Fostoria & Findlay Railway, Fostoria, Ohio.—This company and the Western Ohio Railway have leased the Niles block on South Main Street in Findlay and will remove the Union Interurban station from its present location three blocks further south. The Toledo, Bowling Green & Southern Traction Company will also join them. Plans are being considered by the companies to build a new freight depot in Findlay.

Dallas (Tex.) Consolidated Electric Street Railway.—Work has been begun by this company at Elm Street and Peak Street in the city of Dallas for its new carhouses. The structure will be one-story, 175 x 180 ft., and of fireproof construction. There will be fourteen tracks leading out of Peak Street into the shops and there will be a number of pits. Machinery will be moved from the company's present repair shops on the south side of Elm Street and much new machinery and equipment will be added. The company's old repair shops will be used for storage purposes.

Seattle (Wash.) Municipal Railway.—The Board of Public Works has awarded the contract for the construction of this company's carhouses and repair shops to the Manhattan Building Company, Seattle. The work entails the expenditure of about $6,000.

POWER HOUSES AND SUBSTATIONS

East St. Louis Light & Suburban Company, East St. Louis, Ill.—This company will add to the power station equipment of the East St. Louis Light & Power Company a 2800-kva, 66,000/2300-volt water-cooled transformer which will be furnished by the General Electric Company.

Centerville Light & Traction Company, Centerville, Ia.—This company is enlarging its power house in Centerville and installing new equipment consisting of a new engine and generator set.

Southwestern Traction & Power Company, New Orleans, La.—Plans are being considered by this company to build a new power house and several substations in the near future.

Bangor Railway & Electric Company, Bangor, Maine.—Construction of the new dam of the Bangor Power Company, at Veazie, Maine, has been completed. The new dam, which is on the Penobscot River, 3 miles above Bangor, Maine, will add 1000 hp to the generating capacity of the power plant and will increase the company's total capacity to 18,700 hp. The new development is constructed entirely of reinforced concrete and steel with a maximum height of 27 ft. The base has a width of 25 ft., tapering to 6 ft. at the summit. A new wheel room has been built adjoining the power station and next year additional equipment will be installed. The old steam plant is retained to supply auxiliary power.

Worcester (Mass.) Consolidated Street Railway.—This company has installed a new 5000-kw turbine at its Millbury power house. This extra power generated in the Millbury plant will be used for auxiliary purposes and to supply the old Charlton power house, which is to be used as a substation.

Menominee & Marinette Light & Traction Company, Menominee, Mich.—This company will place in operation in one of its substations in Menominee a 200-kw two-unit, three-bearing synchronous motor-generator set, switchboard and accessories purchased from the General Electric Company.

Wahpeton-Breckenridge Street Railway, Breckenridge, Minn.—This company has purchased from the General Electric Company one 50-hp, 2300-volt motor for its power house.

Richmond Light & Railroad Company, New York, N. Y.—This company has placed an order for three 1000-kw rotary converters with the General Electric Company.

Montreal & Southern Counties Railway, Montreal, Que.—This company has awarded the contract to the Canadian General Electric Company to equip the substation at Rougemont, Que. The equipment consists of a 300-kw motor-generator set, a bank of transformers, high and low tension switchboard, lightning arresters and switching apparatus.

Greenville, Spartanburg & Anderson Railway, Spartanburg, S. C.—A new three-phase rotary converter which will double the capacity of the plant has been installed by this company in its power house on West Whitner Street, in Anderson.

Bryan & Central Texas Interurban Railway, Bryan, Tex.—During the next thirty days this company plans to build a new power house. It expects to purchase a generator and engine with a capacity of 150 hp.

Ogden (Utah) Rapid Transit Company.—This company is installing transformers and other new equipment at its power station on Washington Avenue in Ogden.

Lynchburg Traction & Light Company, Lynchburg, Va.—This company has installed a 1350-hp unit at its Reusens power house in Lynchburg. The generator for the new unit was installed by the General Electric Company and the additional waterwheel by the S. Morgan Smith Company.

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Manufactures and Supplies

ROLLING STOCK

Toronto, Hamilton & Buffalo Railway, Toronto, Ont., it is reported, contemplates using steel gas-electric motor cars on its line between Hamilton and Waterford and between Hamilton and Brantford.

Belt Line Railway Corporation, New York, N. Y., has been authorized by the Public Service Commission of the First District of New York to increase its capital stock to provide funds to cover the cost of the thirty-nine storage battery cars which were ordered from The J. G. Brill Company, as described in the ELECTRIC RAILWAY JOURNAL of June 28, 1913.

TRADE NOTES

Westinghouse Machine Company, East Pittsburgh, Pa., has made an appropriation of $125,000 to provide additional facilities, owing to its increasing business.

Cincinnati Car Company, Cincinnati, Ohio, has acquired the Armor Steel Foundry plant and is remodeling it in order to have increased facilities for manufacturing cars.

Dossert & Company, New York, N. Y., have received orders for their connectors from the Lehigh Valley Transit Company, West Penn Railways, Toledo Railways & Light Company, Baltimore & Ohio Railroad and the American Car & Foundry Company.

Railway Utility Company, Chicago, Ill., has appointed Charles A. Eggert sales engineer, with headquarters in Chicago. Mr. Eggert has been with the Consolidated Car Heating Company for the past twelve years. This item is in correction of a trade note which appeared in the ELECTRIC RAILWAY JOURNAL of Nov. 8, 1913, and which stated erroneously that Mr. Eggert had been with the Railway Utility Company for the past twelve years.

H. W. Johns-Manville Company, New York, N. Y., has received an order to equip all the trains of the Long Island Railroad with its J-M fire extinguishers. The company has recently put on the market "J-M high temperature cement No. 31," which it is said can be used practically whenever working temperatures range between 1500 deg. and 3100 deg. Fahr. This new material is a dry powder mixture composed of asbestos and other materials of secret preparation. It is mixed with water to the proper consistency (about 18 lb. to 20 lb. of water to 100 lb. of powder) for working like mortar or tamping around molds. The company expects to open a new office and warehouse in its Baltimore branch, owing to increased business.

Keyes Products Company, New York, N. Y., has reconstructed its finishing department at Montville, Conn., which was destroyed by fire in the early part of August. This plant is now in full operation. New machinery has been installed and great improvements have been made for the manufacturing of "Nevasplit" headlining and panels. Orders which have been accumulating during the period of inaction caused by the fire will now be filled and shipped promptly. The company announces that it is placing on the market a non-inflammable "Nevasplit" board, which has all the hardness, strength and water-resisting qualities of the regular board, and in addition acts as an effective barrier against fire. This fireproof board is a non-absorbent non-conductor of heat and is designed for use not only for headlining but for excluding heat and cold in the construction of steel cars.

ADVERTISING LITERATURE

National Scale Company, Chicopee Falls, Mass., has issued two folders, one describing its counting machines, another its National Chapman elevating trucks.

Gilbert & Barker Manufacturing Company, Springfield, Mass., has issued a catalog describing and illustrating its process for burning fuel oil under low pressure.

Cincinnati (Ohio) Milling Machine Company has issued a catalog describing and illustrating its semi-automatic millers with intermittent feed and power quick return.

Universal Trolley Wheel Company, Northampton, Mass., has issued an attractive pamphlet calling special attention to the self-lubricating quality of its universal trolley wheel.

H. W. Johns-Manville Company, New York, N. Y., has issued a catalog describing and illustrating the application of its built-up roofing, prepared roofing, asbestos shingles, waterproofing and mastic flooring.

Davis-Bournonville Company, New York, N. Y., has issued two catalogs, one describing its oxy-acetylene welding and cutting apparatus, the other its oxygraph for cutting steel according to pattern with the oxy-acetylene flame.

Railway & Industrial Engineering Company, Pittsburgh, Pa., has issued a folder describing its simultaneously operated disconnecting switches for indoor and outdoor mounting adapted to all capacities and voltages.

National Tube Company, Pittsburgh, Pa., has issued a circular illustrating its different types of "Kewanee" unions, including the regular octagon, round end, hexagon and M. & F. patterns of this air-tested union with no inserted parts.

Brown Hoisting Machinery Company, Cleveland, Ohio, has issued a catalog describing Brownhoist grab buckets, shovel buckets and various kinds of tubs. Illustrations are shown of the application of these buckets by various companies, among them the Brooklyn Rapid Transit Company, Portland (Ore.) Railway, Light & Power Company and the Cleveland Electric Railway.

Electric Service Supplies Company, Philadelphia, Pa., has recently issued three catalogs. One describes and illustrates various railway devices sold by the company, including Keystone car distinction signs, steel gear cases and trolley catchers. Another catalog describes the essential features embodied in the manufacture of Keystone steel gear cases. A third catalog lists and describes winter railway supplies, such as snow-sweeper rattan, Root track scrapers, adjustable track brushes, Keystone sand driers and track and switch brooms.

NEW PUBLICATION

Elektrische Strassenbahnen und Strassenbahnähnliche Vorort und Uberlandbahnen (Electric Street and Interurban Railways). By Karl Trautvetter. Berlin, 1913: Julius Springer. Size, 6 in. x 9½ in. 240 pages. Price in paper, $2; in cloth, $2.20.

This work is free from lengthy, unnecessary description and the author has succeeded admirably in discussing the engineering features of electric railway work in small compass and with great simplicity. The illustrations, which number 334, appear to be original with very few exceptions. The treatise extends from the preliminary studies and cost estimates through the actual construction of track, line and power installations up to the completely equipped car. The arrangement of the work alone makes it of value to the American electric railway engineer who is familiar with German and who can make proper allowance for German conditions.

The New York, New Haven & Hartford Railroad on Nov. 6 filed its answer to the appeal taken by ex-Governor Bulkeley of Hartford and other stockholders from a decree of the Public Service Commission of Massachusetts authorizing the railroad to issue convertible bonds and also to issue 675,520 additional shares of stock. The company submits that several of the paragraphs contained in the appeal were merely propositions or conclusions of law which do not require to be either admitted or denied. But the respondent submits that the petitioners are not interested parties within the meaning of the law and are not entitled to petition the court under the terms of the act authorizing the Public Service Commission to pass upon the issue of bonds. The answer sets forth that the commission acted lawfully and that its determinations were final and not open to review. On Nov. 11 Judge Sheldon, of the Supreme Court, refused to issue an order restraining the company from issuing the $67,000,000 debenture bonds. It was announced that Judge Sheldon would sit on Nov. 18 at the hearing on the bill in equity appealing from the decision of the commission and to consider the case on its merits. He is expected to refer the case to the full bench for a hearing. It was said that probably there would be no actual presentation of the case before the court until the first week in December.

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ULTRA-REFINEMENT IN LOCOMOTIVE REPAIRS

It has often been remarked by Americans that European electric locomotives are built like watches, and the regret is implied that similar refinement in workmanship is not to be expected of the American mechanic. This to a certain extent is true. The design, construction and repairs of locomotives in this country have assumed simplicity as a keynote, and in consequence there has been developed a class of railway mechanics to whom 1/32 in. has become absolutely meaningless. Superficially this might be considered unfortunate, but on the other hand there seems little reason for working to 0.001 in. on bearings which will be running 1/16 in. loose long before the time when the engine is considered ready for an overhauling. In this country it is a rule that the needs of economical operation are best conserved when the locomotive mileage is kept high, and this in turn means long intervals between shoppings together with the minimum of tinkering between trips. Parts so designed as to require extraordinary care and skill in fitting are not likely to survive either the heavy stresses or the rapid wear of railway service, and a construction which involves their use should be changed in preference to the alternative of keeping the engine out of service while delicate adjustments are being made.

THE SATURATION OF THE DOLLAR

Although the address recently given by Samuel Insull before the Investment Bankers' Association in Chicago dealt specifically with the subject of electrical securities, several points were brought out that may be of interest in the electric railway field, particularly in the case of companies having both transportation and light and power properties. According to Mr. Insull, there are two classes of engineering—engineering as it is usually understood, which deals primarily with construction, and selling engineering, which covers the getting of business after construction. We agree with Mr. Insull that too much importance can hardly be attached to the latter. In most circumstances when the construction engineer has completed his work the capital investment is fixed until further additions or betterments are necessitated, and it becomes the problem of the selling or commercial engineer to make the best possible showing for the investment by keeping every dollar of it working as many hours per day and as many days per week as is possible, with due regard to the safety of operation and the permanency of service. The question of filling up the valleys in the load curve through the recognition of the diversity of load factor thus becomes one of unlimited importance. Mr. Insull uses a particularly felicitous phrase in this connection—"the saturation of the dollar." In explanation he says that the investment per customer of the Commonwealth Edison Company has been lowered, the output raised and the relation of income to investment changed from 13½ per cent in 1898 to 21 per cent in 1912. In other words, through the activities of the selling organization every dollar of the capital investment has been made to work harder and its potential energy has been increasingly transformed into a kinetic energy that brings in more dollars and cents.

VOCATIONS OF COMMISSIONERS

The vocation of men appointed to serve as members of public service commissions is receiving greater attention than it did a few years ago. Experience has shown the need for careful consideration of this matter. In the past lawyers have generally predominated on commissions. It is recognized that many of the issues brought before a commission require legal consideration and lawyers are especially qualified by their training to write the decisions which are a large part of a commission's work. It has been found, however, that other knowledge and experience than those provided by a study of the law are really essential in commission membership. At present a movement is under way looking to the appointment of engineers on the Public Service Commissions of New York State. This is clearly in the interest of a well-balanced study of regulative issues. The lawyer needs the judgment of the engineer, and the engineer needs the ability of the lawyer. Both can serve the public working together as equals better than if one was the recognized employee of the other. An illustration of the tendency in commission membership which should be commended is that of the appointment of S. L. Tone, of Pittsburgh, to the new Pennsylvania commission, which will assume jurisdiction over utilities on Jan. 1 1914. There can be no question regarding Mr. Tone's technical

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qualifications. He is well equipped to act on questions affecting the operation and finances of public utility corporations. The fact that he comes from a public utility company makes him better able to understand the problems of such companies. He will not need to take time to acquire a preliminary acquaintance with public utility questions, as has been found necessary by members who have taken office in some of the other new commissions. As we stated long ago, we see no reason why capable men should not pass from public utilities to public service commissions, or from commission service to company employment. There ought to be nothing in the service of one which should deprive a fair and judicial-minded man from employment by the other. A fair settlement of the problems is the desired and, in fact, the necessary end of regulation by commissions if that regulation is to be successful.

BUS OPERATION HERE AND ABROAD

Mr. McCollum's report to the Board of Estimate and Apportionment, city of New York, on the respective merits of the street car and omnibus is a most illuminating document. As presented in our abstract in this issue, he shows that the wide use of the motor bus in England is not owing to any overwhelming technical or economic superiority of the bus over the tramcar. It has been due chiefly to the fact that the bus business has been free to expand at will, whereas the tramway system throughout Great Britain has been shackled by the most archaic restrictions and by discriminative, if not oppressive, taxation. Moreover, there is a striking difference in the assistance to the development of the city as a whole on the part of each transportation enterprise. The street railway system covers the city and necessarily must take the lean with the fat; the bus operator need serve only the routes that seem surely profitable. Such facts as the foregoing have been stated before, but this time they are brought home to the American operator owing to the fact that this report was prepared because four different applications for bus franchises are now before the city of New York. In commenting on the lessons of European experience, Mr. McCollum takes the broad and just ground that the question must be solved from the standpoint of the general welfare and with due regard to the money now invested in good faith for street railway service. He would not countenance bus operation over routes which are already adequately served with traffic facilities nor grant franchises which did not place buses under conditions of control similar to those applied to street railways.

To the investor a comparison of operating and ultimate costs of buses and street railways is of vital moment, but the question of broader interest is: Which form of transportation is most beneficial to the public? Mr. McCollum's figures indicate that the superior schedule speed of the bus is due largely to the fewer stops consequent upon its smaller capacity, and he points out further that speed restrictions upon motor buses are a dead letter, at least in London. If one should build a bus of capacity equal to a given car, it would be far larger and probably no faster. This statement is confirmed by the calculations of J. B. Hamilton, general manager Leeds Corporation Tramways, who has found that the seating capacity of the average British motor bus is but 60 per cent of that of a tramcar, and that even its greater speed and flexibility do not enable it to earn more than 80 per cent as much as the car. It appears then that even in England, where the street cars are notoriously slow, the bus falls 20 per cent behind in capacity. It cannot be too frequently emphasized that, with the ever-increasing congestion of our city streets, capacity is the keynote just as it has been in the electrification of congested steam railroad lines, and that maximum capacity has not yet been attained with a vehicle which must carry its own power station. Under such unequal conditions as prevail in England, the bus can injure the street railway but it cannot do the work of the street railway with the same satisfaction to the public.

Much has been made of the ability of the bus to go anywhere, but it is doubtful whether this feature is one that is appreciated by the unfortunate pedestrian. The accident figures quoted by Mr. McCollum show that the flexibility of the bus is indeed a source of great danger on crowded city streets. With all the foreign experience before them, it is inconceivable that the authorities of New York or other large American cities will be willing to permit the unrestricted development of bus service. If the bus is placed on a parity with the street railway, its principal field for city service will be on "show" streets at fares *de luxe*.

HOW ABOUT THE THREE-WIRE SYSTEM?

Might it not pay at this stage of affairs for engineers to take up again and carefully consider the use of the three-wire system for street railway service? As our readers will remember, it was tried on at least three systems in the United States nearly twenty years ago and after a relatively short period was abandoned. It was also tried with a moderate degree of success abroad yet has been dropped out of account in all recent European construction. Now, a good many things tried and abandoned early in the art have been at later stages taken up again and worked out to a successful conclusion, and the New York, New Haven & Hartford Railroad is planning to make just such a revival of three-wire working with its 11,000-volt, single-phase overhead conductors. In this system, which is briefly outlined in a paper read by H. Parodi before the British Institution of Electrical Engineers, the running rails would be connected to the center of a 22,000-volt transformer with its terminals connected to the overhead conductors for adjacent tracks, the primary being in series with the 11,000-volt generator. Consequently the voltage between each track conductor and the rails would remain at 11,000 volts, although the transmission of power would be accomplished at 22,000 volts, provided the loads on the two tracks were balanced. The feeders for the overhead lines could, of course, be transposed as often as desired to reduce inductive interference with telegraph lines and to assist in balancing the system, the rails remaining neutral at all times and carrying current only over short stretches.

In early installations for street railways there were two practical objections to the three-wire system—first, complication on the switchboard and in overhead crossings,

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and, second, the difficulty in practice of getting such a degree of balance as would insure a good degree of saving in the conductors. These objections were originally valid, but it is an open question whether they are necessarily valid now. The burden of feed wires is getting progressively more and more serious as the distributions become more and more extensive, and if any considerable measure of relief can be obtained by three-wire distribution the subject deserves at least a thorough re-examination.

The two difficulties mentioned are to a certain extent concurrent, for the difficulty with overhead conductors is largely dependent on the particular arrangement required by the overhead service. The scheme in the early stages of the art was tried in several forms, sometimes by working the cars on the two sides of a double track, plus and minus respectively, and again by the use of a zone scheme of distribution or the arrangement of certain districts plus and minus. The saving in copper secured is almost entirely dependent on the details of this overhead distribution, and this therefore is, from the economic standpoint, the first thing to be worked out. The main trouble in such a distribution would seem to be due to the extremely shifty character of the load imposed by a railway system. The wandering of the load, in fact, is one of the principal troubles in electric distribution generally.

We are not aware that details of any close study of the subject have ever been made public, and it would certainly be worth while for someone to go into the matter thoroughly, showing the variations of load in some city throughout a given distribution territory at various hours. This could readily be done, following the principle of a relief map of which the ordinates should be the normal loads in various sections, and a series of such maps modeled to show the topographical load conditions at various hours would give a wonderfully good insight into the distribution conditions which would have to be met in applying a three-wire system. In studying the details of the matter it might be necessary to consider the two sides of a double-track line separately as making contiguous stretches of hills and valleys.

With such data at hand the first step toward the study of the three-wire situation would have been taken, and an examination of the data would readily show how great a saving in copper could be accomplished. The possible gain might then turn out to be worthy of further study in the details of overhead work in switching arrangements. Our general impression is that the early trials showed a saving insufficient to justify the added complication, yet those particular conditions may not now hold to anything like the same extent. Certainly complications are less to be feared than they once were, considering the advance which has been made in material and methods.

In lighting and general power service the three-wire distribution is, of course, standard, but lighting and power service differs from street railway work very widely with respect to the magnitude and character of the wandering load. This is the thing which primarily needs to be determined, and the task would be an extremely interesting one for some of our engineering schools to take up in a study for advanced students as a preliminary to an investigation from a rigorous engineering standpoint.

RECTITUDE IN RAILWAY AFFAIRS

An editorial in the last issue of the *Railway Age Gazette*, which we reprint in this issue, calls attention to the growing tendency of the public to hold railroad officials to a very strict code of ethics in connection with their relations with those who sell supplies to the railroads. The point to which attention is called particularly at this time is that of the giving of Christmas presents by representatives of supply companies to officials of railroad companies, a practice which the *Age Gazette* says is on the wane but is still in evidence to some extent. The argument is made, not that such an act is necessarily dishonest, but that, in the glare of publicity in which all railroad officials from now on must expect to live, any practice which has even the appearance of evil is reprehensible and will react on both giver and taker.

During the present week we have instances of the investigation being conducted into the effect which the outside enterprises of the officers of the 'Frisco may have had upon the recent receivership of that railroad and the statement that in Louis Brandeis' opposition before the Interstate Commerce Commission to the increase of freight rates in New England he will go thoroughly into the question of interlocking directorates and will seek to determine to what extent they have influenced the orders placed by the companies for supplies and any other business relations of the railroads.

There is no doubt that the codes of morals formerly thought adequate will no longer be considered to apply. An example of the extent to which the large steam railways have gone to avoid even the appearance of any scandal is shown by the rules put in force two years ago at the annual convention of the Master Mechanics and Master Car Builders at Atlantic City in June. Formerly, all entertainment at these conventions was furnished by the manufacturers, but, beginning two years ago, the railway associations insisted that the expense of the entertainment should be cut down to the simplest character and that all expenses should be defrayed jointly by the railway associations and the supply association in the proportion in which the attendance at the convention represented the supply men or the railway men. Even the provision for the free use of roller chairs was abolished in the endeavor to avoid all ground for suspicion.

We have referred to this subject not because we believe that there is any extensive practice in the electric railway field of this kind which should be checked. We cite the matter simply as an evidence of a changing condition. Electric railway officials are no less liable to examination in connection with these matters than steam railway officials. If they are not subject to the Interstate Commerce Commssion, their acts are open to review by the state commissions, and at no previous time has there been a closer scrutiny of the financial affairs of the electric railway companies than at present. As our contemporary says, it behooves every railroad man to put his "house in order," so that, in case the question should be raised, the investigators will not find anything connected with the company or with the acts of subordinate officials which the manager would not like to have found or on which a wrong construction might be placed by the public at large.

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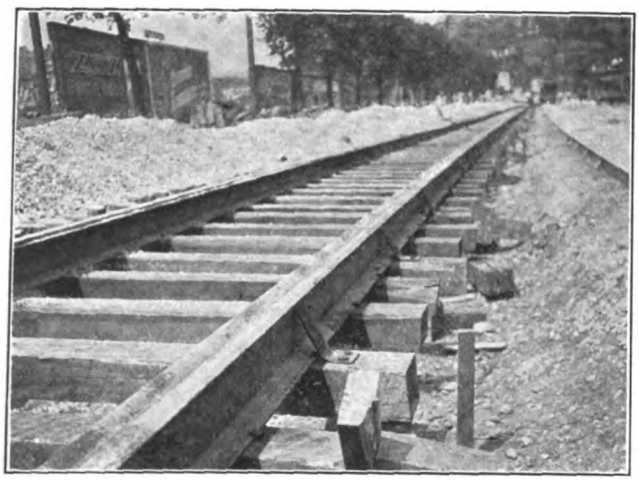
Cincinnati Traction Company's Track Construction Methods

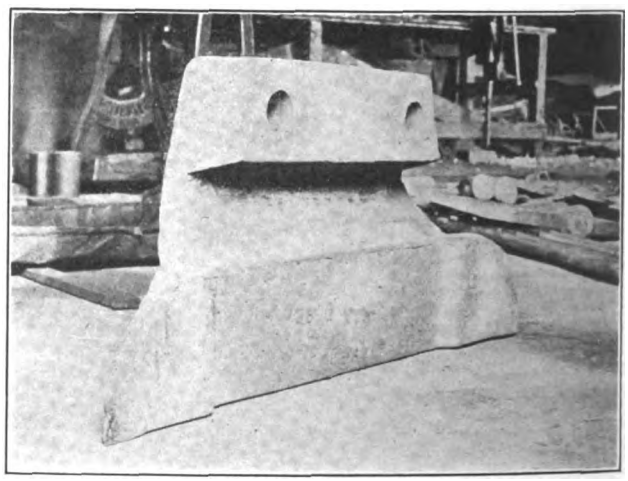
During the Past Few Years This Company Has Been Engaged in a Large Amount of Track Rehabilitation and by the Establishment of a Standard Form of Construction and Standard Methods of Installation the Work Has Been Highly Systematized, Resulting in Very Material Reductions in Cost

During the past few years the Cincinnati Traction Company has engaged in a large amount of track rehabilitation and construction, as it has approximately 230 miles of wide-gage track (5 ft. 2½ in.), of which a large part has reached the limit of its life under existing traffic conditions. Prior to beginning construction on a large scale the company adopted a standard track design for both extensions and rehabilitation. It consisted of 140-lb., 9-in. girder-grooved rail, laid on 6-in. x 8-in. x 8-ft. white oak ties and spaced at 2-ft. intervals, the ties being embedded in 14 in. of 1:3:7 concrete. This provides a sufficient depth of concrete to obtain 6 in. or 8 in. of foundation under the ties and at the same time serves as a base for the pavement. The paving is granite block laid on a 1½-in. sand cushion with 1 : 2 sand and cement grout filler.

Tie rods were not used in the construction owing to the difficulty in obtaining workmen who could lay uniform joints in the pavement around them, and they were replaced by pressed-steel rail braces installed at every fourth tie. These rail braces are spiked independent of the rail, which is fastened to the tie with one spike on the inside and two on the outside of the base. A cast-welded joint, 13 in. in length, requiring about 200 lb. of metal, is used in all standard construction. Iron low in sulphur is specified for these cast joints, and in order to maintain the low percentage of sulphur coke is employed as a fuel in the melting process.



Cincinnati Track Construction—Standard 9-in., 140-lb. Girder-Grooved Rail Track Construction



Cincinnati Track Construction—Double-Sheared Plow Casting Used to Remove Concrete Beam from Rail

EXCAVATION

The usual procedure in rehabilitating or constructing new track in paved streets has been carefully planned. According to a prearranged program, any section of track to be rebuilt is given over to the construction department, regular service being either detoured over connecting lines or handled by means of a temporary track laid on the street surface. Following the removal of traffic, the old track is torn up to make way for a Thew electric shovel, which excavates either concrete or earth. Generally the bottom of the trench made by the power shovel is about 21 in. below the surface of the street. The excavated material is loaded into wagons or dump cars, the former being used when it is impossible to divert traffic from a parallel track or when a temporary track cannot be laid in the street. If the material is removed by wagon, it is hauled to some convenient dumping ground, and if removed by cars it is taken to the railway company's property in need of filling material. At its material yard the street railway company has about ½ mile of track on steel ties assembled in 30-ft. lengths. This is used where it is necessary to lay a temporary track on the street surface. A locomotive crane is employed to load this track onto flat cars, and after the track sections have been set on the pavement at a construction job, they are bolted together with angle bars. The railway company also has several portable cross-overs and a portable Y. The latter is used to turn cars where a portion of the old track is disconnected during the construction period. In many instances, however, one of the old double tracks is used as single track during the reconstruction work, and Kerwin portable cross-overs are provided at frequent intervals to facilitate car movements.

Some of the old lines now undergoing rehabilitation are of concrete beam construction. One of the difficulties experienced in tearing up this type of track to make way for the electric shovel has been the removal of the rail which is partly incased in the concrete beams. The cost of breaking the concrete away from rail by hand was found to be not only expensive but too slow for practical purposes, and a novel means was devised to accomplish it both quickly and economically. A section of 85-lb. A. S. C. E. rail was securely bolted to the rear truck of the locomotive crane and bent from the horizontal so that the projecting end was in contact with one-track rail. A cast-steel shoe was then bolted to this projecting end. This shoe was provided with a slot to fit over the ball of the rail and between the under side of the rail groove and the rail base on the inside of the track. The casting thus serves as a double-pointed plowshare or rooter, and as the crane car moves forward the concrete is wedged away from the web of the rail on one side. After the concrete has been separated from the rail the remainder of the beam is broken up and removed by the electric shovel.

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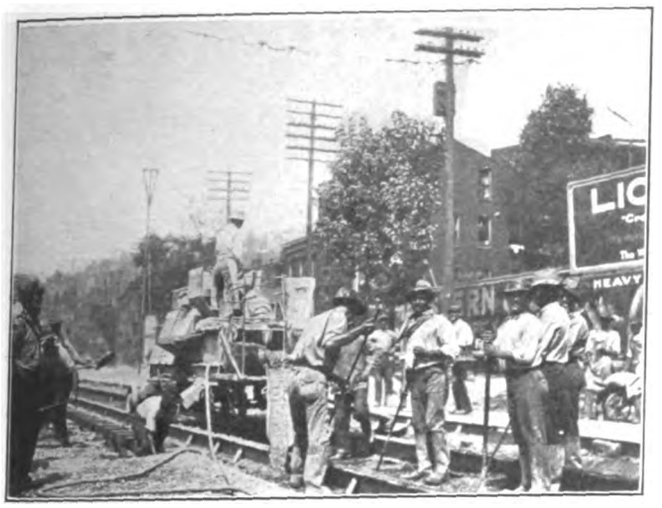
After the bulk of the material has been excavated by the electric shovel, the final subgrade surface is prepared by hand. This work is followed by thoroughly rolling the trench with a 7-ton or 10-ton road roller. The next step in preparing the subgrade is to excavate a small trench, 1 ft. wide x 1 ft. deep, at the center of the track. An ordinary 4-in. farm drain tile laid with open joints is placed in this trench on a 3-in. layer of washed river gravel. A second 3-in. layer of washed gravel is deposited over the top of the tile and thoroughly tamped around it, care being taken, however, to keep the tile in perfect line and surface during tamping. The top layer of gravel is covered over with earth, which is also packed with tampers. This track drain is connected to the city sewer system at intervals of 600 ft. where the track grade is continuous and at all breaks in grades. Surface drainage is provided by concrete inlets set in the flangeways inside the rails. Every precaution is taken in applying the grout filler to make the pavement thoroughly waterproof.

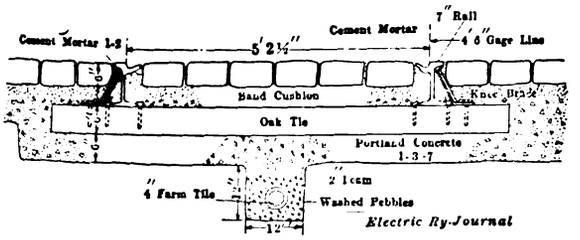


Cincinnati Track Construction—Discharge End of Concrete Mixer

Cincinnati Track Construction—Charging End of Concrete Mixer

TRACK LAYING

After the subgrade has been prepared, the ties are brought to the job in dump cars which run on the track paralleling the one undergoing reconstruction. The side boards on one side of these dump cars are raised so that the ties will slide into the trench when the car is tilted. As a general rule ninety ties are loaded in each car, and they are dumped at intervals so that the distributing may be done each way from the tie pile. After the ties have been spaced in the trench, the outside end of each tie, if in double track, is marked at a uniform distance from the end. This mark indicates the outside position of the rail base when it is spiked to the tie. The gang of spikers on the outside rail works a little in advance of the gang on the inside rail and adjusts the ties to the mark.



Cincinnati Track Construction—Cross-Section of Standard Track

The girder-grooved rails are transported from the material yard to the construction work on a crane car. The rails are unloaded into the trench, and before they are spiked in position they are connected temporarily with fish-plates which are removed when the permanent joint is applied. As a rule the delivery of crushed stone and sand follows the track laying, so that the cars on which they are loaded may be run over the new track and the stone or sand dumped on the shoulder of the trench. All material is distributed with a view of eliminating unnecessary handling. A sufficient quantity of cement for each day's run is delivered to the work by wagons, and this is set on the sidewalk close to the curb line. While the concrete materials are being delivered the new track is surfaced on 6-in. x 6-in. x 12-in. yellow pine blocks with shims and wedges to take up slight variations in alignment and surface.

CONCRETING AND PAVING

At this point in the progress of the work an electrically operated concrete mixer is run onto the new track. This mixer is of the continuous type, and energy for its operation is obtained through a pole and flexible cord connection to the trolley wire.

During the early stages of the construction work the continuous mixer was operated in connection with a batch board, the mixed concrete being dumped on it and shoveled to the point where it was required in the trench. However, this necessitated four shovelers on the batch board in addition to the workman who dumped the concrete under the ties and leveled it off, and to reduce the number of men a pivoted spout was attached to the discharge end of the mixer, which made it possible to deposit the concrete where it was required. This arrangement permitted a reduction of five men in the concrete gang and represented a saving of $10 per day. Other slight modifications have also been added to the machine to produce maximum economy in operation.

In the construction and rehabilitation work during the past summer an average of approximately 200 cu. yd. of concrete had been placed each ten-hour day. This quantity of material was handled with twenty-five men in the concreting gang, divided as follows: Two men shoveling stone, four men shoveling sand, three men handling cement, three men tamping ties, one man flat-tamping, one topman, one spout man, one water boy and a foreman. In order to maintain a continuous discharge of mixed concrete, the men shoveling stone were divided into two gangs of five each which alternately rest and shovel at ten-minute or fifteen-minute intervals. With this force an average cost, dependent upon local conditions, of between 28 cents and 33 cents per cubic yard for labor and superintendence has been obtained.

After the foundation has been in place a sufficient length of time to set, the sand cushion is cast in place and leveled

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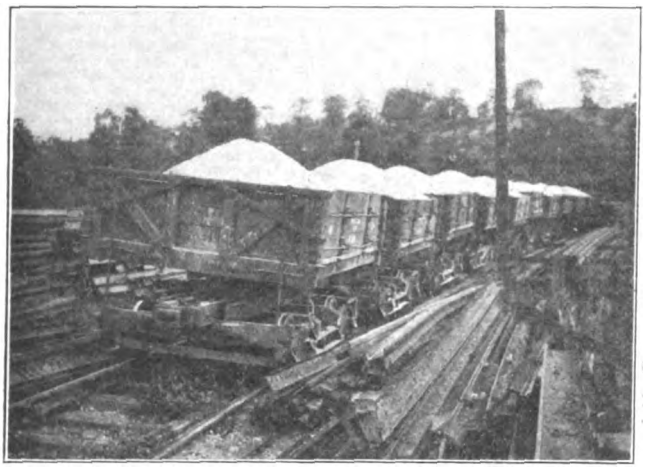
with a wooden templet. This is followed by the paving gang, which lays the granite block in place in the track allowance and applies the grout filler. Openings in the paving surface and concrete foundation are left around the rail joints, and these are filled after the rail joints have been cast-welded.

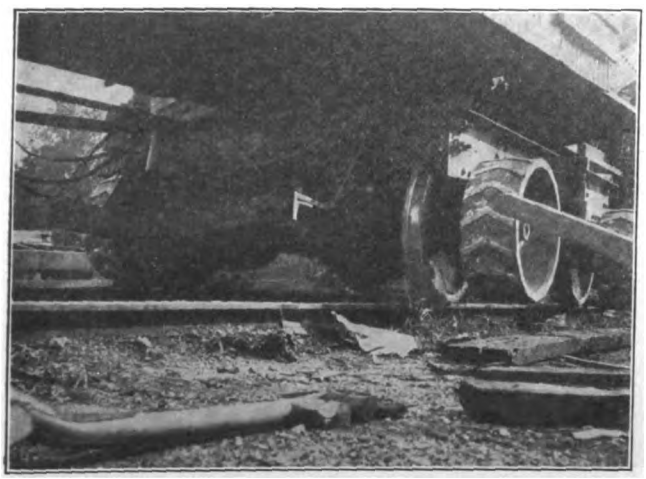


Cincinnati Track Construction—Type of Dump Cars Employed in Track Work

In welding the rail joints the temporary joint plates are all removed and replaced by steel plates which form the cores around which the cast joints are poured. Before any joint is welded, however, the rail surface is cleaned of all scale by a sand blast, after which the molds are set in position and packed so that there will be no leakage of the metal around them. After the welding operation is complete and the remainder of the pavement has been laid, all joints are ground to obtain a uniform surface across the abutting rails.

LABOR-SAVING EQUIPMENT

Almost all classes of track material are delivered by steam roads at a large material yard, where they are held in storage until needed. Ties are unloaded from the cars by the use of roller conveyors. Stone and sand are unloaded by a crane with a clam-shell bucket either into bins



Cincinnati Track Construction—View Showing Application of Traction Wheels and Motor to Truck of Electric Shovel

where the material is retained in storage or direct into dump cars for transportation to the construction work. Rails and special work are also handled by cranes, and scrap iron and steel is loaded into cars by an electromagnet.

The electric shovel previously referred to is of the Thew automatic type. Two novel improvements have been added to it, however, since it was received from the manufacturers, and they have greatly increased its efficiency in operation. A GE-800 motor has been mounted on the shovel truck, and it is connected to the back axle by reduction gears and to the front axle by a chain and sprockets. This extra motor was added to make it possible to propel the shovel over the street railway tracks at a higher speed than was attainable by the self-propelling gear mechanism which originally accompanied the shovel. The other feature which has been added to the shovel consists in a 24-in tractor wheel mounted beside each one of the four 26-in car wheels on an extension of each axle. The tractor wheels have 9½-in. ribbed flanges. Both the car wheels and tractor wheels have been applied to the extended axle with a taper fit, and their application makes it unnecessary to provide a temporary track in the trench at the time the shovel is in operation. When the shovel begins work the temporary track is stub-ended where the trench begins and as soon as the car wheels leave the rails the load is transferred to the tractor wheels. The shallow trench excavated by the shovel makes a comparatively rapid forward movement and to accomplish this without a temporary track would require either exchanging the car wheels for tractor wheels or else the construction of a temporary track in the trench. The presence of tractor wheels on the truck makes both of these operations unnecessary.

A REMARKABLE DELAY RECORD

An example of what may be accomplished toward eliminating failures of single-phase motor-car equipment will be found on the New York, Westchester & Boston Railway. During the months of August and September of this year only two delays due to the cars or equipment occurred, one during each month, although the trains operated for the two months numbered respectively 6321 and 6115. The following table gives the delay records in detail:

General Statistics	August	September
Total number of trains operated	6,321	6,115
Total number of trains delayed	40	44
Total number of trains on time	6,281	6,071
Percentage of trains on time	99.37	99.28
Trains delayed between five minutes and fifteen minutes	39	44
Trains delayed more than fifteen minutes	1	0
Causes of Delays		
Delayed on tracks of N. Y., N. H. & H. R.R.	25	29
Failure of power supply	9	9
Delayed by signals (not signal failures)	5	5
Failure of equipment	1	1

In explanation of the above causes for the delays it should be stated that the New York, Westchester & Boston Railway reaches its New York terminal after a run of several miles over the tracks of the New York, New Haven & Hartford Railroad, which crosses a navigable stream by means of a drawbridge not far from the end of the Westchester tracks. Practically all of the delays from late delivery were due to this cause, the remainder being caused by trains held up for operating reasons in passing through the New Haven terminal yards.

The delays due to failures of power supply were brought about by temporary interruptions of the service for various electrical reasons outside of the lines of the railway company. Power is purchased from the New Haven Railroad power station at Cos Cob and is transmitted over a line about 13 miles in length.

The delays on account of signals should not be classed as equipment failures of any kind but rather as operating failures because they were caused by trains being properly held by stop signals either on account of regular trains in advance or the unexpected presence of work trains or cars on the line. No signal failures occurred during either of the two months in question. Of the two equipment failures, one was really chargeable as a "man failure," the motorman having been unable to discover and remedy the cause of a minor difficulty with the air brakes.

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The Illumination of Street Railway Cars*

The Authors Discuss the Changes in Methods of Lighting Which Have Been Brought About by the Introduction of Tungsten Lamps, Outlining the Effects of Reflectors and Interior Coloring and Giving the Results of Tests on Several Different Lamp Arrangements

BY L. C. PORTER AND V. L. STALEY

Until very recently little has been done toward improving the lighting of street cars. Modern methods of efficient and economic illumination have been in vogue in almost every other phase of industrial, public and private enterprise. So far, however, the great majority of street cars are lighted with the clear, bare carbon lamps. While these lamps may have given sufficient light for reading purposes when a car system was originally built, they very soon became inadequate, owing to increase in street railway schedules, growth of the community, etc. Even under the best of conditions, the lamps as installed without shades or reflectors do not afford efficient utilization of the generated light; nor is the lighting free from annoying glare. At certain rush hours there is a drop in voltage, which with carbon lamps produces a marked decrease in the illumination. When the tungsten-filament lamps were produced, it was recognized that they had characteristics which made them highly advantageous for railway service. Their increasing resistance with increase of voltage was a large advance toward steady illumination with fluctuating voltage, and their high operating efficiency enabled a large increase in illumination with actual reduction in energy consumption. The tungsten pressed filaments at first manufactured were too fragile to withstand the severe vibration of street car service, but now the strength of the lamp is such that it withstands even surprisingly bad operating conditions. With its high efficiency, about 1.25 watts per candle, it has practically eliminated the use of the tantalum lamp.

The first of the recent changes in the lighting of the car bodies has consisted in replacing the carbon lamps, lamp for lamp, with 23-watt or 36-watt tungsten lamps. This brought about an increase in the illumination at normal voltage of 6 per cent where 23-watt tungsten lamps were used and 66 per cent where 36-watt lamps were used. At 80 per cent normal voltage there was an additional increase of 43 per cent over the carbon, due to the better regulation of the tungsten lamps. This gain was obtained at a power saving of 65 and 44 per cent respectively, depending upon whether 23-watt or 36-watt lamps were used.

Owing, however, to the very high intrinsic brilliancy of the tungsten filament in the lamps, the glare was increased, so that it became quite evident. It was also realized by illuminating engineers, from tests which had been conducted on various installations in buildings, that a large percentage of the total light flux generated by the lamps was being wasted. This was due to the fact that much of it fell on dark walls and headlining and was largely absorbed or passed out of the windows. In other words, the lighting with clear bare lamps was neither comfortable nor efficient. This led to a study of possible reflector equipments.

Investigation showed that the use of scientifically designed reflectors giving the so-called intensive type of distribution would not only largely reduce glare but also raise considerably the efficiency of light utilization of the installation. It was found that two principal reflector locations could be used to advantage, one being the use of a single row of lighting units down the center line of the car—i. e., center-deck lighting—and the other being a double row of units, one down each half deck. As far as uniformity of distribution, absence of sharp shadow and efficiency were concerned, either method gave equally good results. The center-deck system, however, had the advantages of fewer fixtures to install, less wiring, less cleaning and maintenance and the use of larger, hence stronger and less expensive per candle-power, lighting units. That is to say, both initial installation and maintenance costs were lower with this system. In the center-deck system lighting units were also placed higher and a little further out of the direct line of vision of seated passengers. For both systems the lamps were wired on alternate circuits.

The question of the intensity of light required is one which has had considerable attention. It has been found that from 2½ to 3 ft.-candles were desirable on the reading planes (45 deg. and 3 ft. above the floor), or the position in which the average reader holds a paper. With either center-deck or half-deck lighting, where efficient intensive type reflectors are used, approximately 82 lumens per running foot of car body will supply this illumination. With the present efficiencies of the railway tungsten lamps this corresponds to about 10 watts per running foot, or 1.25 watts per square foot of floor area. Indirect or semi-indirect lighting systems have also been tried. These required the use of very light headlining, and even then it is necessary largely to increase the energy required for direct-lighting systems. Glare, however, is practically nil. The power required, together with the necessity of frequent cleanings of both reflectors and headlining for satisfactory service, and the low head room in street railway cars, makes the direct-lighting system usually preferable.

There are many types and styles of reflectors on the market both for direct and indirect lighting. Many of these are perfectly satisfactory for car use, choice of the particular type being dependent upon the artistic taste of the individual making the selection. A few general considerations, however, were found applying to all types.

FIXTURES AND REFLECTORS

The passengers in a street car must be protected against accident. With the addition of glass reflectors to the car comes the need of some form of special holder which will absolutely insure the reflector against jarring loose and falling. Several types of holders have been designed to meet this demand. Of these, two have proved very satisfactory. Both of these utilize a cone-shaped wedge which screws down, thus forcing springs against the neck of the reflector and locking them there. One holder uses spring fingers, the other a coiled helix to grip the reflector neck. These holders also contain the lamp socket and can be either screwed or bolted to the car. Another holder is under construction in which a spring is used for the socket of the lamp shell, similar to the marine type socket. This will absolutely prevent the lamp from shaking loose.

Even the very best holder requires the use of a good rugged reflector. These should be made of fairly heavy glass to assure their strength. For direct lighting either clear prismatic or opal glass reflectors will give excellent service. If satin-finish or sand-blasted reflectors are used, more frequent cleaning is necessary to maintain their efficiency. For the average car having a ceiling of 7 ft. to 8 ft. and a width of 8 ft. reflectors giving the intensive

*Abstract of a paper read before the Chicago Section of the Illuminating Engineering Society, Nov. 12, 1913.

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type of distribution were found to give the most satisfactory results. The intensive type of distribution was found best because it delivered the greatest percentage of the total generated lumens or light flux where it was most needed, namely, on the passengers' reading matter. Opaque reflectors are not recommended for direct-lighting systems because of the dark, gloomy appearance they give to the ceiling. For indirect lighting, however, they are excellent.

Reflectors should be used which have sufficient depth to prevent the lamp filament from being visible to any except the passengers almost directly beneath the lighting units. Any system of semi-indirect or indirect lighting requires a very light headlining, which should have a matte surface. If a glossy surface is used, the direct reflection of the lamp filaments may result in considerable objectionable glare.

INTERIOR CAR FINISH

The question of the color and finish of the interior of a street car is one which warrants a great deal more attention than has so far been given to it. Whether the lighting system be indirect, semi-indirect or direct, the finish of the car has a very appreciable effect not only on the resultant illumination but also upon the passengers' comfort. A light color finish has several advantages. It gives the car a cheerful appearance and in this manner serves indirectly as an advertisement for the railway company. It makes the contrast between the lighting units and the rest of the car less conspicuous, thus making the illumination more pleasing. Of still more importance, however, is the fact that with a light finish a considerably higher percentage of the light is reflected down on the reading plane.

Tests have shown that with the common dark-yellow finish of street cars the efficiency of light utilization is approximately 15 per cent where no reflectors are used and 30 per cent with a good direct reflector system. In one car in which the finish of the walls and ceiling was white as high as 60 per cent utilization efficiency was obtained. While it is in most cases impracticable to use white finish, a great deal of improvement is possible over present practice. Upon the finish of the car depends to a certain degree the amount of light that it is necessary to furnish. This in turn involves the type of illuminant used.

LAMPS

The first incandescent lamps used were the 16-cp, 64-watt carbon lamps. They were especially selected for the amperes to burn in series. Later the 54-watt gem or metallized carbon lamps came into considerable use. These were followed by the 40-watt tantalum and the present four sizes of tungsten lamps.

On a system having considerable voltage variation between different points lamps should be chosen whose voltage approximates the average voltage of the system, taking into account the time element and distance factor. Tungsten lamps have several very decided advantages over carbon lamps. Owing to their positive temperature coefficient, their candle-power changes less on fluctuating voltage. Thus on low voltage at the ends of a long line during the rush hours, or in climbing hills, they will still give considerable illumination when carbon lamps may be practically extinguished. Their power consumption per candle-power is very much lower than carbons and their light is whiter.

Improvement in the method of drawing tungsten wire, of course, resulted in improved strength of tungsten lamps. This, together with advancement in the methods of mounting, makes possible the use of these lamps under the severest conditions of street car service. The lamp manufacturers are now able to draw tungsten wire to exact diameter. This assures the fact that in series operation all lamps will operate at the same efficiency. Lamps of exact amperes instead of those covering a range can be supplied. Thus the railway companies can be sure of obtaining at any time lamps which will operate satisfactorily in series with those already installed, resulting in uniform brilliancy.

It is present practice in the manufacture of tungsten railway lamps to use one size wire for each size lamp, regardless of voltage; that is, the filament diameter is selected for lamps of a certain wattage rating at 115 volts and cut longer or shorter, depending upon the voltage desired. Hence the wattage of the lamps will be slightly higher for voltages above 115 and slightly lower below that figure; but this variation is not great enough to be objectionable. Street railway lamps are operated at a slightly lower efficiency than those for regular multiple service, chiefly to obtain the long life necessary to justify their higher first cost with very low power rates.

Four tungsten lamps have been especially developed for railway service, namely:

23-watt S-19	bulb operating at 1.34 watts per candle
36-watt S-19	bulb operating at 1.34 watts per candle
56-watt S-21	bulb operating at 1.20 watts per candle
94-watt S 24½	bulb operating at 1.20 watts per candle

All four types are giving a laboratory life of 2000 hours and are so rated in the manufacturer's data books. This life under service conditions may be estimated at 1200 to 1500 actual burning hours. From these figures it is easy to see that these lamps are economical. Take, for example, a 34-ft. car equipped with twenty-five lamps. If 64-watt carbons are used, the following figures are obtained:

Renewals per hour; cost of lamps at list price of 14 cents (14 cents × 25 ÷ 1200 hours)	$0.0029
Cost per hour of energy delivered at the car, 1600 watts at 1 cent per kw-hour (64 × 25 × 1 cent ÷ 1000)	0.0160
Total	$0.0189

If 23-watt tungsten lamps are used, by similar calculation the results will be:

Lamp renewals (35 cents × 25 ÷ 1200)	$0.0075
Energy (23 × 25 × 1 cent ÷ 1000)	0.0057
Total	$0.0132

This shows an actual net saving of $0.0057 per car hour, in addition to obtaining better illumination. If ten 56-watt tungsten lamps and reflectors are used, the saving becomes $0.0096 per car hour, while the useful illumination is practically doubled. This saving in 1466 hours' operation would pay for the eight reflectors and eight special holders necessary. Thus, after five months' operation (at ten hours per night) the equipment will have paid for itself, and from then on a clear saving of $0.0096 per hour would accrue to the company, to say nothing of the advertising value of well-lighted cars. This saving on 500 cars (assuming that 33⅓ per cent of them are lighted on an average ten hours per night) amounts to $5,670 per year; and who can state the advertising value? The ultimate saving will eventually warrant the rewiring of old cars to enable the use of tungsten lamps and reflectors. Where new cars are under construction the installation cost to the builder will be lower with the tungsten lamp and reflector system.

In order to check up the estimated advantages of the use of tungsten lamps in street railway service, a considerable number of both illumination and service tests have been conducted. As a result of these tests several railway companies, both large and small, have standardized the tungsten lamp and reflector center-deck system of car lighting, are having it installed in all new cars and are rewiring some of the old ones.

TESTS

It may be of value to give a brief summary of tests conducted on typical types of cars and typical lighting equipment. In Table I tests A and B were made on ordinary small cars, A being lighted by the not uncommon systems of grouping 64-watt carbon lamps on the center deck. In car A there were four lamps in the center of the car, two lamps located 4 ft. to each side of the center and one at each end. This resulted in very uneven illumination, there being a maximum of 9.75 ft.-candles in the center of the

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car, which fell to 1.5 at the ends. Car B was a similar car, lighted with five 56-watt tungsten lamps and clear prismatic reflectors in the car body. The illumination in this car was very uniform, having a value of 6.5 ft.-candles in the center and 2.25 at the extreme ends. This was obtained with a considerable power saving and a large reduction in glare.

Cars C and D were typical 34-ft. cars, car C being lighted with fifteen 64-watt carbon lamps in the car body and car D with six 56-watt tungsten lamps equipped with clear prismatic reflectors. Comparison of these two cars shows that the average illumination in the car D is considerably greater than that of the car with carbon lamps; that the effective lumens per watt vary by so great a difference as 0.4 to 2.4 in favor of the tungsten lamps; also that glare was practically eliminated in car D.

Car E was a typical 28-ft. car lighted with gem lamps grouped under flat steel porcelain enamel reflectors, while car F was a similar car lighted with two rows of 36-watt tungsten lamps equipped with clear prismatic reflectors on the center deck. In this car transparent signs were used, which depended for their illumination entirely on the interior light of the car. It will be seen that this car had a considerably higher average intensity which, owing to the absence of glare, gave an effective illumination even higher than the intensity values indicate, as no photometer will measure the effect of glare.

Car G was a 34-ft. car similar to car B, but in which the carbon lamps had been replaced by one circuit of 94-watt tungsten lamps equipped with alba reflectors, four being located in the car body and one on each platform. In addition to these there was one circuit of 23-watt lamps for signs and headlight. The distribution curves show that the illumination in this car, while of excellent intensity and quality, was not quite so uniform as was obtained with the 56-watt system in car D. This was due to the necessarily long spacing where but four lamps were used in a 34-ft. body.

Car H was a typical 28-ft. car in which the old carbon lamps had been replaced, lamp for lamp, by 23-watt clear bare tungsten lamps.

Car I shows well the enormous advantage of white headlining. In this car, though lighted with semi-indirect fixtures, the average illumination with but 23 watts higher power consumption is equal to that of car H, readings taken on a 42-in. plane being accordingly higher than on a 36-in. plane. This is due to the dark yellow ceiling of car H and the white porcelain enamel of car I. After these two cars have been in service for some time, the depreciation in car I will undoubtedly be considerably higher than in car H.

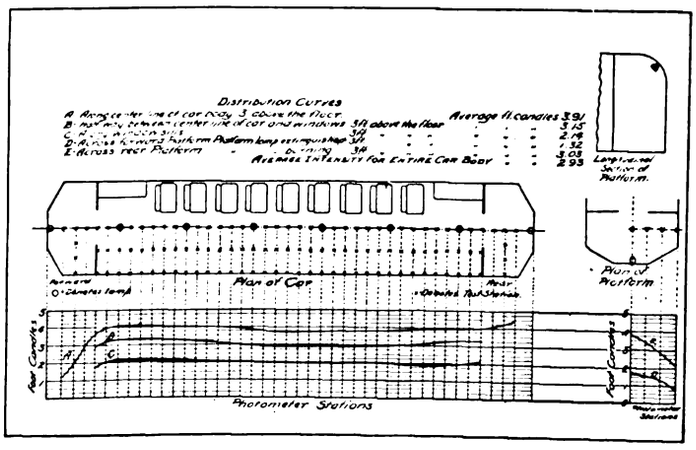
It may be apropos, where so much stress has been laid on the question of glare, to call attention to the fact that the more light thrown directly in the eyes of an entering passenger the more brightly illuminated will the car appear. To an outside observer or an entering passenger at first glance the car lighted with properly diffused light will appear darker than one lighted with clear, bare lamps, though the former may actually deliver far more light on the reading plane, where it is of service. A few moments' reading in such a car makes its comfort over the glary one very apparent.

TABLE I—SUMMARIES OF RESULTS IN DIFFERENT LIGHTING TESTS

Railway Company	Size of Car Body	Interior Finish of Car Body	Lamps Used in Car Body	Average Foot-candles on 3-Ft. Horizontal Plane	Lumens per Sq. Ft. in Car Body	Effective Lumens per Watt in Car Body	Total Watts on Car for Lighting, Body, Platform and Signs	Cost of Illumination of Car at 1 Cent per Kw-hr.
Massachusetts & Northern Street Railway Co., Athol, Mass.	A 8 ft. x 24 ft.	Light mahogany and bird's-eye maple headlining	10 64-watt carbon	4.0	8.58	1.3	960	$0.01135
	B 8 ft x 24 ft.	Dark green	5 56-watt tungsten with clear prismatic reflector	4.0	11.48	2.9	560	0.00935
Bay State Street Railway Co., Boston, Mass.	C 8 ft. x 34 ft.	Dark yellow	15 64-watt carbon	1.5	9.15	0.4	1600	0.01892
	D 8 ft. x 34 ft.	Dark yellow	6 56-watt tungsten with clear prismatic reflector	2.9	10.25	2.4	560	0.00935
Capital Traction Co., Washington, D. C.	E 8 ft. x 28 ft.	Mahogany; olive green headlining	11 54-watt gem with flat steel porcelain enamel reflector	3.2	9.2	1.2	810	0.01060
	F 8 ft. x 28 ft.	Mahogany; olive green headlining	8 36-watt tungsten with clear prismatic reflector	5.2	9.5	4.0	360	0.00652
Cleveland Railways, Cleveland, Ohio	G 8 ft. x 34 ft.	Dark yellow	4 94-watt with alba reflector	37-in. plane 4.2	11.3	3.4	585	0.01064
Brooklyn Rapid Transit Company, Brooklyn, N. Y.	H 8 ft. x 28 ft.	Dark yellow	14 23-watt tungsten	2.2	10.6	1.53	460	0.01043
	I 8 ft. x 42 ft.	Red; white headlining	15 23-watt tungsten	42-in. plane 2.7	7.6	2.6	460	0.01043

METHODS OF TESTING

In making photometer tests in street cars readings are generally taken on a horiozntal plane 36 in. above the floor. The width of the car is divided into five parts and a line of stations is run through the center of each division. Thus in an 8-ft. car one line of stations would be directly down the center of the car, the next 19 in. toward the side of the car and the third 38 in. from the center line. Along these lines stations are chosen over the forward edges of the cross seats. Their location gives the average positions in which passengers hold their reading matter. Where long seats are used the stations are generally taken every 2 ft. lengthwise in the car. Owing to the fluctuating voltage of a trolley circuit it is necessary to take simultaneous voltage readings with photometer readings. In order to make one test comparable with another, each photometer reading must be corrected for voltage to the normal voltage of the lamps used.



Car Lighting—Results on 34-Ft. Car with Seven 56-Watt Lamps and Prismatic Reflectors

Usually five readings are taken at each photometer station. In some instances, particularly where relatively great spacing of the lighting units is in use, it is of value to take readings on 45-deg. planes toward each end. The ratio of

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these readings multiplied by the horizontal values gives an arbitrary measure of the relative effectiveness of the lighting system.

In order to obtain figures on the cost of operation of different systems which may be applied to any road, the authors submit Table II, figured on the assumption that energy delivered at the car costs 1 cent per kw-hr. and that lamps are purchased on a $1,200 contract and have a service life of 1200 hours. In figuring the car hours of illumination, account should be taken of the percentage of total cars in service which operate all night and those which operate three-fourths, one-half or one-fourth of the night, etc. The lighting hours vary throughout the year, but an average of ten hours per night is a conservative figure covering all night burning the entire year round.

Table II—Cost of Street Car Illumination

Lamps	Cost of Renewals per Hour (1200 Hours' Life). $1,200 Basis	Cost of Power per Hour at 1c. per Kw-hr.	Total Operating Cost i. e., Renewals and Energy per Lamp per Hour
64-watt carbon	$0.00008	$0.00064	$0.00072
23-watt tungsten	0.00021	0.00023	0.00044
36-watt tungsten	0.00021	0.00036	0.00057
56-watt tungsten	0.00027	0.00056	0.00083
94-watt tungsten	0.00048	0.00094	0.00142

No figures have been given for the cost of cleaning and maintenance of reflectors, where reflectors are used, as the authors were unable to find any accurate data on this subject.

In conclusion, the authors point out that the use of tungsten lamps in place of carbon is highly advantageous because better illumination is produced at an actual saving in operating expense. Where tungsten lamps are used it is highly desirable to install efficient reflecting devices to reduce glare and increase the efficiency of light utilization. In all cases a light interior car finish is to be desired.

ENGINEERING COMMITTEES DISCUSS SUBJECTS FOR NEXT CONVENTION

The subjects and executive committees of the American Electric Railway Engineering Association met, respectively, on Wednesday and Thursday, Nov. 19 and 20, to lay out the committee work for the 1914 convention. The subjects committee made a preliminary study on Thursday afternoon which was reviewed the next day by the executive committee. The meeting of the subjects committee was attended by President J. H. Hanna, Washington; ex-President Martin Schreiber, Newark; John Lindall, Boston (chairman of the subjects committee), and ex-Secretary Norman Litchfield, New York. The session of the executive committee was attended by the following members: Messrs. Hanna, Lindall, Schreiber and Litchfield; F. R. Phillips, Pittsburgh; J. P. Barnes, Syracuse; L. P. Crecelius, Cleveland; B. F. Wood, Altoona; H. F. Merker, East St. Louis, Mo.; also by G. W. Palmer, Jr., Boston, chairman of power distribution committee; E. R. Hill, New York, chairman of heavy electric traction committee; C. S. Kimball, Washington, chairman of way committee; W. H. Sawyer, New York, vice-chairman power generating committee, and R. C. Cram, Brooklyn.

President Hanna was empowered to confer with the Transportation & Traffic Association on the subject of train operation. On motion, the president was also instructed to suggest to the chairman of the power generation committee the desirability of informal co-operation with similar committees of other electrical associations, with particular reference to prime movers. On motion, a committee consisting of the president and secretary was appointed to suggest prices for the forthcoming engineering manual, in whole or in part, to future members and non-members.

A new subject was assigned to the power distribution committee for consideration, as follows: the influence of large short-circuit currents on two and three-phase conductor cable and the dynamical force exerted between conductors during the time the short-circuit lasts. The committee will also continue the subjects of specifications for rubber-insulated wire and cable (with National Board of Fire Underwriters), revision of specifications for trolley wire with American Society for Testing Materials, and sundry line material specifications.

To the committee on power generation were assigned the following new subjects: control of currents in three-conductor, high-tension feeders, so as to limit them to a predetermined value; capacities and efficiency of boiler room, covering relative merits of automatic stokers, pointing out where it would pay to install them; control and safety devices for power stations and feeder circuits, with special reference to reactance; advantages and disadvantages of sixty-cycle apparatus for railway use.

The committee on engineering accounting will be requested to continue the subjects of inter-departmental charges, cost accounting and overhead charges jointly with the Accountants' Association.

The committee then discussed the duties of the Engineering Association's permanent representative to the American Society for Testing Materials. This representative, Norman Litchfield, will have the privilege of bringing to the committee meetings of the Testing Society any members of the Engineering Association who may be needed to act with him as advisory experts. This connection is entirely independent of the creation of possible joint committees.

On motion, it was decided to bring to the attention of the executive committee of the American Association all standards which have been approved by the convention and the committee on standards.

The committee on block signals will be asked to continue its digest of block signal laws and rulings and further study of installations. Its new subject will be the design of standard signal apparatus.

The proposed committee on train operation, which is to be a joint committee with the Transportation & Traffic Association, will continue train operation as applied to passenger, freight and express service and add the effect of car design and equipment on duration of stops.

The committee on buildings and structures is to continue the subjects of fire protection rules (jointly with the National Fire Protection Rules) and will add general specifications and form of contract and power house construction.

The committee on heavy electric traction is to continue the study of locations and clearances of overhead and third-rail working conductors. Its new subject will be a study of electric locomotive design.

The committee on life of railway physical property is to continue that subject.

The committee on way matters is to handle the subjects of proper foundations for tracks in paved streets, with particular relation to width, use of T-rail in paved streets, pavement for girder and high T-rails and use of alloyed steel rails.

The equipment committee will continue the subject of specifications for wires and cables for cars, specifications for solid wrought carbon-steel wheels and specifications for air-brake hose. Lighting and lightning protection of cars will be new subjects.

The subject of education was postponed for the year.

The New York Electric Railway Association has just issued its thirty-first annual report, covering the proceedings of the year 1913, in a handsome cloth-bound volume of 169 pages. Among the papers and discussions contained in this publication are "Construction of Crew and Car Schedules," "The Proper Location of Trolley Wire on Curves and the Corresponding Location of Overhead Frogs," "Coupon Transfers," "Fare Boxes" and "Operation of Trailers in Connection with Peak Load City Service."

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Bus Operation in London and Paris

This Report, Presented by John A. McCollum, Assistant Engineer to the Board of Estimate and Apportionment, City of New York, Disapproves Bus Service Where the Present Railway Facilities Are Ample and Recommends That Any Franchises Granted Should Specify the Character and Speed of the Vehicle Used

Under date of Nov. 5, Harry P. Nichols, engineer, chief of bureau of franchises, Board of Estimate and Apportionment, City of New York, transmitted to Mayor Kline a report on bus operation in London and Paris made by his assistant, John A. McCollum, after a trip to those cities in July, 1913. An abstract of Mr. McCollum's report follows:

BUS COMPANIES IN LONDON AND PARIS

About 95 per cent of all the buses in London are operated by the London General Omnibus Company, Ltd. The only other company which operates an appreciable number of cars is the National Steam Car Company, Ltd. The larger company is owned by the Speyer Underground interests. It operates on weekdays seventy-three routes, having a total length of 671 miles. On Sundays 79 miles of additional routes are used. The longest regular weekday route is 15.9 miles, and the longest Sunday route 16.9 miles. On weekdays about 2280 vehicles are used, and on Sundays 2380. The average daily mileage of the L. G. O. motor buses is about 110 miles, compared with 63 miles for the earlier horse bus. The National Company operates about 140 buses. In March, 1913, when the London General Omnibus Company employed 2750 buses, it carried 1,588,822 passengers. London also has some Tillings gas-electric buses.

In Paris the General Omnibus Company, under a contract with the city dated May 28, 1910, has the exclusive right to transport passengers by buses within the walls of Paris and also the exclusive right to operate a system of street railways within the same territory. This company has about 900 motor buses, about fifty of which are kept in reserve. It operates on forty-seven routes, having a total length of 165 miles.

HOW OPERATING RIGHTS ARE OBTAINED

In London there is no law to prevent anyone from operating an omnibus within the Metropolitan district. This district is much larger than London proper and has an area of about 700 square miles. Only a license from the commissioner of police is required. This is granted almost as a matter of course, provided the vehicle conforms with certain standards. On the other hand, street railway rights must be granted by Parliament and yet may be vetoed by the local borough authority. To prevent this veto it is often necessary to contribute large sums for local street improvements. The borough councils also have power to refuse licenses for omnibuses, and this is occasionally done.

TAXES AND OTHER PAYMENTS

In London the usual taxes are paid by the omnibus companies upon their realty. The import duty on gasoline is approximately 6 cents per gallon, but the bus companies pay only 3 cents because they operate public conveyances. For one bus this tax would amount to about $136 per annum, assuming 100 miles as the distance traveled a day, 7½ miles as the distance traveled per gallon and 310 days as the number of days in operation. Two licenses are required, namely, the five-dollar county license, which is available practically the entire life of the vehicle and the ten-dollar police or hackney carriage license, which is taken out annually. In addition, $19.50 per omnibus per annum is paid for excise duties. All in all, the total charges per bus amount to at least $160 per annum, plus $5 for each omnibus put in service and plus the taxes on realty.

The railways and tramways of London pay the usual realty taxes. The license per car is $10 a year. The tramways also pay a tax on permanent way which for the year ended March 31, 1913, amounted on the London County Council Tramways to 4.4 per cent of the passenger revenue. They must also keep in repair the pavement for 18 in. on each side of the rails. The franchises further provide that an appropriation shall be made from the earnings toward the straightening, widening and other improvements of streets in which the railway is operated. The sum appropriated for the last purpose during the year ended March 31, 1913, was about $350,000, and the total sum expended by the London County Council Tramways up to that date was nearly $3,000,000.

An entirely different arrangement is in vogue at Paris. Here the municipality requires 3½ per cent of the gross receipts from annual bus passenger earnings up to $5,770,000. If the receipts exceed that sum, the company must pay 4 per cent of the amount in excess. These payments are reduced one-half when the buses are used for opening lines with small initial traffic. The street railway franchise of the General Omnibus Company calls for 6 per cent of the gross receipts from passenger earnings received within the city walls. There is also a local benzol tax in Paris of approximately 10½ cents per gallon, or 2.3 cents per bus mile. However, if the sums paid for bus and street railway rights, together with the tax on fuel, exceed 6 per cent of the combined bus and street railway receipts, the company may claim a reduction to an amount not in excess of 6 per cent of the aggregate receipts.

EFFECT OF BUS OPERATION ON STREET RAILWAY EARNINGS

On March 31, 1913, the London County Council Tramways operated 138 miles of double track, 10 miles of single track and 1275 cars. Most of the cars are double-deck and are standardized for a capacity of seventy-eight passengers. The capital employed was about $63,000,000. The sinking fund, which now amounts to nearly $10,000,000, is obtained by assigning to it annually sums equal to one-twenty-fifth of the value of machinery, plant and track and one-fifty-ninth of the value of land and buildings. In addition to this, as arranged about five years ago, provision must be made for a replacement fund at the rate of 1 1-3 cents per car mile operated.

The London tramways are seriously handicapped by being unable to build tracks within the dense business area of the city, whereas the motor bus operates within this central area and is also not prohibited from operating in the tramway territory. The buses are operated on all routes upon which a profit can be earned, whether identical with the tramways or not. On March 31, 1913, for instance, 62 per cent of the trackage of the London County Council Tramways was identical with bus routes. Notwithstanding the increase in car mileage during the year ended March 31, 1913, the receipts per car mile on the electric divisions decreased from 22.58 cents to 20.08 cents, the operating expenses increased from 13.08 cents to 13.2 cents, and the number of passengers carried on all lines decreased from 533,440,235 to 512,652,653.

The net surplus during the previous years provided for the renewal fund at the rate of 1 1-3 cents per car mile and a substantial general reserve fund, the two aggregating much more than $1,000,000 in each of the two previous years. Less than $2,500 was available for these funds during the year ended March 31, 1913. Without doubt, this condition resulted largely from the increased number of motor buses.

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In London buses have a monopoly of the best traffic districts of the city, charge a slightly higher fare than the street railways, do not furnish all-night service, contribute nothing toward paving maintenance or street improvements, require small capital account in comparison with earnings, and can operate profitably on a small margin above operating cost. Because of these conditions they are severe competitors of the tramways, and Mr. McCollum believes that their continued competition under these advantages will work disastrous results to the tramways. The safety of the situation seems to lie in regulation or restriction of the routes of omnibuses, which at the present moment seems unlikely to occur, or the control of both tramways and omnibuses by the same interests, thus eliminating competitive operation.

In Paris there is no competition between the surface railways and the omnibuses as the two are under the same ownership. The routes of both systems have been laid out under the franchise with consideration to the work best performed by each. Furthermore, the franchise fixed the rates of fare and the routes upon which both railways and buses may operate and also permitted a readjustment of fares for both services should the conditions be such that either system is not profitable. London fares, however, are not fixed.

All opinion agrees that omnibus and heavy motor traffic on macadam roads caused a largely increased cost for maintenance and replacement. It is also nearly as unanimous that the greater weight of vehicles and increased speeds have caused the breaking up of foundations which had been laid to carry a lighter traffic.

COST OF OPERATION

While actual competition in motor bus business does not exist at London, the danger of competition exists because of the ease with which licenses may be obtained. The operating companies are therefore loath to divulge details as to the cost of operation. It would appear, however, that the average operating cost of the gasoline buses of the London General Omnibus Company per vehicle mile amounts to 15 cents, with an addition of 2 cents for interest and depreciation.

The National Steam Car Company, which avoids the gasoline tax by using kerosene, asserts that its cost is a little less. The saving in tax alone would amount to 0.4 cent per vehicle mile. Thomas Tillings, Ltd., submits the following figures as to the cost of operating its gas electric buses 1,387,031 miles in 1912:

	Cents
Running and maintenance	2.326
Tires	2.210
Drivers	2.514
Gasoline, lubricating oil, grease and paraffin	2.394
Vehicle lighting	0.150
Rents, rates, taxes, garage, lighting, water, trade vehicles, depreciation	1.972
Conductors	1.694
Body upkeep	0.470
Traffic expenses	0.534
Total cost per mile	14.264

The Tillings figures, however, may include the cost of operating the same type of car in other places outside of London.

The Paris company gives the following costs for its four types of gasoline buses. The company states that these figures are approximate and believes that certain of the items are susceptible to reduction in the future.

	Cents
Maintenance of chassis	4.022
Maintenance of bodies	0.928
Maintenance of tires	3.714
Brushing, cleaning, lighting and heating of vehicles	0.821
Fuel, including the city toll thereon	6.574
Oil, grease and waste	0.650
Machinist	3.094
Expenses at the depots (supervision, lighting, motive power, tolls, shippers, etc.)	1.857
Average cost per mile	21.660

The annual report of the Fifth Avenue Coach Company, New York, as submitted to the Public Service Commission for the First District, covering the operations of that company during the year ended June 30, 1912, states that it had eighty-one vehicles in operation during the year and that they were operated 1,440,841 miles. With this mileage and the items of operating expense given therein as a basis, the average cost of operation per mile was computed as follows:

	Cents
Maintenance, buildings and fixtures	0.035
Tires	3.132
Maintenance, equipment	7.208
Conducting transportation	17.565
Damages and injuries	3.042
General expenses	2.308
Total operating expenses per mile	33.290
Depreciation of vehicle equipment, figured at the monthly rate of one-thirty-sixth of total cost	5.311
Taxes	2.697
Total operating cost per mile, including depreciation and taxes	41.298

LICENSES AND SUPERVISION PRACTICE IN LONDON

The entire supervision of buses in London lies with the police department. This supervision relates first to the design of the vehicle and second to bus operation. The rules applying to this subject were issued in August, 1909. Previous to that time many buses weighed 5 tons empty and as much as 8 tons loaded. The rules issued in 1909 and now in use permit only the operation of buses weighing no more than 6600 lb. empty or 13,440 lb. loaded. The weight is distributed about two-thirds on the rear and one-third on the front axle. After the vehicle is approved by the police department it goes to a noise committee of three, also appointed by the commissioner of police. This committee submits the vehicle to three tests as follows: operation of vehicle loaded to full extent, operation on a grade of 6.25 per cent to 5.8 per cent for a distance of about 1800 ft., and operation on level.

Mr. McCollum remarks that if New York permits motor buses in large numbers it will have before it a much larger problem than London because London had experience with horse buses. This is one reason why New York should proceed slowly in permitting motor buses to operate upon its streets.

SPEEDS OF BUSES AND CARS

The London police regulations require buses to be so geared that the highest speed shall not exceed 12 m.p.h., or to be fitted with a device which shall give a constant warning as long as the speed of 12 m.h.p. is exceeded. This provision is not enforced by the police. The average bus speed between 9 a. m. and 7 p. m. on seventy-seven routes, including stops, as computed from the average speed of each route furnished by the company, is about 8.1 m.p.h., while the maximum for a route is 10.8 m.p.h. and the minimum is 7.4 m.p.h The capacity of the motor bus is one-half that of the London double-deck surface car; consequently two motor buses are required to do the work of one car and the number of stops per bus may not exceed one-half that of the surface car. Tests made in August, 1911, showed the average speed of motor buses on four routes to be 10.13 m.h.p. and of electric cars 8.16 m.h.p.

In Paris the motor buses are geared for a somewhat greater speed than in London.

FARE COLLECTION

In London bus fares are on a straight zone system and average about 1 cent per mile. The passenger receives a receipt which shows the fare collected and a punch mark opposite the fare limit. The street railway fares of the London County Council Tramways are also on the zone system and average about 1 cent per mile, except that workingmen's tickets are sold for as low as 0.4 cent per mile. On the London United Tramways operated by the Speyer interests a modified zone system is used; that is to say, the rider pays less for each of the additional fare zones. The mileage rate on these lines is slightly less than on the buses.

In Paris the plan is to charge a certain sum in one sec-

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tion and another sum if the passenger wishes to go beyond the first section. Two classes of fares are charged, the first-class fare being 3 cents per section and the second-class fare 2 cents. The corresponding rates for more than one section are 5 cents and 3 cents. Prior to the franchise of 1910 uniform fixed fares were in vogue, namely, 6 cents for first class (inside and on platform), and 3 cents for second class (on the upper deck). Transfers were also issued to those who paid the higher fare.

The street railways of Paris charge 3 cents for a first-class and 2 cents for a second-class ride in one section. For more than one section the corresponding fares are 4 cents and 3 cents.

LIFE OF VEHICLE, COST OF DEPRECIATION, ETC.

The vehicles of the London General Omnibus Company are off duty 10 per cent of the time. They are overhauled once a year just before the vehicle is submitted to the police for a license renewal. Under this system but few of the parts of the original vehicles, except the frame and axles, are left after a few years' operation. It has been estimated that the normal life under these conditions might be ten or twelve years, but experience up to this time has shown that a vehicle becomes obsolete after five to seven years' use because of improvements in design. The list price of the L. G. O. gasoline buses varies from $3,500 to $4,000 each. However, on the assumption that when bought in quantity these vehicles cost $2,500 each and that the normal life is six years, a replacement fund of about $400 a year will be necessary for each vehicle.

The National Steam Car Company sets aside one-sixth of the cost of the car each year, although it asserts that some of its cars have been in operation for eleven years. The first cost of this car is somewhat greater than that of the gasoline cars. The National Company also states that 97 per cent of its fleet is in operation throughout the year instead of only 90 per cent.

What has been said about inspection and replacement in London is also true with regard to Paris. The buses used in Paris have been operated less than three years and therefore are of comparatively new design. The cost of the Paris bus is said to be more than $4,000, and an ample depreciation fund is provided.

FINANCIAL CONDITIONS OF OMNIBUS COMPANIES

Little need be said about the National Steam Car Company of London because it operates only such routes as yield a profit. The General Omnibus Company, however, as it has attained a practical monopoly, must necessarily maintain an efficient service in the entire territory to prevent competition. It is without doubt operating many lines which in themselves show a small profit.

Compared with street railways, the percentage of gross receipts required for operation seems very high, as it exceeds 90 per cent. During the last six months of 1912 the cost of operation on the London General Omnibus system was 92.3 per cent of the gross receipts. This, of course, includes maintenance and depreciation. The capital invested, however, is very much less than the corresponding investment in street surface railways by the London County Council, the proportion being, in comparison with the number of passengers carried in 1912, as follows:

	Passengers Carried	Capital Invested
London County Council Tramways	512,652,652	$53,000,000
London General Omnibus Company	492,858,934	15,500,000

From this it is easily seen that the capital required in the omnibus per passenger carried is far less than similar capital for street surface railways as operated in London. With, therefore, this small capital investment, the operations of the London General Omnibus Company are considered to be very profitable, even though the operating expense, as compared with the gross receipts, seems to be abnormally high.

In Paris, no exact data giving capital investment were obtained, but since the railways and buses are operated by the same company, there is little likelihood that the earnings of the company will fall below the operating expenses and interest on capital invested.

ACCIDENTS

During the past few years the tramways have carried about twice as many passengers as the buses, yet in number of fatal accidents reported within the Metropolitan police area those caused by motor buses were more than double those caused by the tramcars. On the other hand, in number of injuries those caused by the tramway cars exceeded those caused by motor buses. In November, 1912, a parliamentary committee was appointed to inquire into the causes of accidents and to make recommendations for safety measures. The report of the committee, made on Aug. 11, 1913, gives the following statistics with respect to fatal accidents caused by motor omnibuses in both the Metropolitan police area and in the ancient city of London:

Year	Licensed	Fatalities	Per 1000 Buses
1909	1,180	59	50.0
1910	1,200	70	58.3
1911	1,962	114	58.1
1912	2,908	182	62.6

The same report states that the Metropolitan police give as the result of motor bus operation for the first six months of 1913 eighty-seven deaths and 1582 accidents, and that on the assumption of the number of omnibuses being 3000, public carriages 11,000 and estimated private power vehicles 14,000, "a very serious disproportion of fatalities caused by motor omnibuses is shown." The committee recommended a closer control of the motor buses by the authorities.

The bus companies deplore the many accidents which occur and have devoted much energy to obtain means for their prevention. Rewards have been offered by the General Omnibus Company for safety devices. It is expected that the number of deaths will be halved by a fender which has been devised for the rear wheels, but as yet nothing satisfactory has been found for the front wheels. No definite statistics could be obtained on accidents in Paris.

GENERAL DISCUSSION AND COMPARISONS WITH NEW YORK

Although the conditions in London and Paris are in many ways not similar to those of New York, some deductions may be made from the study of the two systems which should be of value in determining the method of operation and control in New York. Disregarding the cost of operation, the omnibus has certain advantages over the surface car in performing the same work which cannot be lightly considered. These follow:

The motor bus is independent of a large complicated system outside of the vehicle itself; it is itself a complete traffic unit.

It can easily adapt its movements to street traffic.

Not being confined to a fixed track, vehicles may run side by side, thus clearing dense traffic intersections much more rapidly than the surface electric railway cars.

Routes may easily be changed, either temporarily or permanently—temporarily when there is obstruction due to fire, parades, etc.; permanently when desirable because of change of traffic conditions, making other routes more desirable to the traveling public, and without loss of investment in permanent street structures.

Passengers entering or leaving buses may do so at the curb without risk of crossing dangerous street traffic.

The breakdown of one vehicle in the street does not derange the service of other vehicles of the same system.

Point to point speed somewhat exceeds that of the street car without exceeding maximum speed of the street car.

On the other hand, it may be said that the motor bus has also its disadvantages, when compared with the street surface car.

It is a constant source of accidents. London statistics

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show it to be much more so than other fast-moving vehicles.

The motor bus, because of its limited capacity, is unable to provide rush-hour facilities as effectively as the street car of larger capacity. (This is on the assumption that the weight and capacity of motor vehicles are rigidly limited, as in London.)

The capacity of the motor bus being less than that of the street car, more moving vehicles in the street are necessary to do the same amount of work, thereby increasing the liability to accidents.

When operated in large numbers, the motor bus will require more rigid regulation by the municipal authorities as to type of vehicle and method of operation.

Less comfort to passengers, due to vibration. This vibration increases as the street surface becomes more uneven.

It cannot be said that there is in any borough of New York a densely populated or busy section from which surface railways are entirely excluded. If there is need for the motor bus in New York, the reason therefor must be found elsewhere. Nevertheless, there are routes in New York upon which the motor bus can supply a needed service in local areas, giving the public the benefit of its satisfactory features and at the same time minimizing its disadvantages. A study of bus operation in London and Paris leads to the belief that if permitted in New York the city should exercise its authority as to routes, size, type, weight, capacity and operation of vehicle. The motor bus should not be permitted on any route unless it will thereby fill a place in the transportation field not already supplied; or, if it is to duplicate the service already furnished, it should not be permitted unless it will thereby provide a much more complete, efficient, economical, comfortable or otherwise better facility than that now existing. It would not be for the public good to reduce the traffic on a railway unless the damage done to the surface railway was outweighed by the advantageous features of the motor bus. When the system is operated by private capital continuous efficient street car service can result only with prosperity of the enterprise. The disastrous effect on the London County Council Tramways has already been cited. Of course, to a certain extent, the increase in facilities will also result in increased riding. Motor buses operated by more than one company should not be permitted on the same route. The experience of London shows that if this is allowed the number of accidents will be increased by the racing of rival buses. Further, if more companies than one were to receive a franchise to operate buses in New York, it would only be a short time before one company would control the entire operation. Motor buses should not be operated in the same street with street surface railways, except for short distances where such duplication of route is necessary because there are no other existing highways available for that portion of the omnibus route. This is undesirable, not only on account of competition, but because of such deliberate interference as has occurred in London, where in some cases buses run so close to surface cars that people cannot use the latter in safety.

Motor buses should be excluded from streets having macadam pavement and permitted only on pavement having a heavy foundation. The weight of the vehicle should not exceed that permitted by police regulation of London.

Power should be retained by the franchise whereby the board (city authority) may govern all features of the construction, size, power, etc., of the vehicle, with the right to change any rules when experience shows that such change will be of benefit.

Rate of fare should depend somewhat on distance traveled.

No advertising signs should be permitted on the outside of omnibuses.

Rate of speed should be limited, not by a maximum speed limit only, but in regard to dangerous or reckless driving as well.

Upkeep of vehicles should be insisted upon with a penalty provided for failure to comply with rules in regard thereto, and thorough municipal inspection should be maintained.

FRANCHISE GRANT

Whatever is done at first in the operation of motor omnibuses in New York can be at best only an experiment. The term of the grant of a franchise for such experimental operation should be as short as is possible while at the same time giving the company a fair chance to close its operations at the end of the term without financial loss. The life of any one type of vehicle probably does not exceed six years, as has already been explained. In order, therefore, that a profit may result from the operation, sufficient funds must be laid aside each year from earnings to replace the vehicle at the end of the six-year period. Since the motor bus operation does not require any expenditure in permanent way in the streets and the largest investment is in the vehicles themselves, the short life of the vehicle has a large bearing upon the term of grant which the company can accept. It is believed that in no case should the first franchise for omnibuses be granted for a period exceeding ten years in duration, and that it should be for a much shorter time if it can be shown that the company can afford to accept such shorter term. The Paris franchise is for a much longer term than this, but the municipal control as to rates of fare depending upon earnings, etc., reserved therein is one which can be worked out only after the preliminary elementary stage has been passed.

CHICAGO MEETING AMERICAN RAILWAY ASSOCIATION

The fall meeting of the American Railway Association was held at the Blackstone Hotel, Chicago, Nov. 19, 1913. About 200 delegates attended the two sessions at which reports were presented by the various standing committees. The report of the joint committee on automatic train stops included a revision of the requisites of installation for automatic train control. After a discussion of this report it was referred back to the joint committee for further consideration.

The committee on maintenance reported that the question of modifying the specifications for carbon steel rails, as provisionally approved by the association Nov. 20, 1912, by providing for a variation of ⅜ in. from the specified lengths, instead of ¼ in., had been referred to the American Railway Engineering Association for its consideration and recommendations. The question of the contour of chilled-iron car wheels and the throat clearances of frogs, crossovers and guard rails had been referred to the Engineering Association and the Master Car Builders' Association jointly, for full investigation and report.

The committee on electrical working reported that it was giving attention to the questions of overhead working conductor clearances and the clearances for automatic train stops. This committee desired that conclusions as to these questions be reached by the railway technical associations which were also considering them before recommending action for the parent association. At the close of this meeting it was decided to adjourn until Dec. 3, 1913, when another meeting will be held in Chicago. It was also decided to hold a session in New York City May 20, 1914.

The Bureau of Statistics of the American Iron and Steel Institute has recently issued its annual report of the American and foreign iron trades for 1912. A gross tonnage table is given of all kinds of rails, including girder and high T-rails for electric railways, produced annually from 1897 to 1912, inclusive. The year 1906 shows a maximum production of 3,977,887 gross tons.

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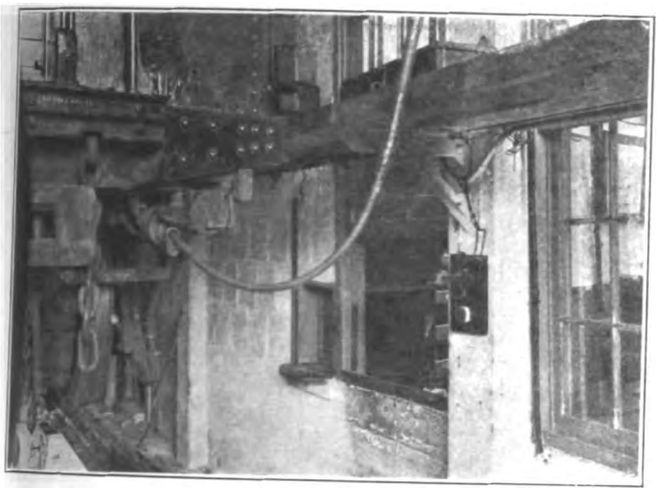
AN INSPECTION PIT SAFETY DEVICE

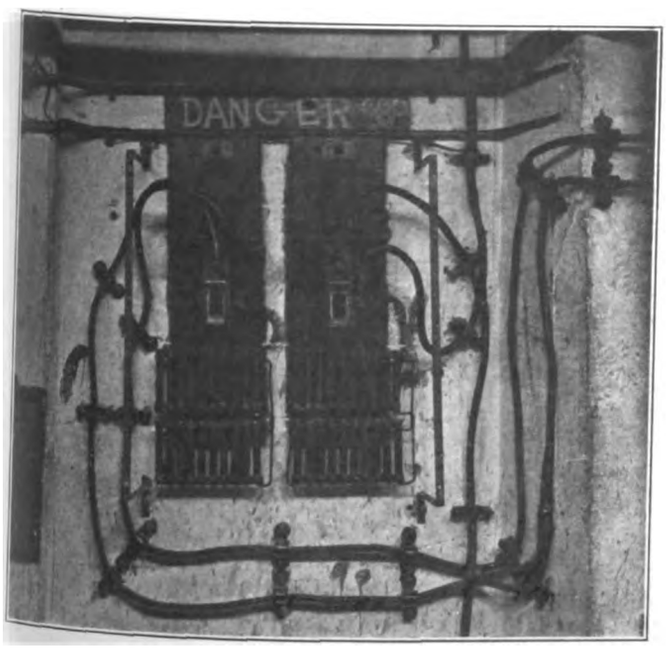
The protection of employees has received a large amount of consideration in the Jersey City shops of the Hudson & Manhattan Railroad, which are in charge of P. V. See, superintendent of car equipment. One of the safety devices in use there is an automatic apparatus which replaces the



Trolley and Snap Switches with Pilot Lamp

time-honored practice of calling out in a more or less audible voice "Juice on car No. 732" before the current is put on a car. The new contrivance not only gives a clear warning whistle ten seconds before the current is put on the cars, but it also keeps up this warning as long as the current remains on any of them.

The whistles used are high-pitched and of disagreeable sound quality. Hence they are more effective than an ordinary audible warning because their annoying and persistent character forces the repairmen to keep the current on the car no longer than absolutely necessary. Before the installation of this apparatus the current was often on the contact shoes for an hour or two at a time. Now the cars

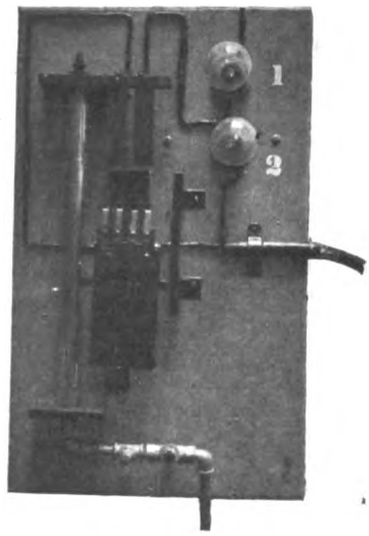


View of Contactors

are not alive more than ten or fifteen minutes a day and usually about one minute at a time.

The apparatus consists of four Westinghouse air signal whistles which are equally placed throughout the length of the 400-ft. inspection pit, one electropneumatic valve, two contactors and one piston with contacts. The accompanying diagram shows the complete circuit. When a switchman desires to move a car he proceeds as follows:

He first puts the Coburn trolley, which is dead, into the car and turns on one of the snap switches which are mounted on the wall, as illustrated. This switch has a double circuit, one point making a ground for the No. 1 or No. 2 contactor shown, depending on the side of the carhouse. The same switch also completes the circuit for the magnets which operate the air whistles, by grounding them. The whistles then start to blow.



Brass Tube, Piston and Weight

On the air line with the whistles is a brass tube with piston which is connected to a heavy weight as illustrated in another view. A small adjustable leakage valve near this piston regulates the building up of the air-pressure in this line. As the pressure increases it raises the piston and weight. Four contact fingers are fastened on this weight. When the piston is raised to the top of its stroke it makes contact with two other fingers, thereby completing the circuit for the No. 1 or No. 2 contactor, picking it up and energizing the

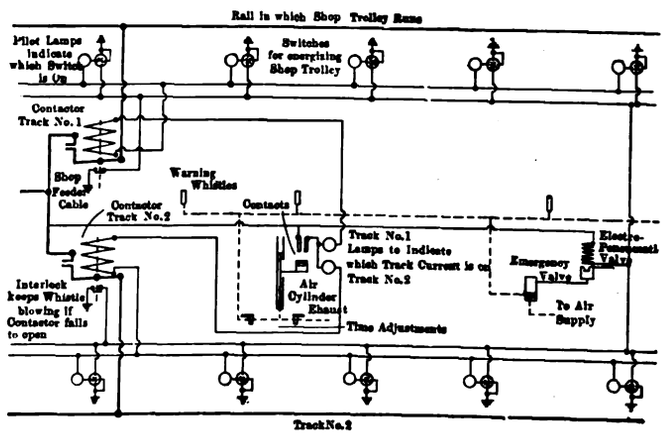


Diagram Showing Complete Circuit of Inspection Pit Safety Device

Coburn trolley. When the switchman turns off the snap switch the trolley removed from the car is no longer alive, and there is no possibility that the operator will receive a shock should the insulation on the cable be defective.

A 2½-mile electric tramway, the first in any Chinese city (as contrasted with foreign settlements), was inaugurated in the native city of Shanghai during the week ended Aug. 16, 1913. The enterprise is essentially a native one. No foreigner has been allowed to subscribe to the capital of about $130,000. The installation has been done entirely by Chinese contractors, and the management and working staff are all Chinese. Six cars are now running, and twelve cars, with six trailers, are under way. The cars are serviceable without being elaborate. They carry eight first-class and sixteen second-class passengers. Energy is taken from the Shanghai Inland Electric Works, which formerly supplied the city's light and power but stopped working about four years ago.

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Papers and Proceedings of C. E. R. A. Meeting

At the Fall Meeting of the Central Electric Railway Association, Held at Indianapolis Nov. 20-21, Papers Were Read on Bolted Construction, Steel Wheels, Cast Wheels, and Traffic—Abstracts Are Published Together with an Account of the Proceedings

CHILLED-IRON CAR WHEELS FOR ELECTRIC RAILWAY SERVICE

BY W. A. BENNETT, GRIFFIN WHEEL COMPANY

The white metal, or chilled iron, in the tread and flange of a cast-iron car wheel contains between 3 per cent and 3½ per cent combined carbon; the gray iron in the plates and hub contains about 0.75 per cent. The mild steel from which forged wheels are made in this country contains about 0.70 per cent to 0.75 per cent combined carbon, and in England from 0.40 per cent to 0.50 per cent.

On the scleroscope scale the hardness of chilled iron runs from 70 to 74, and the hardness of steel such as is used for making wheels is 30 to 32. Chilled iron is non-ductile and can be machined by grinding only, while mild steel and cast iron are easily machined.

The wearing parts of the wheel—that, is, the parts which are affected by the action of the wheel on the rail or the brakeshoe on the wheel—should be of material which will offer high resistance to wear. The plates must have sufficient strength to withstand the stresses which come upon them, while the hub must be such as can be easily machined and sufficiently elastic to hold the proper pressure against the axle to prevent loose wheels. The chilled-iron wheel meets all of these requirements.

The most important subject to consider in reference to wheel performance is friction. The relation of the various grades of iron to tractive effort and braking power, as well as wearing qualities, therefore, is important in considering their value as materials from which to manufacture wheels.

TRACTIVE EFFORT

A large number of experiments were conducted a few years ago by George L. Fowler in the interest of the Schoen Steel Wheel Company, to show, among other things, the relative tractive power of steel and chilled-iron wheels. He found the average coefficient of friction between the wheel and rail, for loads averaging from 3000 lb. to 7000 lb. per wheel, to be 0.256 for chilled iron and 0.249 for steel. For the heavier loads up to 20,000 lb. to 30,000 lb. per wheel the coefficient for the chilled-iron wheel averaged 0.217, the steel wheel 0.235.

Results obtained from a more recent test show that the coefficient of friction for chilled-iron wheels, under loads ranging from 3000 lb. to 7000 lb., averages about 0.273, and for steel wheels under the same load about 0.353. For heavier loads of about 20,000 lb. the coefficient for chilled-iron wheels is about 0.164, and for steel 0.171. The same wheels tested on oiled rails show a coefficient for a chilled-iron wheel, under loads of 3000 lb. to 7000 lb., of about 0.183, and for steel 0.184. For the heavier load of 20,000 lb. the coefficient of friction for both chilled iron and steel was 0.145.

The results shown in Mr. Fowler's test would indicate that the coefficient of friction is slightly higher for chilled wheels under light loads and for steel wheels under heavier loads. The results shown in the other test referred to would indicate that the steel wheels have the higher coefficient of friction on dry rails for both light and heavy loads, but on the oiled rails both wheels have identically the same coefficient of friction.

If we average the results of both tests, we find that there is a slight difference in favor of the steel wheels for a dry rail, but for slippery rails both are the same. This is because the fibers of the steel in the wheel and rail actually interlock when both are clean, but when the rail is greasy this interlocking does not take place; consequently the coefficient of friction is reduced.

The practical test, of course, is the operation on the same line of cars, some of which are equipped with steel wheels and others with chilled-iron wheels. This has been watched repeatedly on certain lines having difficult schedules to maintain on account of a maximum number of stops and a high average speed. In such cases, after close observation, it has been found that there is no tendency on the part of the cars equipped with either chilled-iron wheels or steel wheels to lag behind, a condition which would be immediately noticed if it existed. This is the best evidence that there is no appreciable difference in tractive effort between chilled-iron and steel wheels.

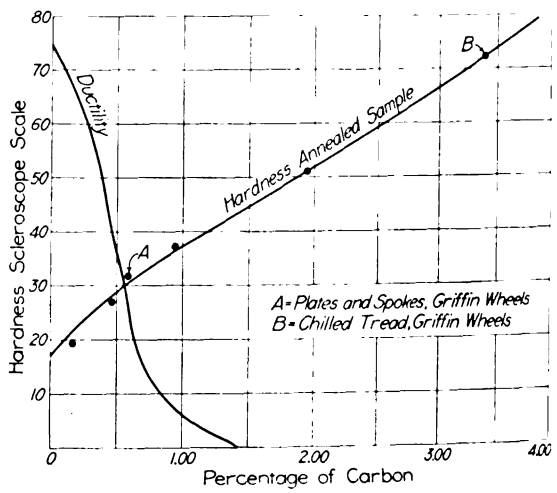

Diagram Showing Relation Between Hardness and Percentage of Combined Carbon

BRAKING POWER

Numerous tests have been made at different testing laboratories to determine the coefficient of friction of various brakeshoes on both chilled-iron and steel wheels. In a test recently made at Purdue University the following coefficients of friction between wheel and brakeshoe were recorded:

Shoe Pressure, Lb.	Streeter Shoe		Diamond "S" Shoe	
	Chilled Iron	Steel	Chilled Iron	Steel
2808	0.247	0.216	0.225	0.198
4152	0.208	0.187	0.200	0.165
6840	0.176	0.147	0.184	0.140

The above results closely agree with the result usually found either in laboratory or service tests, namely, that the brakeshoe friction for chilled-iron wheels is about 20 per cent higher than for steel wheels.

The Master Car Builders' specifications for brakeshoes call for a coefficient of friction on chilled-iron wheels of 0.22 for 2808-lb. pressure and 0.16 for 6840 lb., the initial speed being 40 m.p.h. For steel wheels the coefficient should be 0.125 for 6840 lb. and 0.11 for 12,000 lb., the initial speed being 65 m.p.h.

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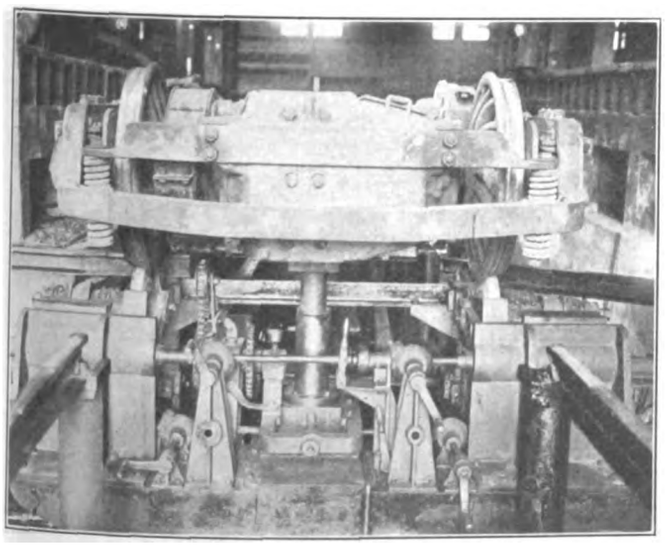
CARE OF WHEELS

The duty of the flange is to guide the truck, and necessarily in performing this duty the flange, coming in contact with the side of the rail head, will wear to a certain extent. In street railway service, and under light passenger equipment on steam roads, excessively worn flanges should not exist, because the pressure required to guide the truck is comparatively small. Under wheel loads from 8 tons to 12 tons, however, the flange pressure is greatly increased, so that there is a greater possibility of the flange wearing to the condemning limit before the tread is worn hollow.

To prevent worn flanges the first thing is to see that the wheels mounted on the same axle are the same tape size; that is, have the same circumference. If one wheel of a pair is larger than its mate, it will have a tendency to run ahead and consequently crowd the other wheel to the rail. In order to catch up with its mate, the small wheel must continually slip ahead or the large wheel must spin. If the small wheel slips, this slipping produces greater tread wear, thus making a further increase in the difference between the two circumferences, and consequently more flange wear, until eventually the wheel is removed for worn flange. This not only causes the loss of the small wheel, and probably of the large wheel also, but greatly increases car resistance and produces excessive rail wear and more frequent removal of cars from service.

The following calculation will show what a small difference in mating amounts to. Suppose one wheel to be one tape size larger than its mate, or 1/8 in. larger in circumference. A 33-in. wheel makes approximately 611 revolutions per mile. Therefore the large wheel travels 76 in. per mile farther than its mate. In 30,000 miles this difference amounts to 190,000 ft., or 36 miles.

Another item which has a very strong relation to sharp flanges is keeping the trucks properly squared. This receives close attention on some railways, while on others it is entirely neglected. One large street railway, using 2000 chilled-iron wheels per year, pays particular attention to it, as well as to mating wheels, and has practically eliminated sharp flanges. The cars weigh less than 40,000 lb. and the average life for a wheel exceeds 100,000 miles.



Car Wheel Grinder with Truck in Position for Operation

The effect of trucks out of square has been investigated by the American Steel Foundries Company, where it was found, after a large series of tests had been made, that the resistance per ton on the same curve would vary from less than 20 lb. to 50 lb., depending upon the condition of the truck. The increased resistance of cars obviously means increased flange pressure, with a consequently rapid wearing of flange and rail.

If the car is down on the side bearings, or if the center bearing is stiff, the work of turning the truck increases flange wear and also rail wear. Also, mounting one wheel closer to the end of the axle than its mate causes that wheel to run to the rail and produces flange wear.

GRINDING WHEELS

Even under the best operating conditions, there is likely to be some skidding of wheels, which produces small flat spots in various parts of the tread of all kinds of wheels. These flat spots are often very small and gradually increase in size until they are sufficient to cause a removal of the wheel.

Section of Chilled-Iron Wheel

Where steel wheels are used facilities are provided for turning the tread of the wheel to a true shape, so that it may be again placed in service and the maximum mileage obtained. It has not been the custom, however, to provide facilities for truing chilled-iron wheels, but on account of their cheapness they are scrapped when removed from service. This is often a wasteful method, as it is entirely practicable to install a grinder in the pit of the carhouse, which in a very few minutes will reinstate the original contour without removing the wheels from the car and without withdrawing the car from regular service.

Aside from grinding the wheel to remove imperfections which are developed in service, the grinder is useful in checking new wheels just before they go into service. The removal of all errors arising from inaccurate machine work will cause the cars to ride smoothly, and the tendency to produce flat spots will be greatly reduced.

The accompanying illustration shows a pit wheel grinder designed by the Griffin Wheel Company for this class of work. The advantage of grinding wheels without removing the trucks from the cars is self-evident. The time required for grinding will vary from ten minutes to half an hour, depending upon the amount of metal which requires removal. All small skidded spots up to 1 in. in length can be removed in ten or fifteen minutes. The cost of a grinder of this type is about one-sixth of that required for a modern lathe to turn the treads of steel wheels.

COST

The question of the cost of wheels and other materials which are worn out on account of their contact with the wheel is a very important matter, and on account of the different results which are obtained under different conditions the problem is quite complex. As the chilled-iron wheel has been standard for so many years, its cost is well known. The machine shop costs for the chilled-iron wheel for mounting, installing, removing, etc., including overhead, are about $1.25 per wheel. This amount added to the original cost of the wheel for any class of service gives the total first cost of the wheel. Should it be necessary to grind the wheel during its lifetime, the labor, interest and depreciation of grinder, power, emery wheels and overhead charges are added. When the wheel is sold for scrap the interest on the investment for the time the wheel has been in service is added to the first cost, and after deducting the scrap value from this amount the actual net cost is obtained for the ton mileage made by the wheel. In considering wheel costs, however, there are other items than the wheel alone which must be considered, such as brakeshoe cost,

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rail maintenance, general convenience, power consumption, etc.

SAFETY

The safety of a wheel is a subject which has not received the attention from electric railway engineers that has been given it by steam road engineers. All wheels are safe if properly designed for the service in which they are to be used and if they are free from structural defects. In designing anything whatever the material of which the thing is to be made is selected to fill best the requirements.

The railroad wheels used prior to the year 1753 were of wood, and when iron wheels were introduced in that year they met with great opposition. It was not until 1767 that wooden wheels went out of use. Chilled-iron wheels came into use in the latter part of the eighteenth century, and thus have been in use for over 100 years.

There are in railroad service to-day about 20,000,000 chilled-iron wheels. If these wheels each run 8000 miles per year and carry an average load of 10,000 lb., we have a ton mileage for one year of 800,000,000,000 ton miles. When we consider this enormous amount of service and the few wheel failures that result from it, we can truly say that the chilled-iron wheel has reached a high state of perfection.

The reliability of chilled iron for car wheels can be brought to any desired degree by simply considering the design. There is no equipment too heavy, there is no speed too high, for chilled-iron wheels. Within the past year chilled-iron wheels have been introduced in the tenders and pilot trucks of the heaviest engines of the Pacific type operating in the mountains. They have been introduced in the cars carrying loads as high as 150,000 lb. down the steepest grades in railway service. They have been called for under interurban cars where the specified speed was 75 m.p.h. All this is accomplished by simply paying ordinary attention to the design.

THE RELATION OF THE TRAFFIC DEPARTMENT WITH ITS COMPANY

BY J. F. STARKEY, GENERAL PASSENGER AGENT LAKE SHORE ELECTRIC RAILWAY

We traffic men are the ones who must face the traveling public most conspicuously, and it is not pleasant to have thrown into our faces remarks derogatory to our lines, these remarks being prompted by something that we are in no wise responsible for and over which we have no control. I do not mean that these instances are the rule, but they sometimes happen, and when they do it is wise policy on the part of the head of any department to which the complaint may be taken by the traffic department to give a listening ear and seek to remedy the evil. We are the servants of the public and cater to their patronage, and it is the wise thing for us all to do, though sometimes it is hard, gracefully to respond to all questions from the public, even though they may seem ridiculous, and courteously to listen to any complaint that may be made. We have formidable foes in many places in the steam road service. There are many who, though they would prefer oftentimes to patronize the steam lines, use our lines on account of the superior facilities we offer in regard to frequency and other conveniences. Even those who patronize us with a lukewarmness should be treated with due courtesy so that eventually they may become our friends.

The head of the traffic department should strive to his utmost to increase the revenues of his company and to be alive to grasping every opportunity afforded. Many of our lines will soon reach, if not already there, the rehabilitation period, and this means the expenditure of much money. The traffic man is the one who is most familiar with conditions pertaining to his department, and he should have a free rein. The general manager should not curb him, for if he has not full confidence in his traffic head, it is high time that he should replace him with someone else.

Close working relations with connecting steam lines should be gone into as much as is possible. As one instance I might relate that one steam road during the past summer operated excursions to Niagara Falls and turned its passengers over to the line I represent at Toledo, Ohio. We took them to Cleveland, turning them over to a boat line. For this service we furnished special cars in one direction only, getting our full special car rate, and during the season we handled more than 2000 of these passengers. I believe there are many steam lines which as individual lines would be glad to enter into working relations with us, and I hope the time is not far distant when the barrier may be removed so that we may "give and take" with many of them.

Personally, when everything is considered, I much doubt the wisdom of freight handling as a source of revenue when the basis of handling it is on a par with the steam lines as far as rates are concerned. True, there is, in gross, a goodly sum as revenue derived, but when the leakages of every nature, the menace, often, to passenger travel, the cost and maintenance of equipment, the time and expense of the traffic department, etc., are considered, does it yield much additional net revenue? If we can, by reason of better facilities, induce merchants, jobbers and manufacturers to give us their patronage at a rate considerably above that charged by the steam lines—and I will not term them competitors in the line of freight traffic, because they are our superiors in this branch of railroading, except where patrons demand quick service—then and then only can I see a profitable venture in the freight department. If we would utilize fewer cars and make our basis of charges correspond with the service given, I would then emphatically advise the traffic department to give much of its energy to this branch of the industry.

The handling of household goods and commodities of this nature is much like the merchant who sells bananas, the more he sells the more he loses. We have been so keen, so anxious to do business and take away from the steam lines everything we could get our hands on that we sometimes even go so far as to grant special rates that are below those of the steam lines or the official classification. Unless we are permitted by the commissions of our several states to charge the rates we should get, we had better devote our energies to passenger traffic, which to my mind is much more satisfactory from a remunerative standpoint than the freight business. I am always open to conviction, and if any one can show me that the freight department is a profitable branch, I am willing and anxious to go after it if my general manager deems it wise to add this to my duties. At present we do no freight business except in hauling crushed stone, gravel, etc., and switching. We do a pick-up and delivery express business which we term the "Electric Package," and for this service we charge practically the same rates as the old-time express companies.

Another source of revenue that I believe is worthy of due consideration is the special car and special party business. I know there are many member lines that do not believe in party rates, but I am a firm believer in them, and the results of their being in effect on our line have been very satisfactory. As one instance, during the past summer there was a ball team at one of the cities on our line, and almost every Sunday a competing team from Cleveland played there. By reason of a slightly reduced rate for a party of twenty or more we secured the patronage not only of all these teams but of a crowd of "rooters" as well, so that often there were from thirty to thirty-five

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in the party instead of the "nine" with a couple of utility men. I could cite many instances where at the time of a convention at some point, instead of delegates only, the special rates induced quite a party to go. If it is profitable to give even lower rates for a party of fifty or more and furnish them special service, then it surely is also profitable to establish a party rate for twenty or more where they use the regular service, and I think that without exception every member line grants the special-car rate.

The Central Electric Traffic Association I believe to be the greatest organization in the field of electric railway operation. There is none as important in any other part of the country, and I would say to the general manager that he makes a mistake if he hampers in any way the attendance of his traffic head at its meetings. It has meant much to the member lines of this association, much more perhaps than is realized by those other than the traffic officials. We believe that there should be a liberal exchange of transportation by all connecting lines to members of the traffic department so that any member may be equipped to go at a moment's notice in any part of the territory, as invariably it means mutual benefit.

STEEL-TIRED, FORGED AND ROLLED-STEEL WHEELS

BY M. D. HAYES OF THE MIDVALE STEEL COMPANY

The following nine general types of steel-tired wheels about cover American practice, past and present: (1) bolted type; (2) Paige spoke type; (3) Paige plate type; (4) Mansell ring type; (5) Gibson type; (6) Boise type; (7) shrunk type; (8) fused type; (9) Allen paper type. At the present day, however, the first four types practically cover the majority of the wheels of this character now in use in America.

In general, the steel-tired wheel consists of a rolled-steel rim or tire surrounding a center consisting of the web and sub portion, which latter may be made of cast iron, cast steel, plate steel or forged steel and in shape may be either solid web and hub or single plate; solid web with cored hub or double plate hub; cored web or double plate; spoke center or built-up center.

Car wheel and locomotive tires, which latter are really a large car-wheel tire, are manufactured from either open-hearth or crucible steel. Fair average chemical and physical properties of a steel tire are as follows:

Chemical properties:	
Carbon, per cent	0.65 to 0.85
Phosphorus, per cent	0.06
Manganese, per cent	0.55 to 0.80
Silicon, per cent	0.15 to 0.35
Sulphur, per cent	0.05
Physical properties:	
Tensile strength, pounds	125,000
Extension, per cent	8
Contraction, per cent	12

MANUFACTURE

In describing the process of tire manufacture it will be impossible to cover the various shades of difference used by the different makers, but that used by the Midvale Steel Company will sufficiently illustrate the art. In this process a long cylindrical steel ingot is cast by the pouring of molten metal into a cast-iron mold. These molds average about 16 in. in diameter and are about 7 ft. high. When the metal is cold the molds are stripped from the ingot and the latter are cut into sections called billets, each of which is to form a tire. Each portion resembles a large cheese.

The top portion of the ingot, in which the segregation of impurities mostly occurs, is discarded, and only those portions of the ingot are used which are free from the impurities above mentioned. Furthermore, it is a well-known fact that the tendency in all castings while cooling is for slaggy materials and impurities to segregate and form toward the center, where the shrinkage sometimes forms a pipe or axial opening, and the whole aim, therefore, in the fabricating of a good tire is to retain only those portions of the ingot which are on or near the outer circumference and which, having cooled the most rapidly, have therefore the most uniform fiber texture and are the freest from impurities. In this way the longitudinal axis of the original ingot and the hub or center of the finished wheel or tire are parallel and in the same plane.

The billets are forged under a steam hammer, the first process being the punching out of the center portion, forming an opening through which a mandrel can be run. The forging process is continued, so as to enlarge the piece into a ring of sufficient dimensions to be taken up later by the tire rolls. These rough rings, after forging, are again introduced into the heating furnace and the temperature is raised to the proper degree for rolling. The last process is the introducing of these rings into the rolls, where they are revolved in a horizontal plane between pressure rollers which engage the interior and outer faces and the two sides of the tire at the same time, thus elongating the tire by lengthening its circumference and increasing its diameter as the rolling process proceeds. The roll which engages the outer face of the tire has the desired contour cut into it, and therefore, when the tire has reached the required diameter and is removed from the rolls, the outer face of the tire has taken on a flange and tread of the exact shape required.

The rolling of tires has now reached a very great state of proficiency, and in numerous cases tires are being placed in service just as they come from the rolls, the circumferential dimensions, together with the tolerances for the contour, being so close as to require no further machining except the boring of the interior face of the tire for the particular type of fastening to which it is to be applied.

TYPES OF CENTERS AND FASTENINGS

A glance through the catalog of any standard wheel maker will show many and various designs for steel-tire fastenings, but, as is the case in almost every service, certain types have distinguished themselves as being particularly fitted for certain conditions and therefore have withstood the wear and tear better than their less fortunate companions.

For most types of fastenings now used the shrinkage of the tire plays the initial part, and whatever else is used to augment the original strength due to shrinkage is added only as an accessory or a precautionary measure for insuring against the eventuality of a tire losing this initial shrinkage.

Among the different types of fastenings used the M. C. B. Association has within the past two years recommended for special approval the bolted type of tire. In this particular type an interior flange or shoulder is rolled on the inside of the tire, which fits in a recess in the wheel center, and through this shoulder of the tire and the center are passed bolts at regular intervals around the circumference of the rim, the number of these bolts being in proportion to the size of the wheel. Many features are claimed for this fastening which cannot very well be disputed. In the first place, it is a well-known fact that when tires have become considerably worn and the remaining section gets thin there is very great danger of the rolling loads elongating the tire and increasing the diameter of the same on the center, and thereby the original shrinkage is lost, so that unless some means is provided for maintaining the tire in its position the failure of the wheel is inevitable. To provide against this possibility the bolted section would be as near a perfect solution of the problem as could be designed; for even if the tire itself gets loose, through the causes above mentioned, the ring of bolts is sufficient to maintain the solidity of the wheel. This has been proved in a number of cases where the tire has actually broken in two and has been retained in its position by the bolts which serve the double purpose of keeping the tire from turning

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on the center as well as preventing pieces of the tire from flying off. It is very probable also that the additional stock of metal left in this inner shoulder of the tire has prevented many a break when the outer part has been worn thin.

The Paige spoke type, a three-piece wheel, is in very common use on engine trucks and is a modified form of the regular type of bolted wheel described above. The addition of a plain ring on the outer face makes it possible to use two rows of bolts on different bolt circles, the outer engaging all three members, tire, ring and center, while the inner roll only engages the ring and center. Owing to the wider tongue on the inside of the tire, there is even more stock left in the tire to resist breakage when it is worn thin than in the first type, and this construction is especially adapted for resisting the effect of side thrusts given to an engine truck. With this construction the tire can neither turn upon nor fly off the centers. The centers are generally of cast iron.

The Paige plate type, a four-piece wheel, is not strictly a bolted type, except in the sense that the tire has an interior shoulder and is bolted to the center; for, unlike the regular bolted type, as adopted by the M. C. B. Association, there is no provision made in a Paige wheel for shrinkage. The only bearing which the tire has upon the center occurs on the faces of the two thin steel plates which form the web of the wheel and which are bolted to both rim and hub with a hollow space between. Like the standard bolted wheel, this tire cannot turn, neither can it fly off in case of breakage, but it has not the same area of support on the center to back up the tire when worn thin as is the case in the M. C. B. bolted type. There are various reasons why this wheel has preserved its identity among the numerous other types, among which might be mentioned its almost universal use under Pullman and passenger cars, where its elasticity and freedom from singing and noise have given it great favor. When properly built it makes a very solid construction for the service in which it is now being used. Of course, it is confined entirely to steam road service, as the weight and complicated structure of the wheel prohibits its use on trolley lines or those where lighter equipment is in vogue. Almost no railway on this continent which is equipped with Pullman, dining, mail and baggage and parlor cars is without its complement of Paige wheels.

The Mansell type with single or double lip is also a four-piece wheel. In the Mansell ring fastening a groove is cut on each side of the tire, into which the lipped ring is inserted, and although this tire might lose its shrinkage and become loose enough to turn on the center, yet the ring is so designed that in case of breakage of the tire it cannot fly off, owing to the shouldered lip. These rings are bolted or riveted to the center and in some cases have an additional lip on the inside of the ring which clasps the center. Among the disadvantages said to characterize the Mansell ring is the additional number of parts which go to make up the wheel and the additional machine work necessary to produce these rings and maintain a neat fit in the grooves; also it is rightly claimed that when the tires are worn thin and there is a possibility of losing their shrinkage, there is nothing in the construction of these rings that will prevent the tire from turning on the center. This also is a more expensive type of wheel than the first mentioned, in which the bolted fastening is used, and is more difficult to repair. Although the Mansell rings as fasteners are still in service on some of our largest railroad systems, their continued use is usually explained by the fact that the cost of the original installation has prevented them from changing their design, owing to the large amount of material in wheel centers which would have to be scrapped or put aside were a new design to take its place.

The Gibson type, a three-piece wheel, has an interior shoulder on the outer face of the tire, together with a groove into which a separate retaining ring called the arbel is inserted on the inside face of the tire. This ring is of special shape, being concave on one side and convex on the other, as shown in cross-section, and after being in service in the groove of the tire, the outer shoulder of the tire is peened in against the ring, thereby securing it solidly in position and forming a locked joint. The wheel center is thus dovetailed into the space between the ring and the opposite shoulder. Here again the shrinkage of the tire on the center is the main dependence of the wheel for solidity, the ring being inserted to accomplish about the same results as in the case of the Mansell ring described above. However, in case of the tire becoming loose on the center, there is poor provision against turning, although the dovetail is an attempt to prevent the tire flying off in case of breakage. This type of fastening is not very extensively used.

The Boies type is composed of two parts only, like the shrunk or fused wheel, having no bolts or separate fastenings, as in the previously described types. Its dependence for solidity rests entirely on an interlocking device at the grooves, which are machined in both tire and center. Unlike most other wheels, the center is usually made of wrought iron, which, with its additional ductility, prevents breakage through the small shoulder where the grooves occur. The method of mounting the tire is to slip it in a heated state on the center from right to left until the groove on the left-hand side of the tire engages closely the groove of the center on the same side. The tire is then cooled and shrunk. After this is done a roller or peening device is run around on the inner face of the right-hand groove, forcing the small shoulder of the tire up into the groove of the center, thereby forming a lock joint. This wheel is not as complicated to construct as is indicated by the description, but it is not very universally used. A few roads, however, make a specialty of it. The wheel can be used for either engine trucks, tenders or coaches and is mostly constructed with the single plate web. It must be stated, however, that if once loose there is nothing to prevent this tire from turning on the center.

The shrunk type is the simplest of all tire fastenings and is probably the oldest in point of history. Nothing can be conceived more simple in wheel construction where two parts are used than simply to shrink a tire on the center, depending entirely on the shrink value of the tire for holding the wheel intact. While this type of fastening is used in a great many cases for locomotive tires, yet for car-wheel tires for steam roads it is almost obsolete, as under the extreme loads which the railways are now carrying it would be entirely too dangerous a fastening to be depended upon. There is no provision whatever for keeping the tire from turning on the center in case of loss of shrinkage. In some cases a small shoulder is placed on the outside edge of the bore or a few studs are inserted tending to counteract the effect of slide slippage. There are a number of wheels of this type, both with spoke and solid web centers, still in service under the lighter class of steam road equipment and also under trolley cars. The wheel is very simple in construction, is very easy to repair, and the initial cost, as well as the cost of upkeep, is very low. For trolley service this wheel is holding its own fairly well, as in a number of cases where roads do not have their own shops it is very easy to renew the tires on this type of wheel without complicated or heavy machinery.

The fused type, another two-piece wheel, is a very simple type of wheel, but it is rather hard to fabricate successfully, owing to the special manner in which the center and tire are fastened. The tires are first heated and then placed in such a position as to form the outer ring of a mold for casting the centers. In this manner the molten cast iron of the center is brought into contact with the heated surface of the tire and a fusion of the two metals is supposed to take place. When cooled, therefore, it will be seen that

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the tire and center are practically one piece, if a successful union of the metals has been accomplished. Provision is also made for a partial resistance to side slippage by curving the inner bore of the tire, which fits into a hollow in the rim of the center. Obviously, unless a good character of joint is made between the center and the tire, there is every chance for this tire to become loosened and turn in service. Therefore, the maker is not absolutely so sure of getting a first-class job as in some of the other types in which the fastenings are positive in character. There are very few fused wheels now being used.

The Allen paper type is a five-piece wheel which is now practically obsolete, although as a matter of history it may be well to include a description of this in the list of wheels which have been in their day very popular. The whole interior portion of the center is composed of layers of paper pressed into position and housed on the outside with steel plates for the protection and stiffening of the paper center. These cover plates also afford a more secure bearing surface for the bolts which hold the laminated paper centers tightly in position. The hub is a separate iron casting, flanged and bolted to the center, in pretty much the same manner as the tire, which also has an interior flange, with a ring of bolts securing the same to the center. There is no provision in this wheel for shrinkage value in the tire and its safety rests entirely upon the rigidity and compactness of the paper center reinforced with its complement of bolts to hold it together. This wheel was once used almost exclusively under Pullman, dining and passenger cars. One of the primary features claimed for it was its silence in rolling, and this was very much to be desired, especially under sleeping cars. It was also very popular for use under private cars, where its elasticity and freedom from noise were its principal recommendations. It cannot be claimed for this wheel that it compares with the solid metal center wheel in strength and, owing to its complicated construction, it has long since fallen into disuse.

It will be seen that in comparison with the type of fastening the type of center is more directly a function of the character of service in which the wheel is to be placed; for example, heavy equipment naturally would take a heavy solid design of wheel center, where extreme rigidity is aimed for. Also the material of the center is directly contingent on the character of service. In the main it might be said that the solid or plate centers are mostly used under steam-road equipment for heavy passenger and Pullman service, also for engine tenders. This service would also include the Paige double-plate wheel.

The spoke type of wheel on steam roads seems to have attained its greatest field under engine trucks, but here one of the particular reasons for choice is the ease with which the lubrication of the bearings inside of the wheels can be accomplished by the use of the openings in the web. In engine trucks the journals come on the inside and, as they are hard to reach, the spoke type of center affords very easy access. For this reason alone it would appear to be fairly well established in this service.

Spoke-center wheels are more universally used in electric service for either motor or trail wheels than any of the other steel-tired types, as they are lighter in weight and present a more artistic and neater appearance than the solid-web type; so that in those wheels where strength is not absolutely the principal factor the spoke type of wheel has attained its greatest hold.

There are several other types of steel-tired wheels in use, but mostly in foreign countries. In fact, a good many of the types described in this paper had their origin abroad, where much lighter equipment in railway service obtains, so that the American practice really represents an evolution of, or an improvement upon, that of foreign countries. It may be safely said that, as the American railway equipment is constantly increasing in size and weight, the weaker forms of steel-tired wheels will gradually drop out and cease to exist, their place being taken by those forms which have demonstrated their ability to withstand best the most severe attacks of service.

SOLID STEEL WHEELS

The genesis of the rolled-steel wheel which is used to-day in American steam and electric service may be said to belong to the year 1898. At that time Charles T. Schoen, who was engaged in the manufacture of steel freight cars, conceived the idea that the wheel as well as the other parts of the truck and car could be made from pressed steel. Having the courage of his convictions, he immediately began experiments to this end, with such good results that by the year 1903 the business of manufacturing solid forged-steel wheels was established for the first time on a commercial basis.

Closely following the success of this first venture, others took up the project, and to-day four companies are manufacturing forged, or forged and rolled-steel, wheels, as follows: the Schoen Steel Wheel Company (now the Carnegie Steel Company), the Standard Steel Works Company, the Milvale Steel Company and the Forged Steel Wheel Company. It cannot be said, however, that the idea of the forged-steel wheel is wholly an American one, for previous to the dates mentioned certain European firms, principally in Germany, had already developed certain classes of machinery for forging or rolling circular steel disks, and it was really a development of, or an improvement upon, these methods which resulted in the American rolled-steel wheels.

About ten years, therefore, represents the life history of the rolled-steel wheel as we know it in America, and considering the short time which elapsed between its experimental and its present stage, the universality of its use for all classes of service, both steam and electric, is almost phenomenal.

That such a type of wheel would sooner or later come into being was obvious for more than one reason, but chief among the reasons was the crying need for a wheel that would keep pace with the advance in freight-car building, where a constant demand for heavier and larger equipment was caused by the increased tonnage which the railroads were called upon to handle.

Under conditions, therefore, that called for cars of 100,000-lb. capacity it was found wholly unsafe to rely on cast-iron wheels. Steel-tired wheels had given satisfactory service under passenger cars running over these same roads, but they were out of the question for freight equipment, because of their high cost, and in consequence the fabrication of the solid-steel wheel has been reduced to such a state of perfection that it is even disputing the place of a cast-iron wheel under the lightest trolley service in our city streets.

The rolled-steel wheel resembles very closely the cast-iron wheel in section, the difference being in the web, which is a single plate integral with the hub and rim but having no brackets, as in a standard cast-iron wheel. The design of the wheel is susceptible of as many changes in details as are necessary to meet the requirements of the railroads using them, and while there is a wide difference of opinion as to the best proportions for the thickness of the rim, yet such details as the dish, length of hub, contour of tread, etc., are determined to a great extent by the details of truck construction, as well as of equipment, especially on electric roads.

For steam service all treads and flanges are uniform, corresponding to the M. C. B. standard. Some variations, however, occur in the webs and hubs and thickness of rims, and occasionally a variation in the height of flange, if intended for engine trucks.

QUALITIES AND METHODS OF FABRICATION

In producing the wrought-steel wheel it may be said that two main points were aimed at—first, to retain the solidity and simplicity of the cast-iron wheel, and, second, to main-

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tain the hardness, ductility and toughness of the rim of the steel-tired wheel. Both these ends seem to have been attained, but it is interesting to observe that among the four manufacturers of steel wheels there are radical differences in the methods of fabrication, although the raw materials used are the same and the finished products are practically identical in appearance. The accompanying table will serve to illustrate these differences more clearly.

Following are the average chemical and physical properties of rolled-steel wheels, as fabricated by the American makers:

Chemical properties:	
Carbon, per cent	0.65 to 0.85
Manganese, per cent	0.60 to 0.85
Silicon, per cent	0.15 to 0.30
Phosphorus not to exceed, per cent	0.06
Sulphur not to exceed, per cent	0.05
Physical properties:	
Tensile strength, lb	125,000
Elastic strength, lb	72,000
Extension, per cent	10
Contraction, per cent	15

Comparing these properties with those previously given for a steel tire, it will be seen that all parts of the rolled wheel have about the same high qualities as given for the tire, from the fact that it is a one-piece mass of the same material and practically uniform throughout.

Practically all of the differences in methods of fabrication are confined to that part of the process which covers the treatment or preparation of the ingot after it has been cast and before the bloom is made into a finished wheel, although there are some differences in the final process of finishing which have to do with the actual pressing and rolling of the finished wheel blank. It is not intended in this paper, however, to enter into a detailed discussion of all these differences.

Every forging, whether it be a wheel, an axle or a crank shaft, has its inception of origin in a casting, so that in the case of a solid-steel wheel the production of a cast-steel ingot is the first step. In this process a group of molds is set ready for pouring of the molten steel. At the center is the riser, into which the steel is poured from the ladle and through which it is introduced into the various molds surrounding the same by openings which enter the bottom of the mold and allow the metal to flood the mold from the bottom up. This method tends toward solidity and uniformity in the texture of the ingot and more readily facilitates the escape of the impure gases from the molten mass as the mold is filling up. Each mold holds an ingot of cylindrical shape about 16 in. in diameter and about 7 ft. long. When the ingot is cold the mold is stripped from it and the ingot is removed to a machine shop, where it is cut or sliced into sections.

Up to this point of procedure the practice is identical with that of the manufacture of steel tires, as previously described. From this point on, however, the treatment of a billet for a wheel differs very radically from that described for the tire, and as the next step in the making of the wheel is the forging or pressing of these billets, they are introduced into a heating furnace and the temperature is raised sufficiently for this purpose.

The next step is a hydraulic forging process, the billet being pressed down into a rough blank with a suggestion of the flange on the outer edge and also a depression in the web between the hub and tire. A second pressing immediately follows the first without additional heating, the blank being carried from one press to another. The billet now has assumed fairly well the characteristics of the finished wheel, at least as far as the outline is concerned.

The bore of the hub is next punched out, and this is a very significant feature of this particular process for the following reasons: The impurities, if any, are segregated or collected either in the form of a pipe, which is an opening, or in slaggy, spongy material, in the center and near the top of each ingot; therefore the important thing in producing a good wheel is to retain in the rim or tire of the wheel those portions of the billet which were first cooled and which were furthest removed from the segregations of the center, being in consequence the purest and most uniform in fibrous texture. To this end the defective portion of the wheel is punched out of the bore of the wheel, which has retained the same center line as in the original ingot, and therefore the rim of the wheel is the same steel that was in the original outer circumference of the billet before pressing.

At this stage a second heating of the ingot is necessary in order to prepare it for the last stage of its manufacture, which is the rolling. It is, therefore, introduced into another heating furnace, and after the temperature has been raised to the desired point the wheel blank is introduced into a set of special rolls designed for the purpose. Of these the side rolls, which engage the disk of the wheel on each side of the web, are the main driving rolls of the machine, and it is their rotation which gives the direction of rotation to the wheel disk. At the back, between these side rolls, is a back roll, which engages the face of the tread and which is constantly pushed against it as the wheel spins or revolves between the side rolls, so that in this spinning process the web is consolidated or squeezed and the diameter of the disk is greatly enlarged until the wheel approaches its finished state. This rolling of the wheel disk gives to the rim of the wheel a fiber texture almost identical with that of the wheel tire, as the rotation of the wheel between the rolls tends to consolidate and elongate the rim in the same manner as a tire and the working of the metal is as nearly parallel to it as the state of the art will permit. So perfect has this rolling process become that a large number of wheels are suitable for immediate service without machining on the treads, the rotundity being within the tolerances called for just as they come out of the rolls.

After the rolling is finished, the wheel is transferred to a smaller press, in which the proper dish or hub projection is given to it. This is not pressing like the former operations, but is simply a bending or pushing of the hub and web out of a straight plane into that required for the particular service into which the wheel is to be placed. The dishing of the wheel is the last operation, and the wheels are then sent to the annealing room, where they are stacked together in such a manner as to retain a sufficient amount of their own heat for twenty-four hours' annealing, thereby insuring against any injurious strains that might tend to develop from too quick cooling. When annealed, the wheels are sent to the machine shop, where the treads and faces of the hubs and rims are machined off when necessary and the hubs bored, after which they go to the loading platform for shipment.

PERMANENT SECURITY OF BOLTED-UP CONSTRUCTION

BY JOHN B. SEYMOUR, NATIONAL LOCK WASHER COMPANY

Bolted-up construction is a species of bond which may be readily disassembled but temporarily gives the security of a single piece of material. This is necessary in order to accommodate expansion and contraction of metals due to changes in temperature and to facilitate removal or repair of particular portions without affecting the general structure.

Good practice requires going over such structures some thirty days after original installation, retightening nuts and bringing all parts to a firm contact. This practice continued at stated intervals is sufficient for structures of great weight and strength receiving constant and even strains, such as Corliss engines, turbines and similar machinery. Railroad work, however, is subject to the diametrically opposite condition of tremendous blows, thrusts and strains at irregular intervals, as well as extremes in

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temperature, and it is found that, despite tightening from time to time, the structure itself changes, material loses its original cross-section, bolts stretch and the original fit of the parts is so lost that eventually it is impossible to draw them to their original position of rigidity.

From the fact that loosely bolted parts can be tightened if the nuts are turned looseness has naturally been attributed to nut movement, and to prevent this many lock nuts and nut-locking devices have been patented and a few have become articles of common use. There are now in force more than 1000 patents of this nature, but not one of them will compensate for periodic tightening of nuts, nor will they maintain bolted construction in its original rigidity for any considerable duration of service. Tests have been made on practically every variety of bolted construction, which conclusively demonstrates that looseness may occur without nut movement.

On track joints and on special work the nuts have been secured to the bolts by drilling and cottering only to find there was appreciable looseness after a very short period of time. Conditions in car work naturally differ from conditions in track, but the following account is illuminating: The possibility of looseness without nut movement was raised some years ago by the superintendent of a private car line, and as a test he arranged that a car which had come back from its initial trip should have all nuts thoroughly retightened and a certain number so cottered that nut movement was an absolute impossibility. Eight column bolts and four hanger iron bolts were removed and carefully micrometered, replaced and tightened firmly to position, after which the nuts and bolts were drilled and cottered. In ninety days the car was back in the yards, and an examination showed that each of the cottered bolts was loose, and inspection showed frictional wear under both heads and nuts.

Stretch of bolt has been assigned as the cause of looseness, but where all parts are in firm contact and the combined elastic limit of the bolts is far greater than any possible strain stretch of bolt is a physical impossibility. If, however, a very slight degree of looseness has taken place in a bolted structure, sudden strains and blows are not resisted by the structure as a unit but by each bolt separately, in which case the bolts may be strained beyond the elastic limit. Corrosion also has been regarded as the cause of looseness, but interior corrosion obviously cannot take place if all parts are in firm contact, although it may readily occur if there is any looseness in the bolted construction.

Hence we may eliminate as the original causes of looseness in bolted-up structures movement of nut, stretch of bolt and corrosion, and we may consider all of these as occurring after the looseness has originated. However, all materials expand and contract in proportion to their volume with changes in temperature. We allow 1/16 in. to 33 ft. of rail length for a change in temperature of 10 deg. Movement of bolted parts on each other occurs from end thrust since it is commercially impossible to make all bolt holes to a theoretical driving fit. Where movement of objects in surface contact occurs frictional loss must take place, and after the loss has taken place conditions are prepared for nut movement, stretch of bolt and corrosion; also, where such loss has occurred, the bolted construction fails to resist the blow or strain as a unit, and this entails either that each individual portion of the bolted structure must have a strength greater than the total strain imposed or else that the units composing the bolted structure must be malformed.

If this analysis is correct the problem is to compensate for looseness caused by frictional loss, and as we cannot spend an amount of labor in nut tightening which will provide suitable compensation, the only remedy seems to be the placing of a spring within the bolted structure, whose power of resistance is proportioned to the greatest possible strains which may come on the structure in service.

The spring lock washer, or spiral nut lock, is the only device which has even been offered to meet these conditions, but as a compensating device it has proved woefully lacking. As originally designed it was intended to prevent nut movement only, but it has also been offered as a remedy for other causes of looseness. Its imperfection is apparent when we consider that the heaviest spring nut lock affords little more than 3000 lb. pressure when coiled for a 1-in. bolt, while the elastic limit of a commercial 1-in. steel bolt is 18,000 lb.

To give proper efficiency the power of such a device should be from one-half to three-quarters the elastic limit of the bolt on which it is applied. Such a device has never been manufactured and cannot be produced in a plain spiral nut lock. I do not wish to decry in any way the value of our present high-tension nut locks. While not actually compensating for internal looseness they do, to a considerable degree, prevent stretch of bolts, and while not resisting the maximum service strains they resist the average strain to such an extent that their use has provided a greater economy than have other devices of a similar nature.

As manufacturers we fully appreciate the limitations of our product, and for several years we have experimented with various methods of meeting actual mechanical requirements. These efforts have been successful to the extent of demonstrating that spring lock washers can be produced whose permanent pressure efficiencies will equal the elastic limits of all sizes of commercial bolts, but the present problem is to produce from the experimental device a practical commercial article.

PROCEEDINGS AT INDIANAPOLIS

By Telegraph

The fall meeting of the Central Electric Railway Association was held at the Hotel Severin, Indianapolis, Nov. 20-21. The first session was called to order with President A. W. Brady presiding and sixty members in attendance. Following the reading of the minutes of the previous meeting, reports of various standing committees were requested. The report of the standardization committee, which was presented at the meeting of the association on June 26, 1913, was again submitted for final action. This report included standard controlling dimensions for 6-in. trolley wheels, proposed arrangement of electro-pneumatic signals, standard trailer light connections and standard end connections for interurban cars. Owing to the fact that these standards had not been considered and approved by the American Electric Railway Engineering Association, it was decided upon motion to delay their adoption until the national association had taken action. President Brady then stated that the executive committee had decided that the question of appointing a joint weight and inspection bureau and maintaining an index bureau in connection with claim department records was pertinent and would be brought up for discussion at the February meeting.

There being no further business, J. B. Seymour read a paper entitled "The Permanent Security of Bolted Construction." This is published in abstract elsewhere in this issue. Following a brief discussion E. F. Berger read a paper entitled "Forged and Rolled-Steel Wheels and Steel-Tired Wheels." This paper was illustrated by lantern slides. In order to permit a general discussion of the wheel problem, W. A. Bennett was then requested to present his paper on chilled-iron wheels for electric railway service. This was also illustrated with lantern slides which showed the methods and processes of chilled-iron wheel manufacture.

R. N. Hemming, Union Traction Company of Indiana, opened the discussion with the statement that it was difficult to remove flat spots from chilled wheels except

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by grinding either in a special machine or with a wheel-truing brakeshoe. On the other hand, this was not true of steel wheels because the flat spots which developed would roll themselves out.

F. D. Carpenter, Western Ohio Railway, said he would like to use chilled wheels because they eliminated a large percentage of the metal loss which was necessary in turning steel wheels. He found, however, that the dangerous conditions brought about by chipped flanges in chilled wheels necessitated the use of steel wheels. If this defect could be overcome, he would return to the use of cast wheels because of their low cost and economy.

F. J. Foote, master mechanic Ohio Electric Railway, expressed the belief that special work on electric roads, together with sharp curves and turnouts, was responsible for chipped flanges on chilled wheels. J. B. Seymour, National Lock Washer Company, urged that electric railway companies spend more money in track maintenance and said that less money would then be required in the upkeep of rolling stock.

Mr. Bennett, the author of the paper on chilled-iron wheels, in reply to this criticism, stated that poor track maintenance was largely responsible for chipped flanges. In other cases it was due to improper design as found on roads where the flange, which was intended only to guide the truck, served instead as the tread. In many instances flange-bearing special work was responsible for chipped flanges, more especially special work of the kind where the groove was not self-cleaning. If special work was kept clean and the curves greased, chipped flanges would be eliminated. In reply to the question of safety of chilled wheels as compared with steel wheels, Mr. Bennett said that the Pennsylvania Railroad reported that, out of a total of 325,000 steel wheels, 328 had failed. On another steam road, out of a total of 331,500 chilled-iron wheels, 120 had failed. This emphasized the fact that although the steel wheel did have a greater tensile strength it was not especially advantageous.

Mr. Hemming closed the discussion by stating that he did not believe that data on wheels gathered from steam roads could serve as a criterion for electric roads. Certain service conditions existed on electric roads which must be met if safe operation was to be obtained.

At the session of Friday, Nov. 21, J. F. Starkey, general passenger agent Lake Shore Electric Railway, read a paper entitled "The Relation of the Traffic Department to the Company." This appears in abstract upon another page. Charles Murphy, of the Indiana Railroad Commission, then spoke upon the subject of industrial arbitration. After a general discussion the meeting adjourned.

MEETING OF "AERA" ADVISORY COMMITTEE

On Nov. 17 there was held at the office of the American Electric Railway Association, New York, a meeting of the *Aera* advisory committee, which was attended by C. Loomis Allen (chairman), Syracuse; H. C. Donecker, Newark; H. H. Adams, Chicago; C. G. Rice, Pittsburgh; H. A. Bullock, Brooklyn; Cornell S. Hawley, Boston, and J. C. Collins, Rochester. J. D. Mortimer, Milwaukee, and Harlow C. Clark, of the ways and means committee, of which Mr. Donecker is chairman, were also present.

After a full discussion, it was decided to accept advertising for *Aera* beginning with the January, 1914, issue. Solicitation is to be carried on from the office of the association, but if the results do not prove satisfactory a solicitor will be employed. It was also provided that upon each member of the advisory committee would rest the responsibility for securing articles from representatives of his particular department for publication during the year, Mr. Clark, the editor, to keep in touch with this matter. The editor was made responsible for the character of the material appearing in the Question Box.

For the January issue there will be articles from Mr. Adams on engineering matters, from Mr. Rice on the attitude of the claim department toward the public, from Mr. Collins on the relation of the accounting department to public service commissions, from H. E. Reynolds, Boston, on the transportation department and the public, from Mr. Hawley on the manufacturers' share in improving electric railway conditions, while from Mr. Allen there will be a general article covering these matters in a broad way.

SHORT-CIRCUIT SUBSTATION ACCIDENT IN CHICAGO

A severe and rather remarkable accident occurred at the Harding Avenue substation of the Commonwealth Edison Company about noon on Nov. 4. This substation is owned and operated by the electric service company, but its output is sold exclusively to three railway companies—the Metropolitan West Side Elevated Railway, the Chicago Railways and the Chicago City Railway. The substation is equipped at present with one 4000-kw Westinghouse rotary converter of the commutating-pole compound type. Twenty-five-cycle, 9000-volt alternating current is delivered to this large machine, the output of which is 600-volt direct current.

The substation switchboard is equipped with three busbars—one main bus, an auxiliary and one used for testing. The last-named affords a convenient means for testing the main recording wattmeters of the various railway companies and is often used for that purpose. At the time of the accident construction work was in progress to unite the two sections of this testing busbar by placing in position a new section to connect two existing sections. Two or three men were employed, partly on the first floor and partly in the basement. Canvas was wrapped around the live parts of the busbar, and all the usual precautions were taken. While work was in progress and two men were back of the switchboard on the main floor a loud explosion was heard, and flames burst out with quantities of smoke. The men ran out with their clothing on fire and, although they received immediate first aid, one was fatally burned.

It appears that in some way a contact was made between the metallic work in the building structure and the main lead of the rotary between the machine and its switch and circuit-breaker. The trouble so reduced the voltage that the no-voltage release of the main circuit-breaker was tripped and thereby disconnected the rotary from the busbars. However, the draft of current was not sufficient to open the oil switch which controls the energy supply to the rotary converter, and therefore the machine ran on, still pumping energy into the short-circuit. The operator diagnosed the trouble correctly and operated the control switch, thereby opening the oil switch of the rotary converter and cutting off the source of supply within a few seconds.

The strain on the insulators which insulate the cable rack from the frame of the building was great, owing to the short-circuit, and some of them broke down, developing arcs between some of the section feeders and the framework supporting the cable rack. These were not heavy arcs and possibly they were due to molten metal. These arcs received the next attention of the operator and were extinguished. In the meantime a considerable fire, started by the burning canvas, was in progress. The operator next turned his attention to this and put out the flames with the local fire-fighting equipment. His next task was to examine the apparatus to see if it would be safe to put it back into service. At nearly the first moment of the accident he had notified the load dispatcher downtown by telephone, so that in turn the railway companies were notified to make temporary provision through the feeding network, should it be necessary. Things were in pretty bad shape, but nevertheless the operator was satisfied that the machine would stand up to its work, and he put it back into service, carrying its load, within twenty minutes from the time of the explosion. There was no interruption to service.

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REPORT OF FRANCHISE COMMITTEE OF NATIONAL MUNICIPAL LEAGUE *

BY DELOS F. WILCOX, CHAIRMAN; ROBERT TREAT PAINE, JAMES W. S. PETERS, ABRAHAM E. PINANSKI, CHARLES RICHARDSON AND CLINTON ROGERS WOODRUFF

It is our view that just at present there is a tendency toward too great centralization in the control of public utilities. The idea of state regulation has gained great headway, and under some of the forms of public utility laws the powers of the municipalities to control local utilities, either through franchise contract or through regulation by means of ordinances or local commissions, are being seriously curtailed or taken away entirely. The league has always been friendly to the idea of municipal home rule, and the home rule movement has been gaining very considerable headway in recent years. It is especially important, therefore, that the league should inquire carefully into the significance of this counter movement for exclusive state control in the matter of public utilities, hitherto regarded as one of the most important fields for municipal activity.

The public utility laws providing for exclusive state regulation do not necessarily and directly strike at the principle of municipal ownership, although in some cases they bring municipally owned utilities under supervision to the same extent as utilities owned and operated by private corporations. Nevertheless, there are certain features of exclusive state regulation which tend to make the municipalization of utilities more difficult, and to that extent interfere with one of the most fundamental provisions of the home rule program.

As a practical matter, the more powerful the corporations become and the more widespread their services, the more important it is that they should be directly answerable to the local communities which they serve. It may easily be possible that any appointive state commission will fall more or less completely under the domination of the powerful interests which control the public utilities of the state, and thus the very machinery provided for the regulation of utilities be captured by the interests presumed to be regulated by it.

We are of the opinion that in most cases regulation cannot be either logical or effective without the active cooperation of both state and local authorities. A city must have control of its streets. This necessity becomes more acute as cities increase in population and the congestion of street traffic and of the surface, underground and overhead street uses develops. Then, too, when the problems of congestion of population become serious, a city finds it necessary actively to initiate and control the development of its public utilities, particularly its local transportation system.

At the same time it is clear that in the country and in small towns the public authorities are wholly lacking in equipment for the regulation and control of public utility corporations. This is especially true where utilities of an interurban or state-wide character merely pass through the local communities. For a country town to attempt to regulate an interurban railroad, except as to the most rudimentary questions relating to the occupation of the streets, would be illogical and practically impossible. It appears to be desirable, therefore, that the state public service commission should have general jurisdiction over public utilities throughout the state, so that there shall be no "twilight zone" within which the companies may escape adequate regulation. We are of the opinion, however, that at least every city of sufficient importance to enjoy powers of home rule in the framing of its charter should have the right to establish a separate department, bureau or commission for the purpose of supervising the utilities operating within its limits to such extent as may be necessary for the protection of the distinctively local interests of the community. Even in the largest city, with the best equipped utility department, the state commission should still have jurisdiction over certain important matters.

DIVISION BETWEEN STATE AND CITY

Speaking generally, all those elements of regulation which have to do with the activities of corporations as such and which invite uniform treatment without reference to widely varying local conditions will naturally fall to the lot of the state commission. These matters include the regulation of stock and bond issues, the fixing of a uniform system of accounts, the requirement of public reports and the determination of certain fundamental questions which relate to the stability of the investment. The city, if it chooses to exercise it, should have broad power of control in all matters relating to the occupation of the streets and the character of the services rendered and should be in a position to municipalize the utilities whenever it desires to do so, and for that purpose it should have a continuing right to enter into franchise contracts by the terms of which municipalization can be made practicable.

A state-wide public utility law which provides that every franchise granted by local authorities shall be an indeterminate permit, terminable only upon purchase of the property of the utility at a price fixed by the state commission, is, in our judgment, inadequate to protect the interests of the city, and in fact tends strongly to hamper the city in future efforts to municipalize the utilities.

There are certain elements of regulation which lie on the border line between state and local functions. One of these is the regulation of rates. We are inclined to the opinion that the fixing of rates, which has to do fundamentally with the protection of the investment as well as with the rights of the patrons of the utility, should be recognized as a function in which local and state authorities may properly co-operate.

The problem of extensions is a delicate and difficult one. Obviously some power of initiative as well as of veto on the part of the public authorities is necessary. At the same time it is clear that any company could be driven into bankruptcy by the arbitrary exercise on the part of the local authorities of unlimited control over extensions.

AMORTIZATION OF THE INVESTMENT OUT OF EARNINGS.

We desire to state emphatically that in our opinion the experience of the utilities of the country, and perhaps especially the transportation utilities, has been such as to give a distinct warning against the policy of permanently capitalizing superseded property, accumulated deficits and intangible elements of value. Whatever may be necessary in an adjustment of the capital account fair alike to the investor and to the public, we are of the opinion that all these elements—sometimes included in appraisals in excess of the permanent value of the physical property—should be written out of capital within a comparatively short period of years.

There may be a legitimate difference of opinion as to the advisability of requiring the amortization of the entire capital account of a public utility while it is being held under private ownership. The amortization we refer to is not the amortization of the company's bonds for the benefit of its stockholders, but the amortization of the investment itself, represented by both stocks and bonds, as a process for the gradual transfer of the ownership of the property from private to public hands. We believe that the time is ripe for urging the recognition of the amortization principle in all franchise contracts, and would further state that in our opinion the tendency will be to amortize too slowly and too little rather than the reverse.

It is essential to the proper development of the utilities

* Abstract of a report presented at the annual meeting in Toronto, Ont., on Nov. 15, 1913.

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of any city and to the full realization of the principles of public control that, in all cases where the outstanding franchises run in perpetuity or for unreasonably long periods, the city should definitely set about devising means for recapturing them. While it is our opinion that every legitimate investment in a necessary public utility should be carefully protected, we do not believe that franchises as such should be irrevocable or that they should have special value apart from their function of giving life to the property of the utility.

VIEWS OF PROFESSOR BEMIS

Prof. Edward W. Bemis did not sign the report but wrote that while he agreed in the main with the views presented he doubted the wisdom, at the present time, of lodging in any state commission any control of the capitalization or rates of public utilities in the larger cities, especially west of New York State.

OPINIONS OF PURCHASING AGENTS REGARDING THE FORMATION OF AN ASSOCIATION

In a communication published in the ELECTRIC RAILWAY JOURNAL for Nov. 8, 1913, it was suggested that the benefits of an interchange of ideas were sufficient to warrant the purchasing agents who attended the American Electric Railway Association convention in holding at least informal sessions by themselves under the direction of the parent body. To bring out the prevailing opinions of purchasing agents with regard to this matter letters were sent to several electric railways in different parts of the country, and some of the replies are presented herewith.

R. R. Smith, Indianapolis Traction & Terminal Company, says: "It has several times occurred to me that it would be a very good plan to hold such meetings. As I look at the matter, the purchasing departments of the various companies have been left to struggle along in the old rut, while all other operating departments were making advancements. Let us have these meetings by all means."

W. H. Staub, United Railways of Baltimore, says: "I think that the suggestion is a very good one and that there are sufficient topics of general interest to the purchasing agents to warrant provision for them to have sessions to themselves at the annual conventions of the American Electric Railway Association. If such meetings have proved helpful in the other branches of electric railway service, why shouldn't they be beneficial to the purchasing branch, enabling the purchasing agents to compare methods, etc., for mutual improvement? If anything definite should develop toward the adoption of such an idea, I should be very glad to co-operate in launching it in any way that I can."

W. J. Mulholland, American Railways Company, says: "This is a matter that has been in my mind for many years past, but I have never seemed to be able to 'get together' with anyone who was interested in the subject. There are doubtless many things that could be discussed in such an organization for the benefit of the purchasing agents themselves and the companies with which they are connected, without in any way being detrimental to the various people with whom it is necessary for them to do business. I should be very much in favor of getting together such an organization."

E. F. Schneider, general manager the Cleveland Southwestern & Columbus Railway, writes: "In my estimation there is so little in common in the methods of purchasing supplies used by different electric railways that there would hardly be sufficient reason for establishing a purchasing agents' department. There are so many things which enter into the matter of purchasing, such as time, freights, quantities, standards, etc., that I can hardly see any justification for an association of this kind."

S. R. Dunbar, Union Traction Company of Indiana, says in part: "I feel that meetings of this character for purchasing agents would not be very likely to attract much attendance, largely perhaps because of the varied responsibilities which the office of purchasing agent carries with it in different companies. It might be, however, that a sufficient number of topics of general interest would crop up to make the meetings very desirable."

COMMUNICATION

INCLOSING SPECIAL WORK AT CARHOUSES

SCRANTON RAILWAY COMPANY
SCRANTON, PA., Nov. 13, 1913.

To the Editors:

I notice in your issue of Nov. 1 an editorial on "Carhouse Special Work" in which you take exception to the advisability and desirability of inclosing the lateral entrance track. An excellent reason for this practice, however, is that the carhouse to which you evidently refer can be maintained at a temperature of 70 deg. Fahr. in any kind of weather with very little difficulty. Of course, local conditions must govern the installation of carhouse tracks, but I believe that where it is possible to cover the ladder tracks at minimum cost such protection is worth the price. One door opening at the corner of the building is a much better protection to the building than if the whole side is opened up. I can readily see that it would be out of the question to cover the tracks if the ladder was at right angles to the carhouse tracks.

I have had some experience with the tracks inclosed and know the desirability of having them that way if possible. Most of the cars on the average road are in the carhouse only between 1 a.m. and 5.30 a.m., and a fairly warm building is required to melt off from the trucks the accumulated snow and ice. If the carhouse can be kept at a temperature of 70 deg., the ice drops from the trucks in a very short time and therefore gives the inspection force more time for work than it would have otherwise.

We had one of these "inclosed" carhouses in a New England city, but we went to the extreme in this particular case because we had a covered ladder track at each end of the building. We had other carhouses all heated by the same system, but much more night work could be accomplished in the "inclosed" carhouse. I might add that the installation of overhead work over an inclosed ladder track is much more simple and durable than an outdoor installation.

I do not think that it would be at all necessary to equip each bay with doors, as has been done, and the saving in cost in this respect would materially reduce the cost of covering the ladder track.

FRANK CAUM, General Manager.

NEW SOUTH WALES TRAMWAYS

T. R. Johnson, chief commissioner, has presented to the New South Wales government his report on the working of the tramways for the year ended June 30, 1913, as follows:

		Increase Over Last Year
Revenue	£1,754,566	£173,173
Expenditure	£1,572,190	£240,777
Passengers carried	294,445,452	27,665,906
Car mileage	26,954,767	2,592,548

The net result, after providing for operating expenses and interest on the capital invested, is a deficit of £32,456. During the year tramway extensions totaling 12 miles were opened for traffic, making the line mileage 208, while a number of new lines are under construction and further extensions are contemplated. Good progress has been made with the erection of the new tramway power house at White Bay, Balmain, and a portion of the plant has been erected on permanent foundations and is now under steam.

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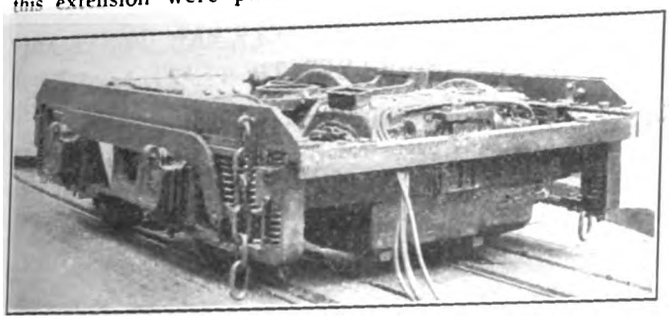
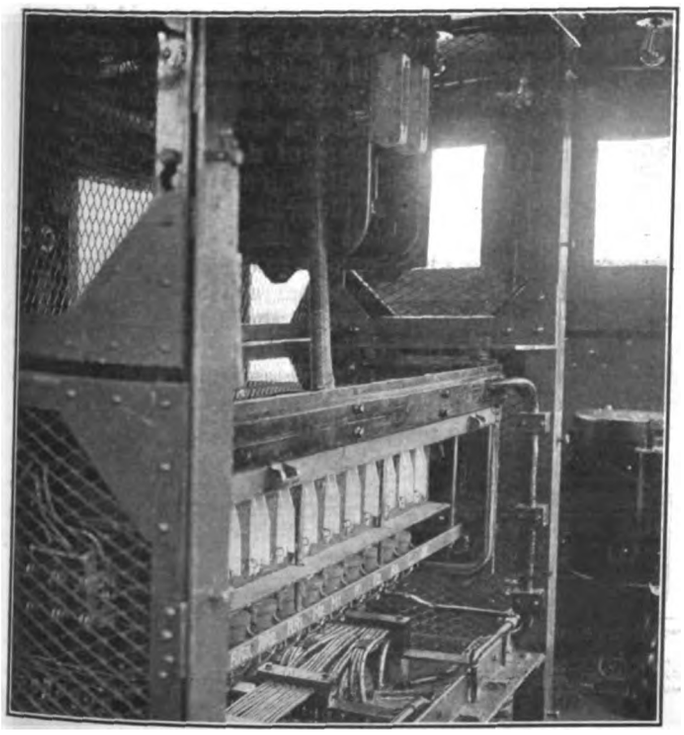
ELECTRIC LOCOMOTIVES REPLACE EXPENSIVE TRUCKING SERVICE

The plant of the Chase Rolling Mill Company, Waterbury, Conn., is located about 1½ miles from the nearest railroad track and at an elevation considerably above the railroad. Heretofore all the hauling raw material and finished product to and from the station has been handled by eight-horse teams. This proved to be expensive, costing at least 50 cents a ton. Some construction data on this extension were published in the ELECTRIC RAILWAY JOURNAL for Aug. 30 in an article entitled "Way Construction of the Connecticut Company." To replace these teams an electric line 2.3 miles long, with a maximum grade of 5 per cent, was built from the railroad to the mill. Two Baldwin-Westinghouse 45-ton electric locomotives were then employed to handle the work formerly done with twenty eight-horse teams. Each locomotive is equipped with four Westinghouse No. 301-D-2, 100-hp, 600-volt motors geared 17:60, type HL control, and No. 14-EL air brakes.



Truck Showing Outside-Hung Motors

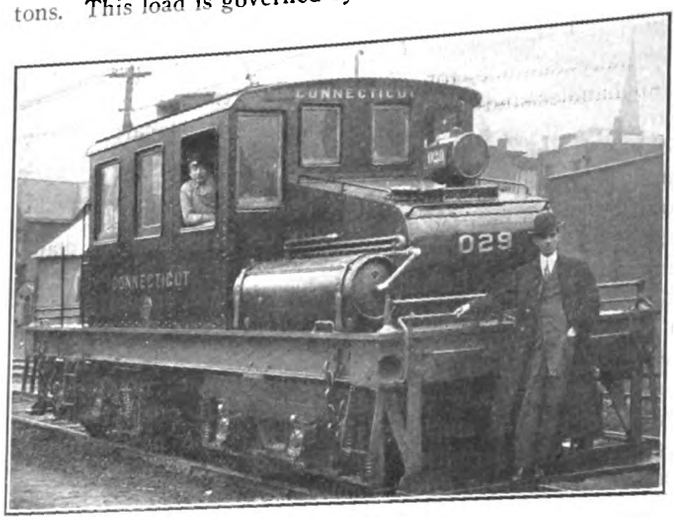
The control equipment of these locomotives is mounted in the center of the locomotive and surrounded by an expanded metal screen cage as shown in one of the accompanying views.



Control Equipment of Locomotive

It will be seen from another view that one departure from the usual construction followed in locomotives is that the motors are outside instead of inside hung. This arrangement was necessary to give the trucks a short wheelbase so as to enable them easily to negotiate the sharp curves on the line.

Each locomotive makes from eight to ten trips per day and with a load of approximately from 100 to 125 tons. This load is governed by the 5 per cent grade, which is 3000 ft. long. These machines have been in operation since the first of the year.



General View of Locomotive

Some of the characteristics of these locomotives are given below:

CAPACITY

Continuous capacity tractive effort with natural ventilation	4,560 lb.
Tractive effort at one-hour rating, at 7.8 m.p.h. at 600 volts	17,270 lb.
Maximum tractive effort	22,500 lb.

RATED HAULING CAPACITY

Track Profile	Number of Cars Each Weighing 45 Tons with Load	Maximum Speed, M.P.H.
Straight level track	38	9.2
½ per cent grade	21	7.8
1 per cent grade	13	7.8
2 per cent grade	7	7.8

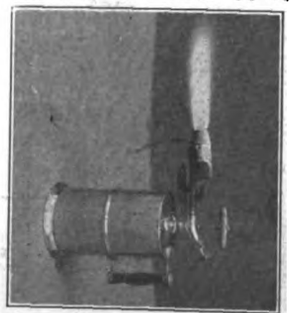
MECHANICAL DATA

Truck wheelbase	4 ft. 6	in.
Total wheelbase	20 ft. 0	in.
Length over bumpers	28 ft. 9	in.
Length of cab inside	12 ft. 0	in.
Length of hoods	6 ft. 6	in.
Width of hoods	4 ft. 6	in.
Width over all	5 ft. 6	in.
Diameter of driving wheels	34	in.
Total height over cab roof	11 ft. 0	in.
Gage	4 ft. 8½	in.
Trucks	2-4 wheel swivcled	

PORTABLE STEEL TIRE HEATER AND PORTABLE KEROSENE TORCH

Two new oil-using shop specialties of the Hauck Manufacturing Company, Brooklyn, N. Y., are shown in the accompanying halftones. One of these is a portable tire-heating outfit, which can be used with crude fuel or kerosene oil. The tire casing is adjustable for tires of any diameter ordinarily employed in railroad work. The adjustable feature is obtained by the use of a flexible casing, made up of a number of interchangeable steel segments. By manipulating the fastenings at the joints these segments can be made to accommodate the diameter of the tire. The tire is placed in the casing and the heat is ap-

Tire Heater



Kerosene Torch

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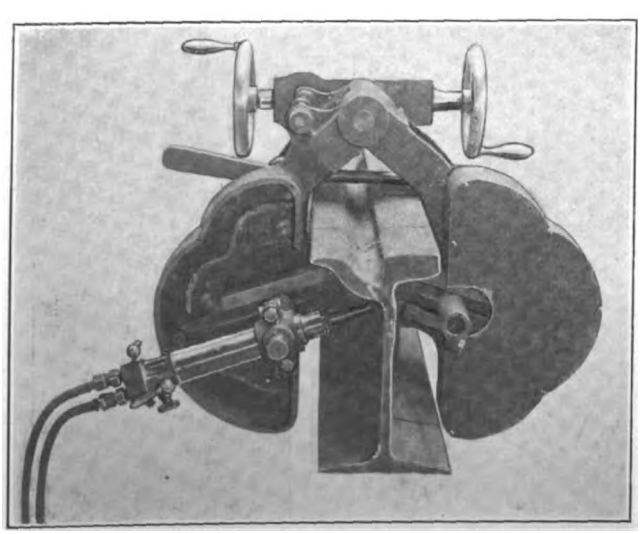
plied through the burner at the bottom. The flame passes around the tire inside the casing, which is left open at the top to allow the escape of heat. The manufacturer asserts that with this outfit any steel tire can be removed in fifteen minutes, using approximately 2 gal. of oil.

The second illustration shows a new kerosene torch which the Pennsylvania Railroad and others have found especially suitable for use in straightening and brazing grab handles and other safety appliances on cars. Many parts like these are broken by trying to straighten them cold, especially when the frost is in the iron, but with this torch they can be readily bent back to shape. The same torch can also be used for burning off paint and for many other heating operations in or about a car shop. It is made in two sizes, namely, ½-gal. and 1-gal. capacity. The manufacturer believes that this torch meets the need for a device that can make effective use of kerosene. The latter fuel is cheaper and safer than gasoline; furthermore, one standard grade contains 32,230 b.t.u. more than the gasoline usually employed in shops. The new torch is said to have permitted the bending of a ½-in. x ¼-in. piece of copper in three minutes and of a 1-in. brass rod in two minutes; also to have heated a 2-in, shaft red hot in five minutes.

AN OXY-ACETYLENE RAIL-CUTTING MACHINE

The Davis-Bournonville Company, New York, has recently developed the oxy-acetylene rail-cutting machine shown in the accompanying illustration and known as the "railagraph." It can be used on a rail in position in the roadbed. The machine consists of a stand which is clamped on to the rail, and on each side of the rail a bracket is provided in which the cutting torch can be mounted. This bracket is secured to a slide which is moved by a roller held in contact with a cam by a tension spring. Different forms of cams are provided for cutting different styles of rails.

The machine is driven by the small handwheels at the top and as these are rotated the torch is made to travel over the rail, the cam and slide arrangement holding the end of the torch about ⅛ in. from the work. In operation, the torch is first applied at one side of the rail and

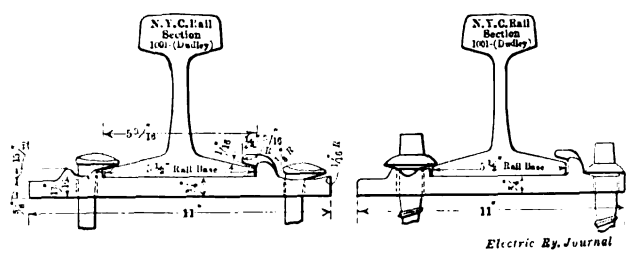


Oxy-Acetylene Rail-Cutting Machine

fed over the line on which it is to be cut, one-half of the base, the entire web and one-half of the rail surface being cut by this operation. The torch is next removed from the holder, and, mounted at the opposite side of the rail, it is passed over the work a second time in order to cut the remaining halves of the base and rail surface. During a recent exhibition a 9-in. girder rail was cut off in three minutes, with a consumption of 2 cu. ft. of acetylene and 5½ cu. ft. of oxygen. A comparison between this time and the time required to cut off such a rail with a hand hacksaw will readily show the desirability of using the equipment for work of this kind. The standard Davis-Bournonville machine cutting torch is used on this machine, except that for rail cutting the torch is made about 2 in. shorter than the standard dimension. Oxygen is used at a pressure of 50 lb. per square inch.

REINFORCING PLATE FOR ANGLE-BAR JOINTS AND HOOK SHOULDER TIE PLATE

Two important specialties for the track department which have already been widely applied on steam railroads are now being actively exploited in the electric railway field by the Lackawanna Steel Company. One of these is

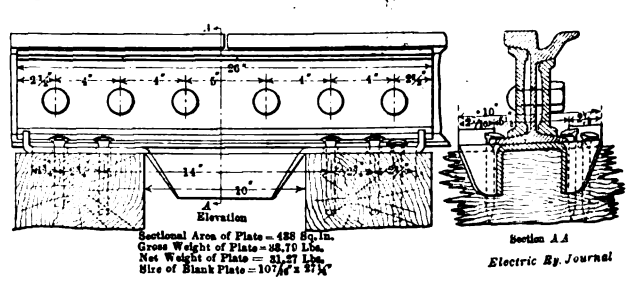


Hook Shoulder Tie Plate with Spike and Screw Fastenings

the Abbott rail joint plate and the other is the Lackawanna hook shoulder tie plate.

The rail joint plate was developed some years ago to help the ordinary angle-bar joint to take heavier loads inasmuch as the vertical section of the bar itself is limited. The plate is a single piece of plain, flat axle steel, forged into a shape that makes a short deck bridge, having greatest strength at the center cross-section, with wide flat end bearings, upturned corner lugs and spike holes arranged to fit any angle-bar rail joint in T-girder and step joint combinations. In the last case, proper support and alignment is furnished by the joint plate in its regular position together with a simple flat plate of thickness equal to the difference in height of the rail sections. An application of the plate to a girder rail is illustrated.

In general, this joint plate is designed to reinforce the angle bar by giving a base support to the rails at the ends; to prevent deflection of the angle bar and battering of rails; to reduce the tendency to stretch the bolts and loosen the nuts; to give wide tie bearings, taking the place of two tie plates and saving ties; to serve as anti-creepers through the engagement of the corner lugs with the ends of the angle bars, and also to make rail guides to prevent lipping



Rail Joint Plate Applied to Girder Construction

of ends if the angle bars should accidentally become broken or displaced. The plate can be easily installed after track laying is completed and therefore is applicable to either old or new track.

The hook shoulder tie plate is of simple pattern with shoulders for both sides of rail, one of which is in the shape

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of a hook to extend over one flange, making a holder between the plate and the rail. It is designed to be fastened to the ties without having spikes come in contact with the rail. The spikes hold the plates and the plates hold the rail. The hook shoulders may be installed in reverse position on every other tie, thereby making them a permanent holder of the rail, or all on one side, which makes possible the removal of the rail without disturbing the plates.

NEW AUTOMATIC TRAIN STOP

A satisfactory test of a new type of automatic train stop was conducted in Pittsburgh recently to establish its ability for operation under actual working conditions, its application to both electric and steam systems being demonstrated by installations on the Fort Wayne division of the Pennsylvania Lines just west of Pittsburgh and on the Ardmore division of the Pittsburgh Railways. The equipment, both on track and rolling stock, had been in service for some time, that on the Fort Wayne division having been installed nearly two years ago. The inventors are Gardner B. Gray, chief signal inspector of the Pennsylvania Lines West, and Guy P. Thurber, a Pittsburgh consulting engineer. The patents are held by the Automatic Train Control & Signal Company, Pittsburgh, Pa.

The device, which is called the Gray-Thurber automatic train stop, operates on the closed-circuit principle; that is, a train or electric car equipped with it cannot proceed unless the circuit governing it is closed and complete throughout its whole length. Thus any derangement of the apparatus will act to stop the train or car. The accompanying illustration shows its application to electrically propelled trains. An alternating current is used for the train control system, so that the blocks may be insulated from each other and provision still made for returning the propulsion current to the power house through the rails by carrying it around the insulated joints between blocks through impedance bonds, which serve as sufficient insulation against the alternating signal current.

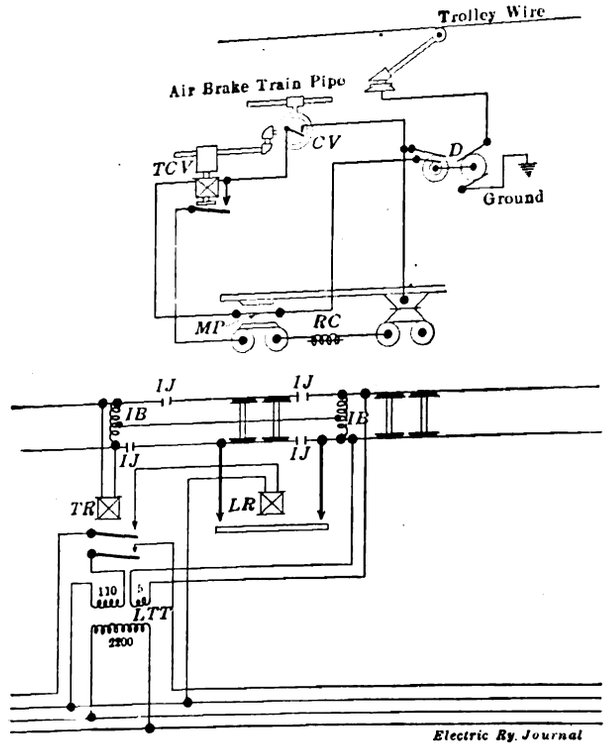
The principal equipment on the car consists of a relay which governs an air valve and a small dynamotor driven by the direct propulsion current which furnishes a low-voltage alternating current to energize the relay. One of the trucks is insulated from the rest of the car. The circuits on the car are illustrated in the upper part of the accompanying cut, which shows the apparatus in the "stop" position. From the dynamotor, *D*, the normal circuit extends to rear truck, to rail, to front truck, to armature of train control valve, *TCV*, to winding of magnet and back to the dynamotor. As long as this circuit is complete the armature to train control valve is held up, the valve is closed and the car may proceed.

The insulation between the truck and body of the car consists of two sheets of fiber with a metal plate, *MP*, between them. This is made a part of the car circuit, so that if the insulation breaks down, a short-circuit will result between the dynamotor and the relay, the latter will be de-energized and the car will stop.

Whenever the armature falls on account of an interruption of the current normally flowing through the relay, the circuit is broken, thus keeping the brakes applied until the cut-out valve, *CV*, is turned, closing the air valve and the car circuit at the same time. This re-energizes the relay so that the armature is lifted up again, the train control valve is closed and the car may proceed. The cut-out valve is normally held open by a spring. If the train control system breaks down, the cut-out valve may be latched shut so as to permit the car to be run into a switch. An impedance bond, *IB*, between the trucks to return the propulsion current to the rails from both sets of motors completes the car equipment.

Insulated joints in the rails are provided at the ends of each block, as shown in the lower part of the accompanying diagram. If the rails have been laid with alternating joints it is necessary to insert a short section to bring the insulated joints opposite. The next joints ahead are also insulated, so that as the car enters a block its front truck stands on a short section of track isolated from any signal current. The direct propulsion current is carried around these insulations through impedance bonds *IB*, as above stated. A loop circuit which may be broken by the de-energization of the relay, *LR*, completes the car circuit, while it is crossing the opposite insulated joints, so that the car will ordinarily pass into the block.

The track apparatus is such that the application of the train stop to a road already equipped with an automatic block signal system is a simple matter. It consists of a track relay, *TR*, a transformer, *LTT*, having a high voltage primary supplied with an alternating current from the



Wiring Diagram for Automatic Train Stop, Showing Connections for the Car and for the Track

power house, a track secondary of low voltage and a 110-volt secondary which energizes the line relay, *LR*. The line relay, *LR*, is controlled by the track relays of two blocks ahead, or of whatever territory it is desired to protect, and its function is to make and break the loop circuit around the insulated joints, *IJ*, and thus to cause the car to be stopped if the protected territory ahead is occupied. The insulation at the joints is guarded by a detector.

The municipality of Vienna, Austria, has issued an illustrated book of 154 pages in commemoration of the first decade of the municipal operation of the local electric railway system. Among its features are the views of traffic at congested points, the home manufacture of special work, methods of maintaining cars, operation of bus lines as suburban feeders, houses built for employees, manufacture of employees' uniforms and cleansing of the same by the vacuum process. The views of car developments show the latest motor car with separate entrance and exit on the rear platform, train operation and the trial double-deck car. Illustrations are also presented of many handsome waiting rooms for passengers and booths for switchmen. A full-size model of conduit construction is used in the instruction rooms. The general manager of the Municipal Tramways is Ludwig Spängler, whose innovations in cars have been described from time to time in these columns.

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News of Electric Railways

Substance of Chicago's Surface Railway Unification Ordinance

The ordinance passed by the Chicago City Council at a special meeting on Nov. 13, authorizing the unified operation of all the surface railways in the city of Chicago, contains a number of provisions which are radical departures from the old 1907 settlement ordinances. The new ordinance was read section by section and attempts were made to amend different sections, to require the Board of Supervising Engineers to advertise for bids for all material valued in excess of $500, to force the railways to furnish a sufficient number of cars to provide seats for all passengers when they reach a point approximately 1 mile from the loop district, to include specific provisions as to what streets the through routing of cars should include, etc. All of these were voted down and the ordinance was passed by a vote of fifty-four to seven practically as it came from the local transportation committee.

The passage of the ordinance was desired in order that the companies might utilize to the fullest extent the trackage in the loop district owned and operated by the two principal surface railways. Under the existing arrangement it has not been possible to carry out the scheme of through routing provided in the 1907 ordinance, owing to the fact that the two companies could not agree on a system of accounts whereby each would receive its proper proportion of the earnings of each through-route car. Under the new ordinance all questions of dividing revenue on through routing are eliminated, and all local service throughout the city will be balanced so far as local schedules permit. This balancing of service will be under the control of the Board of Supervising Engineers.

Another important provision of the merger ordinance is in fixing a 5-cent fare on the surface lines throughout the entire present and future limits of the city of Chicago. At present the Calumet & South Chicago Railway, as well as the Chicago City Railway, collects a 10-cent fare from all passengers from that part of the city north of Seventy-ninth Street who travel into the district south of that line. Under the terms of the 1907 settlement ordinance the Calumet & South Chicago Railway could continue to collect a 10-cent fare until such time as the gross earnings reach a point where the net receipts would pay a 5 per cent annual interest on the capitalization for the entire period of operation from 1907. This company agreed to waive its right to collect the extra 5-cent fare, and the city has agreed to pay it a sum equal to the aggregate amount, including interest adjustment at the rate of 5 per cent per year, of the annual deficits of this company as defined by its old settlement ordinance. The Board of Supervising Engineers computed this aggregate amount of deficits up to July 31, 1913, and found that it totaled $303,545. The passage of the merger ordinance by the City Council authorized the payment of this amount of money from the city's 55 per cent of the net receipts of the South Side surface lines.

Under the 1907 settlement ordinance it was provided that the companies should deposit in a separate fund 8 per cent of the gross receipts, which amount was to constitute a reserve fund for taking care of renewals and depreciation. At that time, however, it was provided that the Board of Supervising Engineers could increase the percentage until the fund was sufficient to take care of renewals and depreciation. Since the passage of the 1907 ordinance the board has not seen fit to increase this amount, although it has expressed itself several times as being of the opinion that an increase was necessary. In order to be positive that the renewal fund was sufficient the city and the surface railways agreed to increase this amount from 8 per cent to 10 per cent in the merger ordinance.

Another important clause in this ordinance provides that when sewers or water mains are constructed or reconstructed in streets occupied by railway tracks, and it is necessary for the railway company to reconstruct any portion built according to the standards for track in paved streets, as provided by the Board of Supervising Engineers, the expense of reconstruction, except such portion as the Board of Supervising Engineers may determine as properly chargeable against operating expenses, is to be charged against capital account.

The railways also are authorized to use T-rail in paved streets where its use is approved by the Board of Supervising Engineers. This clause in the ordinance provides that the design of the T-rail shall be satisfactory to the Board of Supervising Engineers and that it shall not extend above the top level of the street pavement. It also provides that where T-rail is used the space between the rails and between the tracks shall be paved with granite block. If after track has been constructed with T-rail the Mayor and City Council are not satisfied with it, they have reserved the right to require the company to replace it with the standard 129-lb. grooved rail construction.

Under the existing ordinances the companies are required to use grooved rail in all new track construction. The merger ordinance provides that it is unnecessary to use grooved rail of the standard section in unpaved streets or streets where the sewer and water supply pipes have not been laid. Track in unpaved streets may be a type of temporary construction approved by the Board of Supervising Engineers.

The provisions for heating the cars as passed by the local transportation committee and published in the Electric Railway Journal Nov. 1 were adopted by the City Council without change.

At the time negotiations for the merger ordinance were in progress the representatives of the railways hesitated about including the universal transfer privilege. It was agreed, however, that if sufficiently stringent provisions regarding the use of transfers were embodied in the merger ordinance, the companies would grant the universal transfer privilege. As a result of this agreement the following provisions were embodied in the merger ordinance to prevent the fraudulent or improper use of transfers:

"It shall be unlawful for any person: (1) to sell, barter or exchange for any consideration whatever any such transfer, or to give away any such transfer; (2) to receive or to use or attempt to use or offer for passage upon any street railway car of the companies, or any of them, any such transfer not issued for the use of such person by an officer, agent or employee of the companies, or any of them; (3) to throw away or otherwise discard any such transfer without first tearing such transfer in two; (4) to use or attempt to use or offer any such transfer after such person receiving the same shall have interrupted or suspended his or her passage for the transaction of business; (5) to counterfeit any such transfer; (6) to punch or alter or change the punching of any such transfer (authorized agents of the companies, or any of them, excepted). Any person violating any of the provisions of this section shall be liable to a penalty of and shall be fined not less than $1 nor more than $25 for each offense."

Under another section it is provided that the basis of accounting between the companies and the city of Chicago shall be the same as under the 1907 settlement ordinance.

It is also provided that the companies may invest in first mortgage bonds secured by their respective properties subject to the approval of the Board of Supervising Engineers and the city comptroller of Chicago. The railways are also authorized to lease any real estate belonging to them, not used for transportation purposes, for periods of such length and on such terms as may be approved by the Board of Supervising Engineers and the city comptroller.

The clause providing for the re-use of rails having a wearing life of not less than five years was changed to seven years. Rails having a wearing life of this length may be used in newly paved or repaved streets, provided they are placed on standard foundations.

There was no change in the street-cleaning clause which provides that during a period of five years after the ordinance becomes effective the companies shall pay the city of Chicago for cleaning the right-of-way, including the removal of snow, the sum of $51.50 per month for each mile of double track operated. The companies agree to make these monthly payments on 454 miles of double track. All

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extensions built or acquired during the five-year period are to be added to this mileage and paid for at the agreed rate.

The electrolysis prevention provisions as passed by the local transportation committee and abstracted on page 966 of the ELECTRIC RAILWAY JOURNAL for Nov. 1 were adopted with unimportant amendments. The ordinance was signed by the Mayor on Nov. 18.

Interurban and Street Car Service Defined

The finding of the arbitration board in the matter of arbitration between the Southern Pacific Company, Oakland, Cal., and its train employees as to what constitutes interurban and street car service follows:

"From a review of all the evidence submitted it would appear, and the board finds as its determination of what constitutes street car service as distinguished from suburban electric service, as follows:

"1. Street car service differs from suburban electric service in the greater expedition with which passengers in suburban electric service are carried from terminal to terminal, or between stations, by reason of the fact that street car service is designed to do, and does, a more local or transient transportation business than suburban business, in the transportation of passengers locally in a single community, whether that community be a single municipality or a community divided by municipal, county or state boundaries.

"2. Subject to municipal regulations for purposes of public safety, the passenger in street car service may, on signal, enter or leave the car at a street intersection, though sometimes stopping points for street cars are between street intersections by reason of physical or operating conditions. In suburban electric service, on the other hand, the stops are at arbitrary stations fixed by the operating company, or by franchise provisions, though a suburban car may in certain parts of its run stop at street intersections by reason of congestion of traffic, local police regulations, insufficient headway between it and the preceding car, or use of a track operated under a franchise requiring stops at street intersections.

"3. Street cars do not handle baggage, except hand baggage carried by passengers, mail, except for the accommodation or convenience of the government, freight or express, while there are no such restrictions on suburban electric cars.

"4. The usual method of operation of street car service consists in the running of single cars, sometimes with a trailer, whereas suburban electric service usually operates with greater power and with cars capable of operation as single cars or in multiple-unit trains, as the necessity for passenger accommodation requires.

"5. In street car service customarily a less commodious type of equipment with much less power than in suburban electric service is used, the street car service demands upon the equipment being usually different on account of the frequency of stops in street car service as compared with suburban electric service and the lack of the necessity for the same maximum rate of speed in street car service as in suburban electric service. This is not a controlling distinction, however, as the type of car used sometimes varies with the maximum of the speed required and the distance to be traveled in the suburban service.

"Although suburban equipment may occasionally be temporarily used in street car service such temporary use of suburban equipment would not change the character of service from street car service to suburban electric service. On the other hand, the fact that an electric suburban equipment is run over the streets of a city does not necessarily make the service rendered by it a street car service.

"6. The fact that transfers may be given to or from a street car to or from a suburban electric car or train, or steam train, operated by the same or a separate management, does not of itself change to suburban service the character of the service rendered by the street car.

"7. The fact that cars furnishing street car service run on the same rails, or that they alternate or are intermingled with suburban, interurban or steam service, or any or all of the three last-named classes of service, does not change the character of the former service from street car service to suburban electric or other service; provided, that in the Alameda and Oakland Pier electric service the service furnished by electric cars of any type, or by electric trains composed of cars of any type, that run into said piers or either of them, and by cars or trains that connect with said last-named cars or trains on schedule, but do not stop at all, or nearly all, street intersections at will of passenger, but only at regular scheduled stations for the particular train, is hereby determined to be suburban electric service as distinguished from street car service; and provided further, that pending the completion of the overhead structure at Sixteenth Street, Oakland, and the running of cars through from Fourteenth and Franklin Streets, Oakland, to said Oakland Pier, the service furnished by cars now operating exclusively between said Fourteenth and Franklin Streets and Sixteenth Street is hereby determined to be suburban electric service.

"The date from which this finding, decision and award shall be deemed to have become effective is Aug. 18, 1913, and the period during which said finding, decision and award shall continue in force shall be at least one year from said last-named date."

The determination of the question was to furnish the parties to the agreement with a definition which they themselves could use in clearing up the meaning of the provisions of Subdivision 2 of the agreement between them, which refers to the portions of the Pacific system of the Southern Pacific Company in Alameda County and in Oregon that have been electrified, and any portion of the Pacific system that may hereafter be electrified, and any new lines constructed for operation in connection therewith, and, under the provisions of the agreement, therefore, the determination of what constitutes street car service as distinguished from suburban electric service was confined to the territory in Alameda County and in Oregon.

Howard Elliott on the New Haven's Problems

Howard Elliott, chairman of the board of directors of the New York, New Haven & Hartford Railroad, in an address which he delivered before the members of the Chamber of Commerce of New Haven, Conn., on Nov. 19, 1913, dwelt upon the problems which confront the company and pointed out the possibilities which exist in the territory served, particularly in Connecticut, for properly planned agricultural development. Referring to the past and to the future, he said in part:

"Since the purchase of steamships, electric railways, Boston & Maine and other so-called outside interests there have been elected to the board of directors enough new men so that a majority of the board as now constituted were not members when these acquisitions, which are now so much criticised, were made. Mr. Hustis, the new president of the company, and I came here on Sept. 1.

"With no feeling of criticism of the past or of any men connected with the company then or now, the new directors and officers and the old ones are all working loyally to review the situation and to do what is right to those who own and to those who use the railroad, to conform to the law when it is clear that the law has been transgressed and to practise the most rigid economy consistent with safety and fair service to the public.

"New Haven and Connecticut can help in this difficult work by saying that time must be allowed to solve this problem. If it is necessary or wise to sell electric railways, steamer lines, railroads and other property, such sales cannot be made in a day or a week or a month or even a year, especially at this time of halting business. There will have to be much patient negotiation, and will it help Connecticut and New England to force these sales so that there is an unreasonable loss and crippling of the whole transportation machine? This problem needs the thoughtful consideration of the people generally as well as of the members of governmental bodies and of the directors and officers of the railroad, and reasonable time should be given."

In regard to the electric railways as an aid to the farmers, Mr. Elliott said:

"One of the most effective agencies by which prosperity can be brought to the farms is the electric railway. There are now in operation in this state 384 miles of electric railway express routes, averaging two cars a day and furnishing an express service to the farmer. To-day the farmer

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living along these lines can connect with the great highways of commerce from his own front door. But the Connecticut farmer is naturally conservative. He is too apt to think of the $2 that he can save by hauling his apples himself, though it means a whole day on the road and just so much productive labor lost to the farm. Potentially, the electric railways through the farming communities may mean even more than this to the farmer. It is entirely within the realm of possibilities to utilize the same current now moving his goods in furnishing him power for co-operatve refrigerating plants. This is only one of the many possibilities in the agricultural development of this State."

In conclusion Mr. Elliott said that the following three things were absolutely essential if the railroad situation in New England was to be what all desire:

"First—There must be confidence, loyalty and co-operation between officers and men all along the line and a good *esprit de corps*. This is now here in part and by careful organization and work the officers hope and believe they can increase this spirit.

"Second—There must be confidence, frankness and reason between the great shipping and traveling public and the railroad so that differences of opinion may be discussed in a calm, businesslike way with a willingness on the part of each to consider the viewpoint of the other.

"Third—There must be open-minded, fair and frank relations between all the different public bodies with which the railroad has to deal so constantly—commissions, city councils, legislators. The railroad is a servant of the people and so are these governmental agencies—and both must act with prudence and remember that unfair and dishonest treatment of people, communities or property will in the long run hurt the people as a whole. I believe thoroughly in the future of New England and in the ultimate success of her transportation system. The New Haven is a great property; it is in trouble now, but patience, hard work and fair treatment by all should enable it to give the service the people want and at the same time permit a good return to the owners."

Revised List of Grievances Submitted at Indianapolis

A revised list of grievances, formulated so as not to conflict with the provisions of the strike settlement agreement of Nov. 7, was submitted on Nov. 14 to the officials of the Indianapolis Traction & Terminal Company, Indianapolis, Ind., by a committee of employees. The new demands omitted all reference to the Amalgamated Association, but asked for recognition of an "employees' association," and included in the demands for higher wages many classes of employees not affected by the strike. The company has ten days in which to consider the demands, before submitting them to the Public Service Commission for its decision, and conferences are now being held between representatives of the company and its employees in an effort to adjust the minor grievances.

Chester P. Wilson, president of the Interstate Public Service Company, announced on Nov. 14 that all of the trainmen of the Indianapolis, Columbus & Southern Traction Company had signed an agreement with the company similar in form to the agreements recently entered into by the Terre Haute, Indianapolis & Eastern Traction Company and the Indianapolis & Cincinnati Traction Company with their employees for the settlement of differences which arise.

Several brutal attacks have been made recently on non-union employees of the Indianapolis Traction & Terminal Company operating night cars. Some of the men who were attacked had to be taken to hospitals. Substantial rewards have been offered by the company for information leading to the arrest and conviction of the persons who resort to violence to coerce the non-union men into joining the organization.

The Indianapolis Board of Trade passed a resolution on Nov. 18 commending the action of Superintendent of Police Hyland in suspending thirty-three policemen who rebelled and removed their badges rather than protect property of the Indianapolis Traction & Terminal Company during the recent strike. The resolution states that "a most disgraceful and violent riot occurred during the street car strike," and, after describing the conditions, condemns "the cowardly action of those who, in violation of their oaths of office, at a time when the peace and safety of the city and citizens were in peril, refused to perform their duty." The Indianapolis Chamber of Commerce on the same date passed a similar resolution and protested strongly against any police officer being retained in the service who refused to do his duty during the strike.

The form of agreement between the Terre Haute, Indianapolis & Eastern Traction Company and its interurban trainmen was signed on Nov. 13 by Samuel M. Ralston, Governor of the State of Indiana; Robert I. Todd, president of the Terre Haute, Indianapolis & Eastern Traction Company, and each of the 185 interurban trainmen of the company. The agreement is somewhat different in form from the other interurban agreements in that it includes the Governor as a party to the agreement and in the fourth clause states particularly that the agreement is to avoid "strikes, lockouts, interruption of operation of cars," etc.

The officers of the Indianapolis & Cincinnati Traction Company failed on Nov. 19 to reach an agreement with the employees in regard to the questions over which they were at odds and the differences which remain to be settled will be submitted to the Indiana Railroad Commission for aribtration.

Storm Damage in Cleveland and Vicinity

Street railway service in Cleveland, which was interrupted by the heavy snowstorm of Nov. 10, was almost normal again on Nov. 15. It is estimated that the Cleveland Railway lost about $40,000 in revenue as the result of the storm, but there was no heavy property damage. Power cables and trolley wires were broken in only a few places. In most instances these breaks were caused by other poles and wires falling against or across lines of the railway. The concrete poles stood the strain remarkably well. Out of a large number in use only a few were damaged. They were not down, but the concrete was cracked and had fallen off where the poles were badly bent. The Cleveland Railway could have operated uninterruptedly on a fair schedule, if the tracks had not been obstructed. When the company was forced to suspend operations on account of fallen wires the snow piled up on the tracks.

Most of the interurban railways succeeded in getting cars into operation by the afternoon of Nov. 12, but of course difficulties were met after that time. Lines to the west of the city had less trouble than any of the others. Between Cleveland and Ashtabula the condition of the country due to the storm was very bad. The Northern Ohio Traction & Light Company's lines in Akron were at a standstill for some time and there was some trouble in Canton. The line between Cleveland and Akron was opened on the afternoon of Nov. 12.

Boston Elevated Concludes Presentation of Evidence

The presentation of evidence by the Boston Elevated Railway in the pending arbitration proceedings in connection with wages and service conditions was concluded on Nov. 15. William A. Bancroft, president of the company, was cross-examined by counsel for the employees' organization at the final session. He made the point that large bodies of men must be paid on the basis of average compensation, whereas the individual official of exceptional ability naturally receives a more particularized compensation. Regarding the cost of living and its purported increase in recent years, the witness emphasized the differences between the mere cost of living and standards of living, showing that the phrase "living wage" is subject to many interpretations. Since 1911 no salaries have been paid to members of the executive committee or to members of the finance committee.

The employees have always shared in the management of the company. They are consulted with respect to all matters except the investment of money. Some of the most valuable advice which the witness has ever had came from men in the car service. The proportion of gross receipts paid out in salaries at Boston is about the same as that paid out in New York, Brooklyn, Chicago and other large cities.

Russell A. Sears, general attorney, testified at length

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regarding the cost of accidents on the Boston system. The cost of accidents is about 0.8 cent per car mile on the surface lines, 0.27 cent per car mile on the elevated lines and 0.15 cent per car mile in the Cambridge subway. Under the Massachusetts workingmen's compensation act, which went into effect July 1, 1912, insurance has cost the company $82,900 a year. The witness said that last year 1847 accidents to employees were reported, or about 18 per cent. Mr. Sears said that the company goes beyond the act in paying the employee half his wages during the second week of disability, upon application, and in some special cases pays also half the first week's wages. Accident prevention is constantly studied by a safety committee of 210 employees, with local subdivisions. This general committee began work July 1 last, and accidents have been reduced 25 per cent thus far as compared with last year. The company pays for the time of men working on such duties. During the six years preceding the establishment of the compensation act the company averaged only six suits a year from employees. The total cost to the company in the last fiscal year of accidents and damages to persons and property was $1,182.000. On quick settlements the company paid about $328.000, on suits settled before or during trial $400,000, and on judgments about $303,000. The cost of litigation is about 25 per cent of this total.

B. J. Arnold Reports on Chicago Railway Terminals

The report of B. J. Arnold on Chicago railway terminals recommends a system of through-routed electrical suburban rapid transit on tracks depressed through the business district and zone from which all steam traffic is excluded. The plans do not interfere with the main outlines of the proposed new union station on the West Side, which is to be used by the Pennsylvania, Chicago & Alton, St. Paul and Burlington railroads.

Mr. Arnold's report requires extensive alterations in the Pennsylvania freight terminal plan on account of excessive congestion, and recommends ultimate elimination of La Salle Street station as well as Dearborn Street station and re-routing of roads using them to either the new union station or the projected station of the Illinois Central line. It also requires interchange of suburban trains between the Chicago & Northwestern Railway and the St. Paul Railroad, providing transportation to the north shore and to western suburbs and to roads tapping the territory west and south.

The recommendations of John F. Wallace to the terminal committee of the City Council of Chicago were summarized in the ELECTRIC RAILWAY JOURNAL of Nov. 1, 1913, page 992. Action on the recommendations of Mr. Wallace was postponed by the committee pending the presentation of the report by Mr. Arnold, who was retained by the citizens' terminal plan commission.

Suit Brought for Damages During Buffalo Strike

The International Railway, Buffalo, N. Y., has brought suit against Erie County to recover damages for the wrecking of cars and other depredations by crowds of men during the street car strike. County Attorney Sullivan has outlined the defense he contemplates for the county against the action of the railway. He is quoted in part as follows:

"The International Railway has sued the county for property damage which it alleges was incurred during the strike. The county sets up as a defense that the company was attempting to operate its cars with men not qualified under the railroad law. We expect to prove that the company attempted to operate cars with such characters as 'Ed' Hutchinson, 'Thirty' Murray, 'Stiff-neck' Davis and about 1500 others of similar character brought here and put in charge of its cars on which it expected the citizens of this city to ride."

Mr. Sullivan is said to have expressed the opinion that the county will have no difficulty in proving that the men named, with others of their kind, were from New York and were unfit to operate the cars under the provisions of the railroad law.

In May, 1913, the company through its president, E. G. Connette, filed a claim for $108,400 against the city of Buffalo for damage to the company's property during the strike.

Inspection of the United Railroads, San Francisco

James H. Reed, Pittsburgh, president of the Philadelphia Company; Moritz Rosenthal, of Ladenburg, Thalmann & Company, New York, and Mason B. Starring, president of the United Railways Investment Company, were members of a party which arrived in San Francisco on Nov. 12 to inspect the property of the United Railroads, San Francisco, and to confer with Jesse W. Lilienthal, president of the company. Mr. Starring issued the following statement:

"Our visit to San Francisco on this occasion is the repetition of the inspection trips which a committee from the board of directors of the Investment company has made yearly, commencing with my election to its presidency in 1911.

"It is our desire to see as much as practicable not only of the United Railroads property but also of the various electric power, gas and water properties in which we are interested. Since the committee's last visit the management of the United Railroads has been turned over to a board of directors headed by Jesse W. Lilienthal and composed of residents of San Francisco. We have not met these gentlemen since their election. To learn their views and to ascertain in what way we should co-operate with them, not alone for the profit of the company but also for the best interests of San Francisco, are the principal objects of this trip."

Delos F. Wilcox Talks on Cleveland Situation

In an interview with a local Cleveland paper recently Delos F. Wilcox, for some years chief of the bureau of franchises of the Public Service Commission of the First District of New York, stated that the Tayler grant in that city is being put to the political test. The franchise is faulty in two ways, according to Mr. Wilcox. In the first place the company has no stimulus toward economy in expenditures, because the stockholders are permitted to receive not more than 6 per cent return and are not allowed to benefit through restricted expenditures. The company should be allowed to pay its stockholders whatever it could make for them on a service dictated by the city, he said. In the second place, if the administration is really in favor of municipal ownership, a sinking fund should have been established in order that funds for the purchase might be available when wanted. He said that 4 per cent of the gross receipts set aside yearly would just about purchase the property at the expiration of forty years. Setting aside this amount might tend to reduce the interest fund or might make necessary an advance in the fare, but this is better than endeavoring to raise the entire amount when the city wishes to purchase the property. He said that as long as no steps were taken toward the establishment of a sinking fund the street railway question would be in politics.

Wheel-Guard and Fender Order Reaffirmed

After a rehearing the Public Service Commission of the First District of New York has served an order on the Brooklyn Heights Railroad and other surface railways of the Brooklyn Rapid Transit system reaffirming previous orders, with certain modifications, requiring the companies to equip their cars with wheel guards and fenders. This action was taken upon an opinion rendered by Commissioner Milo R. Maltbie, who held the hearings in the case. The order as modified requires that on or before May 1, 1914, the companies shall equip certain cars hereinbefore required to be equipped with wheel guards in the borough of Queens or in the borough of Brooklyn with projecting fenders at the forward end of each car, such fenders to be of a type or types to be approved by the commission and to be carried in an operating position and so that the front part of the apron shall be not less than 10 in. nor more than 12 in. above the rails and no fixed or rigid part of such fenders shall be less than 10 in. above the rails. On or before Dec. 1, 1913, the companies are required by the order to submit to the commission for its approval complete drawings and specifications showing, among other things, all measurements and the method of attachment to the car of the type or types of fenders and wheel guards intended or desired to be used in compliance with the order, except

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such types of wheel guards as have already been approved by the commission by resolution adopted April 22, 1910.

In a statement which he issued on Nov. 19 in regard to the attitude of the company toward the order of the commission, T. S. Williams, president of the company, said: "This company, in its desire that every safeguard shall be placed around the lives of those who use its lines and those who go about in the public streets, can take no position other than the one it has always occupied, namely, that the projecting fender is a menace in and of itself, and where wheel guards are installed produces more accidents than it prevents."

Ticket Ordinance Passed in Portland, Ore.

The City Commission of Portland, Ore., has passed the ordinance requiring the Portland Railway, Light & Power Company, Portland, Ore., to sell tickets good over its lines at the rate of six for 25 cents. The measure is to go into effect within thirty days from Nov. 7. The company is required to issue books containing fifty tickets to be sold at the rate of six for 25 cents. Books are now issued by the company granting fifty rides for $2.25.

Commenting on the passage of the ordinance, Franklin T. Griffith, president of the company, said in part:

"For fourteen months W. J. Hagenah has been working on the appraisement of our properties. His only instructions were 'Get it right.' The summary of his report shows: Present value of physical property and working capital, $12,284,487; reproduction cost of new physical property and working capital, $14,126,096, and the present value of physical properties, working capital and intangible value or going cost of the business, $18,404,383.

"Based on the present value of the physical property and the working capital our return on the investment is 4.06 per cent; based on the reproduction cost it is 3.53 per cent, and based on the present value of physical property, working capital and intangible value or going cost of the business, it is 2.74 per cent.

"These figures, which we called to the Council's attention, make it readily apparent that this company is not making a mint of money. In fact, we are getting only a nominal return on our investment. During the year ended June 30, 1913, it was only 4.06 per cent.

"The commissioners do not doubt our figures, in my opinion, but the majority of them are convinced that a reduction in fares will result in an increase in traffic sufficient to make good our losses.

"It is true that some Eastern cities in the same class as Portland in point of population do have lower fares. However, comparison of fares is most unjust for the reason that all other conditions are not compared likewise. Such basic facts as relative mileage covered, cost of construction, wages, numbers of cars operated and the density of population must in justice be considered.

"There are many other reasons why I do not see where the action of the Council in ordering a reduction of fares is justified by the facts. While I am sure that its members voted as their convictions demanded, still I believe they should have postponed action until they had had an opportunity to make a fair inquiry and fully ascertain the facts, something they have not had the time to do."

Rectitude in Railway Affairs

In an editorial on this subject, in its issue of Nov. 14, the *Railway Age Gazette* says:

"The season for the beginning of Christmas shopping is now open. It is, therefore, once more an opportune time to remind our readers in the railway and railway supply businesses that nowadays they live, work and have their being in the spotlight of publicity. This being true, it behooves them to avoid both evil and the appearance of evil. Sometimes there is real evil in the giving of Christmas presents when the donor is a man who is seeking to get contracts and the recipient is the man from whom he is trying to get them. Sometimes there is no evil in it. Seldom, however, do presents of substantial value pass between a representative of a supply concern and an officer, whether high or low, of a railway without the incident presenting at least the appearance of evil. Such gift-giving and gift-receiving, if not open to just censure, is clearly open to a construction which is adapted to do both the railways and the supply concerns harm. Last year and the year before at about this time the *Railway Age Gazette* warned against the dangers incidental to the extensive practice of present-giving which has grown up in the railway and railway supply businesses. It is believed that our comments on the subject and those which others have made have done some good. They have not, however, had the effect of abolishing the practice. What is still worse, all the discussions of and the scandals connected with various forms of grafting have not been sufficient to eliminate it from the railway business. There are numerous forms of stupidity. The most bone-headed form of it, however, is the stupidity of dishonesty. No man is so hard to convince that he should desist from doing things that he is doing as the man who is making a dishonest profit from doing those things. His stupidity almost always leads him to believe that he, at least, is shrewd enough to prevent his conduct from being detected and exposed. The experience of others who have been detected, exposed and disgraced for doing just as he is doing usually is lost upon him. It would seem, however, that the many, many developments which have occurred in the railway business within the last decade—and especially within the last half decade—should have taught every man who is connected with that business, or who has business relations with it, that the time has come when it behooves him to put his house in order so that when the muckrakers for the magazines, or the inspectors of the Interstate Commerce Commission, or the lawyers for the Interstate Commerce Commission, swoop down on him they will not find anything which he would not like to have them find."

Issue Between Public Service Commission and Company at Nevada, Mo.

Differences which have arisen between the Public Service Commission of Missouri and the Nevada Water, Light & Traction Company, Nevada, Mo., will be taken to the courts. The commission holds that it has power to remove the manager of the company. W. H. Hallett, attorney for the company, contends that the holding of the commission is in direct conflict with the decision of the Supreme Court of Missouri, to which the case will go on appeal by the company. The commission approved a rule requiring cash deposits to secure payment for meter service and also held that the consumer should be given the privilege of furnishing personal security in lieu of a cash deposit. The commission also held that it has power to change the rates fixed by franchise. The commission holds that it has power to order a defendant corporation to remove a manager when in its judgment such removal is for the benefit of the public, and to direct the company to secure the services of competent persons.

Proposals Invited for Line in Azores.—The American consulate at St. Michaels, Azores, has forwarded to the Bureau of Foreign and Domestic Commerce, Washington, D. C., copies of a prospectus for building and operating an electric railway on that island, for which proposals are invited by the Junta Geral (local parliament).

Decision in Regard to Franchise Taxes in New York.—The Appellate Division of the Supreme Court of New York, Third Department, has rendered a decision sustaining the contention of Attorney-General Carmody that the receiver of a dissolved corporation must pay franchise taxes accruing before dissolution and that such taxes are preferred in payment over all other claims.

Electrification of Ocean Shore Railroad Planned.—The directors of the Ocean Shore Railroad have decided to call a meeting of the stockholders of the company in January to vote on the question of increasing the authorized capital stock of the company by $5,000,000, the plan being to issue $200,000 of the new stock at once to provide funds to electrify the line and complete improvements now under way.

Toronto Purchase Agreement to Be Prepared.—On Nov. 11 the City Council of Toronto, Ont., decided to have an agreement prepared covering the plan to take over the property of the Toronto Railway. If this agreement cannot

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be completed in time for approval by the Hydro-Electric Power Commission of Ontario and for submission to the people as a by-law on Jan. 1 a synopsis covering the situation will be submitted on that day in the form of a plebiscite.

Safety Measures in New York Electric Zone.—The Public Service Commission of the Second District of New York has ordered the New York, New Haven & Hartford Railroad to allow no one, except those engaged in the maintenance of overhead construction, to get upon or ride on the top of any car within the electric zone. The commission has also instructed the company to install illuminated warning signs for the safety of employees and others. The order becomes effective on Dec. 15.

Question Regarding Type of Rail in New Albany.—The city of New Albany, Ind., has brought suit against the New Albany Street Railway and the Louisville & Southern Indiana Traction Company in which it alleges that the use of the T-rails constitutes a menace to travel and asks that the company be directed to lay girder rails on all improved streets. The case was heard in the Floyd Circuit Court before a special judge recently, and the demurrer of the electric railways was overruled. It will now go to trial on its merits.

Hearing on Omnibus Application in New York.—The Board of Estimate of New York gave a hearing on Nov. 13, 1913, on the petition of the People's Five-Cent Bus Corporation for a franchise to operate buses run by electricity over twenty-one routes within the central and western parts of Manhattan Borough. After the hearing the matter was referred to the franchise committee, which may grant another hearing. Opposition to the granting of the franchise came from the Fifth Avenue Coach Company, the New York Railways and the Park Avenue Association.

Reduction in Tax Value Asked by Ohio Electric Railway.—W. Kesley Schoepf, president of the Ohio Electric Railway, Cincinnati, Ohio, filed a brief with the State Tax Commission recently in which he asked that the tax value placed on the property be reduced from $15,000,000 to $11,000,000. In support of this request, he said that the loss of the company from the flood last March was more than $400,000 and the consequent loss of business about $300,000 more. He said that many of the lines built by the company are not yet earning a sufficient amount to make them profitable.

Technical Talks to Trainmen Resumed.—H. H. Buckman, master mechanic of the Louisville & Northern Railway & Lighting Company and of the Louisville & Southern Indiana Traction Company, with offices at New Albany, Ind., is preparing to resume his talks before the Boosters' Club of the traction companies on the subject of the wiring of electric cars and the methods to be used in making emergency repairs. The trainmen attend the meetings, and with the aid of blueprints and other diagrams the exact mode of constructing the wiring of a car is explained.

Separate Operation of Port Arthur & Fort William Electric Railway.—That Fort William and Port Arthur, Ont., will operate their respective parts of the hitherto mutual Port Arthur & Fort William (Municipal) Electric Railway as separate units was decided on Nov. 2, when the Fort William Council voted to manage its own end of the line, leaving Port Arthur to direct the section of the railway in its own limits. Port Arthur delivers the power for the operation of the whole line. The charter for the road was secured twenty years ago by Port Arthur and terminates on Dec. 1. One fare for the two cities is compulsory by legislation.

Expert Passenger-Rate Clerk.—The United States Civil Service Commission announces an open competitive examination for expert passenger-rate clerk, for men only, on Dec. 10, 1913. From the register of eligibles resulting from this examination certification will be made to fill a vacancy in this position in the Quartermaster Corps at St. Louis, Mo., at a salary of $1,200 per annum, and vacancies as they may occur in positions requiring similar qualifications in any branch of the service. Persons who desire to take the examination should apply at once to the United States Civil Service Commission, Washington, D. C., or to the secretary of the United States Civil Service Board, for application Form 1312.

Report on Employers' Liability and Workmen's Compensation Laws.—Senator Sutherland, of Utah, chairman of the commission authorized by Congress to investigate and report on employers' liability and workmen's compensation laws, outlined on Nov. 8 the salient differences between an employers' liability bill and the proposed workmen's compensation act, pointed out the exact effect of the proposed legislation and met, seriatim, various objections which have been made to the measure by those who now oppose it. The last Congress passed the measure by a vote of three to one in both branches, but the Senate was unable to get an agreement on the few House amendments in the closing hours of the session, the legislation thereby failing.

Report of Committee on Height of Buildings in New York.—It is expected that the committee appointed by George McAneny, president of Manhattan Borough and president-elect of the new Board of Aldermen of New York City, which has made an exhaustive study of the question of the height of buildings, will recommend a general limitation of building heights. The committee will complete its labors in a few days and will very likely have its report ready for presentation when Mr. McAneny returns from his vacation, when definite action will be taken. The report will be submitted in two sections. The recommendation of the committee needs only the sanction of the Board of Estimate and the Board of Aldermen to make it operative.

Mr. Mitten to Confer with Transit Director Taylor.—Thomas E. Mitten, chairman of the executive committee of the Philadelphia (Pa.) Rapid Transit Company, announced on Nov. 17, after a meeting of the board of directors, that nothing could be said as to what the company's position would be on the city's plan for a Broad Street subway until after he had conferred with Transit Director Taylor. Mr. Mitten said: "I am awaiting Director Taylor's return, and I will have nothing to say as to whether this company favors or disapproves of the director's plan to have the company lease the subway and equip it until after that meeting. He will arrange the meeting upon his return at our mutual convenience. No doubt Director Taylor will make such a statement after our conference."

Report on Plan to Take Over Toronto Radial Lines.—Corporation Counsel Geary, of Toronto, Ont., has reported to the Board of Control in reference to taking over the radial lines in the city limits and operating them in conjunction with civic car lines and the new lines to be projected. Mr. Geary said: "We are taking over the parts of the Toronto & York Radial Railway, Mimico division and Scarboro division, lying within the city limits. I hope to be able at a later date to submit an arrangement for the use of the tracks on Yonge Street within the city limits in common with the Toronto & York Radial Railway, Metropolitan division. The radial lines belonging to the Toronto Suburban Railway are part of the system which has a franchise from the old city of West Toronto."

Public Hearings on Kansas City Franchise.—The joint committee of the Kansas City Council appointed to consider the proposed franchise of the Metropolitan Street Railway has held daily meetings for some time past to hear the suggestions of all interested in the measure. Matters which have already been considered include the demands of organized labor, those of the Kansas City Terminal Railway that the Metropolitan Street Railway be made to bear half the cost of erecting viaducts which the electric line will use, and the suggestions of residents interested in the routing of cars to and from the new union station, which will be put into commission early in the new year. W. D. Miles, who has taken a prominent part in the franchise negotiations, proposed that a provision be inserted in the grant to allow a competing company to use six consecutive blocks on any street in Kansas City.

Proposals for Improvements in Montreal.—The Montreal (Que.) Tramways has submitted proposals for the improvement of the tramways service to the Board of Control of the city. Briefly, the proposals include a new artery for traffic between Place Viger or some nearby point and Windsor Street; a boulevard between Craig Street and Mount Royal or Van Horne Avenue, or preferably the Back River; a subway from some point on Craig Street between Bleury and St. Denis Streets running north to Mount Royal

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or Van Horne Avenue; a subway under St. Catherine Street followed by a tube under Notre Dame or St. James Street or from Hochelaga west as far as Victoria Square, with a fork to Westmount and Notre Dame de Grace, and a bus line on Sherbrooke Street. It is asked that the city take steps immediately to widen Vitre Street from near St. Denis Street to Bleury Street or Victoria Square. The subways would be operated individually by the company at a straight 5-cent fare. The franchise would be for forty years, the company paying to the city 4 per cent of its gross earnings from the surface lines.

Examination for Junior Accountant and Examiner and Assistant Examiner.—The New York State Civil Service Commission announces that an open competitive examination will be held in various cities throughout the State on Nov. 29, 1913, for the positions of junior accountant with the Public Service Commission of the Second District of New York, examiner with the commission and assistant examiner. The position of junior accountant pays from $1,080 to $1,500 a year and is open to men only, between twenty and thirty years of age, who have been trained in the theory and principles of economics, including accounting, finance and statistics. The positions of examiner and of assistant examiner pay from $1,800 to $2,400 and from $1,500 to $1,800, respectively, with expenses when engaged in field work, and it is desired to secure for these positions eligibles between the ages of twenty-five and thirty-five years with practical experience in corporation accounting in one or more of the following fields: steam railroads, street and electric railways, electric corporations, gas corporations, telephone and telegraph corporations. Those who desire to take the examination should address the State Civil Service, Albany, N. Y., for the necessary application blank.

Power Plant Accident in Utah.—The Utah Light & Railway Company, Salt Lake City, Utah, is installing two 2500-kva hydroelectric units at its Pioneer plant in Ogden Canyon. The hydraulic turbines, which operate under a 450-ft. head, have 24-in. gate valves back of them, controlled from the switchboard. On Oct. 26 an irresponsible person opened one of these valves from the switchboard. At the time the workmen had the quarter turn of the turbine off and the scroll case open, so that when the gate valve opened the water flooded the power house floor to a depth of 2 ft. Four 1000-kva generators were put out of commission, as was the transformer equipment handling the Ogden lighting circuit. As the gate valve which had been opened accidentally was closed its disks broke and water shot out again, requiring the large valves on the 6-ft. receiver to be shut down. It was nearly midnight when the water was shut off, but the Ogden City service was shut down only an hour or so before temporary connections were made from the high-tension transformers so that Ogden City could be supplied from the Salt Lake plant. The damage to the Ogden power plant amounts to not more than $5,000.

Officers' Club Entertains.—The members of the Officers' Club of the Lehigh Valley Transit Company, Allentown, Pa., escorted the officers of the Easton Transit Company, a subsidiary concern, on a pleasure and inspection trip over the Philadelphia division recently and dined at the Hotel Allen. Charles N. Wagner, secretary-treasurer of the Lehigh Valley Transit Company, called upon President H. A. Fehr to tell his former associates how welcome they must feel themselves when guests of the Officers' Club. H. H. Paterson, superintendent of the Easton company, responded. The guests were F. H. Hazzard, secretary and treasurer; H. H. Paterson, superintendent; F. E. Crick, superintendent of overhead lines; R. C. Green, master mechanic; C. E. Jenkins, engineer of maintenance of way; Charles B. Brunner, claim agent of the Easton Transit Company. The hosts were H. A. Fehr, president; C. N. Wagner, secretary and treasurer; C. M. Walter, auditor; C. C. Collins, traffic manager; George E. Miller, superintendent; H. W. Bromley, superintendent of the power station; W. W. Wysor, engineer of maintenance of way; H. L. Coker, superintendent of lines; A. H. S. Cantlin, manager electric light companies; R. J. Pike, purchasing agent; William Trythall, claim agent; Thomas Gibson, real estate agent; Harry Branson, master mechanic; C. L. Murray, freight agent; Col. E. C. Spring, business manager Philadelphia division; F. A. Burgess, superintendent Philadelphia division.

PROGRAMS OF ASSOCIATION MEETINGS

Midyear Meeting American Electric Railway Association

The midyear meeting of the American Electric Railway Association will be held in New York on Friday, Jan. 30. The committees will meet on Jan. 28 and 29. It is probable that the banquet will be held on the evening of Thursday, Jan. 29. At the meeting of the association on Jan. 30 the report of the committee on joint use of poles will be considered. This report, which was presented at Atlantic City, was referred back to the committee with instructions to secure expressions from member companies and to report at the midyear meeting. There will also be two or three addresses on topics connected with electric railway work.

The banquet this year will not be a complimentary dinner extended by the Manufacturers' Association. It will be in charge of a joint committee of the American and the Manufacturers' associations, which will select the speakers and have the other details of the dinner in charge. Tickets will be sold at a price to be fixed by the committee to cover the cost.

New York Electric Railway Association

A meeting of the executive committee of the New York Electric Railway Association was held at the Engineers' Club, New York, on the afternoon of Nov. 14. Those present were Frank Hedley, New York, president of the association; James F. Hamilton, first vice-president, Albany; Stuart Wilder, second vice-president, Mount Vernon; James P. Barnes, Syracuse; John J. Dempsey, Brooklyn; S. Walter Mower, Cooperstown, and Charles C. Dietz, Albany, secretary and treasurer. Charles V. Smith, secretary to Mr. Hedley, was also present. It was decided to hold the eighteenth quarterly meeting of the association in New York City on Tuesday, Dec. 9, at the Engineering Societies Building, 29 West Thirty-ninth Street.

The committee on arrangements, of which Mr. Hamilton is chairman, met after the session of the executive committee. It decided that the papers and discussions at the December meeting should be devoted to the subject of public relations. The details of the program will be published later. The members of the committee on arrangements, in addition to Mr. Hamilton, are the following: W. H. Collins, Gloversville; James P. Barnes, Syracuse; J. S. Doyle, New York; Charles R. Ellicott, New York, and H. N. Ransom.

National Civic Federation

The fourteenth annual meeting of the National Civic Federation will be held at the Hotel Astor, New York, on Dec. 11 and 12. These departments of the federation are to report at the meeting: the department on compensation for industrial accidents and their prevention, the food and drug department, the welfare department, the woman's department, the department on industrial mediation laws, the department on regulation of municipal utilities, the department on regulation of industrial corporations, the department on industrial economics. The department on compensation for industrial accidents and their prevention has a commission of six men who are making a study of the actual results of the working of the various forms of compensation acts. The commission has confined its work to the states where the compensation law has been in effect for at least a year, which include Massachusetts, New Jersey, Michigan, Ohio, Illinois, Wisconsin, California, Oregon and Washington. In the light of the information secured by this commission the model workmen's compensation bill of the National Civic Federation will be redrafted. The department on industrial mediation laws will report on a model state mediation bill. The department on regulation of municipal utilities will report on its proposed model bill for the regulation by the state of street railways, gas, electric light and other municipal utilities.

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Financial and Corporate

Stock and Money Markets

Nov. 19, 1913.

The volume of transactions on the New York Stock Exchange to-day was not as large as on either of the previous days of the week, but there was no evidence of weakness, the price changes being mostly in the shape of moderate declines. New Haven prices receded early in the day, but were exceptionally strong at the close. Rates in the money market to-day were: Call, 2½@3 per cent; sixty days to six months, 4¾@5 per cent.

At the opening of trading in Philadelphia to-day attention centered in the traction issues. Union Traction recovered during the day to 43½. Philadelphia Rapid Transit, under pressure, closed at a net decline of 1⅛ for the day.

In the Chicago market small declines in stocks were established. Bonds were firm.

During the early hours of trading in Boston to-day dealings were small and the tone was heavy. Trading was dull at the close.

The volume of transactions on the Baltimore Exchange to-day was small, but the tone was firm. The demand for bonds continued good.

Quotations of traction and manufacturing securities as compared with last week follow:

	Nov. 12	Nov. 19
American Brake Shoe & Foundry (common)	88½	87
American Brake Shoe & Foundry (preferred)	128	127
American Cities Company (common)	36	36
American Cities Company (preferred)	63	63½
American Light & Traction Company (common)	332	339
American Light & Traction Company (preferred)	105	106
American Railways Company	38⅞	38¼
Aurora, Elgin & Chicago Railroad (common)	a42	41
Aurora, Elgin & Chicago Railroad (preferred)	83	84
Boston Elevated Railway	82	85
Boston Suburban Electric Companies (common)	7	7
Boston Suburban Electric Companies (preferred)	60	60
Boston & Worcester Electric Companies (common)	6½	*6¼
Boston & Worcester Electric Companies (preferred)	38	38
Brooklyn Rapid Transit Company	86½	86¾
Capital Traction Company, Washington	112	112
Chicago City Railway	160	160
Chicago Elevated Railways (common)	25	25
Chicago Elevated Railways (preferred)	75	75
Chicago Railways, ptcptg., ctf. 1	a92	90
Chicago Railways, ptcptg., ctf. 2	26	27
Chicago Railways, ptcptg., ctf. 3	6	7
Chicago Railways, ptcptg., ctf. 4	2½	2
Cincinnati Street Railway	105	105
Cleveland Railway	103½	103¾
Cleveland, Southwestern & Columbus Ry. (common)	*5½	*5½
Cleveland, Southwestern & Columbus Ry. (preferred)	*30	*30
Columbus Railway & Light Company	18	18
Columbus Railway (common)	59½	59½
Columbus Railway (preferred)	88	88
Denver & Northwestern Railway	111	111
Detroit & United Railway	a80	a80
General Electric Company	140½	140¼
Georgia Railway & Electric Company (common)	119	119
Georgia Railway & Electric Company (preferred)	85	85
Interborough Metropolitan Company (common)	14⅛	14
Interborough Metropolitan Company (preferred)	58	58⅝
International Traction Company (common)	*40	*40
International Traction Company (preferred)	*95	*95
Kansas City Railway & Light Company (common)	*22	*22
Kansas City Railway & Light Company (preferred)	*30	*30
Lake Shore Electric Railway (common)	*7	*7
Lake Shore Electric Railway (1st preferred)	*92	*92
Lake Shore Electric Railway (2d preferred)	*25	*25
Manhattan Railway	129⅞	130
Massachusetts Electric Companies (common)	11	11
Massachusetts Electric Companies (preferred)	66	65
Milwaukee Electric Railway & Light Co. (preferred)	100	100
Norfolk Railway & Light Company	*25¼	*25¼
North American Company	70	70
Northern Ohio Light & Traction Company (common)	66¼	66¼
Northern Ohio Light & Traction Company (preferred)	97	97
Philadelphia Company, Pittsburgh (common)	39¾	39½
Philadelphia Company, Pittsburgh (preferred)	39	39
Philadelphia Rapid Transit Company	19⅞	19⅛
Portland Railway, Light & Power Company	*56	56
Public Service Corporation	107	106
Third Avenue Railway, New York	39⅞	39⅝
Toledo Traction, Light & Power Company (common)	30	a30
Toledo Traction, Light & Power Company (preferred)	80	a80
Twin City Rapid Transit Co., Minneapolis (common)	104	104¼
Union Traction Company of Indiana (common)	*13	*13
Union Traction Company of Indiana (1st preferred)	*83	*83
Union Traction Company of Indiana (2d preferred)	*25	*25
United Rys. & Electric Company (Baltimore)	25½	25½
United Rys. Inv. Company (common)	18	18
United Rys. Inv. Company (preferred)	35	34
Virginia Railway & Power Company (common)	a56	56
Virginia Railway & Power Company (preferred)	93¼	96
Washington Ry. & Electric Company (common)	92	88
Washington Ry. & Electric Company (preferred)	89	87
West End Street Railway, Boston (common)	70	68
West End Street Railway, Boston (preferred)	89	90
Westinghouse Elec. & Mfg. Company	65¾	64
Westinghouse Elec. & Mfg. Company (1st preferred)	110	112½

*Last sale. a Asked.

ANNUAL REPORT

Chicago Elevated Railways

According to a financial report of the Chicago Elevated Railways for the twelve months ended June 30, 1913, the gross earnings of the combined companies, the Northwestern Elevated Railroad, the South Side Elevated Railroad and the Metropolitan Elevated Railway, increased during the period $45,158, but the net earnings decreased $31,597 and the surplus as of June 30, 1913, was less by $177,555 than the surplus a year before. There was a falling off in other income of over $40,000, and interest and taxes increased about $181,000, so that the net income from all sources was $921,019, against $1,124,242 the previous year, making a decrease of over $208,000. The Chicago & Oak Park Elevated Railroad is in the hands of a receiver, and its figures are not properly a part of the showing of the above three lines, although all four are operated under one management according to the collateral trust agreement. The combined statement of income, profit and loss of the South Side Elevated Railroad, Metropolitan Elevated Railway and Northwestern Elevated Railroad for the fiscal year ended June 30, 1913, is as follows:

	1913	1912
Gross earnings	$8,005,450	$7,960,292
Operating expenses:		
Maintenance of way and structure	$197,887	$196,251
Maintenance of equipment	354,630	328,687
Conducting transportation	2,958,025	2,883,534
General expenses	383,156	408,472
Total operating expenses	$3,893,698	$3,816,944
Net earnings	$4,111,752	$4,143,348
Other income	631,577	672,124
Total income	$4,743,329	$4,815,472
Charges	3,822,309	3,691,230
Balance	$921,020	$1,124,242
Surplus year ended June 30, 1912	233,250	
Balance, June 30, 1913	$1,154,270	
Dividends	1,098,575	890,992
Surplus, June 30, 1913	$55,695	$233,250

The report also contains individual statements for the South Side Elevated Railroad, Metropolitan Elevated Railway and the Northwestern Elevated Railroad.

The statement of income, profit and loss of the Northwestern Elevated Railroad for the year ended June 30, 1913, follows:

	1913	1912
Gross earnings	$2,580,334	$2,539,705
Operating expenses:		
Maintenance of way and structure	$72,223	$64,234
Maintenance of equipment	113,678	110,072
Conducting transportation	1,037,854	1,015,270
General expenses	120,963	124,818
Total operating expenses	$1,344,718	$1,314,394
Net earnings	$1,235,616	$1,225,311
Other income	606,248	637,510
Total income	$1,841,864	$1,862,821
Charges	1,840,991	1,745,066
Balance	$873	$117,755
Surplus year ended June 30, 1912	18,867	
Balance, June 30, 1913	$19,740	
Dividends	.....	98,888
Surplus, June 30, 1913	$19,740	$18,867

A similar statement for the South Side Elevated Railroad for the fiscal twelve months ended June 30, 1913, shows the following financial results:

	1913	1912
Gross earnings	$2,470,664	$2,443,588
Operating expenses:		
Maintenance of way and structure	$53,231	$57,783
Maintenance of equipment	124,175	112,731
Conducting transportation	828,210	805,893
General expenses	116,552	129,162
Total operating expenses	$1,122,168	$1,105,569
Net earnings	$1,348,496	$1,338,019
Other income	11,049	20,431
Total income	$1,359,545	$1,358,450
Charges	858,160	840,340
Balance	$501,385	$518,110
Surplus year ended June 30, 1912	96,090	
Balance June 30, 1913	$597,475	
Dividends	575,483	422,020
Surplus, June 30, 1913	$21,992	$96,090

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The earnings of the Metropolitan Elevated Railway for the fiscal year were as follows:

	1913	1912
Gross earnings	$2,954,451	$2,976,998
Operating expenses:		
Maintenance of way and structure	$72,433	$74,234
Maintenance of equipment	116,777	105,884
Conducting transportation	1,091,961	1,062,371
General expenses	145,641	154,492
Total operating expenses	$1,426,812	$1,396,981
Net earnings	$1,527,639	$1,580,017
Other income	14,279	14,182
Total income	$1,541,918	$1,594,199
Charges	1,123,157	1,105,823
Balance	$418,761	$488,376
Surplus year ended June 30, 1912	118,292	
Balance, June 30, 1913	$537,053	
Dividends	523,092	370,084
Surplus, June 30, 1913	$13,961	$118,292

Columbus Railway & Light Company Reorganization

The committee having in charge the reorganization of the street and railway electric lighting companies of Columbus, Ohio, have sent out a circular to the stockholders of the companies interested extending the time for the deposit of securities until Nov. 25 and asking the consent of the depositors to a possible change in the plan by which the property of the Columbus Light, Heat & Power Company will not be taken into the reorganization but will continue to be controlled under lease to the Columbus Railway & Light Company unless the stockholders of the Light, Heat & Power Company deposit their stock by Nov. 25. There have already been deposited a sufficient number of shares of stock of all the companies, with the exception of the Columbus Light, Heat & Power Company, to make the plan operative. Litigation was commenced by some of the stockholders of the light, heat and power company who were dissatisfied with the representation given them and the deposit of securities of that company has been delayed on this account.

The plan as originally outlined will be carried through with the exception of the necessary changes caused by the omission of the Columbus Light, Heat & Power Company property and the continued control of that property under lease. Stockholders of the Columbus Light, Heat & Power Company who have deposited their stock will receive the same representation in the new company as if the Columbus Light, Heat & Power Company had come in, provided the Public Utilities Commission gives its consent. A large percentage of the stock of the light, heat and power company has agreed to the reorganization and it may be that by Nov. 25 enough more will be deposited to make the plan operative as originally contemplated. If this should not be done the committee will proceed on the lines indicated in the circular to the stockholders.

Right of Stockholder to Copy Corporate Books

According to a decision handed down recently by Associate Justice Haley, of the Supreme Court of the State of Maine, any stockholder, even though he own but one share of stock, may have access to the books of the corporation and may copy the list of stockholders contained therein. Justice Haley ordered a writ of mandamus to issue, commanding William M. Bradley, Portland, Me., as the clerk of the Commonwealth Railway & Light Company, a Maine corporation doing business in Michigan, to allow Warren N. Whitington, New York, to copy the list of stockholders of the corporation. It appeared from the evidence submitted that Mr. Whitington has had control of his one share of stock only a short time. Mr. Bradley took exception to the decision for the company and the question will now go before the full bench of the court.

American Railways, Philadelphia, Pa.—Charles R. Miller, Governor of Delaware, has been elected a director of the American Railways to succeed the late R. D. Apperson.

Babylon (N. Y.) Railroad.—The Public Service Commission of the Second District of New York has issued an order granting the application of the Babylon Railroad for consent to increase its capital stock from the present authorized and issued amount of $25,000 to $75,000.

Barcelona Traction, Light & Power Company, Ltd., Toronto, Ont.—Emilius Jarvis & Company, Toronto, Ont., issued a circular recently relative to the affairs of the Barcelona Traction, Light & Power Company, which operates in Barcelona and its suburbs in Spain. At the present time of an authorized issue of $12,500,000 of 7 per cent noncumulative preferred stock, there is outstanding $10,000,000; of an authorized issue of $30,000,000 of common stock, there is outstanding $27,450,000, and of first mortgage 5 per cent bonds of 1911, due in 1961, there is a present issue of $7,500,000.

Boston (Mass.) Elevated Railway.—At the annual meeting of the stockholders of the West End Street Railway to be held on Nov. 25, stockholders will be asked to authorize the issue of "not exceeding 20,000 additional shares of stock" to fund floating debt incurred for additions and improvements to property.

Boston Suburban Electric Companies, Newtonville, Mass.—The Boston Suburban Electric Companies has issued the following statement of earnings for the fiscal year ended June 30, 1913: Income from securities held, $181,246; expenses and interest, $48,401; net income, $132,845; dividends paid, $129,548; surplus for the year, $3,297; previous surplus, $600,727; total, $604,024; charge against profit and loss surplus after closing June 30, $8,387; surplus at end of period, $595,637.

Chicago (Ill.) Railways.—A meeting of the registered holders of the participation certificates, Series 1, 2, 3 and 4, of the Chicago Railways has been called for Dec. 22 in Chicago to pass upon the resolution for unified operation of the Chicago Railways, the Chicago City Railway, the Southern Street Railway, and the Calumet & South Chicago Railway, as authorized by ordinance of the City Council of Chicago, passed on Nov. 13.

Cincinnati, Lawrenceburg & Aurora Electric Street Railroad, Cincinnati, Ohio.—Frank S. Shutts, receiver of the Cincinnati, Lawrenceburg & Aurora Electric Street Railroad, has reported to the insolvency court that the road's assets are valued at $1,034,148. John W. Peck, attorney representing the receiver, is reported to have stated that the assets exceed the liabilities and that the receivership will be lifted soon.

Electrical Securities Corporation, New York, N. Y.—At the annual meeting of the stockholders of the Electrical Securities Corporation held recently, G. P. Gardner was elected a director to succeed E. K. Boisot.

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind.—The Public Service Commission of Indiana has authorized the Fort Wayne & Northern Indiana Traction Company to issue $600,000 of notes to be secured by the pledge of $1,000,000 worth of bonds of the company. The proceeds of the issue of notes are to be used for improvements.

Gary & Interurban Railroad, Gary, Ind.—The Gary & Interurban Railroad has applied to the Public Service Commission of Indiana for permission to issue $100,000 of 6 per cent notes, payable on Nov. 1, 1915, to be secured by a first lien on the line from Laporte to Woodville Junction. The new notes are to be used to refund $100,000 of notes of the Goshen, South Bend & Chicago Railroad.

Interborough Rapid Transit Company, New York, N. Y.—The Public Service Commission of the First District of New York will hold a hearing on Dec. 2 on the application of the Manhattan Railway to create a second mortgage to secure $5,490,000 of bonds. In compliance with the lease of 1903 of the property of the Manhattan Railway to the Interborough Rapid Transit Company the proceeds of the bonds secured by the new mortgage will be turned over to the Interborough Rapid Transit Company to reimburse it for expenditures for improvements and betterments.

Kansas City Railway & Light Company, Kansas City, Mo.—A writ of attachment against the Kansas City Railway & Light Company, granted to Arthur S. H. Jones and served on the New York Trust Company, the National City Bank and Blair & Company, has been placed on $100,000 of the money which the company has on deposit with the New York Trust Company. The complainant is the owner of $100,000 of the Kansas City Railway & Light Company's 6 per cent notes which matured on Sept. 1, 1912, and were

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not paid. On Aug. 15, 1912, a committee was formed and the owners of the notes were asked to deposit their holdings with the committee. The majority of the noteholders complied with this request, but the $100,000 of notes which Mr. Jones owns were not deposited and he now demands that they be paid.

Memphis (Tenn.) Street Railway.—Hugh McCloskey, who was recently elected president of the American Cities Company, and J. S. Pevear, who was recently elected vice-president of New Orleans Railway & Light Company, have been elected directors of the Memphis Street Railway to succeed A. H. Ford and George Bullock.

New York, New Haven & Hartford Railroad, New Haven, Conn.—The executive committee of the New York, New Haven & Hartford Railroad decided on Nov. 18 to defer the proposed issue of $67,552,000 of convertible debenture bonds until the final decision of the Massachusetts Supreme Court in the litigation started by Morgan G. Bulkeley is rendered and arrangements were made for borrowing $45,000,000 at once from a syndicate headed by J. P. Morgan & Company. The notes, bearing interest at 6 per cent, will be taken at 99½ by J. P. Morgan & Company, Kidder, Peabody & Company and Lee, Higginson & Company. They will be payable in six months or may be called at any time before that, and in any event will be called upon the receipt of the proceeds of the proposed debenture bonds.

Ocean Shore Railroad, San Francisco, Cal.—A meeting of the stockholders of the Ocean Shore Railroad will be called for January to vote on the question of increasing the authorized capital stock of the company $5,000,000, $200,000 of which it is proposed to issue at once.

Ohio Traction Company, Cincinnati, Ohio.—The Ohio Traction Company has been authorized by the Public Service Commission of Ohio to issue its 5 per cent preferred capital stock of the par value of $300,000, to be sold for the best price obtainable, but for not less than $90 a share, to provide funds for extensions and improvements.

Poland (Ohio) Street Railway.—On Nov. 19 the Public Utilities Commission of Ohio authorized the Poland Street Railway to lease to the Mahoning Valley Railway all of its property, consisting of a line of street railway extending a distance of approximately 4.6 miles from the intersection of Poland Avenue and Powers Way, in Youngstown, Ohio, to and into the village of Poland, Ohio. The Mahoning Valley Railway was authorized to lease this property for an annual rental in no case to exceed $8,500.

Rochester, Corning & Elmira Traction Company, Rochester, N. Y.—Justice Benton, in the Supreme Court at Rochester has handed down a decision granting William C. Gray, receiver for the Rochester, Corning & Elmira Traction Company, judgment for about $150,000 against Otto C. Heinze, Max S. Schultze and others, who are alleged to have manipulated the company in their interest. The directors authorized Mr. Heinze to withdraw $125,000 belonging to the company which was on deposit with the Knickerbocker Trust Company. Shortly afterward Mr. Heinze went into bankruptcy and has not yet been discharged. The withdrawal was settled by delivering to the Rochester, Corning & Elmira Traction Company 120 shares of Western Development Company stock declared to be valueless. The Supreme Court directed the receiver to disregard the transfer and sue the defendants for the money withdrawn.

Sunbury & Susquehanna Railway, Sunbury, Pa.—The Pennsylvania Steel Company has filed a bill in equity in the County Court asking for the appointment of a receiver for the Sunbury & Susquehanna Railway, operating an electric railway between Selingsgrove and Northumberland, a distance of 8 miles.

Third Avenue Railway, New York, N. Y.—At the annual meeting of the stockholders of the Third Avenue Railway retiring directors were re-elected, and the consolidation of the Kingsbridge Railroad with the Third Avenue System was formally ratified.

Toledo Railways & Light Company, Toledo, Ohio.—A decree has been entered by United States District Court in Toledo sustaining the rights of H. L. Doherty & Company, New York, N. Y., in operation of various traction and lighting properties in Toledo. The directors adverse to their interests have resigned and the entire matter has been adjusted. It has been stipulated that there will be no appeal from the order which has been entered. In this final decree the court states that the Toledo Traction, Light & Power Company is the lawful owner and holder of 117,447 shares and $11,500,000 of bonds of the Toledo Railways & Light Company.

Washington Water Power Company, Spokane, Wash.—A special meeting of the stockholders of the Washington Water Power Company has been called for Dec. 2 to vote on increasing the capital from $15,000,000 to $20,000,000.

Dividends Declared

American Railways, Philadelphia, Pa., quarterly, 75 cents, common.

Citizens' Traction Company, Pittsburgh, Pa., $1.50.

Columbus (Ohio) Railway, quarterly, 1¼ per cent, common.

Northern Texas Electric Company, Fort Worth, Tex., quarterly, 1¾ per cent, common.

Tennessee Railway, Light & Power Company, Memphis, Tenn., quarterly, 1½ per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

AMERICAN RAILWAYS, PHILADELPHIA, PA.

Period			Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m.,	Oct.,	'13	$450,660	.....	.....	.....	.....
1 "	"	'12	417,286	.....	.....	.....	.....
4 "	"	'13	1,940,990	.....	.....	.....	.....
4 "	"	'12	1,780,858	.....	.....	.....	.....

AURORA, ELGIN & CHICAGO RAILROAD, WHEATON, ILL.

1m.,	Sept.,	'13	$182,597	*$114,813	$67,784	$33,510	$34,274
1 "	"	'12	182,851	*99,093	83,758	32,120	51,638
3 "	"	'13	602,274	*344,502	257,772	101,068	156,704
3 "	"	'12	573,749	*304,323	269,426	96,262	173,164

COMMONWEALTH POWER, RAILWAY & LIGHT COMPANY, SAGINAW, MICH.

1m.,	Sept.,	'13	$194,220	*$59,576	$134,644	$80,000	$54,644
1 "	"	'12	115,135	*12,701	102,434	30,000	72,434
12 "	"	'13	1,949,180	*344,811	1,604,369	610,000	994,369
12 "	"	'12	1,243,356	*111,500	1,131,856	360,000	771,856

GRAND RAPIDS (MICH.) RAILWAY

1m.,	Sept.,	'13	$107,960	*$73,624	$34,336	$8,969	$25,367
1 "	"	'12	109,592	*58,449	51,143	14,753	36,390
12 "	"	'13	1,276,819	*774,275	502,544	172,549	329,995
12 "	"	'12	1,220,783	*684,519	536,264	175,820	360,444

LAKE SHORE ELECTRIC RAILWAY, CLEVELAND, OHIO

1m.,	Sept.,	'13	$133,404	*$69,533	$63,872	$35,213	$28,659
1 "	"	'12	125,743	*66,378	59,364	35,168	24,196
8 "	"	'13	1,075,872	*628,297	447,576	316,206	131,370
8 "	"	'12	998,520	*566,593	431,927	314,417	117,510

LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY, LEWISTON, MAINE

1m.,	Sept.,	'13	$64,139	*$38,647	$25,492	$15,630	$9,862
1 "	"	'12	62,006	*34,463	27,543	14,304	13,239
12 "	"	'13	668,841	*414,878	253,963	177,643	76,320
12 "	"	'12	612,207	*386,394	225,813	173,181	52,632

NORTHERN OHIO TRACTION & LIGHT COMPANY, AKRON, OHIO

1m.,	Sept.,	'13	$289,023	*$169,220	$119,802	$47,271	$72,271
1 "	"	'12	268,074	*146,402	121,672	48,813	77,859
8 "	"	'13	2,444,698	*1,471,036	973,662	413,196	560,460
8 "	"	'12	2,247,866	*1,257,571	990,295	394,363	595,932

PORTLAND (MAINE) RAILROAD

1m.,	Sept.,	'13	$90,286	*$55,687	$34,599	$16,503	$18,096
1 "	"	'12	87,997	*54,197	33,800	10,254	23,546
12 "	"	'13	1,030,896	*708,200	322,696	144,736	177,960
12 "	"	'12	967,893	*684,504	283,389	119,421	163,968

PORTLAND RAILWAY, LIGHT & POWER COMPANY, PORTLAND, ORE.

1m.,	Sept.,	'13	$547,451	*$278,501	$268,950	$176,918	$92,032
1 "	"	'12	542,387	*272,822	269,565	148,329	121,245
12 "	"	'13	6,689,055	*3,322,192	3,366,863	1,934,892	1,431,971
12 "	"	'12	6,557,842	*3,249,749	3,308,096	1,699,268	1,608,828

ST. JOSEPH RAILWAY, LIGHT, HEAT & POWER COMPANY, ST. JOSEPH, MO.

1m.,	Sept.,	'13	$106,445	*$63,303	$43,142	$20,198	$22,944
1 "	"	'12	95,875	*56,871	39,004	19,710	19,294
12 "	"	'13	1,236,783	*698,564	538,219	240,173	298,046
12 "	"	'12	1,151,645	*671,624	480,021	235,141	244,880

TWIN CITY RAPID TRANSIT COMPANY, MINNEAPOLIS, MINN.

1m.,	Sept.,	'13	$787,891	$387,351	$400,540	$144,112	$256,428
1 "	"	'12	730,845	351,688	379,156	143,079	236,078
9 "	"	'13	6,568,762	3,336,218	3,232,544	1,322,846	1,909,698
9 "	"	'12	6,089,072	3,109,910	2,979,162	1,284,713	1,694,449

VIRGINIA RAILWAY & POWER COMPANY, RICHMOND, VA.

1m.,	Sept.,	'13	$423,409	$217,241	$206,167	$132,720	$73,447
1 "	"	'12	402,344	193,634	208,710	124,537	84,173
3 "	"	'13	1,317,808	659,684	658,125	397,926	260,199
3 "	"	'12	1,234,928	612,862	622,067	371,389	250,678

*Includes taxes.

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Traffic and Transportation

"Safety First" Campaign Started on Detroit United Lines

The following announcement was made in the Nov. 14 issue of *Electric Railway Service*, the company's publication, in regard to the plans of the Detroit (Mich.) United Railway for carrying out its proposed safety first campaign:

"'Safety first!'

"Please get these two words firmly fixed in your mind. You are going to read of them and hear of them a great many times within the next few months.

"Repeat the words: 'Safety first.' Think about them. Remember them. Get the habit of 'Safety first.'

"The Detroit United Railway is about to start upon a 'Safety first' campaign extending over its entire 800 miles of track within and without the city of Detroit.

"The company desires to impress upon every one of its patrons that safety is the first consideration, that it comes before time, speed and everything else.

"As an initial step in this campaign of safety, the company proposes to have the words 'Safety first' in plain letters at every point where they will attract attention. Along the right-of-way, on tool houses, depots, telephone booths, freight houses, milk stands, carhouses, highway crossings, trolley poles and fence posts the words 'Safety first' will urge you to caution. On passenger cars in several conspicuous places the same warning will cause you to remember that safety supersedes everything else. The work of placing these 'Safety first' signs will be conducted as rapidly as is possible.

"The campaign to be undertaken by the Detroit United Railway is in line with the country-wide effort of electric and steam railways to impress upon their patrons the importance of 'Safety first.' Many people with other things to think about forget the dangers which beset them if they do not exercise caution. This movement is designed to prevent them from forgetting it is essential that they shall always be on their guard against possible injury. Eternal vigilance is often the price of life as well as of liberty.

"Before you board a car remember safety.

"Before you leave a car remember safety.

"When you are tempted to run and catch a moving car hesitate and think of 'Safety first.'

"If you are about to cross behind a car without noting the possible approach of others from the opposite direction, stop and recall 'Safety first.'

"Never run in front of a passing car—that isn't 'Safety first.'

"Don't get off a car facing the rear. With the left hand take hold of the grip handle, left foot to the step, right foot to the ground, face forward and remember 'Safety first.'

"To the children we offer two suggestions in connection with the 'Safety first' campaign:

"Never hitch on and steal rides behind street cars or wagons.

"Never play on the car tracks.

"The public can help in this 'Safety first' movement. Its co-operation is essential if the campaign is to have the desired result. The company can make every possible provision for the safety of its patrons, but unless the patrons respond to the company's efforts very little can be accomplished.

"The Detroit United Railway appeals to its patrons to assist in making 'Safety first' the watchword and slogan of the entire system, city and interurban. With this assistance and co-operation the results of the campaign will unquestionably prove gratifying to the public and the company alike.

"But please remember: 'Safety first.'

"Always safety."

The company printed a placard 21 in. wide by 19 in. high in red and black, headed "Safety First," on which it said: "The Detroit United Railway will be delighted with your help in its campaign to protect life and limb. 'Please don't take chances.' Read the next number of *Electric Railway Service*, out Friday, Nov. 14."

Passenger Traffic in the New York Subway

The Public Service Commission of the First District of New York has made public a statement of passenger traffic on the subway division of the Interborough Rapid Transit Company as indicated by the number of tickets sold at each station in the year ended June 30, 1913. It appears that during the year 327,471,510 passengers rode in the subway as compared with 302,973,856 during the previous year. This represents a daily average travel of 963,152 as compared with 891,099 for the previous year. The net increase for the year was 24,497,654 as compared with 26,269,060 for the previous year. Atlantic Avenue, at the end of the line, with its direct connection with the Brooklyn Rapid Transit System and the Long Island Railroad, continued the busiest station of the system, having a daily average of 62,536 passengers compared with 55,664 for the previous year. Brooklyn Bridge comes second with 53,203 passengers, and Grand Central third with 49,821 a day. The following summary has been prepared from the original report to show the returns of the stations on the Lenox branch, the Broadway branch, the main line from Ninety-sixth Street to the Battery and the Brooklyn branch, with figures for the express stations at Ninety-sixth Street, Seventy-second Street, Grand Central, Fourteenth Street and Brooklyn Bridge, also Times Square and all the stations below the Brooklyn Bridge and in Brooklyn:

Stations	Total	Year's Increase	Daily Average (a) 1913	1912	1911
Lenox branch (total)..	63,508,597	5,343,064	186,790	171,075	153,296
Broadway branch (total)	42,117,654	4.001,464	123,875	112,106	100,053
Ninety-sixth Street to South Ferry (total)	178,967,848	11,315,991	526,376	493,094	458,044
Seventy-second Street	4,554,314	236,099	13,395	12,701	12,065
Times Square	13,211,957	502,646	38,859	37,380	34,303
Grand Central	16,939,238	1,943,715	49,821	44,104	40,586
Fourteenth Street....	14,086,688	1,076,639	41,431	38,265	36,813
Brooklyn Bridge	18.088,949	381.360	53,203	52.081	49,734
City Hall	530,209	D 8,575	1,559	1,585	1,741
Fulton Street	15.899,866	1,220,643	46,764	43,174	39,039
Wall Street	7.973,638	440,031	23.452	22,158	21.382
Bowling Green	5,575,507	433,449	16,399	15.124	13,460
South Ferry	1,756,623	116,050	5,167	4,825	4,855
Brooklyn (total).....	42.664,453	3.809,135	125,484	114,280	101,919
Borough Hall	8,942,227	483,595	26,301	24.878	22,810
Hoyt Street	7.639,520	655,905	22,469	20,540	17,779
Nevins Street	4,820,566	333,253	14,178	13,198	12,157
Atlantic Avenue...	21,262,140	2,336,382	62,536	55,664	49,173
Miscellaneous	212,958	28.000	626	544	525
Grand total	327,471,510	24,497,654	963,152	891,099	813.837

(a) Treating Sundays as half days (340 days to the year). (D) Decrease.

The commission has also made public a summary of passenger traffic on the Second Avenue, Third Avenue, Sixth Avenue and Ninth Avenue lines of the Manhattan (Elevated) Railway, operated by the Interborough Rapid Transit Company, for the year ended June 30, 1913. The summary of figures for these lines as made public by the commission follows:

Division	Total	Year's Increase	Daily Average (a) 1913	1912	1911
Second Avenue line..	44,383,978	405.019	130,541	129,350	129.806
Third Avenue line...	143,308.012	1,672,166	421,494	416,576	410,130
Sixth Avenue line....	87,256,189	252,236	256.636	255.894	253,980
Ninth Avenue line...	31,896,827	244,744	93,814	93.094	92,700
Grand total	306.845,006	2,574,165	902,485	894.914	886,616

(a) Treating Sundays as half days (340 days to the year).

Texas Traction Company's Courtesy Pamphlet

The completion of the Southern Traction Company's lines between Dallas and Waco, Tex., and between Dallas and Corsicana, Tex., made this system, when combined with the Texas Traction Company's line, which is under the same management, the largest interurban system in the Southwest. The total length of these two lines is approximately 237 miles. As the new extension between Dallas and Waco was made possible through investments made by citizens of the various counties and towns along the line, the management, particularly its president, J. F. Strickland, is anxious that the popularity evident on the day of its opening, Sept. 30, shall continue throughout its operation. In order to accomplish this, the president issued a pamphlet to trainmen on "Courtesy." This pamphlet contains numerous epigrammatic clauses presented in abstract as follows:

"There are many things that you, with your training

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and experience, understand but which the public does not. We should, therefore, not assume that passengers should comprehend them without asking questions, but when they make inquiry of you give them the courtesy of a reply, just as full and clear as you can make it and stay within your knowledge of the facts.

"If anyone asks you what time the 4 o'clock train leaves, do not treat the matter as a joke, but consider that the passenger is probably nervous owing to his intended journey and does not realize fully what he is asking. Be courteous in your reply. Special attention should be given to the young and inexperienced in travel, to the aged and to ladies when traveling alone.

"Words are only one means of expression; manner is quite as important. We should, therefore, remember that a kindly and gracious manner is not only the sign and mark of a self-respecting man, but is to our words what oil is to machinery—making them move effectively to their purpose. True courtesy is no respecter of persons. It remembers that 'A man's a man for all that' and gives a civil word and helping hand quite as readily to the ill-clad stranger as to 'the lords of high degree.'

"Courtesy is something that the public has a right to expect of us, and it pays in many ways. It pays in the friends it makes us personally and as representatives of the company; it pays in minimizing the friction of our lives and that between the company and its patrons; it pays in raising our standing with the company, and it pays in the personal satisfaction which results from having done the right and kindly thing by our fellow-man.

"The man who comes in contact with the public has opportunities for advancement over the man in a private office. He has a natural opportunity to advertise his ability to the public that the man in the private office does not have. The very man whose impatience he returns with patience may be the one figuratively to take him by the hand and lift him to a better position.

"Returning good for evil is not just a religious law, it is a natural law—it is returning efficiency for deficiency. As there is no end to the harm that discourtesy may do, likewise there is no end to the good that courtesy may do—it is like the brook, it flows on forever. Courtesy always pays dividends; the man to whom we are courteous tells other people about us. The story is repeated and our good reputation is made. If we are discourteous, the story is repeated and our reputation is made, but in a very different manner.

"Interurbans have two things to offer in exchange for business—service and personality. Personality in this connection means courteous treatment of the public and affability. It is our desire that the true value of courtesy may be fully appreciated by all the representatives and employees of these companies, and that rivalry may exist in a friendly effort to see who can make the best record along this line."

The Open-Door Policy in Brooklyn.

The New York *Evening Post* published in its issue of Nov. 15 an article dealing with Timothy S. Williams, president of the Brooklyn (N. Y.) Rapid Transit Company, and his experiments in applying civility, courtesy and publicity to the transit problems in Brooklyn. After sketching briefly the career of Mr. Williams in journalism and business the writer continued in part as follows:

"The Brooklyn Rapid Transit Company used to be one of the best-hated corporations in the country. Nobody in Brooklyn had a good word for it, and visitors to the foreign borough across the East River shuddered at mention of its name. The traffic conditions at the Brooklyn Bridge were a scandal and a by-word. Blocks and delays were frequent, guards and employees were not over-polite, and the misguided citizen who ventured to complain at the offices was soon put in his place. In fact, the Brooklyn Rapid Transit was in practically the same state of mind as most other corporations before what might be styled the period of corporation enlightenment dawned upon a weary people.

"Mr. Williams came to the presidency at about the time it was getting to be the thing for public service corporations to consider some of the people's feelings. He knew the merits of publicity and cordiality of public sentiment. The transit conditions of the city were in the utmost confusion. Great schemes were on foot to assist the unwieldy city to grow. This meant new subway lines and extensions to elevated lines.

"Mr. Williams set to work. First, he began to make himself solid with his public. He sought to spread abroad the impression that the Brooklyn Rapid Transit considered itself a servant of the public. There had been a general and sustained increase in mechanical efficiency for several years back, and, of course, the opening of the East River tube had taken some strain off the Brooklyn Bridge. What Mr. Williams tried particularly to do was to better the personal relations of the company with its patrons. He tried to establish a feeling that the company depended upon the support of the people and that it was anxious to have their support. Many looked with suspicion upon this campaign; they do still look with suspicion upon it. But it has made headway.

"He is the head of one of the greatest transit systems in the country, with thousands of employees, hundreds of miles of surface and elevated track—not to speak of the subways which he has gained for his company since he became its head—and a volume of business fully equal to that of a big transcontinental line. Nevertheless, anybody who has a legitimate reason for seeing him can walk into his office without having to wait longer than you would expect to wait outside of any busy man's sanctum."

Increase in Wages in Omaha.—Announcement is made by the Omaha & Council Bluffs Street Railway that it will voluntarily raise wages of motormen and conductors 1 cent an hour, bringing the new wage schedule to from 24 cents to 29 cents an hour according to length of service.

Opinion by Commission Asked in Regard to One-Man Cars.—C. Taylor Leland, secretary and treasurer of the Pottstown & Phoenixville Railway, Pottstown, Pa., has asked the Public Service Commission for a ruling on the question whether it is legal to operate an electric car with one man.

Increase in Wages on Atlantic City Lines.—The Atlantic City & Shore Railway, Atlantic City, N. J., will advance the wages of motormen and conductors 2 cents an hour, effective Jan. 1. The increase in the cost of living is given by the management as the reason for the advance in wages.

Schenectady Fare Hearings Postponed.—The time for oral argument in the complaint of the city of Schenectady against the Schenectady (N. Y.) Railway for its refusal to sell six tickets for 25 cents has been postponed from Nov. 25 to Dec. 16, by reason of the illness of Corporation Counsel Cooper of Schenectady.

Steam Passenger Service Abandoned.—On the ground that it cannot compete with the service of the Kansas City, Clay County & St. Joseph Railway from Kansas City to St. Joseph, Mo., the Rock Island Railroad has abandoned passenger service between those points. The change has also cut off steam service to Atchison and Leavenworth, Kan.

Municipal Road and Private Corporation Ratify New Transfer Agreement.—The Geary Street Municipal Railroad, San Francisco, and the United Railroads began to interchange transfers on Nov. 14 at the intersection of Geary and Kearney Streets and Geary and Larkin Streets. The Municipal road will pay 3 cents for each passenger who presents one of its transfers on a United Railways car and will receive only 2 cents for each passenger transferred to its line by the United Railroads.

Free "Movies" in Texas to Decrease Street Car Accidents.—Stone & Webster have closed a contract with a number of motion-picture playhouses in Texas by which it is agreed to show moving pictures emphasizing the necessity of being careful in getting on or off street cars. For a number of years Stone & Webster have conducted a systematic campaign along these lines by street car, newspaper and other kinds of advertising. School children in Dallas, Fort Worth and other Texas cities have been supplied with complimentary tickets which will admit them to the performances at which the pictures are shown.

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Brockton & Plymouth Fares and Service to Be Investigated.—The Massachusetts Public Service Commission will hold a hearing at Boston on Nov. 25 upon a petition by Harry B. Davis and others for an investigation of fares and service on the Brockton & Plymouth Street Railway. The board will consider the establishment of service on a two-hour interval in parts of Plymouth, will investigate the condition of cars and equipment with respect to cleanliness and general upkeep, and will examine the financial condition of the road with regard to the necessity of maintaining the present 6-cent unit of fare.

Pacific Electric Railway Resorts to Moving Pictures.—The Pacific Electric Railway, Los Angeles, Cal., has resorted to the use of motion pictures in the instruction of conductors and motormen as to the application of its rules for the prevention of accidents. The pictures were shown on Nov. 7 for the first time to 600 employees at the new Garden Theater, Los Angeles. By this method the officials of the company believe that the trainmen can be taught their duty under a given state of trying circumstances in such a way as only sad experience could otherwise impress upon them. Byron Dixon, head of the company's school, superintended the making of the pictures, and Lester Scott acted as director of the actors, who were recruited among the employees.

Safety Committee on Kansas City Road.—An improvement or safety club has been formed by the Kansas City, Clay County & St. Joseph Railway, of which J. R. Harrigan is president. The claim agent of the road has been elected chairman of the club. The latter appointed the head of each other department as a sub-chairman. Each sub-chairman selected a number of men in his own department as members of his committee. At present the improvement or safety club consists of about fifty men, ranging in rank from head of a department to a section hand. If an employee in one department sees room for improvement in that branch of the service he reports to the head of his department, who makes the change. In other cases the report is forwarded to Mr. Harrigan, who sees that it passes through the necessary channels. New committees will be appointed every six months.

Steam Suburban Service Unprofitable.—The Pennsylvania Railroad, which has operated a suburban service between Louisville, Ky., and New Albany, Ind., for many years, will suspend this service on Jan. 1, it is reported, though no official bulletin has been issued on the subject. The reconstruction of the company's Fourteenth Street bridge across the Ohio River at Louisville has made this step necessary, it is explained. Owing to the competition of the lines of the Louisville & Northern Railway & Lighting Company and the Louisville & Southern Indiana Traction Company, the Pennsylvania's suburban business out of Louisville has fallen off greatly in recent years, and instead of operating trains half-hourly they are run only hourly at present. It is also reported that in case the Pennsylvania Railroad should decide to resume the service after the bridge has been reconstructed it will equip the line for electric operation.

Connection Between Steam and Electric Railway.—On Nov. 11 the Oakland, Antioch & Eastern Railroad, Oakland, Cal., applied to the City Commissioners of Sacramento for a franchise to connect its tracks with those of the Western Pacific Railway. This has given rise to the unofficial statement that the Western Pacific Railway and the Oakland, Antioch & Eastern Railroad have entered into a traffic agreement whereby the former will run its trains over the Oakland, Antioch & Eastern Railroad's tracks from Sacramento to Oakland. The franchise provides for a double-track broad-gage line from a point in M Street, the Sacramento entry of the Oakland, Antioch & Eastern Railroad, south in Second Street to the intersection of Third and R Streets. The franchise is for a term of thirty-five years and was signed by Samuel Naphtaly, vice-president of the Oakland, Antioch & Eastern Railroad. The estimated cost of construction is $20,000. By using the tracks of the Oakland, Antioch & Eastern Railroad the Western Pacific Railway can reduce materially its running time between Sacramento and Oakland. The electric road will be benefited inasmuch as the arrangement will provide through freight connections with the East.

Personal Mention

Mr. F. H. Chamberlain has been appointed general manager of the Alabama Power Company, the operating corporation of the Alabama Traction, Light & Power Company, Birmingham, Ala.

Mr. Howard Elliott, chairman of the board of directors of the New York, New Haven & Hartford Railroad, New Haven, Conn., has been elected president of the Connecticut Company, New Haven, and the Rhode Island Company, Providence, R. I.

Mr. Frederick A. Persons, who has been superintendent of the Concord, Maynard & Hudson Street Railway, Maynard, Mass., has been appointed to the position of superintendent of motive power and equipment of the Massachusetts Consolidated Railways with headquarters at Greenfield.

Mr. Thomas W. Ryley, whose resignation as superintendent of the Norwich & Westerly Traction Company, Norwich, Conn., was noted in the Electric Railway Journal of Nov. 8, 1913, was waited upon recently by a committee of the employees of the company and presented with a purse of $50 in gold.

Mr. C. A. Jefts, who has been superintendent of the Gardiner division of the Concord, Maynard & Hudson Street Railway, Maynard, Mass., has been appointed superintendent of the company to succeed Mr. Frederick A. Persons, who has become connected with the Massachusetts Consolidated Railways.

Mr. Joseph T. Hearn, who has been connected with the traffic department of the Boston & Worcester Street Railway, Boston, Mass., has been appointed superintendent of the Providence & Fall River Street Railway, Swansea Center, Mass., to succeed Mr. Alvah C. Dole, who, as noted elsewhere in this column, has been appointed superintendent of the Pawtuxet Valley division of the Rhode Island Company, Providence, R. I.

Mr. A. L. Bodwell, for years connected with the office of the city engineer of Providence, R. I., has been selected by Commissioner of Public Works Slade and Public Service Engineer Robert L. Brunet for the position of railway inspector. Mr. Bodwell was appointed in accordance with the provisions of the ordinance passed last spring by the City Council creating the office of public service engineer and providing for the appointment of an assistant whose duties would be confined to the supervision of railway traffic on the city's streets.

Mr. Alvah C. Dole, superintendent of the Providence & Fall River Street Railway, Swansea Center, Mass., has been appointed superintendent of the Pawtuxet Valley division of the Rhode Island Company, Providence, R. I. Mr. Dole has been superintendent of the Fall River line for seven years, succeeding his brother, Mr. George P. Dole. At one time, he was conductor on the Haverhill, Merrimac and Amesbury line. He had charge of the electrical work when the carhouse was being equipped. He was the conductor on the first car over the road on June 4, 1901.

Mr. William C. Brown resigned on Nov. 18 as president of the New York Central & Hudson River Railroad, effective on Jan. 1, 1914. Mr. Brown has been in railroad service continuously for more than forty-four years. He said in offering his resignation: "I feel that I have earned that freedom from care, hard work and responsibility which can be secured only by retiring from active service." Mr. Brown has been connected with the New York Central & Hudson River Railroad for twelve years, five years in charge of the operation and maintenance of the property, two years as senior vice-president and five years as president. During the period covered by Mr. Brown's connection with the company the work of electrifying the lines of the company in and about New York City was begun and carried to completion and the Grand Central Terminal was reconstructed and enlarged.

Mr. Allan G. Armstrong has resigned as general auditor for W. S. Barstow & Company, Inc., New York, N. Y., managers for the General Gas & Electric Company and the Eastern Power & Light Corporation. Mr. Armstrong has

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been connected with the electric railways, gas and electric light corporations for the last fifteen years. He was formerly with the Norfolk & Portsmouth Traction Company, Norfolk, Va. Later he was connected with the Southern Pacific Steamship Company, and subsequently to that he was with the receivers of the Metropolitan Street Railway, New York. He then became auditor for the receivers of the Ithaca (N. Y.) Street Railway and for the receivers of the New York, Auburn & Lansing Railroad. He next entered the employ of Barstow & Company. Mr. Armstrong's resignation from Barstow & Company becomes effective on Jan. 1, 1914. He proposes with others to organize the Armstrong Auditing Company, to specialize in accounting for public utility corporations.

Mr. C. Nesbitt Duffy, who has been elected vice-president and general manager of the Manila Electric Railroad & Light Company, Manila, P. I., was the guest of honor at a banquet at the Hotel Pfister, Milwaukee, on the evening of Nov. 15. To wish him success in his new work and to express regret at his leaving Milwaukee, thirty-three associates of Mr. Duffy connected with The Milwaukee Electric Railway & Light Company attended the dinner. As an evidence of the esteem in which he was held, a handsome silver service was presented to Mr. and Mrs. Duffy by the company. It bore the following inscription: "To Mr. and Mrs. C. Nesbitt Duffy on the occasion of their departure for Manila, P. I., with the sincere best wishes from the officers, staff and employees of The Milwaukee Electric Railway & Light Company, Nov. 15, 1913." A set of pearl shirt studs and cuff links was presented to Mr. Duffy at the office, and employees of the departments presented him with an autograph album bound in seal and containing their signatures. In making his address of farewell, Mr. Duffy voiced his appreciation of Milwaukee and the company and explained his reasons for going to Manila. Mr. J. D. Mortimer, president of the company, expressed regret at Mr. Duffy's leaving, and, voicing the sentiment of every one connected with the company, wished him success in his work in Manila. Those present in addition to Mr. Duffy were Messrs. J. D. Mortimer, president; R. B. Stearns, vice-president; S. B. Way, vice-president; F. J. Boehm, George W. Kalweit, W. J. Ramsey, A. J. Bohl, E. T. Mason, A. G. Schwenke, F. V. Benz, A. A. Meisenheimer, H. A. Rogers, R. H. Pinkley, George Keummerlein, Jr., M. S. Rausch, C. H. Lemon, C. M. Rosecrantz, George P. Miller, Edwin S. Mack, E. J. Evans, G. G. Post, R. R. Lukens, John Anderson, R. B. Snyder, C. E. Partee, Edwin H. Gruhl, G. W. Vanderzee, H. A. Flertzheim, James D. Shaw, J. B. Blake, C. W. Lamb, E. A. Gimbel and Bert Hall. The directors of the Citizens' Business League of Milwaukee entertained Mr. Duffy at luncheon at noon on Nov. 15.

Mr. J. S. Pevear, who has been vice-president of the International Railway and vice-president of the Buffalo & Lake Erie Traction Company, Buffalo, N. Y., has been elected vice-president of the New Orleans Railway & Light Company, New Orleans, La. Mr. Pevear became connected with the Buffalo & Lake Erie Traction Company in 1911 as general superintendent. He had previously been connected with the Twin City Rapid Transit Company, Minneapolis, Minn., and the General Electric Company. He was superintendent of the St. Paul lines of the Twin City Rapid Transit Company. The International Railway system, with which Mr. Pevear was connected as vice-president, is a consolidation into one operating company of various street railways in the United States and Canada, including lines in Buffalo, Niagara Falls, Lockport and Tonawanda, and comprising in all 374 miles. The Twin City Rapid Transit Company controls the entire street railway systems of Minneapolis, St. Paul and Stillwater, and has the exclusive right to operate street cars between St. Paul and Minneapolis. The entire system is 402 miles in length. The New Orleans Railway & Light Company comprises 201 miles of line, all the street railways in New Orleans. The company also has a perpetual gas franchise, exclusive until 1925, and a perpetual electric light franchise in New Orleans.

J. S. Pevear

Mr. Hugh McCloskey has resigned as president of the New Orleans Railway & Light Company, New Orleans, La., and has been elected chairman of the board of directors of the company and president of the American Cities Company, the common stock of which has been acquired by the United Gas & Electric Corporation, as mentioned previously in the ELECTRIC RAILWAY JOURNAL. No successor to Mr. McCloskey as president of the New Orleans Railway & Light Company has yet been selected. Mr. McCloskey will assume his new office on Dec. 1. Mr. McCloskey first became identified with railway work in New Orleans as a member of the board of directors of one of the subsidiary companies of the New Orleans Railway & Light Company. On Feb. 22, 1908, he was elected chairman of the board of the latter company. In April of the same year he was elected president of the company and the position of chairman of the board was abolished. Mr. McCloskey's aim was to develop the corporation in a way consistent with the growth and development of the city, and results began to appear in all branches of the service soon after he assumed active control. Mr. McCloskey had the tracks in Carrollton Avenue and City Park Driveway placed in the neutral ground, so as not to interfere with the street paving, and authorized the construction of the new line out to St. James Avenue to Milneburg. Under his administration Spanish Fort was purchased and converted into a pleasure resort, the railway was built to that point, and the company stood half the expenses with the New Orleans Land Company in building a driveway to Spanish Fort. The company has also made important improvements in the electric lighting and gas departments under Mr. McCloskey's direction. He considered that his first duty was to his city and State, and the credit for the wharves and present dock system at New Orleans is attributed to him. Mr. McCloskey received recently the New Orleans *Picayune's* loving cup for his public-spirited efforts in giving the city its wharves and sheds. Besides being prominently identified with electric railway development, Mr. McCloskey is first vice-president of the D. H. Holmes department store, New Orleans; vice-president of the Hibernia Bank & Trust Company and the Hibernia National Bank and vice-president of the Hibernia Insurance Company, New Orleans. He was the founder of McCloskey Brothers, one of the largest wholesale grocery and produce firms in the South.

H. McCloskey

OBITUARY

David M. Mortland, former Mayor of Rockland, Maine, and for many years a member of the State Railroad Commission of Maine, is dead. Mr. Mortland was seventy-eight years old.

Henry M. Richards, chairman of the board of directors of the Washington Water Power Company and vice-president of the Spokane & Eastern Trust Company, Spokane, Wash, is dead.

C. M. Corey, for two years prior to last July auditor of the Kentucky Traction & Terminal Company, Lexington, Ky., died recently at Lake City, Fla., where he had been for the past five months following his resignation from the company on account of ill-health. He was forty-five years old. Prior to his connection with the Kentucky Traction & Terminal Company Mr. Corey was with the Denver (Col.) City Tramway.

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Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

Miami & South Florida Railway, Miami, Fla.—Incorporated in Florida to build a steam or electric railway between Detroit, Homestead, Miami and Palm Beach. Capital stock, $5,000. H. C. Roome, president; Nathan A. Cole, vice-president, and J. M. Cobb, secretary and treasurer. [E. R. J., Sept. 6, '13.]

***Petersburg & Columbia Springs Railroad, Petersburg, W. Va.**—Chartered in West Virginia to build a 120-mile steam or electric railway between Petersburg and Columbia Springs. Capital stock, $25,000. Incorporators: Alexander R. Watson, Marcus C. Hite, John Y. Hite, Lloyd Bailey and R. L. Long, all of Fairmont, W. Va.

FRANCHISES

Birmingham, Ala.—The Birmingham Rapid Transit Company has asked the Council for a new franchise to build its line through Birmingham. The old franchise held by the company has expired. [E. R. J., Oct. 11, '13.]

Sacramento, Cal.—The Oakland, Antioch & Eastern Railway has asked the Council for a franchise in Sacramento that will connect it with the Western Pacific Railroad and allow the lines jointly to compete for transportation with the Southern Pacific Railway between Sacramento and Oakland.

Visalia, Cal.—The Big Four Electric Railway has received a franchise from the Council in Visalia to operate a city line in connection with its interurban line now under construction between Visalia and Tulare. All of the grade on the interurban line except a few miles has been completed. This 45-mile line will connect Tulare, Visalia, Lindsay and Porterville. [E. R. J., Oct. 18, '13.]

New London, Conn.—The Shore Line Electric Railway, Norwich, has received a franchise from the Common Council for an extension through State Street and Water Street to the Boss factory in New London. The company will ask the Public Utilities Commission for its approval of this extension.

Tampa, Fla.—The Tampa Electric Company has asked the Council for a franchise to extend its lines on Grand Central Avenue from Albany Avenue to Lincoln Street in Tampa, a distance of 1 mile.

Hutchinson, Kan.—The Hutchinson Interurban Railway has received a franchise to extend its line in Hutchinson 1½ miles.

Lincoln, Neb.—The Lincoln Traction Company has asked the Council for a franchise for extensions in Lincoln.

Newark, N. J.—Approval has been given by the State Board of Public Utility Commissioners to one of the ordinances asked for by the Public Service Railway and granted by the Board of Works in connection with the proposed terminal plan. The ordinance approved permits the construction of a curve leading from Springfield Avenue north into High Street and the laying of a second track in High Street between Market Street and Springfield Avenue in Newark.

Rochester, N. Y.—The New York State Railways has received a franchise from the Council to double-track Parsells Avenue from a point west of Chamberlain Street in Rochester.

TRACK AND ROADWAY

Gadsden, Bellevue & Lookout Mountain Railway, Gadsden, Ala.—Plans are being considered by this company to extend its lines in Gadsden.

Edmonton (Alta.) Radial Railway.—During the next year this company plans to award contracts to build 7½ miles of new track.

Lacombe & Blindman Valley Electric Railway, Lacombe, Alta.—About 8 miles of grading has been done and contracts for ties and rails are being awarded by this company for its 30-mile line from Lacombe to Gull Lake and Rimbey. Gasoline-electric cars will be operated. E. R. Strathy, Winnipeg, is interested. [E. R. J., Feb. 15, '13.]

Northern Electric Railway, Chico, Cal.—Work has been resumed by this company with the construction of a bridge over the right-of-way at Santa Clara Street, Vallejo.

Fresno, Cal.—Surveys have been completed between Fresno and Clovis, and as soon as the survey to the terminal 4 miles from Academy is completed a company will be organized and incorporated to build this proposed electric line between Fresno, Clovis and the foothills of the Sierra Nevada Mountains. F. S. Granger, Clovis, is the promoter. [E. R. J., Nov. 15, '13.]

Tidewater & Southern Railroad, Stockton, Cal.—This company has placed in operation its line between Stockton and Modesto.

Albany (Ga.) Transit Company.—Material has been received and construction will soon be begun by the company on the extension of the Madison Avenue line in Albany.

Waycross Street & Suburban Railway, Waycross, Ga.—Plans are being made for the immediate extension of this company's line on Gilmore Street through Gilchrist Park in Waycross.

Idaho Falls (Idaho) Electric Railway.—Surveys have been begun by this company, and a contract has been awarded to W. D. Rogers to grade 26 miles of its line between Idaho Falls and Poplar, via Lincoln and Iona. From Lincoln a branch will extend south about 9 miles to Taylor and Goshen. William C. Ross is interested. [E. R. J., Nov. 1, '13.]

Pocatello, Idaho.—J. D. Browning, Pocatello, and L. L. Evans, American Falls, plan to build a street railway in Pocatello. Orders for rails will soon be placed. It is planned to use storage battery cars. [E. R. J., July 19, '13.]

East St. Louis & Suburban Railway, East St. Louis, Ill.—Work has been begun on the extension of the Washington Park line in East St. Louis.

Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind.—Plans are being considered by this company to extend its lines west from Crawfordsville to Veedersburg.

New Albany & French Lick Valley Traction Company, New Albany, Ind.—The Louisville Commercial Club has indorsed this company's project to build a 60-mile line from New Albany to French Lick and West Baden Springs, with a branch from Mooresville to Corydon. John H. Martin, Palmyra, president. [E. R. J., Oct. 18, '13.]

Charles City & Western Railway, Charles City, Ia.—Plans are being made for the electrification of this line and to extend it so as to meet the Chicago Great Western Railroad.

Hutchinson (Kan.) Interurban Railway.—Work has been begun by this company on the extension of its line on Fourth Avenue east in Hutchinson.

Madisonville, Ky.—The project began several months ago by James Breathitt, Jr., Hopkinsville, to build an electric line between Madisonville and Nortonville, a distance of 12 miles, has been revived. [E. R. J., Sept. 27, '13.]

Owingsville & Olympian Springs Railway, Owingsville, Ky.—This company has laid 9 miles of track on its line between Owingsville and Olympian Springs. W. W. Hubbard, Owingsville, president. [E. R. J., Nov. 8, '13.]

Missouri & Kansas Interurban, Kansas City, Mo.—This company plans to build about 45 miles of new track in the spring, according to an announcement by President Strang. The line, which extends from Kansas City to Olathe, Kan., will be extended to Lawrence, Kan., a distance of 25 miles, and later to Topeka, 19 miles additional. The surveys for the extensions have been completed. The route to Lawrence will be via Udora. One bridge will be constructed on the extension.

Springfield & Western Railroad, Springfield, Mo.—Impetus was given to the plan of this railway to build an electric line from Carthage, Mo., to Springfield, when the company's franchise was extended one year. The grant provides for the use of Division Street, Springfield. An

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entirely new survey for the line is being made, the route from Springfield to Sarcoxie having been completed.

Red Lodge (Mont.) Electric Railway.—This company has been organized to build a 10-mile electric railway between Red Lodge, Washoe and Bear Creek. The company is capitalized at $225,000. Among those interested are William Larkin, Thomas F. Pollard, A. H. Davis, Walter Alderson and J. W. Chapman. [E. R. J., Oct. 11, '13.]

Omaha, Lincoln & Beatrice Railway, Lincoln, Neb.—Plans and specifications for the construction of this company's line have been completed and contracts will be awarded by the company late in the winter or early in the spring for the completion of its line from Lincoln to Omaha.

Republic Railway & Light Company, Trenton, N. J.—Plans are being considered by this company for an extension beyond New Castle to New Wilmington, Mercer and on to the north.

United Traction Company, Albany, N. Y.—This company has been asked to build a new belt line over Second Avenue and Delaware Avenue and into the southern section of Albany by way of South Pearl Street.

***Hempstead, N. Y.**—A project is being considered to build an electric line through Franklin Avenue from Hempstead to and through Rockville Centre and Oceanside and across Wreck Lead to Long Beach.

Hornell (N. Y.) Traction Company.—This company has completed a 1-mile extension in Hornell.

Asheville Power & Light Company, Asheville, N. C.—Grading has been begun by this company on the extension of the Charlotte Street line to Grove Park Inn in Asheville.

Dayton, Middletown & Cincinnati Railway, Middletown, Ohio.—Preliminary arrangements are being made by this company to build its line from Norwood to Middletown and Reading. It is planned to begin construction within the next three months. E. H. McKnight, Middletown, general manager. [E. R. J., Sept. 13, '13.]

Norman Interurban Railway, Oklahoma City, Okla.—This company has placed in operation its 33-mile line between Norman, Oklahoma City and Edmond. This line is owned by the Oklahoma Railway and will become a part of that system.

Guelph, Ont.—The City Council has passed a resolution recommending that the Hydro-Electric Power Commission be asked to make a report on the cost of construction and operation of an electric railway to connect Hespeler, Puslinch Lake, Guelph, Elora, Fergus, Arthur, Mount Forest, Meaford and Thornbury.

Toronto (Ont.) Civic Car Lines.—A branch line down Lansdowne Avenue to the Canadian Pacific Railway crossing above Royce Avenue has been advocated by Works Commissioner Harris before the Board of Control. This would link up the present St. Clair line with the terminus of the Carlton line of the Toronto Railway, and Mr. Harris estimates that it could be operated at a profit at the current fare schedule of six tickets for 10 cents or 2 cents each. The cost is estimated at $104,186, with operating and interest expenses at $17,078 a year. Passenger traffic is estimated at 4588 persons daily, which, if no transfers were allowed, would produce gross receipts of $28,674 a year. The length of the line would be about ⅝ mile.

Interstate Railways, Philadelphia, Pa.—Plans and surveys are being made by this company to build a line between Angora and Medina.

Bryan & Central Texas Interurban Railroad, Bryan, Tex.—Work has been begun by this company on its extension through the Brazos section.

Southern Traction Company, Dallas, Tex.—This company has placed in operation its line between Dallas, Waco and Corsicana. The line is in two sections, one extending from Dallas to Waco, 101 miles, and the other from Dallas to Corsicana, 56 miles. Among the towns on the Dallas-Waco division are Lancaster, Waxahachie, Forreston, Italy, Milford, Hillsboro, Abbott, West Elm and Point. On the Dallas-Corsicana division are Ferris, Palmer and Temple.

Parkersburg, Mariette & Interurban Railway, Parkersburg, W. Va.—Work has been begun by this company to double-track several streets in Parkersburg.

Wheeling (W. Va.) Traction Company.—Plans are being considered by this company for an extension from the end of its present Rayland division in Wheeling to Brilliant and eventually to Steubenville, Ohio.

***Green Bay, Wis.**—Plans are being considered to build an interurban railway from Sturgeon Bay to Ephraim and ultimately to Green Bay. E. E. Galle & Company, Minneapolis, are now interested in the project and are endeavoring to dispose of $175,000 worth of stock.

Wisconsin Electric Railway, Oshkosh, Wis.—This company has secured options on a private right-of-way from a point opposite Bowen Street in Oshkosh to a point opposite Commercial Street in Neenah. The proposed right-of-way extends along the right-of-way of the Chicago & Northwestern Railway along the lake shore. The plan is to remove the present line between Oshkosh and Neenah from the Jackson Street road to the proposed private right-of-way. This extension will include the city of Winnebago on its line.

SHOPS AND BUILDINGS

Little Rock & Hot Springs Electric Railway, Little Rock, Ark.—This company has purchased the Toska Leymer tract of land at the end of Nineteenth Street in Little Rock, on which it plans to build its new freight terminals.

Kentucky Traction & Terminal Company, Lexington, Ky.—Definite decision regarding the recently announced plans of this company to establish larger terminal facilities in Lexington has been made. The company has taken a long-term lease on a three-story brick building in the center of the business section. The lease is effective Dec. 1. The building will be remodeled for use as a general passenger station and general offices for the company. The first floor will be fitted up for waiting rooms, while the upper part of the building will be used for office purposes.

Lake Erie & Northern Railway, Brantford, Ont.—The terminal facilities of this railway at Galt, Ont., are being made ready. It is expected that the work will be finished this year.

Sioux Falls (S. D.) Traction Company.—This company is moving its general equipment into its new carhouse and office building on North Main Avenue in Sioux Falls.

Dallas Consolidated Electric Street Railway, Dallas, Tex.—Work has been begun by this company on its new repair shops on Elm Street and Peak Street in Dallas. The structure will be 180 ft. x 150 ft. It will be used as a repair shop, and the company's present repair shop will be used as a carhouse exclusively. The cost is estimated to be about $125,000.

POWER HOUSES AND SUBSTATIONS

New York, New Haven & Hartford Railroad, Stamford, Conn.—This company plans a new substation on Pine Street, South Norwalk. The current will be taken from the power plant at Cos Cob. The new plant will cost about $75,000, of which $35,000 will be spent on a fireproof building.

Illinois Traction Company, Peoria, Ill.—This company plans the expenditure of about $75,000 in improvements to its power plant at Venice, Ill.

Louisville & Southern Indiana Traction Company, New Albany, Ind.—This company has contracted with the Louisville Gas & Electric Company to supply it with power to the extent of 500 kw until March 1, 1914, and 1000 kw thereafter. The company's own power plants are becoming inadequate, and in order to avoid the necessity of enlarging them the arrangement noted has been made.

Manhattan City & Interurban Railway, Manhattan, Kan.—This company has begun work to secure more power from the Rocky Ford power plant. New transformers, lightning arresters and other equipment will be installed.

Rochester Railway & Light Company, Rochester, N. Y.—This company is installing six new boilers at its boiler house for station No. 3 at Mill Street and Factory Street in Rochester.

London (Ont.) Street Railway.—This company will require the necessary equipment to transform 1000 hp, alternating current, as supplied by the city substation, to 550 volts a.c. as used by its lines.

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Manufactures and Supplies

ROLLING STOCK

City Railway, Dayton, Ohio, is receiving propositions for twenty pay-within type cars with maximum traction trucks. It is also investigating the center-entrance cars. The order for these cars will be placed in the near future.

Chicago (Ill.) Elevated Railways has sent out specifications asking for bids on approximately 100 motor and trail cars. These specifications call for a fireproof car body with an all-steel frame and outside sheathing and an interior finish of steel and a fire-resisting composite material. The over-all dimensions of both motor and trail cars are 48 ft. over bumpers, 8 ft. 8¼ in. over window rails and 12 ft. 3½ in. from top rail to top roof. In addition to the bodies, trucks, automatic air brakes and couplers will be purchased for all cars and motors and multiple-unit control for the motor cars.

TRADE NOTES

Watson-Stillman Company, Aldene, N. J., has moved its publicity department to its main office at Aldene, N. J.

Railway Utility Company, Chicago, Ill., has received an order from the Chicago (Ill.) City Railway to equip with utility thermometer control the electric heaters in the 100 new cars which are being built by The J. G. Brill Company.

A. C. Torbert Equipment Company, Chicago, Ill., has been incorporated with a capital stock of $10,000 to mnaufacture and deal in railway equipment, construction and industrial material. The incorporators are A. C. Torbert, F. A. Farnham and Nathan S. Smyser.

Okadee Company, Chicago, Ill., has been incorporated with a capital stock of $25,000 for the purpose of constructing, manufacturing and dealing in railway supplies and equipment. The incorporators are Marshall E. Keig, Arthur G. Hollingshead and Paul Carpenter.

Easton Car & Construction Company, Easton, Pa., has purchased the entire stock and equipment of the Ernst Wiener Company. In addition to continuing the manufacture of industrial railway equipment, cars, tracks and other appurtenances this company will also manufacture plate, tank and structural steel up to ½ in. in thickness.

Horne & Crane Engineering Company, New York, N. Y., has recently been incorporated, with offices in the Engineering Building, 114 Liberty Street, to develop and exploit the Horne & Crane system of automatic train speed control, and to conduct a general engineering business in railway and industrial specialties. Messrs. Horne and Crane were formerly connected with the car equipment department, Interborough Rapid Transit Company, New York.

Coleman Fare Box Company, Ltd., Toronto, Ont., has been incorporated under the laws of Ontario, with a capital of $75,000, to manufacture fare boxes for electric railways. It has bought the business carried on at Tottenham, Ont., by the late J. H. Coleman and the business of the Coleman Fare Box Company, incorporated under New York State laws. The Canadian works will remain at Tottenham, but the head office and sales department will be in Toronto, Ont. The directors are Acton Burrows, W. H. Knowlton, Noel Marshall, R. B. Nordheimer and A. A. Burrows, of Toronto, the last named being the manager.

Esterline Company, Indianapolis, Ind., has appointed the following sales representatives to cover the distribution of "Golden Glow" headlights for electric cars and locomotives in their respective territories: Grayson Railway Supply Company, St. Louis, Mo., covering the Southwest, including the States of Missouri, Arkansas, Oklahoma, Texas, Louisiana, Mississippi and parts of Tennessee and Kentucky; J. G. Duncan, Jr., Company, Philadelphia, Pa., covering eastern Pennsylvania, New Jersey and New York City; E. R. Mason Company, New York, N. Y., covering New York and Connecticut; Brown & Hall, St. Louis, Mo., covering Kansas and Nebraska; Electric Sales Company, Boston, Mass., covering Massachusetts and Rhode Island.

Tool Steel Gear & Pinion Company, Cincinnati, Ohio, has received a contract for the third year for gears and pinions covering the properties throughout the country controlled by Stone & Webster. The company has also received an order for 344 gears and 344 pinions to be used in the electrification of the London & Southwestern Railway, London, England. The motors for this equipment are of 200 hp and the gear is probably the largest that has thus far been made up for street railway service, having fifty-nine teeth, two-pitch, with a diameter of 30½ in. The gears will weigh about 600 lb. each when made and will be made from forged-steel blanks. Other orders recently received are: United Railways & Electric Company, Baltimore, Md., 240 gears and pinions; Texas Traction Company, 120 gears and pinions.

Prepayment Car Sales Company, New York, N. Y., has issued a circular saying: "The Ross & McDonald pay-as-you-enter basic patent (No. 800,172) has just been sustained at New York City, before Judge Holt in the United States Court for the Southern District of New York, and the royalty of $100 per car established. This decision, while upholding the company's right to be compensated for the admitted benefits which its inventions have brought in car design, is of prime importance to the entire street railway industry and to the public, as it will insure the proper application of the prepayment principle based upon the widespread experience of the inventor company." The circular is signed by T. W. Casey, president Prepayment Car Sales Company.

National Electric Specialty Company, Toledo, Ohio, has appointed H. E. Gifford, Jr., sales manager, with headquarters in Chicago. He resigned as Western representative of the L. S. Brach Supply Company to accept this position. Mr. Gifford has been in the signal business since 1905, when he went to work for the New York Central & Hudson River Railroad at Mott Haven, N. Y., as accountant in the office from which the electric zone work was handled. In May, 1906, he was appointed chief clerk to Azel Ames, then signal engineer of the electric zone. When the organization was disbanded in the latter part of 1907 he went into the accounting department of the Union Switch & Signal Company's Pennsylvania Terminal construction organization. In 1910 he entered the employ of the American Conduit Company and was later connected with the installation of the underground conduit system of the New York, Westchester & Boston Railway. In January, 1912, he was appointed Western representative for the L. S. Brach Supply Company. In his new position Mr. Gifford will handle principally the "Vac-M" lightning arresters. These devices are vacuum arresters which are adaptable for all kinds of electrical, electric light, telephone, signal and power supply installations.

ADVERTISING LITERATURE

Titanium Alloy Manufacturing Company, Niagara Falls, N. Y., has issued Bulletin No. 3 of its rail reports, containing sulphur prints and microphotographs showing cross-sections of seven standard and seven titanium-treated open-hearth rails. The results of chemical and physical tests show that (1) the treated rails average better ductility, especially in the heads, and strength than the untreated: (2) the treated steel average an increased shock resistance; (3) treated rails are less easily fractured by fatigue or constantly repeated stresses below the elastic limit, and (4) that treated rails show greater uniformity, indicating freedom from segregation and its attendant evils.

The J. G. Brill Company, Philadelphia, Pa., prints in the *Brill Magazine* an illustrated biography of Allen F. Edwards, vice-president in charge of purchases of the Detroit United Railway. Among the feature articles are the following: "Conditions Which Govern the Type of Car for City Service in Birmingham, Ala.," "Composite-Frame Cars for the Tri-City Railway Company," "Semi-Convertible Car Hit by an Engine," "Twenty-six Passenger Omnibus," "Three Construction Cars for Spain," "City and Interurban Cars for the Wilkes-Barre Railway," "Interurban Combination Cars," and "Closed Cars for South Carolina." The J. G. Brill Company has also issued a catalog containing illustrations of eighty-six different types of city and interurban passenger cars as well as many types of funeral, baggage, freight and service cars. The illustrations are accompanied by floor plans and by dimensions and weights.

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Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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NEW PROGRAM OF ENGINEERING ASSOCIATION

The proceedings of the executive committee of the American Electric Railway Engineering Association, as noted in these columns last week, show a wise desire to limit the number of subjects assigned to the several standing committees. A forceful industry like the electric railway business always has a most tempting number of problems for study, but discretion must be exercised in view of the limitations of convention week. Great progress was made when the advance printing and distribution of convention reports was instituted, yet even when such contributions are read by title only the number of subjects may be too many for an adequate discussion of all. To mention one instance: The subjects assigned to the 1912 committee on equipment covered high-grade rubber insulation, end wear on journals, self-propelled cars, squealing of steel wheels, heat-treated gears and pinions, couplers for interurban cars and end connections on same, specifications for steel wheels, wrought iron, cold-rolled axles and ordinary carbon steel axles. This report, aside from several supplements, embraces more than 110 pages of the printed proceedings of the Engineering Association. The enormous amount of research that is involved may be appreciated from the fact that the section on self-propelled cars had the best bibliography ever gathered on the subject, while the study on steel wheel specifications embodied the invention of original tapes, gages and templets. When committeemen do such work *con amore*, they may be pardoned for feeling some discouragement if time is not found for discussing their efforts. Happily, the executive committee of the Engineering Association has tried to avoid this embarrassment of riches by concentrating, during the coming year, on subjects of immediate interest, feeling that other more general topics which have been treated exhaustively before could be postponed for another year at least. Thus the equipment committee will take up the new tendencies in car lighting but will drop such subjects as self-propelled cars and specifications for axles and wrought iron.

THE NEW CHICAGO RAILWAY CONTRACTS

Under the new contracts recently executed between the electric railway systems of Chicago and the Commonwealth Edison Company the latter is able to carry out extended plans for increasing economy of distribution. The surface lines of the city divide the territory fairly well, the Chicago City Railway occupying the southern and the Chicago Railways Company the northern section. The five elevated railways, however, are superimposed upon the surface roads and the lighting system is, of course, all-pervasive. There are thus three separate electrical distributions in the same territory, each with its conduits, cables and substations. To obtain an approximately unified electrical system, the power company has entered into contracts with the railway companies by which it controls not only all generating and transmission equipment but a considerable part of the apparatus for converting a.c. to d.c. power as well. Provision has also been made for the occupation of otherwise unused space in the railway companies' substations with the lighting company's apparatus. This is a perfectly logical step in the rapid development in the power situation in Chicago, and it is economically a correct one. Entirely aside from the question as to whether the railway companies can generate electrical energy as cheaply as the Edison company or not, no one can dispute the undesirability of having three complete transmission systems supplying the same territory. A single system can not fail to be cheaper and better if it receives equal attention. In fact, all the signs of the times indicate that wholesale energy generation is bound to increase.

CONSERVATION OF WATER POWER

The one definite valuable result of the Fifth Conservation Congress, which met in Washington last week, was the adoption of a statement of principles looking to water-power development. Neither a majority nor a minority report of the water-power committee was adopted, but the congress fortunately approved the declaration of general principles upon which the members of the committee were able to act unanimously. The effect of the action taken on these principles is to commit the conservation congress to a course which should further legislation to promote the development needed so greatly. As large users of power, electric railways have a distinct concern in this matter. Water-power development will help to reduce power costs and thus to offset in slight degree the effect of the steady upward trend of nearly all other costs, both labor

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and material, which enter into electric railway operation. It will also conserve coal which would otherwise be consumed by steam power stations. Thus conservation of water-power, as the committee wisely emphasizes, is a double conservation; the value of the coal not used for specific purposes is measurable, but no one can truly measure the commercial worth of all of the energy lost by the non-utilization of natural water-power. Lost energy of the latter type is economic loss, but that fact is not so much a cause for regret at the past as it is a cause for stirring action in the future in order that non-utilization may be minimized. The declaration of principles adopted by the congress recognizes the right of the government to regulate, to receive compensation, to re-determine compensation, to prescribe accounts, to make privileges unassignable except on governmental approval and to revoke permits after a certain definite period, in which event compensation equal to a fair valuation, exclusive of franchise and consequential damages, is to be paid. It is fully recognized in the report, however, that development, with proper public safeguards, should be earnestly encouraged and hastened. In other words, the committee recognizes the public need of utilization of now wasting resources. In so doing, it names principles which, in its judgment and the judgment of the congress that accepted them, should govern franchises. The tests of the practicability of the principles will come if they are adopted as a government program and are applied generally in the effort to produce the developments which ought to be made. If they are applied reasonably under governmental auspices and are so interpreted as to attract capital and assure efficient development of now wasting resources, real conservation will result. If they are adopted or applied so rigorously as to frighten capital and prevent utilization, there will be no conservation, but continued waste.

LIGHTING STREET CARS

As our columns will bear witness, there has been greater activity in the matter of improving the lighting of street cars within the past year than in the previous decade. We have published within a few weeks a group of interesting and important studies on the technique of car lighting, and it may not be inappropriate here to consider the subject in general. Those who complain of the methods commonly used must realize that a street car is for several reasons one of the most difficult interiors to light properly. In the first place, aside from all difficulties which reside in the proper supporting of the lamps, the physical conditions present about the maximum of difficulty from an illuminating standpoint. That is to say, a street car is long and narrow with insufficient head room for the easy placing of fixtures, with seats generally running lengthwise and with sides mostly composed of windows through which the light may stream unobstructed unless they are covered by dark curtains, which makes the matter no better. Besides this, it has been customary to give the interior woodwork of street cars a rather dark finish. We have, therefore, to deal with what is practically a long and narrow room with little or no diffusion from the wall surface, and we are expected to give good light at least along the two sides without placing lights where they will shine in the eyes of the passengers. The obstacles in the way of meeting the requirements are very great, and it is small wonder that results have been often unsatisfactory. The amount of light required, too, in a car, say at least 2½ or 3 foot-candles, demands a considerable expenditure of energy unless the lights are highly efficient and very carefully placed.

The present increasing use of the drawn-wire tungsten lamp has given greater promise of successful car lighting than has ever been in sight before, and recent experiments show that excellent results are thus obtained. There seems to be little doubt that the best place for the lamps, both theoretically and practically, is found in center-deck lighting where the lights are in a single row at the roof of the car. In this position the lights are above the heads even of standing passengers and in good position to throw the light downward along the two lines of seats at a very effective angle. Furthermore, lights in this position mean greater simplicity and lower cost in the wiring, to say nothing of lessened general maintenance and the easy possibility of using larger tungsten lamps and hence lamps with stouter filaments and more resistant to shock. The amount of energy required, from recent experiments with the present standard railway tungsten lamps and in ordinary cars using lights installed under good reflectors, is about 1.25 watts per square foot of area. Ordinary glass reflectors of the kinds which have proved highly efficient in general illuminating work are well suited to car work, but they must be provided with special appliances to prevent their jarring loose and falling on the heads of the passengers. Suitable holders have been devised to meet this requirement. The reflectors themselves, whatever the material, must be such as give a medium angle of distribution, and this type is fortunately the one most easily made in a variety of shapes and textures. Whatever the reflectors, they ought to be deep enough to prevent the lamp filament from being too much in evidence.

In regard to further improvement it must be remembered that a light finish is important in securing sufficient illumination. The difference in the actual illumination secured in a given car finished in dark mahogany and the same car finished in light maple is sufficient to render possible an economy in energy in the latter case which would show up handsomely at the end of the year. Pale yellowish tints, either in natural wood or in paint, are by far the best, aside from downright white, from the standpoint of illumination. Given a light interior surface, particularly in the center deck, one can utilize semi-indirect or wholly indirect lighting with a fair degree of efficiency. The former would probably have to be on a basis of about 1½ watts per square foot and the latter somewhere about 2 watts. Either is pleasanter in its effect than direct illumination as used in cars, where the lights have at best to be set rather low and are particularly difficult to screen properly. Most illuminating engineers consider semi-indirect lighting as rather preferable to wholly indirect, but either can be made to give admirable results in cars, and these methods are altogether worthy of encouragement, especially in the case of interurban traffic, where passengers have to ride considerable distances and generally settle down to read. We are rather inclined to think, too, that, given a proper interior finish, the total light flux required in semi-indirect and indirect lighting may be reduced to a figure that will not

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render these methods at all unduly expensive, while the fixtures for them are easily maintained and simply wired.

We are glad to see the keen interest in the better illumination of cars and particularly the tendency toward getting rid of the bare lamps which have so long brought unnecessary discomfort to the traveling public. The problem of good illumination has now fortunately been sufficiently worked out to insure rapid progress in the near future.

THE PROPOSED ASSOCIATION OF ELECTRIC RAILWAY PURCHASING AGENTS

The letters which we published last week from five purchasing agents on the desirability of an organization of purchasing agents, somewhat along the lines of the other affiliated associations of the American Electric Railway Association, are in answer to the original suggestion, made in our issue of Nov. 8 by E. E. Stigall, purchasing agent Metropolitan Street Railway, Kansas City. These letters and the other expressions of opinion which we have received are, on the whole, favorable to the plan. The only objection which has been raised is that there may be a lack of topics to consider. We have no fear on this score. Practically the same thought was suggested at the time of the formation of the other affiliated associations, but the union of many minds soon proved that the difficulty in each case was not the lack of subjects which it was profitable to discuss but the embarrassment of making a selection among a great many important topics.

These questions, in the cases of an association of purchasing agents, would include not only methods of procedure, where the discussion should help to develop the best methods for roads of different sizes, but would also include the question of stores, so far as the purchasing agent had charge of the storeroom. Moreover, we do not see any reason why such an association could not also discuss prices. Indeed, such a plan would be in line with the principle of open prices recently adopted by the manufacturers of manganese steel, and, in commenting on the manganese steel open-price society in a recent issue of this paper, Mr. Eddy, who took a large part in the organization of the society, suggested that the plan was as well adapted for the purchaser as for the manufacturer and that there need be no reason why the purchasing agents of the different railroads should not interchange the prices which they pay for all purchases.

Finally, the purchasing agent comes into touch with each of the other associations in a more intimate way, perhaps, than any other branch of service. This should give an opportunity for instructive joint meetings of the purchasing association with the Engineering Association, for instance, at which the relations of price to quality of engineering apparatus could be considered, and with the Accountants' Association, at which the question of accounts could be discussed from the standpoint of the purchasing agent. We also see very close lines of connection between the purchasing agents and the Transportation & Traffic Association and also, although perhaps not to the same extent, between the purchasing agents and the Claims Association. Altogether, the opportunities for useful work on the part of such an organization seem inexhaustible.

THE COPYING OF CORPORATE RECORDS

A decision just handed down by Associate Justice Haley of the Supreme Court of Maine in a case against the Commonwealth Power, Railway & Light Company is of vital interest to the immense number of corporations that have taken out their charters in that State. The ruling, in its general interpretation, is to the effect that any stockholder in a Maine corporation, although he hold but one share of stock, is entitled to have access to the corporate stock ledger, stock transfer book and other corporate books for the purpose not only of inspecting them but even of making a copy of the list of stockholders. The Maine law recognizes, as does the penal or corporation law of most states, the right of stockholders to inspect the corporate books at the principal office or place of business during the usual business hours, but never before, so far as we know, has such an unrestricted recognition been made by the court of the stockholders' right to take off copies therefrom. Some state jurisdictions, it is true, allow stockholders to copy any section of the minute book that they may desire to obtain. In the matter of copying the list of corporate stockholders, however, the right of each shareholder to do so, if recognized at all, is usually restricted to securing a printed alphabetical list of stockholders without addresses. The present decision apparently sweeps away this restriction and gives any stockholder access to the complete mailing list.

One of the evils against which corporation officials and agents have always tried to guard has been the activities of the corporation parasites who frequently endeavor by stealth or force to obtain the names of stockholders for the sake of profiting by their sale. In the light of the decision in question it seems that a mere temporary purchase of one share of stock is sufficient to enable a person to copy the corporate records. In fact, in the case in point the plaintiff became suddenly interested in the personnel of the stock-holding body only two weeks after he had purchased his single share, a fact which tends to refute the claim of any legitimate interest in the list. If the claimant had been an old stockholder, who because of dissatisfaction with the existing management desired to organize an opposition party, his demand to be allowed to copy the list of stockholders would, we believe, have been justified.

Of course, the line of demarcation between the commercializing of the list and its legitimate use within the stockholding body is not always clear, which brings the queston down to a proper one of the specific facts in each case. Under New York, New Jersey and Pennsylvania law, the right even to inspect the corporate books is not absolute but must have reference to an election of directors or otherwise be germane to a person's status as stockholder. This right exists also only in common law and is enforced by mandamus only when the exercise is sought in good faith and for a specific purpose that the court will recognize. These are restrictions which ought doubly to obtain in connection with the right to copy the corporate records. We hope that when the full Maine Supreme Court renders its decision in the case mentioned it will act more in accordance with the decisions and practices which obtain in other states in this country.

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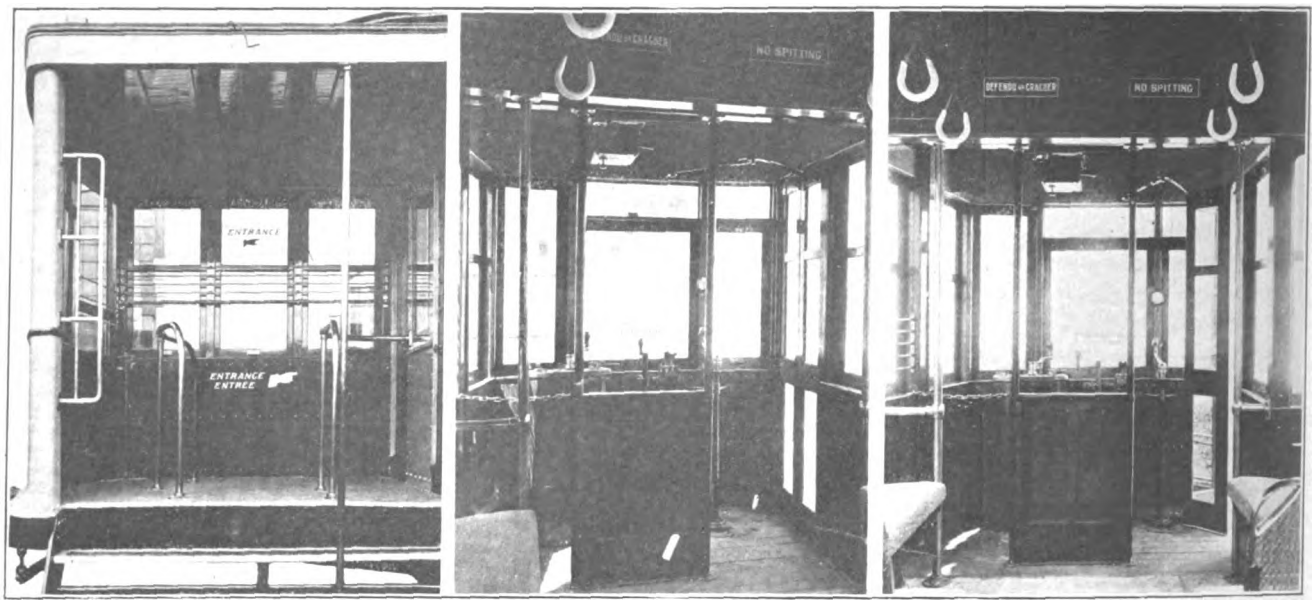
Latest Features of Montreal Cars

The Article Describes a Number of Improvements Such as Arch Roofs, Wooden Cushions for Bumpers of Steel Cars, Method of Getting Clean Air for Ventilation, Door Mechanism, Sign Practice, Etc.

In addition to the twenty-five motor and twenty-five trail cars for train service, as described in the ELECTRIC RAILWAY JOURNAL for Oct. 25, 1913, the Montreal Tramways Company had placed an order in December, 1912, for 225 standard motor cars with Westinghouse 533-T-4 equipments. This order was divided equally between the Canadian Car & Foundry Company and the Ottawa Car Company. The new cars embody several improvements which have lately been applied to reconstructed cars under the direction of D. E. Blair, superintendent of rolling stock, and they also have several other features which have been standard Montreal practice for a number of years past. Particulars of these betterments follow.



Montreal Cars—Rear Platform and Two Views at Front of Car, Showing All-Glass Door, Absence of Bulkhead and Door Levers

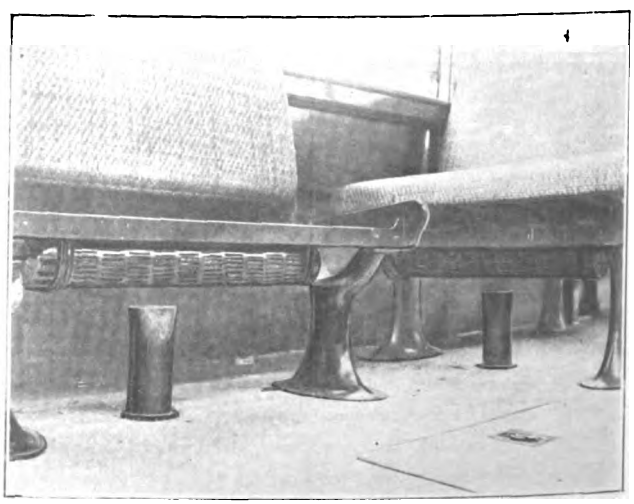
DIMENSIONS AND CONSTRUCTIONAL FEATURES

The new cars are 45 ft. 8½ in. over the platform end sills, 32 ft. 3 in. between the bulkheads and 20 ft. 8 in. between truck centers. The front platform is 5 ft. 7¾ in. outside width and the rear platform 7 ft. 9¾ in. outside width. All-steel underframes are used, the largest sections being 4-in. channel side sills. The corners are strengthened with reinforced and flanged gusset plates. The body bolster is of diamond shape, including channel sections as follows: 10-in. lower member, 12-in. upper member, 6-in. center braces, 18-in. separators. The sides of the car as shown in the accompanying cross-sections are of ¼-in. steel to a height of 18 in. with 1 16-in. plate for the next 15 in. to the bottom of the window sill. The posts are 1⅞ in. wide and only 2¾ in. thick, but to compensate for this an outer strap of 3 16-in. steel is installed from the top of the ¼-in. side plate over the window sill to the letterboard, thus affording an extremely strong reinforcement to the car side. The panels are covered with ¼-in. Agasote for heat insulation. The vestibule and roof of the car are of wood.

The only wood used at the floor level is that for filling the motor trap doors, but the doors themselves are framed with angle iron. The floor foundation is of the Keystone steel type. It is covered with a one-piece vulcanized inlaid rubber carpet which has been standard by the Montreal system since it was first tried in 1904. Not one installation has yet worn out on the 325 cars on which this flooring is used. The combination is very durable and highly sanitary because it is non-absorbent and easily cleaned. The carpet costs 65 cents per square foot, or $140 per car, consisting of the top dressing of 1 16-in. highest grade rubber and ⅛-in. lower grade rubber, vulcanized in turn to 1 16-in. jute. This combination is cemented to the steel foundation. The cement dressing is also applied along the sides of the car so that all water will be discharged toward the center.

ROOF CHANGES, VENTILATION AND HEATING

Like so many other companies, the Montreal Street Railway has adopted the single-arch roof, the first cars of this type having been ordered during December, 1912. Each roof is fitted with eight Perry or Garland ventilators, which are placed in pairs. The difficulty of supplying clean air from openings near the street level has been solved by means of the dust deflector box shown in an accompanying



Montreal Cars—Air Inlets Under Electric Heaters

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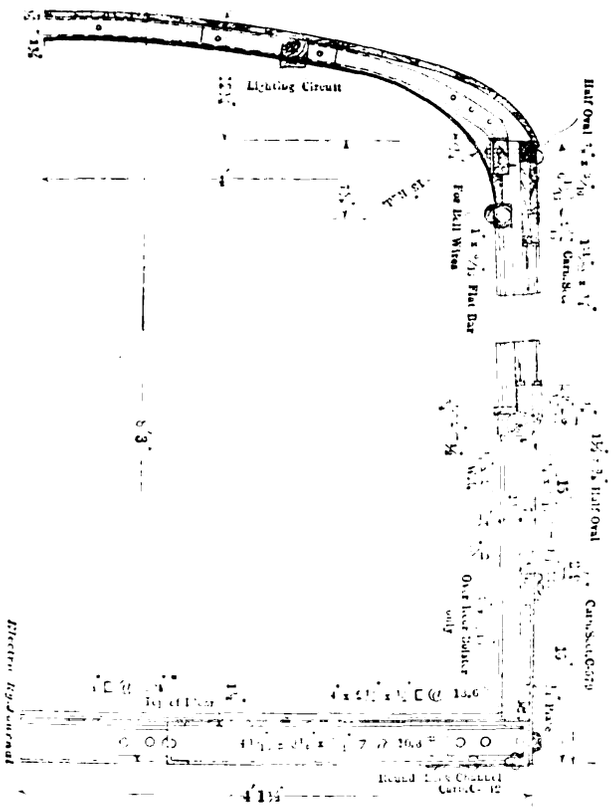
drawing. This consists merely of an open galvanized iron box containing a pair of deflectors. For the single-end cars standard in Montreal these deflectors are so placed that the dust particles of the entering air are forced downward and out at the rear as they impinge against the larger deflector. The cleansed air passes through the floor of

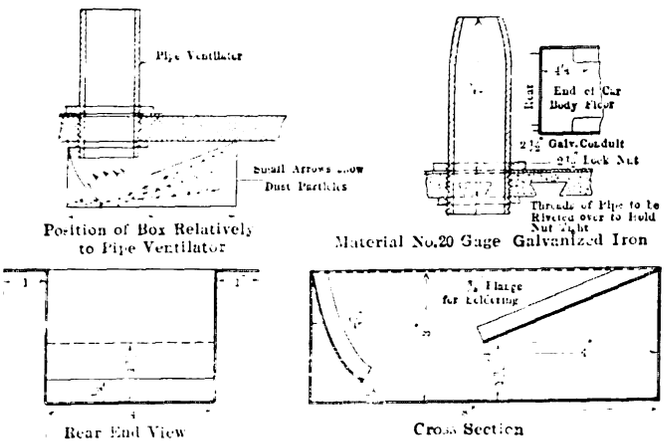


Montreal Cars—Half Cross-Section of Single-Arch Car

the car via a 2½-in. pipe up to the electric heaters, as shown in an accompanying halftone illustration. The deflector box avoids the troubles due to clogged screens, while the effectiveness of the ventilation scheme as a whole is clear from the fact that the car windows will not collect frost even in the most severe weather.

PLATFORMS

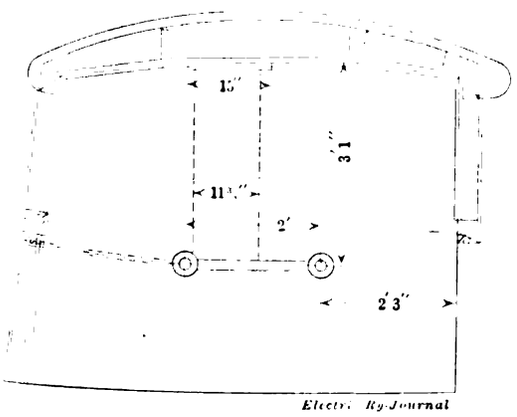
As the pioneer prepayment system, the Montreal Street Railway has done quite a little experimenting in platform length. The front platform, which is used only for exit, has been maintained at 5 ft. 3 in., but the rear platform at one time attained the great length of 9 ft. Both platforms are bolted to the car-body members to facilitate repairs. The new cars have rear platforms with 7 ft. clear space, a size which has been found satisfactory in giving ample room for exit and entrance aisles as well as a place for smokers. The 9-ft. platforms of the older cars have been reduced to 7 ft. also. The oxy-acetylene process was used to cut down the sill members. Montreal rear platforms are open on the operating end and are reached by two fixed steps with 9-in. risers. The distance from the ground to the first tread is 16 in. with the 33-in. diameter wheels new. The rear bulkhead is furnished with a swinging en-



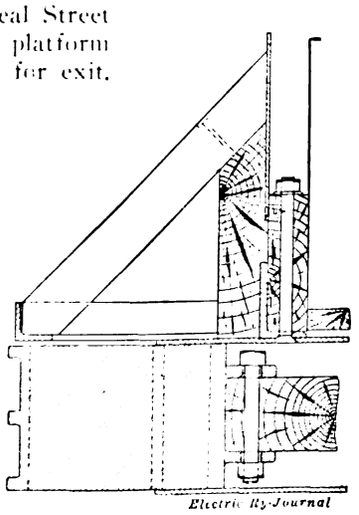
Montreal Cars—Deflector Box for Obtaining Purified Air

trance and a sliding exit door. The rather ornate grab-handles illustrated have been common to Montreal from ante-prepayment days.

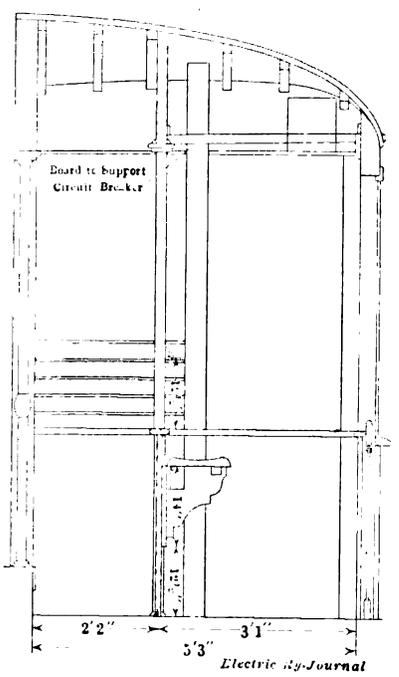
An important change has been made at the front by the practical elimination of the bulkhead. Formerly a bulkhead was carried across the car except for a 24-in. doorless opening at the exit side. However, as the front platform is fully vestibuled, this construction has been superseded except for a panel 2 ft. wide x 3 ft. high from which the motorman's seat is carried. This panel is placed 3 ft. 1 in. behind the middle section of the vestibule sash. The passage to the exit door has also been increased from 24 in. to 27 in. while a chain serves to prevent passengers from using the opening at the left of the motorman. A very important result of this change is to give ample room for a motorman-instructor without his being in the way of the passengers. The views of the folding exit door show the application of clear glass for all panels.



Plan of Front Platform



Wooden Buffer Block



Elevation of Cab

CUSHIONED BUMPERS

The Montreal Company found that a disadvantageous feature of steel cars, as ordinarily constructed, is the tendency toward the loosening of rivets and buckling of members under impacts which, within certain limits, would be

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readily absorbed by a wooden car. The shock of steel against steel at only 2 m.p.h. was enough to produce serious damage. To avoid trouble from this source in the future, the continuous bumper channel has been superseded by the construction illustrated in which a central box girder with a cushion block of ash is used. This construction has

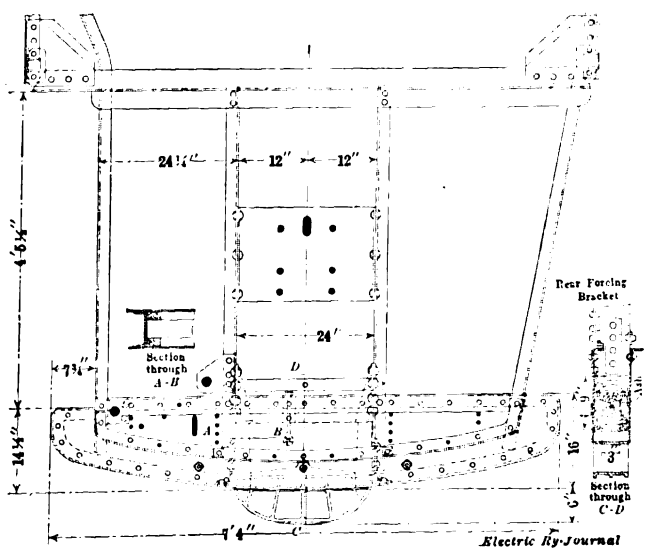
Montreal Cars—Under-Platform Levers, Door Closed and Locked

Montreal Cars—Under-Platform Levers with Door Open; Motorman's Handle Shaft at Left and Door-Hinge Shaft at Lower Right-Hand Corner

been found capable of absorbing impacts of 5 m.p.h. without starting a rivet.

DOOR MECHANISM

Until very recently the exit door on the front platform was of the swinging type. In the latest car a two-leaf folding door is used instead. The simplified mechanism devised for operating these doors eliminates all guides and thus avoids the possibility of jamming. The leverage which is obtained with this mechanism is ample to operate the doors readily. The device is manipulated just like an ordinary hand brake, the spindle and rod for this purpose being

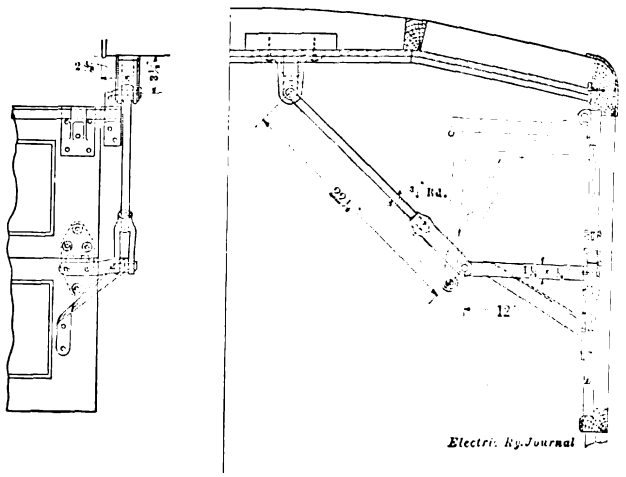


Montreal Cars—Wood-Backed Buffer for Steel-Frame Street Car

conveniently placed between the controller and air brake. To close the doors, for example, the motorman moves this spindle one-half turn, thereby shifting the levers under the platform from their open to their closed positions, as shown in one pair of the accompanying halftones. This movement is transmitted by means of a shaft which is attached to one leaf of the door at the floor line. Near the top of the other leaf is screwed a V-shaped pattern of 1¼-in. x ¼-in. strap which swivels in the prong of a ¾-in. rod which is anchored in the vestibule framing. This rod is threaded at the forked end to permit adjustments. Two accompanying halftones show the position of the vestibule apparatus with the doors closed and open while the same positions are indicated in the drawing by means of full and dotted lines.

SEATING PLAN

The seating is still a combination of transverse and longi-

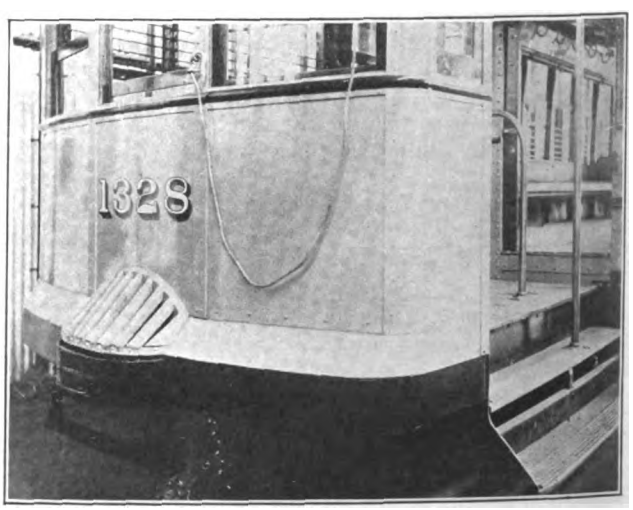


Montreal Cars—Door Lever Arrangement in Vestibule

tudinal types, but the arrangement of the standard 32-ft. 3-in. body has been modified as follows: longitudinal seating at rear lengthened from 7 ft. 10¾ in. to double that dimension; longitudinal seating at the front shortened from 7 ft. 10¼ in. to 34½ in., and the intermediate pairs of transverse seats reduced from five to four. This new plan is clearly more logical than the old one because balance in seating is not desirable in single-end cars.

INSIDE SIGNS

Instead of painting or frosting signs or rules on glass, the company uses a process similar to that of the colored transfer pictures so popular with children. These signs cost only 3 cents to 5 cents each and remain on the glass



Montreal Cars—New Bumper with Wood-Block Backing to Absorb Shocks

despite any number of washings. The materials are furnished by a French firm.

According to a report from the British consul at St. Michaels, the Junta Geral of Ponta Delgrada is prepared to receive tenders for a concession to construct a narrow-gage electric railway, with power station, in the Azores, from Ponta Delgrada to Furnas, with a branch to Riberia Grande. So far as possible the line will run on public roads. The concession is for eighty years, at the end of which the railway will revert to the government. The total cost is estimated at about $1,000,000.

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Errors in the Interpretation of Tests for Electrolysis

The Author Shows that These Errors Will Often Lead to the Drawing of Entirely Wrong Conclusions from the Tests—The "Indirect" Method of Measuring the Currents Is Among Those Criticised

BY CARL HERING

Electrical engineering is justly termed the most exact of all branches of engineering, because the measurements, calculations and predeterminations may be made with a greater accuracy, positiveness and reliability than in other kinds of engineering. Nevertheless, there are still three fields in this branch of science which are open to the charlatan for duping the public with sheer nonsense clothed in apparently serious terms, namely, those pertaining to the electric belt, the lightning rod and "electrolysis," in the sense in which that term is used in connection with corrosion by currents from electric railways.

While much could be written upon electrolysis, the purpose of the present note is merely to point out a few of the errors which are not infrequently made in connection with it by those who profess to know, and in some cases by those who ought to know better. In the latter case a more charitable term to use is "carelessness." The fact that the things under consideration are buried underground where they are inaccessible for disproving the assertions leads to carelessness and liberty in making assertions. If physicians could not so easily bury their faults, mistakes and results of ignorance 6 ft. underground, they would no doubt do a little more studying and be more careful in what they say and do, with an assumed but often unwarranted positiveness.

It has been repeatedly stated that if the voltage measured between two buried conductors is high the mysterious iron-eating current becomes ravenous. As a matter of fact it may be, and doubtless often is, just the reverse. Suppose two pipes which are not in contact with each other to be buried in a box of perfectly dry sand and suppose a high voltage to be applied to them; absolutely no current would flow from one to the other, notwithstanding the cry of danger, based on the high voltage. Now suppose a low voltage was applied to them and a bucket of lye was poured over the sand. A very destructive current would then flow between them, although they would be considered "safe" because the voltage was low.

A voltage reading alone is therefore no criterion at all; the actual results may be the reverse of those supposed. A high voltage merely indicates a stronger tendency for a great current to flow, but a low voltage by no means indicates that a very large current is not flowing.

Moreover, an existing voltage may be merely what might be called "static"; that is to say, without any energy behind it actually to produce a current. It is then quite harmless from the standpoint of electrolysis and practically disappears when the two points are connected with an ammeter. For purposes of distinction the other kind of voltage might appropriately be called "dynamic." Therefore the internal resistance of the voltmeter may often be a very important factor in the measurement, for if too low, it may give quite false results.

The supposed voltage of the "ground" is sometimes measured by driving a "stake" into the earth, old iron pipes being often used for this purpose. Sometimes one stake happens to be a galvanized pipe while the other is a rusted one. In such a case a voltage which was not present before could be found to exist because the zinc and the rust form a depolarized battery. Consequently, not the ground but the one who is making the tests is responsible for the voltage.

To be sure of what is actually going on, it is necessary to find out also whether or not a current is flowing, and if so, how much. This determination is not always simple and easy, as will be shown below, and this is especially the case for one who is not well versed in such measurements. Even if a current is found to be flowing in a pipe, it does not necessarily follow that this current is doing damage. It may be flowing out of the pipe quite harmlessly through a metallic connection instead of through an electrolyte like the liquids in the ground.

It has been asserted that, as the surface of pipes is large, quite a large current could be permitted to leave a pipe without doing much more damage than the usual and expected rusting. It is thereby assumed that the current leaves the pipe evenly distributed over its large surface. But the probabilities are generally quite strong that the contrary is the fact and that the outflow will concentrate itself in one relatively small part where the conditions for its leaving the pipe and finding its way "home" are the most favorable. Thus, such a supposedly harmless current may then do serious damage.

It has also been asserted that at least a certain voltage is required to make the current flow out; that is to say, that a certain counter electromotive force must first be overcome before a current can flow at all; hence below this voltage there can be no current. This is also an error. The so-called counter electromotive force of iron when the current leaves it may actually be negative and probably generally is so. Hence it tends actually to produce a current itself without external help, and if a good depolarizer happens to be present at the corresponding cathode such a self-generated current would very likely flow and corrode the iron. In other words, this would be a case of damage for which the railway currents would in many cases be held responsible even though they were not at all to blame.

Pitting, which is often believed to establish the fact that the corrosion was electrolytic, may also be caused by such self-generated currents if the stream of current happens to be localized at points by the surrounding soil or by holes in the paint on the pipe. On the other hand, the resistance, or, better, the virtual resistance, from a metal surface to the ground may be very high, so high, in fact, that at times it probably acts as a moderate insulator. The difficulties of making a good low-resistance connection with the ground for a large current are well known to those who have tried it. The ground itself seems to have a rather low resistance after the current penetrates some distance and gets well distributed in it.

Measurements have been made in all seriousness with a volt and ammeter to obtain the ohmic resistance of "the ground" between the tracks and a line of pipe, or between two lines of pipe, while currents are flowing in both and while a voltage exists between them; yet can anyone say what such a measured resistance signifies? It must necessarily embrace the whole globe and include the earth as far as our antipodes in Australia. The voltage between them is then divided by this resistance to get the current flowing between them, on the plea that this is Ohm's law and that that law is correct! A part of that calculated current must then necessarily flow through Australia also; hence the claims for damages might involve international complications! Practically all of the real effective resistance is probably only in the immediate surrounding of the pipe. The resistance between two plates in the ocean is

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said to be nearly the same whether they are a few feet or many miles apart.

Sometimes a very large current is made to flow when a pipe is connected to a track through a low resistance. It looks startling, spectacular and serious, and it worries the uninitiated; yet it may not signify any real danger. A pipe may be positive to a nearby track and hence be in the so-called danger zone yet be quite free from danger, because the ground between them, including perhaps some other conductor, may be positive to the pipe.

Much has been said on paper about pipes being eaten away at a poor joint, hence the assertion about the danger of currents flowing lengthwise through a line of pipe. But have these cases been found as often as they have been talked and written about? If this is so serious, why are not the actual cases of such "sawed-off" pipes more numerous? The probabilities in such cases are that owing to the high surface resistance the current generally gets into the ground over a larger area and is not confined chiefly to a ring around the pipe right at the bad joint, which would be the cause of the "sawed-off" effect.

Another not infrequent error may arise when one measures and expresses a true voltage in terms of a resistance in ohms. This practice may lead to seriously false conclusions. A counter electromotive force is physically a very different thing from a resistance, even though both act jointly to oppose the flow of a current. While at times the measurement of volts in terms of ohms may be justified and correct for certain purposes, it should be done only by those who understand clearly what they are doing.

In many cases one of the most difficult measurements to make properly and reliably in tests for electrolysis is that of the currents flowing in inaccessible, buried conductors or through the ground. At the same time this is often one of the most important measurements to make, for as shown hereinbefore a mere voltage alone is not conclusive. The usual way of measuring such currents in pipes is to "assume" the resistance of a piece of the pipe and then divide this into the drop of voltage. This, at times, is a very useful and convenient expedient for a very crude approximate measurement, but the error in the result is just as great as the error in the assumption. The actual resistance of a buried pipe may be quite different from that of samples of new pipe on which the tabulated figures are based. The writer has found discrepancies of as much as 100 per cent between the actual and the tabulated assumed resistance of pipes. Moreover, in crossing valleys a line of water pipe probably has much thicker walls than over hills, and it would not be possible to determine this thickness from the outside appearance.

A practical method for really measuring such resistances of buried pipes in place was described in this journal by the writer in the issue for Oct. 11, 1913. Another method, and one which is often used, is called "the indirect" method, as though there was only one! To dignify a method by a name is thought to give it a cloak of respectability. But let us examine this well-known and much-used method and see to what serious absurdities it may lead.

The method consists in measuring the voltage E between two points, say on a pipe, rail, column, bridge, reinforcement, etc., through which current is supposed to be flowing and which current is to be measured. Then the investigator connects an ammeter between those points and measures the current I through it and at the same time the new and lower voltage e at these points. Then the current which was flowing normally through this conductor is calculated from the formula $EI/(E-e)$.

To test this method, assume that the voltage which produces this current is impressed on the pipe at some distant places, which will almost always be the case and is therefore quite normal. Hence the current goes through some resistances before it gets to the piece under test.

For the sake of convenience in figures, let this unknown resistance be 1 ohm, and let the piece under test have 10 ohms, while the original voltage which causes the current is 11 volts. The normal current flowing through the piece under test is therefore just 1 amp, and the voltage E at the two points under test will be 10. Now connect an ammeter between these points having a resistance, including its leads, of 0.5 ohm. It will then read about 7.1 amp and e will be found to be about 3.55 volts, from which the calculated current obtained by the foregoing formula will be about 11 amp while before it was shown that it really is 1 amp. The error is therefore enormous, more than 1000 per cent. In practice the real current is not known, hence one does not know the error he is making and accepts the result.

One who is careful enough to analyze the theory of this method will find that it is based on the assumption that the total current which actually is flowing between these two points is the same before and while the ammeter is applied. But how is the one who makes the test to know that this unknown current is or is not the same? It depends entirely upon where the voltage is applied, and this is generally unknown. It may be thought safe to assume that the current is constant when the piece under test is known to have only a small part of that total resistance which determines the current, that is to say, when it is only a short piece of a long line of track or pipe. Even this assumes that one knows where the voltage is really applied, which may be a dangerous assumption.

The "indirect" method may lead to still worse absurdities, as shown, for instance, in the following practical case.

The drop of voltage between two fire plugs connected to a long line of 16-in. cast-iron water pipe, at two points 100 ft. apart, is found to be 500 millivolts, which would seem to be serious. The normal resistivity of such a pipe may be of the order of about 0.01 milliohm per foot, so that the resistance of 100 ft. should be about 1 milliohm. Hence the calculated current which is flowing would be 500 amp, a quantity quite important and possibly quite serious.

To find out whether this is true and to confirm it, the "indirect" method is applied. The ammeter is connected and reads 250 amp, and the reduced voltage e is found to be 250 millivolts, or just half of the former E. The current calculated from these observations will then be 500 amp, confirming the first estimated value so nicely that it would generally be accepted as a proof. Two entirely different methods have given the same result; the tester is satisfied, and the pipe owner is worried. As a matter of fact, and in spite of these readings and tests, a perfectly insulating joint existed in this 100 ft. of pipe under test, and normally absolutely no current was flowing through this pipe under these conditions, showing how seriously wrong the results of these measurements may be. Since the method gives the same results whether the current is really flowing or not, it is totally unreliable in this form.

Any one wishing to confirm this statement by analysis can readily do so. Assume the circuit under test to be broken; assume the original voltage to be 500 millivolts, applied at two points beyond the piece under test, and the resistance of the rest of the pipe between these points and not under test to be 1 milliohm. By applying the "indirect" method, the values of E, e and I given above will then be found to be obtained.

This is not at all a tricky case but is one which may easily arise. For example, an instance occurred in which it was thought that the circuit was continuous while as a matter of fact it was not. Moreover, if the joint does not insulate absolutely but only poorly, serious errors will also result, though they may not be quite so large.

The foregoing illustrations will show what wrong and deceptive results can be obtained by the interpretations of the careless or the unskilled, and they emphasize the importance of making such measurements and interpretations with intelligence and care.

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PLANS OF INTERSTATE COMMERCE COMMISSION FOR RAILWAY VALUATION

The Interstate Commerce Commission will have an extensive organization in order to comply with the act of Congress directing the valuation of railways and other interstate agencies of commerce over which it has jurisdiction. The organization is still far from complete, but the commission has made much progress with the plan and has perfected the general outlines of the methods which will be followed.

The work of valuation will be directly in charge of Charles A. Prouty, of Vermont, who has presented his resignation as a member of the commission to President Wilson in order that he may take up his new duties. He will be known as the director of valuations and, subject to the Interstate Commerce Commission, will have complete authority over all features of the work. The organization in this branch of the commission's activities will report to him.

The general lines of this organization were considered carefully by the commission in conference with a temporary advisory committee which has now completed its labors and will not have active connection with the work itself. This advisory committee was composed of Charles F. Staples, member of the Minnesota Railroad and Warehouse Commission; Prof. Edward W. Bemis, of Chicago; Prof. Henry C. Adams, of Ann Arbor, Mich., formerly statistician of the Interstate Commerce Commission; John Lancaster Williams, Assistant Secretary of the Treasury, and Oscar T. Crosby, of Wilmington, Del. It is the intention to create another advisory or advising committee to discuss questions with the commission as they arise in the future, but the personnel of this committee has not been entirely decided.

The commission will make every effort to surround itself with men who have given attention to the matters of railroad regulation and valuation. It is expected that Mr. Staples, who has had long experience as a member of the Minnesota commission, will be a member of the new advisory board. In view of the appointment by the steam railroads of leading attorneys to represent them in the legal aspects of the subject, the commission felt that it would be desirable to have an attorney to represent it in all phases of the valuation from the beginning. With that object in mind, the commission has asked John H. Roemer, chairman of the Railroad Commission of Wisconsin, to take this office, and Mr. Roemer now has the matter under consideration.

The work of valuation will be handled by the commission through a regularly constituted division of valuation corresponding to other divisions in the organization of the commission, such as the division of statistics, the division of accounts, etc. The direction of the engineering organization will be in charge of a board of engineers of which there will be five members, as follows: E. F. Wendt, Prof. W. D. Pence, R. A. Thompson, J. S. Worley and Howard M. Jones. These engineers were appointed directly by the commission. Each will be in direct charge of one of the districts into which the commission has divided the country for the purpose of facilitating the work. Mr. Wendt will be stationed at Washington and will have the direction of the Eastern territory, comprising Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, North Carolina, Pennsylvania, Rhode Island, Vermont, Virginia and West Virginia. Professor Pence will make his headquarters at Chicago and will have charge of the central district, comprising Arkansas, Illinois, Iowa, Louisiana, Michigan, Minnesota and Wisconsin. Mr. Worley will make his headquarters at Kansas City and will have charge of the territory comprising Colorado, Indian Territory, Kansas, Missouri, Nebraska, North Dakota, Oklahoma, South Dakota and Texas. Mr. Thompson, with headquarters at San Francisco, will have charge of the Pacific territory, including Alaska, Arizona, California, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington and Wyoming. Mr. Jones will have headquarters at Chattanooga, Tenn., and will direct the work in the Southern territory, comprising Alabama, Florida, Georgia, Indiana, Kentucky, Mississippi, Ohio, Panama, Porto Rico, South Carolina and Tennessee. Each of these districts includes approximately 50,000 miles of railroad track.

As it is expected that the supervisory and consulting duties of members of the board of engineers will require their presence at Washington frequently for conference with the commission, it was decided to have a district engineer in each division, who will report directly to the members of the board of engineers responsible for the respective divisions. With this method of organization no delay will result from the necessary absence of members of the board of engineers from their respective territories. The district engineers have been appointed directly by the Inter-State Commerce Commission. The district engineers are as follows: Eastern district, Frank Rhea; central district, D. V. Moore; Kansas City district, Carl C. Witt; Pacific district, F. L. Pitman; Southern district, John Y. Bayliss. In accordance with the policy laid down by President Wilson, it is understood that all appointments to offices below the rank of those named are to be made through the Civil Service Commission. It is stated that about 40,000 applications for appointments in connection with this work were received by the Civil Service Commission. The Civil Service Commission has practically finished the analysis of the applications and the certification of names for the Interstate Commerce Commssion.

The headquarters of the division of valuation will be located in a building one block from the headquarters of the Interstate Commerce Commission, which was formerly occupied by the division of statistics and accounts.

Pending the completion of the organization the commission has been giving consideration to a general plan of work and to such initial steps as should be taken to prepare for the greater task of the future. Under date of Aug. 1, the commission issued a tentative draft of regulations for maps and profiles, asking carriers for suggestions for modifications. The second tentative draft was issued under date of Oct. 2 and this requested carriers to offer such criticism and suggestions regarding the regulations as might be helpful to the commission in the preparation of the final specifications for authoritative issue. It is expected therefore that the final authoritative specifications will be issued within a short time.

There is no expectation on the part of the commission that the figures showing the results of the valuation will be available within two years at any rate.

ELECTRIC LINE BETWEEN TOKYO AND YOKOHAMA

In preparation for the increased traffic which is expected between Yokohama and Tokyo (a distance of 18 miles) when the electrification of the present railway line is completed in the spring of 1914, the Japanese imperial government's railway bureau has been improving the roadbed and increasing the number of tracks on this line from two to four. The central power station, which is to supply the current, is shortly to be completed at Kabata, midway between the capital city and Yokohama. On completion of this power house the Tokyo elevated railway line will receive its current from the central plant. This road is the Yamanote line, which runs through the suburbs of Tokyo from Uyeno station on the north of Tokyo and Gofukubashi through the heart of the city opposite the new central railway depot now under construction. The new plant will lessen the strain on the Tokyo city plant, which for some time has been unable to supply all the current needed in the city.

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New Railway Power Contracts in Chicago

The Power Contracts Between the Surface Railways of Chicago and the Commonwealth Edison Company Have Been Revised in Several Important Particulars, and the New Arrangement Is Expected to Apply During the Remaining Life of the Railways' Franchises—The Changes Are Published in Outline

Revised contracts covering power supply during the remaining life of the railway companies' franchises have recently been executed between the Commonwealth Edison Company of Chicago on the one hand and the companies operating elevated and surface railways on the other. Under these contracts, as a result of the more efficient use of generating and distributing equipment provided for, energy will be furnished to net a lower price than before and at the same time more reliable service will be given.

The Commonwealth Edison Company has consistently maintained that it is uneconomical to supply the same territory by means of more than one system of electrical transmission. For several years past the company has supplied all of the power requirements of the Chicago City Railways and part of those of the elevated railways and the Chicago Railways. The railway portion of the output of its power plants has rapidly increased until it is 70 per cent of the total. These plants have been enlarged to care for the increased demand while the few existing railway power stations are being gradually put out of commission.

The Edison company has been supplying twenty-five-cycle, three-phase power at 9000 volts pressure to substations owned and operated by the railway companies. In addition it has operated substations in the same territory for the purpose of transforming the high-voltage three-phase current into the 4000-volt, three-phase form for distribution by the four-wire system at 2300 volts, single-phase, to the lighting and industrial power circuits. The later substations have been connected with the power plants by underground cables entirely distinct from the railway cables. The surface railway lines have also required transmission lines and substations separate from those of the elevated lines. The results of this duplication have been several. In the first place, an excessive number of expensive substations have been required. Second, and possibly more important, the load factor of the cables has been low and the cost of cables and conduit correspondingly large. Third, the unnecessarily large number of cables has increased the tendency to electrolysis.

The new contracts, as their terms given in some detail in the following paragraphs will show, remove the necessity for this duplication. They are modifications of the contracts under which the railways have been operating for some years and have been framed not only with a view to greater efficiency under existing conditions but to provide for the eventual consolidation of the railway systems of the city with possible management by the city or its lessee. It is assumed farther that at any time the steam railways having terminals in Chicago may electrify them and may desire to purchase energy from the lighting company. Hence the articles of the contracts are carefully worded to permit the company to use its generating and distributing equipment for all of these purposes if able to offer satisfactory prices for energy.

CHICAGO RAILWAYS CONTRACT

The first part of the amended contract with the Chicago Railways Company is taken up with a definition of the maximum demand which the Commonwealth Edison Company may be called upon to supply. As in the old contract, this maximum demand for any month is calculated from the heaviest hourly morning and evening loads on three consecutive days so selected as to yield a total energy consumption for the six hours greater than would be obtained as the total of the corresponding six hours on any other three consecutive days. The Edison company must be ready to supply a maximum demand of 20,000 kw or one equal to that established by the loads of previous months if they exceed 20,000 kw. To provide for the extra power required for heating cars in extremely cold weather the "emergency energy" consumed when the temperature of the air is at or below 15 deg. Fahr. is excluded in determining the maximum demand.

The second part of the contract covers the scale of prices for energy. This, as before, is made up of two parts, but a sliding scale is provided for both primary and secondary charges. These are shown in the following table:

PRIMARY OR POWER CHARGE

Maximum Demand in Kw.	Primary Charge per Kw
To and including 30,000	$1.25
Excess over 30,000 to and including 60,000	1.00
Excess over 60,000 to and including 90,000	0.91⅔
Excess over 90,000 to and including 120,000	0.87½
Excess over 120,000	0.83⅓

SECONDARY OR ENERGY CHARGES

Monthly Energy Consumption in Kw-hr.	Charge per Kw-hr. in Fractions of a Cent
To and including 5,000,000	0.400
Excess over 5,000,000 to and including 10,000,000	0.395
Excess over 10,000,000 to and including 15,000,000	0.390
Excess over 15,000,000 to and including 20,000,000	0.385
Excess over 20,000,000 to and including 25,000,000	0.380
Excess over 25,000,000 to and including 30,000,000	0.375
Excess over 30,000,000 to and including 35,000,000	0.370
Excess over 35,000,000 to and including 40,000,000	0.365
Excess over 40,000,000	0.360

These charges are subject to a correction for the price of coal. If during any two-year period the price of coal, having a heating value equivalent to that of coal from mines in central Illinois, delivered at the storage yards of the Edison company exceeds on the average $1.90 per ton, the railway company shall pay an extra charge to cover this excess. The correction in dollars is obtained by dividing by 1000 the number of kilowatt-hours delivered during the two-year period and multitplying this by the excess price of the coal. This calculation is obviously made on the basis of a payment by the railway company of 2 lb. of coal per kilowatt-hour. That is,

$$\text{Excess cost of coal} = \frac{2 \times \text{kw-hr.}}{2000} \times \text{cost} - \$1.90.$$

On the other hand, if the cost of the coal is less than $1.40 the lighting company is to pay to the railway company a sum calculated as described.

As so far described the new contract differs only in detail from its predecessor. The next feature is designed to effect transmission and distribution economies and involves the joint use of substations by the two companies or the erection of substations by the lighting company alone. As at present, the railway company will own and operate at least a part of the required substations, but if there is in these ample space for the equipment required by the lighting company for its lighting or other business, such equipment may be installed under terms mutually agreed upon. This equipment may include rotary converters for 600-volt service and the Edison company agrees that, if it has available capacity in the transforming equipment, it will sell d.c. energy to the railway company for use in the vicinity of the substations. The Edison company farther agrees to install substations where needed or required and to sell d.c. energy under the same general terms as a.c. energy with an additional charge for conversion and for a share of the cost of maintaining the substation based upon the proportion of its output used by the railway company.

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The advantages gained by the new arrangement are partly these: From one substation power can be supplied for all purposes, including railway power for different companies occupying the same territory; for example, the elevated and the surface roads which now have separate systems of substations can be supplied from one system, thus greatly reducing the number of substations required. A reduction in number of substations renders the transmission systems simpler and thus more reliable and at the same time cuts down the transmission cost.

The railway company has agreed to generate no electrical energy during the period from Nov. 1, 1914, to Jan. 31, 1924, but reserves the right to do so after that date. In doing so, however, it is provided that Edison power shall be used in such amount as shall insure an average monthly load equal to 35 per cent of the amount which the lighting company must, under the contract, stand ready to supply.

The new contract differs from the old one in that the energy will be metered in a.c. form at the high-tension terminals of the transformers in cases where the railway company operates the rotary converters, otherwise at the points where power is delivered to the d.c. feeders on the price basis outlined in the last paragraph.

Looking forward to a possible consolidation of the railway systems of the city, the contract provides a new maximum scale of charges for use in such a contingency. These are similar to the ones already tabulated except that the rates apply to different ranges of consumption as follows: primary charge, $1.25 up to 75,000 kw; $1, excess to 150,000 kw; $0.91⅔, excess to 225,000 kw; $0.87½, excess to 300,000 kw; $0.83⅓, excess above 300,000 kw. The accompanying secondary charges are: 0.400 cent up to 12,500,000 kw-hr. per month; 0.395 cent for excess to 25,000,000 kw-hr.; 0.390 cent for excess to 37,500,000 kw-hr.; 0.385 cent for excess to 50,000,000 kw-hr.; 0.380 cent for excess to 62,500,000 kw-hr.; 0.375 cent for excess to 62,500,000 kw-hr.; 0.375 cent for excess to 75,000,000 kw-hr.; 0.370 cent for excess to 87,500,000 kw-hr.; 0.365 cent for excess to 100,000,000 kw-hr.; 0.360 cent for excess above 100,000,000 kw-hr.

The remaining features of the contract involve provisions for arbitration in case of dispute as to service and charges, methods of measuring and checking all physical quantities upon which charges are based, notification of proposed changes in demand for power on the one part and of ability to supply power in excess of contract stipulations on the other, and other details necessary to the satisfactory operation of the agreement.

The new contract has been in force for several months but has just been announced. The operation is very satisfactory and is already resulting in marked economies in construction and operation of substations. Some of the new substations constructed to take advantage of the agreement will be described in an early number of the ELECTRIC RAILWAY JOURNAL.

CHICAGO CITY RAILWAY CONTRACT

The Chicago City Railway Company has used Edison power exclusively for nearly five years. Its original contract covered a five-year period. The new contract is, therefore, in the nature of a renewal. The company, however, obtains a better rate for energy and, by agreeing to the joint use of substations, co-operates in securing the economies already described. The terms of the contract are virtually the same as those of the Chicago Railways contract.

THE ELEVATED RAILWAYS CONTRACTS

The Commonwealth Edison Company has supplied an increasing proportion of the power required by the five elevated railways, but the railway companies, having several power plants of varying degrees of excellence, have continued to operate the most economical of them in order to keep down the service charges and to insure an extra source of power supply. They have now, however, agreed to take their entire supply from the lighting company for a term of twenty-five years. The principal feature in which the contracts differ from the others is the provision made for the leasing by the Edison company of all power plants and substations at rentals so graduated as to cover the natural depreciation of buildings and equipment. By thus controlling all electrical equipment the electric company can operate the steam plants or not as may prove more economical and can utilize the substations in the general distribution scheme already outlined.

In the operation of the power plants and substations the lighting company agrees to maintain the equipment in good running order and to pay the taxes assessed against the property. The railway companies are to supply coal-and-ash-handling service for the power plants, for which service a reasonable charge is to be made, and the railway companies guarantee that the cost of such service and of maintaining a satisfactory supply of water for condensing purposes shall not exceed these costs at the beginning of the contracts. The lighting company has the option of purchasing the power plants, substations and equipment on a scale of prices graduated according to years and allowing for depreciation, but at the same time either party may release the generating stations from the lease.

The electric company also gains the right to install wires and cables upon the elevated structures, with the necessary poles and cross-arms, provided that these do not interfere with the use of the structures for railway purposes.

The Edison company is to furnish d.c. energy at 600 volts and, as the original contract was drawn in terms of a.c. energy, the a.c. equivalent of the d.c. energy is calculated on the basis of transformation efficiency taken to be 93 per cent. The following additional charges are made for transformation: primary charges, 30 cents per kw-hr. to and including 10,000 kw, 26 cents for the excess over 10,000 kw to 20,000 kw, 23 cents for the excess over 20,000 kw. The railway companies also pay a proportional share of the cost of operating the substation and an energy charge of 0.025 cent per kw-hr. for all energy delivered. They agree to take a limited amount of power in d.c. form at the generating stations; for example, the Metropolitan West Side Railway takes not to exceed 10,000 kw.

PLEA FOR LOWER PAVEMENT CHARGES IN ENGLAND

At the meeting of the Municipal Tramways Association in Sheffield, England, on Sept. 24, 1913, a strong plea was made by W. C. Fenton for a reduction of the pavement charges required under the tramways act of 1870. During the last six years, however, according to Mr. Fenton, opposition to this arrangement has been gaining ground, owing partly to the obsolescence of the factors upon which this part of the act was founded and partly to the great increase in both heavy and light motor traffic. The act was based upon the use of horse traction only, involving wear and tear of the paving because of this method of haulage. The tramways are taxed also upon their track, depots and offices. The bus companies contribute toward the cost of street improvements only a small amount through a petrol tax and a small tax on their buildings, which often represents a very low capital expenditure and is not allocated to the particular district affected. The enormous increase of motor vehicles has laid heavier burdens upon tramways for the maintenance of paving within the statutory area of their tracks. Thus in Sheffield a twenty-four hours' observation showed 3327 vehicles using the whole street and only 137 tramcars. Similar statistics in London are 4140 vehicles, including 973 buses, to 336 tramcars. Moreover, says Mr. Fenton, "the wear and tear from this vehicle traffic does not all come at the side of the track, for easier traction on the tracks and in some cases the camber of the roadway causes the use of the tracks themselves."

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FIRE PROTECTION FOR CAR STORAGE YARDS

BY A. L. KEMPSTER, MANAGER PUGET SOUND TRACTION, LIGHT & POWER COMPANY, SEATTLE, WASH.

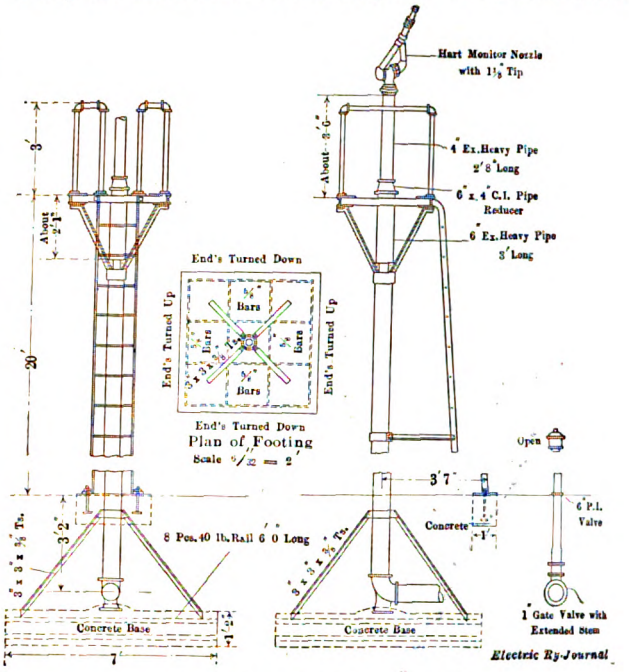
Public service corporations have come to realize that the insurance received in case of fire is but a fractional part of the loss sustained and that the real loss to the company is that caused by the crippled service and the inconvenience incurred by patrons. They have also learned that better protection and good care will decrease the insurance rate.

During the last few years the Puget Sound Traction, Light & Power Company has spent considerable time and money for fire prevention and fire protection. The resulting decrease in the insurance rate has proved that this expenditure has been worth while from a financial standpoint, even without relation to the improved fire protection and the cleaner conditions produced in the company's buildings.

Foremost among the recent installations is a system of fire protection for the North Seattle, Fremont and Jefferson Street car storage yards. The installation, known as the monitor tower system, consists of a number of towers placed about the car yards, each tower carrying a nozzle and an operator's platform. The 6-in. pipe used for the tower also serves as the supply pipe to the nozzle. This nozzle, which is mounted about 23 ft. above the ground, throws a 1⅛-in. stream of water. A universal joint permits the nozzle to be pointed in any direction and at any vertical angle.

The towers are connected to the city water main by a 6-in. supply line, and each system is equipped with a steamer connection for the use of the city fire department. In order to cover the yards thoroughly, the towers were spaced so that any car could be reached by at least two streams. This required the installation of four towers at North Seattle, of three at Jefferson and of two at Fremont.

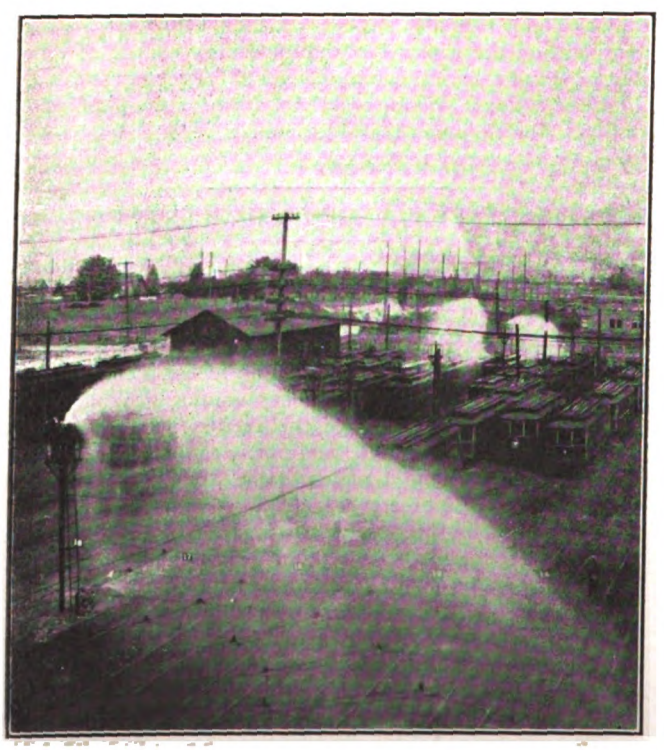
Upon the completion of the work tests were made by members of the Washington Survey and Rating Bureau. At Jefferson car yard, where the static pressure is only 65 lb., the nozzle pressure is 47 lb. and the discharge 255 gal. per minute. At Fremont the static pressure is 125 lb., the nozzle pressure 88 lb. and the discharge 350 gal. per minute. No gage test was made at North Seattle. The static pressure there is 110 lb., so the results would be practically the same at the Fremont yard. From these data it will be observed that in case a car is on fire it can be flooded with water at the rate of 400 gal. or 500 gal. per minute, making it almost impossible for fire to spread to neighboring cars.



Details of Water Tower

This system was installed in preference to hose protection or yard sprinklers for several reasons, some of which are: low cost of installation, practically no maintenance charges and the small space required in the car yards for the towers.

One can quickly and easily turn a stream upon a fire in any part of the yard, while under the ordinary plan of hose



Monitor Fire Protection System in North Seattle Yard

Monitor Water Tower in North Seattle Yard

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and hydrants it is difficult to carry the hose underneath the cars and over the platforms to reach a car that may be burning in some distant part of the yard. The monitor system also permits the cars to be moved, which is impossible where hose and hydrants are used. The operator is above the cars and is able to see every part of the yard and can thus locate and extinguish fire to the best possible advantage. There is no danger from electrical shock to the man operating the nozzle and directing the fire streams, because each tower is thoroughly grounded.

The installation, which was made by the Automatic Sprinkler Company of America, was the first system of this kind installed on the west coast. The work was done in a thorough and substantial manner, so that practically no maintenance should be required for a number of years. Views of the monitor water towers under test and details of design are shown in the illustrations.

INDUCTIVE INTERFERENCE WITH TELEGRAPH AND TELEPHONE LINES

At the joint meeting of the British and French electrical engineers in Paris, of which an account was given on page 1067 of the ELECTRIC RAILWAY JOURNAL for June 14, 1913, a part of the discussion centered upon the subject of inductive interference with telegraph and telephone lines along the right-of-way of single-phase electric railways. The full report of this discussion has now become available through the Proceedings of the British Institution. It is given herewith in abstract.

G. Girousse, engineer of the telegraphs, French State Railways, stated that the trouble due to single-phase traction was different in character with regard to messages along a single wire and along two wires. In the former case, which comprised telegraph and signal lines, current which absolutely prevented the operation of the apparatus existed when trains were passing. In the latter case, or in the telephone lines, annoying and sometimes dangerous voltages were set up even when no trains were running. When the insulation resistance of the circuit was defective, owing to rain, for example, the dangerous pressures disappeared, but conversation was rendered impossible by a crackling noise caused by the harmonics, the effects of which were, however, negligible in the case of the telegraph. The trouble could undoubtedly be reduced by moving the telegraph and telephone lines further from the track, but this of course involved considerable additional expense. It was also possible to protect the telegraph by eliminating the use of ground returns, but this method also introduced various disadvantages. The speaker had obtained good results in reducing the trouble on the telegraph lines by employing a receiver with two equal windings connected so that their magnetic actions counteracted one another when they were connected in parallel and were carrying equal currents. One of these windings was in series with a circuit which was in resonance for the fundamental frequency of the disturbing current. The other had a resistance equal to that of the induction coil. Thus the disturbing alternating current divided into two equal parts and had no external effect, the working current only going through the winding in series with the resistance. This arrangement had been adopted on several of the state lines.

As regards the telephone, the speaker said that these could be protected by transposing the wires of the circuit one-quarter of a turn per pole, also by taking care that the insulation was good and by grounding the wires through discharge coils. The latter could be made in the form of induction coils with two similar circuits, the common point being connected to earth and the two ends to the conductors. The distributing current in going through the two windings in parallel therefore encountered zero self-induction and flowed without difficulty to the earth, but the telephone current had to flow through these two windings in series and was stopped by the large self-induction of the coils, so that the shunt had no appreciable effect from the telephonic point of view.

The speaker considered it desirable to erect telegraph and telephone lines with the telegraph wires on the side nearest the traction line and to run the telephone lines on the top cross-arms and at the farther side of the pole. The telegraph conductors were maintained at a low potential, and since they were grounded at both ends they prevented the pressure from rising to dangerous values on the telephone lines. The use of a low frequency for traction purposes was of considerable importance since the disturbing current was proportional to the frequency, therefore a frequency of sixteen and two-thirds was better than a frequency of twenty-five. There would also be considerably less trouble if in place of an overhead wire a third-rail was employed, especially when it was divided into short sections. Underground cables, even those which were used for telegraphs working over single wire, appeared to be altogether free from these disturbances. On the other hand, underground wires sustained very serious damage from direct-current traction owing to electrolysis.

Some of the experiences of the British Post Office were then described by W. Slingo, who stated that trouble from continuous current railways had been overcome by artificially raising the resistance of the telegraph circuit and considerably augmenting the voltage used for signaling purposes. The interferences produced by high-tension alternating-current railways had been much more difficult to eliminate, but a grounded wire located between the power line and the telegraph line had been found to be successful as a screen, reducing the electrostatic pressure from 350 to 50 volts. However, the interference with telephone loops was not so much due to the fundamental frequency of twenty-five cycles per second in the single-phase systems as to the fact that harmonics were present in the current wave. If the traction current was of approximately true sine-wave form, at such a low periodicity the inductive effects, although present, would not be heard, as the frequency would be below the normal limit of audition. If machines could be produced to generate current at low frequency with approximately a true sine-wave form—that is, without the presence of harmonics—the trouble experienced on account of interference would not appear to a great extent. The only effective methods yet tried—namely, the erection of grounded screen wires and the application of impedance leaks to the ground—were not entirely satisfactory. This was true of the former because it increased the electrostatic capacity of the power line and caused a greater expenditure of energy in charging the power network at all times, and of the latter because it reduced the transmission efficiency of the telephone loops and interfered with the signaling arrangements between the terminal telephone station.

As a part of a paper on the Midi electrification, E. J. Jullian spoke on the difficulties which had been encountered in reducing inductive interference along that line, stating that no universal means had been discovered for satisfactorily overcoming these disturbances. For protecting telegraph instruments, however, the apparatus suggested by Mr. Girousse was to be installed and, for protecting the telephones, transposition of the lines at intervals of about 1000 ft., introduction of transformers between the lines and the receiving apparatus and the replacement of the insulators with others of very high dielectric strength were to be carried out.

Following his usual custom W. Kesley Schoepf, president of the Cincinnati Traction Company, gave the orphans of Cincinnati a picnic at the Zoological Garden on Aug. 7. The inmates of all the institutions for orphans in the city who were able to go were taken, in thirty-one cars.

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MAIN-LINE ELECTRIFICATION OF THE CHICAGO, MILWAUKEE & ST. PAUL IN MONTANA

Probably by Jan. 1, 1914, the Chicago, Milwaukee & St. Paul Railway will have reached a decision as to the type of equipment to be employed for its main-line electrification over the mountains in Montana. It is practically certain that either a 14,000-volt, twenty-five-cycle a.c. system or a 2400-volt d.c. system will be used. The plans of the General Electric Company and the Westinghouse Electric & Manufacturing Company are now under consideration. For the railroad company the entire matter of electrification has been placed in the hands of C. A. Goodnow, vice-president in charge of operation and construction. Previous articles on this proposed electrification have been published in this paper.*

The company first expects to electrify a division of the railroad 113 miles long, extending over the Rocky Mountains between Three Forks and Deer Lodge, Mont. This work will be begun early in 1914. Ultimately the electrification will be extended to that portion of the main line between Harlowton, Mont., and Avery, Idaho, a main-line distance of 440 miles and, including sidings, a total of 450 miles of track. This plan will mean an outlay on the part of the railroad company of perhaps $6,000,000 or $8,000,000, with an annual expenditure of say $1,500,000 or $2,000,000. This work foreshadows the probable electrification of the entire line from Harlowton to the Pacific Coast, a main-line distance of 865 miles, including the line to Tacoma.

Electrical energy will be obtained from the Montana Power Company of Butte, Mont., and the Thompson Falls Power Company, with which the railroad company has entered into long-term contracts, as previously noted in these columns. The length of transmission will vary from about 15 miles to about 140 miles.

In the zone of the proposed electrification the railroad crosses three separate mountain ranges, namely, the Bitter Root Mountains, the Rocky Mountains and the Belt Mountains. The elevations attained by the railroad are respectively 4170 ft., 6322 ft. and 5788 ft. above sea level. The grades range from 1 per cent to 2 per cent in the mountains with many miles of from 0.3 to 0.6 per cent grades between the ranges. Across this profile it is proposed to haul all passenger and freight trains by electric locomotives at speeds of from 25 m.p.h. to 30 m.p.h. in the case of the former, and from 15 m.p.h. to 18 m.p.h. for the freight trains. All switching service will also be performed by electric locomotives. One electric freight locomotive will be capable of hauling a train as heavy as 2500 tons on 1 per cent grades and two will handle the same tonnage on 2 per cent grades. The electric locomotive units will consist of coupled halves.

One interesting feature of the electrification in connection with train dispatching is pointed out by Mr. Goodnow. At the outset but 20,000 kw-hr. will be available for railroad operation under the contract. The dispatcher will have this amount of energy to move his traffic, and he must not use electricity in excess of that amount. To this end he not only must have the entire situation clearly before him so that trains will not be started from terminals at hours when they will be unreasonably delayed on the line waiting for energy, but he must supervise the speed of the trains on ascending gradients. In order to push an important train across a mountain range at maximum speed it may be necessary for the dispatcher to slow down other trains, or he may order one or more trains to move at maximum speed to provide for the prompt movement of subsequent trains. These considerations would seem to add to the complexities of the duties of the train dispatcher, but there are compensations, as Mr. Goodnow points out, in the knowledge that under electric propulsion a train when ordered forward may be made to move at the precise speed calculated, that the meeting and passing points may be figured to the minute, that there will be no delays for coal and water and for cleaning fires, and that the electric locomotive will be ready for service at terminals as soon as a new crew can be provided. The working conditions of the engineman and assistants under electric locomotive operation should also be greatly improved.

*See ELECTRIC RAILWAY JOURNAL, Jan. 11, Feb. 1, Feb. 15, May 24, and June 7, 1913.

MEETING OF NEW ENGLAND STREET RAILWAY CLUB

At the regular monthly meeting of the New England Street Railway Club at Boston on Nov. 20 Carl F. Woods, secretary Arthur D. Little, Inc., Boston, presented a paper upon the "Relation of the Chemist to the Electric Railway." The author pointed out the increasing importance of scientific investigation in relation to the economical operation of railways and cited a considerable number of ways in which the industrial chemist can be of assistance to transportation companies, including fuel analyses, the study of flue gases, feed water, lubricants, cables, wire for trolley service, steel, equipment and supplies in general. An abstract of the paper is given below.

COAL

A glance at the log sheets of any station shows that the item of coal represents about 50 per cent of the total cost of producing power. Many a purchaser buys coal by the ton with no accurate knowledge of its heating value or suitability for his particular conditions. Purchase on the basis of an analysis including the heat units, coupled with intelligent selection under existing conditions, would prevent the need of explaining log sheets showing the consumption of 4 lb. or 5 lb. of coal per kw-hr. or the attempt to burn coal having a fusing temperature of its ash of 2300 deg. Fahr. in a furnace whose temperature over the grates was close to 2800 deg Fahr.

An analysis should show the percentage of moisture, fixed carbon, volatile matter and ash. High moisture means the purchase of so much water at the price of coal, and a proportional amount of heat must be wasted in evaporating it. The volatile matter is of importance as indicating the probable difficulty with which the coal may be burned completely without smoke. All coals having the same amount of volatile matter do not behave alike in the furnace, and it is, therefore, necessary to know both the chemical composition and the actual heating value. The ash is not only valueless but offers greater resistance to free and even distribution of air through the coal on the grates. Excessive quantities of ash increase the labor and cost of firing and of handling ashes.

FLUE GASES

An analysis of the flue gases at once affords a direct measure of efficiency. Under proper conditions of combustion flue gases should contain not less than 12 per cent of carbon dioxide, but they frequently contain as low as 3 per cent. This means that more than 50 tons of excess air are heated to a high temperature for every ton of coal burned. Similarly, fuel losses occur by incomplete combustion. For each pound of coal which is burned to carbon monoxide instead of to carbon dioxide about two-thirds of the available heat is lost. The object of flue gas analysis is therefore to prevent excess of air and at the same time to insure the complete combustion of the coal. The determination of the combustible matter in the ashes at once shows the percentage of unburned coal which is lost through the grates into the ash pits and which represents a direct waste of fuel.

FEED WATER

The formation of scale and the softening of water are due to the simplest of chemical reactions, and by an analysis of proposed feed water a competent chemist can

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readily predict the proper amounts of suitable chemicals necessary to prevent scale or corrosion. Hence he can not only save the company the cost of frequent boring and replacing of tubes but can obviate the necessity of attempting to force heat through the same substance with which many steam pipe lines are insulated. The services of a chemist would prevent the purchase of a special compound at $1,000 a year which consisted of 97 per cent water and 3 per cent molasses, or obviate the need of purchasing a mixture of soda ash, tannin and water under a brand name at 8 cents per pound, when the principal ingredients can be obtained at 1 cent per pound.

LUBRICANTS

The study of lubricants, belt dressings, babbitt metal, packings, transformer oil and many other supplies is a fertile field for the chemist's efforts.

CABLES

It is important to take every precaution to obtain the maximum life from cables. A chemical analysis will show whether the insulation used is composed of shoddy, rubber substitutes or pitch. As even a poor cable will last five years and a fairly good one twice as long, little basis of initial selection is afforded. It is known, however, that certain definite qualities are very satisfactory and that if steps are taken through the chemist to obtain such compounds, the engineer can feel reasonably safe.

TROLLEY WIRE

At least 100 trolley wire breaks occur close to the ear, owing to the stoppage at that point of wave action, as compared with one break in the middle of the span. The frequency of such breaks can be greatly reduced if the wire is purchased to specifications calling for proper strength and ductility. In this case it is worthy of note that several manufacturers are experimenting with different alloys with a view toward producing a stronger and tougher wire which shall at the same time possess the conductivity of copper.

CARS

Recently a master painter was troubled by the crawling of varnish on his cars. The matter was called to the attention of the company's chemist, and an investigation of the soap used in car washing brought out the fact that it contained a material quantity of free fat due to careless manufacture, which remained on the car bodies in small spots and caused the difficulty. The public demand for clean, well-kept cars can be met only by durable paint colors and long-wearing varnish. The chemist cannot perform miracles, but he can determine whether the body color is brightened up with an aniline dye which will rapidly fade in service; whether chrome yellow, supposedly a high-grade imported product, is really lead chromate or a mixture of this with clay and barytes; whether the company's turpentine is produced by steam distillation of gum or is refined kerosene, or whether the varnish used is composed of pure linseed oil, high-priced gums and turpentine or is a solution of rosin in cottonseed oil, thinned with naphtha. He can see to it that varnish is not rapidly dulled by washing with cleaning powders containing free alkali or by putting signs on the dasher with paste cut with free borax. The author referred to the experience of the Detroit United Railway in car washing and the value of chemical analyses of soap in that connection as described in a recent issue of the ELECTRIC RAILWAY JOURNAL.

BABBITT METAL, SOLDER, ETC.

An armature getting down upon a pole piece may easily cost many times the price of a chemical analysis of the babbitt metal. The chemist can determine whether the trolley wheels are of the composition proved by experience to give the best service or whether they contain large percentages of zinc and lead, which are readily volatilized by arcing and rapidly increase the wear. He can ascertain the nature of insulating varnish and impregnating compounds used in field coils and can state whether it will retain its elasticity and impermeability or is composed of substances which rapidly distil under working temperatures and leave a brittle, porous mass.

ELECTROLYSIS

There are few problems of electric railway management concerning which there is so much current misinformation and lack of knowledge as electrolysis. Other interests have not been slow to grasp this and to charge the neighboring railway with responsibility sometimes not its due. A thorough understanding of the chemical phenomena of electrolysis is essential to just action in such cases. In a recent instance an iron service pipe passing below a railway developed a leak. Surrounding the pipe was found a heavy incrustation, and it appeared that the company had made a practice of salting a switch immediately above the pipe. The railway was called upon to settle the damages. An analysis of the incrustation showed that it was composed mainly of sodium carbonate, the presence of which could only be explained by electrolysis of the salt solution soaking down from the track. When an electric current is passed through a salt solution the chlorine migrates to the positive and the sodium to the negative pole. The liberated chlorine corrodes the steel, which results in a deposit of rust. The sodium, when liberated at the negative pole, unites with water to form sodium hydrate, which is in turn finally converted to sodium carbonate. In this case the sodium carbonate was found at the pipe or negative pole, a fact which at once proved that current was passing, but obviously from the rail to the pipe and not vice versa, so that through the work of the chemist the situation was cleared sufficiently to make it necessary to attribute the leak in the pipe to some other cause than the escape of stray railway currents.

The speaker also touched upon the importance of the chemist in the study of steel products of all kinds, in the standardization of miscellaneous construction materials, preservation of metals and timber. In conclusion, he emphasized the opportunities for scientific research existing in connection with electric railway problems and stated that a thorough study of what the chemist has actually accomplished and a broad conception of his duties and possibilities will enable operating costs to be reduced and plant and equipment to be greatly improved.

DISCUSSION

In a brief discussion which followed the presentation of the paper, J. W. Dozier, Nahant & Lynn Street Railway, called attention to the difficulties attending the preservation of varnish on cars subjected to frequent exposures to salt water. On the Nahant-Lynn line it is necessary to varnish all box cars yearly, and all are washed nightly to overcome so far as possible the effects of salt spray which is thrown upon the rolling stock from the ocean probably three times a week. Mr. Woods suggested that experimentation with some of the newer varnishes made of China wood oil and fish oil might be helpful, in view of the resistant qualities of such varnishes as regards water. He also suggested the possibilities of rubbing over the varnish with oil to keep the former glossy and prevent it from becoming dull.

C. H. Hile, chief of maintenance Boston Elevated Railway, spoke briefly of the electrolytic corrosion sometimes observed in iron and steel pipes placed underground, as a result of local differences in composition. Such action, he averred, should not be charged to some street railway unless it could be proved that the damage was positively caused by its stray currents.

Six new members were elected at the meeting.

The outing of the employees of the Columbus Railway & Light Company, Columbus, Ohio, and their friends, was held on Aug. 22. More than 10,000 badges were distributed entitling the wearers to trips to all parts of the city. All amusements at Olentangy Park were opened to them. George W. Whisner, superintendent of transportation, delivered an address of welcome at the park.

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PROTECTION OF WORKMEN AT SOUTHERN PACIFIC ELECTRIC SHOPS

In an article on the rolling stock and repair shops of the Southern Pacific Railway's electrification at Oakland, Cal., published in the Electric Railway Journal for June 17, 1911, brief reference was made to the method there used for protecting men at work on the steel car roofs and pantographs. Further particulars from *The Travelers' Standard* of the Travelers' Insurance Company follow:

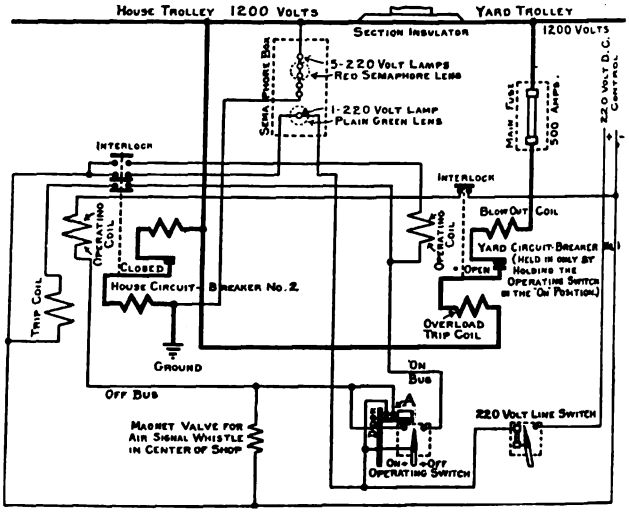
When moving cars into or out of the shop it is necessary to energize the overhead line with 1200 volts. A green light installed over each track at one end of the building indicates that the line below it is grounded, and not energized, while a corresponding red light indicates that the line is energized, with 1200 volts potential. If the line is not energized but is not grounded neither light shows. Furthermore, an alarm whistle is located near the center of the building, and one blast is given upon it when the line is about to be energized. By repeatedly throwing the operating switch to the "off" position the whistle is then made to sound the number of the track on which cars are to be moved. Upon hearing the whistle all employees who may be working on or about the cars are supposed to stand clear of the cars and the overhead line and to wait for the appearance of the red light. If it should appear over the track on which a man is employed he must not return to work until the line is again cleared and grounded, as indicated by the return of the green signal. The switches governing the energizing of the overhead shop trolley wires are under lock and key, and their care rests with the shop foreman.

The yard trolley wire, which is charged continuously to 1200 volts, is insulated from the trolley wire in the shop by means of a section insulator, located at the top of the door frame. The two wires are connected through a circuit-breaker designated in the accompanying wiring diagram as "yard circuit-breaker No. 1," which is protected by a 500-amp copper-ribbon fuse. Another circuit-breaker, designated as "house circuit-breaker No. 2," serves to ground the trolley wire inside the shop. Both circuit-breakers are located on the wall above the doors, and controlled through a secondary or auxiliary circuit, by means of an operating switch fixed upon the end wall of the building at a point convenient for manipulation from the floor. The operating switch is supplied with current from the 220-volt shop circuit and is protected by a 3-amp fuse inclosed in the line switch. The operating circuit is so interlocked that the two circuit-breakers operate alternately. Circuit-breaker No. 1 is held in the closed position by the operating circuit, but only as long as the operator holds the switch handle in the "on" position; and circuit-breaker No. 2, when closed by the operating circuit, is held in this position by means of an integral mechanical lock. The operating coil on circuit-breaker No. 2 is connected in parallel with a valve which operates the air whistle. The operating switch is located in a special box, the door of which has a metal contact, indicated diagrammatically at *A*, which energizes the magnet-valve circuit as soon as the door is disturbed and thus sounds the alarm whistle and gives warning that one of the shop trolleys is about to be energized. A mechanical trigger is also installed in the operating switch box and interlocked with the handle of the switch in such a way that this handle must be moved to the position which energizes the valve magnet and the operating coil on circuit-breaker No. 2, thus insuring that the whistle is sounded before any other operation of the switches can be made. The breaker is closed at the same time, connecting the shop trolley to ground.

To close circuit-breaker No. 1 it is first necessary to open circuit-breaker No. 2, because the operating coil on circuit-breaker No. 1 and the trip coil on circuit-breaker No. 2 are connected in series with contacts on circuit-breaker No. 2 and interlocked. When the handle of the operating switch is placed in the "on" position the trip coil on circuit-breaker No. 2 is energized, opening the circuit-breaker, and through its interlocks the control circuit for the operating coil on circuit-breaker No. 1 is energized, thus closing circuit-breaker No. 1. Circuit-breaker No. 1 is equipped with an interlock which open-circuits the operating switch to the operating coil of the No. 2 breaker, thereby making it impossible to manipulate No. 2 breaker at an improper time.

When the shop trolley is energized current is supplied to the semaphore lens lamps that show through the red lens. This indicates that the trolley is energized. When circuit-breaker No. 2 is closed and No. 1 is open the green semaphore lens lamps are lighted, and the green light indicates that the shop trolley wire is grounded.

A car is moved as follows in or out of the shop: The shop foreman, as the only one with a key to the switch box, must first be notified. He cannot move the operating switch or the line switch without first opening the door of the box.



Wiring Diagram of Safety Circuit-Breakers

The act of opening the door automatically blows the alarm whistle in the center of the shop. After the door is opened the foreman must unlock the handle of the operating switch. This act blows the alarm whistle a second time and simultaneously throws current into the operating coils of the circuit-breaker through which the house trolley is grounded—the object being to test the condition of the circuits by insuring that the house trolley wire is grounded at the time the alarm whistle is blown. In the meantime house circuit-breaker No. 2 is held in, mechanically, by a toggle. Hence it is remotely possible that a mechanical shock may have released it and placed the trolley wire in a dangerous condition before the sounding of the whistle. The handle of the operating switch is now in a position where its operation will trip the ground circuit-breaker, relieve the house trolley wire from its ground connection, energize the operating coil of the breaker through which the yard potential is conveyed to the house trolley wire, and change the semaphore lamps from green to red on the trolley wire energized.

When the car movement is complete and it is desired to clear the house trolley wire, the operations take place in the reverse order, with this important difference—that in case the foreman neglects to throw the handle of the operating switch into its locked position and thereby to energize the operating coil of the house circuit-breaker through which the house trolley wire is grounded, his omission is rectified automatically by a mechanical connection on the switch door, by means of which the handle of the operating switch is placed in its normal closed position. It thus energizes the operating coil of the ground circuit-breaker and sounds the alarm whistle to indicate to the men that the potential has been cut off from the house trolley wires.

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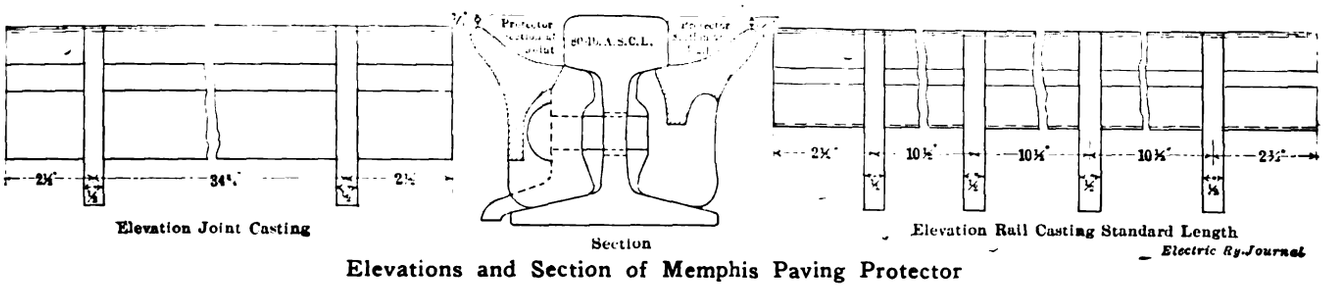
PAVING PROTECTOR USED WITH T-RAIL IN MEMPHIS, TENN.

A paving protector used in connection with T-rail construction in paved streets has been adopted by the Memphis Street Railway Company, Memphis, Tenn. This device was designed in Memphis and is manufactured by local foundries. Its form varies slightly with the rail sections with which it is used. Its purpose is not only to protect the paving alongside of T-rails but also to eliminate the use of the special paving blocks which usually form the flangeways. It is cast in sections 3 ft. in length, which weigh approximately 7 lb. per linear foot. The material used is cast steel which costs between 1½ cents and 2¼ cents per pound, the difference in cost depending on the market as well as the quantity purchased.

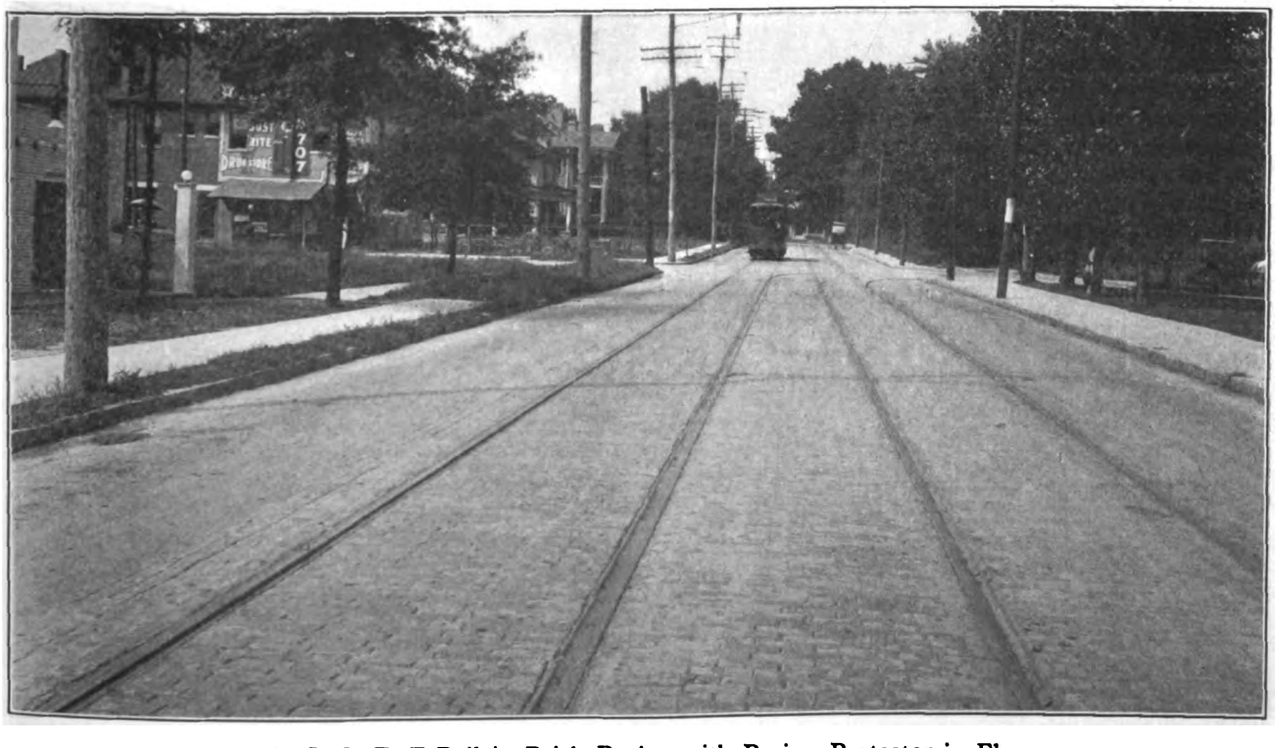


Elevations and Section of Memphis Paving Protector

This paving protector has been used by the Memphis Street Railway Company for more than five years. The circumstances connected with its original installation were that the city government secured from the State Legislature the passage of a front-foot assessment law permitting the city to pave any street by assessing two-thirds of the cost against the abutting property holders and by assuming one-third of the cost itself. The street railway company, under contract with the city, pays for the paving within its tracks and 2 ft. outside. Under this arrangement the city was able to do a great deal of paving at a small cost to itself, especially on streets occupied by the street railway company.

Just prior to the passing of this particular law, the street railway company had reconstructed many miles of its tracks by using 70-lb. and 75-lb. A. S. C. E. rail in what were then and what were expected to be for some time to come macadam streets. The expense that would have been incurred by relaying all this track with girder-groove or tram-rail sections was too great even to be considered, and it became necessary to devise some means other than the use of special paving block to provide a flangeway and protect properly the paving alongside of T-rails. After the company had conducted a number of experiments with various kinds of nose blocks and brick fillers, it decided that the paving protector would serve its purpose best. Consequently it was adopted as standard when paving is required along tracks where T-rail has been laid. The Memphis Street Railway Company uses this protector casting in conjunction with 80-lb. A. S. C. E. rail at the present time wherever the installation results in a saving when compared with the cost of girder-grooved rail.

As shown in the illustration, each section of this paving protector consists of a solid cast-steel groove which forms the steel flangeway. This is held firmly against the ball and base of the rail by ½-in. webs spaced at 10½-in. centers which fit the rail contour like an angle bar. The protector is held securely in position under the ball of the rail by the paving surface and filler. It is made continuous across joints by a slight change in the design to give clearance around the bolt heads and angle bar. The spacing of the supporting web also is increased so it will clear the length of the angle bar. The accompanying half-tone illustration shows track in streets paved with brick where the paving protector has been in service five years under moderately heavy vehicular traffic.



80-lb. A. S. C. E. T-Rail in Brick Paving with Paving Protector in Flangeway

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FRIDAY SESSION OF CENTRAL ELECTRIC RAILWAY ASSOCIATION

The session on Friday, Nov. 21, of the Central Electric Railway Association was held in the Hotel Severin, Indianapolis, Ind., with President Brady presiding. Owing to the unavoidable absence from the city of the Hon. Thomas Duncan, chairman of the Public Service Commission of Indiana, Charles Murphy, one of the commissioners, presented a paper on "Industrial Arbitration." At the conclusion of Mr. Murphy's paper President Brady stated that after the serious trouble recently experienced in Indianapolis there could be no question that there was a demand for legislation to prevent violence and damage to property during industrial strike periods. He urged that all should consider the problem carefully, so that when the question of industrial arbitration came up before the Legislature all could assist in the proper solution of the subject. After brief discussion on the subject of remedial legislation Mr. Murphy received a vote of thanks for the paper on "Industrial Arbitration."

Continuing the program, J. F. Starkey, general passenger agent Lake Shore Electric Railway, Sandusky, Ohio, read his paper entitled "The Relation of the Traffic Department to the Company." This paper was published in abstract in the issue of this paper for last week. J. F. Keys, general passenger agent Detroit (Mich.) United Railway, opened the discussion. He indorsed Mr. Starkey's recommendations and emphasized the point regarding the difference between getting business and billing business. He stated that the most important factor in the successful operation of an electric railway was a satisfied public. The only way to attain this end is through the operating department handling promptly all the business the traffic department can get.

Charles L. Henry stated that no subject was of more importance to the electric railways than traffic, but the great difficulty was in the newness of the problem. Steam railroad methods provide no guide for its successful solution. In Indianapolis, for example, an ordinance provides that the freight rates over electric lines shall not exceed those in effect on steam roads. At the time the ordinance was passed this requirement was considered fair, but since that time the operators of electric railways have been considering the problem carefully and have found that they had failed to consider the kind of service required of them. The dispatch with which freight traffic is handled on electric lines added value to the shipper. At the existing rates the shipper was obtaining this value gratis when the interurban railways should have it, but the city ordinance of Indianapolis prohibited an increase of rates.

In many instances the ordinances governing the operation of interurban railways prohibited transporting certain commodities. A little education along this line, particularly in so far as the shippers were concerned, should be productive of good results. It certainly was no more of a detriment to a community for an inclosed electric freight car to haul certain commodities than for an open wagon to do so. Certainly the advantage of an unlimited dispatch freight service offered to the shippers and consumers should not be prohibited. In closing, Mr. Henry stated that the traffic department could be very useful in carrying on this educational campaign, as the people were entitled to all the advantages offered by electric railways and electric railways were entitled to a fair return for the service which they rendered.

F. D. Norviel, general passenger and freight agent Union Traction Company of Indiana, emphasized the advisability of increasing freight rates. He stated that an exhaustive investigation made by the American Electric Railway Traffic Association showed that freight business as it is handled by electric roads at the present time is unprofitable. The quality of service rendered by electric interurban roads at the present time cannot be offered by other classes of carriers. In view of the marked difference in the character of service rendered by electric and steam roads, it appeared that no serious difficulty should be experienced in devising some means of raising rates.

At the conclusion of this discussion President Brady announced that the next meeting of the Central Electric Railway Association would be held in Cleveland, Feb. 26 and 27, 1914, provided satisfactory hotel arrangements could be made. He also appointed a committee composed of F. D. Carpenter, general manager Western Ohio Railroad; W. S. Whitney, general freight and passenger agent Ohio Electric Railway; E. B. Peck, vice-president Terre Haute, Indianapolis & Eastern Traction; H. C. Mason, general manager Benton Harbor, St. Joe Railway & Light Company, and L. J. Drake, Galena Signal Oil Company, a nominating committee to report at the February meeting of the association.

INEXPENSIVE TIMETABLE FOR INTERURBAN SERVICE

The Berkshire Street Railway, Pittsfield, Mass., employs schedule boards of the type shown in the accompanying illustration at all important stations on its system. The nominal cost of maintaining these timetables, their convenience from the passenger's standpoint and their simplicity of arrangement have received much favorable comment. Each board, located beside the track at a point where the local street lighting provides ample illumination, shows the leaving times of the passing car service from that particular point only. The board is 3 ft. wide and 6 ft. high, with a neat ornamental iron scroll at the top. All

Schedule Board of the Berkshire Street Railway

schedules on the system are semi-annually withdrawn and corrected at the paint shop to meet summer and winter traffic conditions. Any mid-season changes are also promptly made. The company handles a large summer business in pleasure traffic, and in addition to the fixed schedules, distributes illustrated folders containing an excellent map and "step-by-step" description of the route from Canaan, Conn., to Hoosac Falls, N. Y., a distance of 97 miles. All historic spots on the road are marked by bulletin boards numbered to correspond to the data in the folder.

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COMMUNICATION

FLAT CONTACT WIRE FOR PANTOGRAPH COLLECTORS

NEW YORK, WESTCHESTER & BOSTON RAILWAY
NEW YORK, Nov. 22, 1913.

To the Editors:

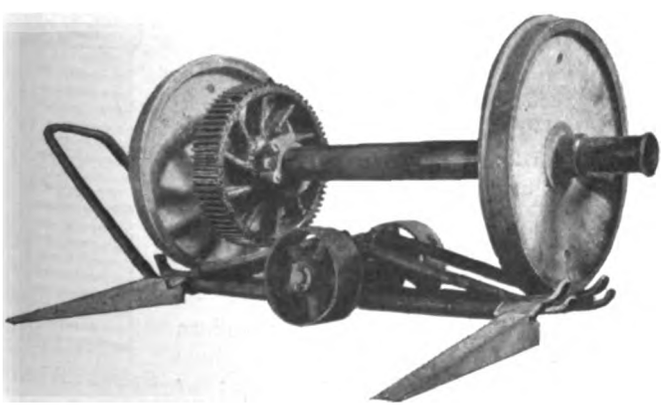
On account of the increasing tendency toward the use of high-voltage systems with rolling or sliding contact shoes, I believe a timely suggestion would be that the contact wire should be manufactured or rolled so that a flat surface comes in contact with the collector. When a round contact surface is used, for some considerable time the collectors are sliding or rolling on a surface of practically no width. As it is necessary to have considerable pressure of the collectors against the trolley wire, the wear on the collectors is very rapid and the wire does not reach a condition for good service until a very long period has elapsed. While the pressure of a pantograph shoe on the wire is generally nearly as much as the pressure of a third-rail shoe on its contact rail, the area of contact is many times less and the wear is proportionately greater.

We have experienced an increase in the life of our standard pantograph shoes from 600 miles to 2500 miles during the operation of our cars for about one and one-half years. This I attribute mostly to the fact that the steel contact wire now has a contact surface worn about ⅛ in. wide, the wire having been of the standard round grooved form at the start. I see no diffculty in the manufacture of a wire with a flat contact surface, or in its installation, as the clips or hangers of the catenary construction would hold it in proper position even on curves. Such a wire would give satisfactory service at once, while from a round wire this can be obtained only after a long period of operation which covers a considerable part of the total life of the wire.

R. R. POTTER, Superintendent of Equipment.

REPAIR SHOP CAR WHEEL TRUCK

The mechanical department of the Duluth Street Railway Company, Duluth, Minn., uses a wheel truck or original design to move a pair of wheels from a storage yard adjoining the shop building to the wheel lathe and press. While it would be just as easy to roll the wheels by hand between these points as to truck them, the new plan obviates the danger that the shop floors will be damaged by sharp or broken wheel flanges when the wheels are removed from one point to the other.



Car Wheel Truck Loaded

Essentially, the truck consists of a pipe carriage balanced on a pair of 12-in. wheels with 6-in. flanges. The carriage is built of three sections of 1¼-in. extra heavy wrought-iron pipe, which taken together form two simple trusses, or the truck side frames. The bottom members of both side frames and the handle used in moving the truck about the shop are formed of a single section of pipe, containing four bends. The upper members of the side frames are bent at the center and flattened at the ends. Both members of each side frame pass through a special cast bearing provided for the axle of the truck wheels. The length of the axle of the truck is sufficient to allow approximately 18 in. of clearance between the wheel flanges. The flattened ends of the pipe which forms the upper members of the side frames are turned up so as to prevent longitudinal movement of a pair of wheels. Plates riveted between the upper and lower members of the two side frames at the car wheel gage lines connect the two side frames, and the car wheels rest on them when in position to be moved. These plates project about 4 in. beyond the side frame on each side of the truck and, together with two 24-in. wedge-shaped wooden blocks which are inserted beneath them, serve as inclines over which the wheels are loaded onto the truck. The upper members of the side frames are riveted to the tops of these end connecting plates and serve as stop blocks to prevent the car wheels from rolling off the truck when it is in motion.

Two men are required to load a pair of wheels, and one man readily wheels the loaded truck about the shop. The complete truck cost approximately $12, including material and labor.

DIESEL ENGINES TO BE MANUFACTURED BY WELL-KNOWN ENGINE BUILDERS

An announcement has just been made of unusual interest and importance in industrial and engineering affairs. A corporation has been formed with a New York State charter to engage in the manufacture on an extensive scale of a full line of Diesel engines, both stationary and marine. The company is planning to extend its line of manufacture up to the large sizes. In this work it will be backed not only by strong American interests but also to a large extent by Swedish capitalists, who now control the Swedish Diesel Motor Company (Aktiebolaget Diesels Motorer). This company is known all over the world as one of the largest and most successful concerns devoted entirely to the manufacture of Diesel engines. These engines are built on the "Hesselman" system.

The new corporation will take over the plant and organization of the McIntosh & Seymour Company, of Auburn, N. Y., well known as a builder of steam engines of the highest grade. The present steam-engine business will also be continued as heretofore. The name of the new corporation is "McIntosh & Seymour Corporation." The board of directors is as follows: Marcus Wallenberg, president Stockholms Enskilda Bank, Stockholm; Frank A. Vanderlip, president National City Bank, New York; Thatcher M. Brown, Brown Brothers & Company, New York; Edwin S. Church, Auburn, N. Y.; J. A. Seymour, Auburn, N. Y.; Oscar Lamm, Stockholm, Sweden, and F. B. Kirkbride and P. W. Henry, New York City. Edwin S. Church, formerly superintendent Akron plant, International Harvester Company, will be executive head of the new corporation. J. A. Seymour, president McIntosh & Seymour Company, will be vice-president, in charge of engineering. The initial capitalization will be $2,200,000, half common and half 6 per cent cumulative and participating preferred stock.

The Swedish Diesel Motor Company started building these engines in 1898. Many of its designs of the most important features peculiar to the Diesel engine, such as the fuel pump, the atomizer, details of pistons, etc., have been purchased and adopted by other leading builders of Diesel engines in Europe. The McIntosh & Seymour Company has long been a manufacturer of steam engines, many of which have been used in electric railway power stations, and its product has always represented the very best in workmanship and design.

It has for some time been a subject of much comment, in view of the highly successful business being done in the

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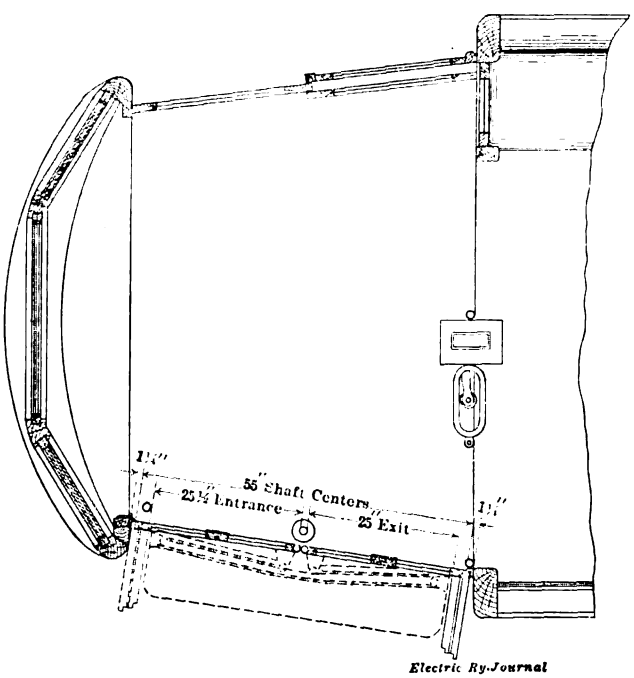
Diesel engines by many European concerns, that no further attempt has been made to use them in this country. It should be remembered that, notwithstanding the increase in the price of fuel oil, the actual cost of fuel oil and its relative cost, as compared with coal, are generally much lower in the United States than in Europe; also that oil suitable for Diesel engines is a by-product which will always be available in ample quantities as long as the present large consumption of gasoline and kerosene exists. Many large new oil fields are also being developed in this country and Mexico.

In view of these facts, there seems to be no reason why there should not be a broad field in this country for this type of engine, especially when constructed by an organization which understands American conditions of manufacture and the needs of the market here as well as does the McIntosh & Seymour Company.

THIRD AVENUE RAILWAY CONVERTING PREPAYMENT CARS TO NON-BULKHEAD TYPE

The Third Avenue Railway, New York, and its allied company, the Union Railway, are changing from body end door prepayment to non-bulkhead prepayment style a total of 477 cross-seat convertible and 100 longitudinal-seat closed cars. The object of this change is to eliminate rear platform boarding and alighting accidents by inclosing the vestibule on both sides so that, as this platform will be fitted with folding doors and steps, it will be as safe as the front exit, which is already furnished with a sliding door and folding step. In addition, the doors on the conductor's platform are furnished with a contact device which keeps the motor circuit open until the doors are closed. The motorman, therefore, does not have to wait for a signal from the conductor. At present only six cars have been equipped, but it is planned to change the rest of the cars within a year on a piece-work basis at the rate of two cars a day.



Remdeled Platform of Third Avenue Car, Showing Removal of Bulkhead and Addition of Folding Platform Door

CARPENTRY CHANGES

The cars changed or to be changed have bulkheads and end body doors of three different types, namely, double sliding doors with end bulkheads, swinging exit door and sliding entrance door with center pocket, swinging exit door and double sliding door with both center and end pockets. All of these types will be changed to the same pattern by omitting all doors and bulkheads except the far-side bulkhead along the entrance into the car body. As shown in the accompanying plan, the remaining bulkhead is equal to the width of a short longitudinal seat and does not interfere with travel. The platform side of this bulkhead will carry the heater switch and possibly other control equipment, while the area in front of it (in the case of the closed cars) serves for a sandbox and seat.

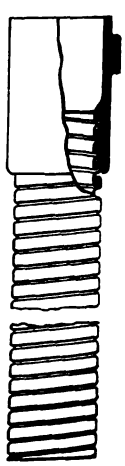
The inclosure of the vestibule consists of the present sliding door, which is used for exit from the front platform, and of a four-leaf folding door, which is manually controlled by the conductor from his station. These doors are of wired glass throughout, so that the conductor can have a full view of the outside of the rear portion of the car. The elimination of bulkheads has also been accompanied by the use of a folding bench on the front platform and a removable seat for the motorman.

ELECTRIC DOOR CONTROL

One important feature of the door control is the contact and relay circuit invented in connection therewith by J. S. McWhirter, superintendent of equipment Third Avenue Railway. The wiring of this circuit is arranged not only to prevent the car from being started until the doors are closed but also to prevent it from being started from any but the first notch of the controller. It is evident that this feature will prevent burnouts in case an impatient motorman has the controller on a more advanced notch in anticipation of the starting signal. Mr. McWhirter has assigned his rights to this device to the Prepayment Car Sales Company, which is supplying the door and step mechanisms on the present order.

SPIRAL-RIBBON SAND SPOUT

A new non-breakable metallic sand spout, to which brief reference was made in the ELECTRIC RAILWAY JOURNAL of Oct. 14, is shown in the accompanying illustration. It has been recently put on the market by the H. W. Johns-Manville Company, New York, N. Y. This spout is a strong metal ribbon wound spirally, the edges being crimped or turned in during the winding to form a continuous interlocking spout that can be bent to the desired curve without fear of fracture. The spout withstands a crushing strain of 300 lb. to each four turns of its spirals and cannot break square, flatten or bend beyond the give of its interlocking metal spirals.. This sand conveyor, therefore, is free from the leakage trouble of ordinary coiled wire spouts which kink and leave an opening. As the spout is tested to withstand a pulling strain of 1000 lb. to 3000 lb., it will not unwind if it strikes an obstruction. This spout is made either in stiff or flexible form so that it can be set for curves as well as tangents. It is finished with plain couplings or with couplings for either DeWitt or Ridlon sand boxes. Its standard diameter is 1⅝ in. and its lengths are 30 in and 36 in. It is believed that such a spout will not only be much more durable than the ordinary design but can be kept much more easily from clogging.



Spiral-Ribbon Sand Spout

The Public Service Railway, Newark, N. J., is completing the building of nine cars at its Plank Road shops, Newark, N. J. These cars are of the company's 2400 type except that a 2-in. ramp is being installed between the kingbolt and bulkhead line. This change will cut down the height of the first platform step from 17 in. to 15 in. with new springs and to 13 in. with springs set and wheels worn.

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News of Electric Railways

Franchise Developments in Kansas City

Whether street cars shall be allowed to run across the plaza in front of Kansas City's new railway station or whether they shall be confined to Main Street was the question which occupied most of the time of the Council committee in charge of the Metropolitan Street Railway's franchise negotiations during the past week. The Main Street people are asking that the franchise be amended to prohibit the Metropolitan from using the plaza. Should the cars not be allowed on the plaza, however, travelers will be forced to walk several hundred feet to the Main Street line. The distance from the street car line to the entrance to the new station is 258 ft.; that to the exit 308 ft.

Another feature of the negotiations of the week was provided by representatives of organized labor, who contended that employees of the Metropolitan Street Railway should be allowed to act on union committees or otherwise be active along that line without danger of losing their positions. The labor representatives were told to submit a draft of amendments covering the subjects in question, and the Council committee will take them under consideration.

At a recent speech on the subject of the proposed franchise for the Kansas City Railway Mayor Jost said that he was opposed to the municipal operation of street railways but favored city control of such utilities. Mayor Jost stated that he believed in municipal ownership and operation of gas, electric light and water utilities, "but when it came to street railroads it was too big a proposition." He added: "It takes ten times more men to run a street railroad than the city has to employ, and it keeps me busy checking up the men I now have to keep track of."

The interurban interests have suggested that the section of Mayor Jost's ordinance dealing with interurban lines be stricken out and one more satisfactory substituted. The original section, abstracted in the ELECTRIC RAILWAY JOURNAL of Sept. 27, 1913, would not be changed in its broad details, but several separate points would be altered. The fact that the Kansas City Railway must take interurban cars as its own cars at the city line and the resulting liability therefor are made clearer. Under the proposed substitute, while such cars are in possession of the company, on its own tracks, it shall be responsible to the passengers, the public and the city for any negligent act or omission of the company, its servants, agents or employees, to the same extent as though it were the owner of such cars; and it shall indemnify and hold harmless such suburban lines against all claims for damages arising from any defect in the company's tracks or ways and from any negligence of the company, its agents, servants and employees in operating such suburban cars while in its possession and under its control. Any suburban line, however, shall indemnify and hold harmless the company against all claims for damages arising out of or connected with any defect in any such car not due to the negligence of the company. Cars of interurban lines must be so constructed as to be suitable for convenient and safe use on the tracks of the company.

The second revised draft of the proposed franchise provided that the Kansas City Railway should, in the absence of any written contract to the contrary with the interurban line approved by the board of control, be entitled to all the passenger fares and freight charges paid for interurban traffic within city limits, and that a commission consisting of two members of the board of control and one interurban representative should determine what portion, if any, of this amount should be paid to each interurban company. The commission, in deciding this question, was to consider the value of the property of the respective interurban lines, the character of the service rendered and the cost and expense to the company of handling such interurban cars. Under the proposed plan the commission is abolished, and the company is to pay to each interurban line for the use of the suburban cars while on the company's tracks the sum of 1 cent for each passenger on such suburban cars when delivered to the company at the point of connection and 1 cent for each passenger on the cars when redelivered to the suburban lines at the point of connection, unless the company and such suburban line shall agree in writing upon some other amount, which agreement shall be subject to the approval of the board of control and also of the city.

Another important provision is that interurban cars shall not be required to stop within the city limits to take on passengers on incoming trips or to discharge passengers on outgoing trips, and that the board of control may determine and by written order designate when and where the interurban cars may be stopped by the company to receive and discharge suburban passengers, and such orders shall be posted and kept at places where the public may be constantly advised thereof.

In the matter of suburban market and produce cars, the original section provided that all such should be run to or near the public markets between 12 o'clock at midnight and 6 o'clock in the morning. The interurban lines desire that the hours of operation of these cars be left to the regulation of the board of control and the city. Moreover, the compensation for the transportation of such cars carrying market products and freight, including the use of the tracks of the company and the power necessary for such transportation, is set at 25 cents per car mile, the interurban company paying the wages of the train crew while the cars are operated over or upon the tracks of the company.

With a view to hastening the work of securing the proposed franchise as many suits as possible outstanding against the Metropolitan Street Railway are being settled out of court by the receivers. Fifty-five suits were dismissed during the past week, agreements being reached between representatives of the electric railway and the plaintiffs. The other cases, in which amicable settlements have not been effected, will be tried in the immediate future.

Indianapolis Differences Placed Before Commission

The differences between the representatives of the Indianapolis Traction & Terminal Company, Indianapolis, Ind., and the committee of employees were placed before the Public Service Commission on Nov. 21 under the terms of the settlement agreement of Nov. 7. The commission will sit as a whole and render decision within thirty days from the date of first meeting. The decision will then be binding for a period of three years upon all parties concerned. All original documents were filed with the answer of the company before the commission, including the original demands in the form of an agreement between the company and the union, the second paper as revised by the committee of employees and the company's answers to the various contentions and grievances. A summary of the demands of the men and the answers of the company follows:

The first section of the grievances asks for recognition of a committee from the "employees' association" to treat with the proper officials of the company regarding all grievances, present and future. The company objects to this on the ground that it is not within the scope of the agreement of Nov. 7, that the same is not within the jurisdiction of the Public Service Commission, and that the three-year clause of the agreement would be violated by recognition of this demand.

The second demand is that 75 per cent of the runs should be "earlies and lates," completed within eleven consecutive hours, swing runs to be completed within fourteen hours; that runs working less than nine hours shall pay nine hours' time, and that time and one-half shall be paid for overtime. The company's answer to this is that operation of the company's lines under such provisions is not practicable if good service is to be furnished in Indianapolis, and the company declines to accede to the demand for time and one-half for overtime and to pay full time for runs of less than nine hours.

The third grievance is in regard to night or "owl" cars.

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The company states that present operating conditions are substantially as demanded by the men.

The fourth contention, one of the most important, relates to wages. It contains demands for a flat rate of 32 cents an hour for motormen and conductors, and in addition names all carpenters, air-brake men, helpers in air department, paint shop men, surfacers, coaters and finishers, pitmen, armature winders, shop wiremen, coil wiremen, controller men, power house men, track men, etc., as parties to an increased scale of wages, the increases varying with the demands of the men. The company objects to this section on the ground that no suburban or interurban men are in its employ, as intimated in the demands, and that the shop employees, power house and track men were not included in the agreement of Nov. 7, which covered only men in train service. The company further contends that its present wage scale of 20 cents to 25 cents an hour is a fair wage and equal to that paid by other employers in Indianapolis to men whose business calls for no more skill than that needed by street railway employees. The company further states that it has always been able to obtain men to operate its cars at the rates now paid, and that during the last four years the wages have been increased between 11 per cent and 20 per cent, according to length of service of the men. The company then sets forth in detail the work of outside agitators leading to the strike called on Oct. 31. The company claims that dissatisfaction did not exist among the employees until these agitators, pretending to represent the employees, trumped up grievances. The company further sets out in detail the rate of wages of all carhouse employees, shopmen, trackmen and power station employees, showing that increases were granted to many of these employees on June 1, 1913, and to others on Nov. 1, 1913.

The fifth grievance is in regard to working conditions on Sundays and holidays, meal relief, etc. The company says that the present working conditions are substantially as demanded.

The sixth grievance is in regard to minor changes in working conditions. The company contends that some of these changes are impracticable, but that it will experiment with other demands made. The seventh and eighth grievances are also in regard to changes in local working conditions.

The ninth contention is in regard to reinstatement of men who have served as officers of the employees' association upon the expiration of such term of office. The company states that this demand is not in accordance with the terms of the contract of Nov. 7. The tenth grievance is concerning minor matters only.

The eleventh demand is that men shall receive $1.50 a day when they are called to the carhouse, whether they work or not. The company says that this is impracticable and that the average wages of extra men exceed the daily minimum demanded.

The twelfth demand is for books of free transportation over all lines. The company states that transportation is given to and from work, and that even this has been abused.

The thirteenth demand is that motormen shall not work as conductors, or vice versa. The company states that this has never been the case except in emergencies.

The fourteenth demand of the employees is for a closed shop not only on the lines of the city company but also on "all lines into and within Indianapolis." The company shows that this demand is not in accordance with the agreement of Nov. 7, that it would limit the scope to which the company might impose discipline and take away the freedom of action to which it is entitled under the law.

The fifteenth to twentieth demands are for minor changes in working conditions which the company refuses to accede to on account of their impracticability.

The twenty-first demand is in regard to the right to choose runs practically on demand. The company states that seniority rights have always been observed, and that if it is the desire of the majority of the men the runs will be thrown open twice a year for choosing, and defines the method of procedure.

The twenty-second grievance is for a board of arbitration to settle disputes. The company answers that such a demand does not come within the scope of the settlement agreement of Nov. 7, which provides that the decision of the Public Service Commission shall be binding for the next three years.

The twenty-third "grievance" contains a straight demand for recognition of the employees' association. The company asserts that it cannot consider this demand because it is not within the scope of the contract of Nov. 7, and that it is not within the jurisdiction of the arbitrators under the said contract, and it further declines to consider the demand for the reason that the award of the board of arbitration (the Public Service Commission) will, under the terms of the contract of Nov. 7, settle all disputes and grievances for a period of three years.

No time has been set by the commission for the first hearing on the above demands.

The petition and answer of the grievances of the men of the Indianapolis & Cincinnati Traction Company, filed several days ago before the Public Service Commission for final decision, was withdrawn on Nov. 22. Charles L. Henry, president of the company, and a committee of the men called at the office of the commission and revoked the petition, stating that a new list will be filed with the commission covering only the matters of the rate of wages and the question of dividing the schedules of the two divisions of the road. Four of the original twenty-one demands have been withdrawn and eliminated by the employees, and the other fifteen have been amended and will probably be satisfactorily adjusted between the company and the men.

Final Offer of Tacoma Railway to City

What is believed to be the final offer of the Tacoma Railway & Power Company, Tacoma, Wash., on the question of the construction of the tideflats car line across the Eleventh Street bridge was recently submitted by John A. Shackleford, president of the company, to the city commission. The Council adjourned without taking any definite action.

Mr. Shackleford's proposition was that if the city of Tacoma would remit the tax against the gross earnings of the company, which amounts to about $20,000 a year, and relieve the company of the obligation of furnishing free tickets to the employees of the city, it would construct the line on a ten-year or twenty-year permit from the city to operate over the bridge, giving the city the right to cancel the contract at the end of five or ten years, provided that the city take over the line and pay the company the full cost of its construction.

Lorenzo Dow, prosecuting attorney for the city, suggested a bond issue of $80,000 to build a municipally owned line. Mayor Seymour said the people of Tacoma had turned down the proposition once, and he added furthermore that they would doubtless realize that the operation of the line by the city would require the payment of a double fare to reach any point in the city from the tideflats. Another suggestion made was that the city maintain the present light rates and use the profits of the light department to construct the line. This proposition also met with opposition.

In his talk to the Council President Shackleford said:

"The cost of the proposed line would be determined by engineers, one selected by the company, one by the city, the engineers so selected to select a third engineer to act with them. On the line so constructed the company would give 5-cent fares, with transfers to other city lines, and would accept on this line transfers which would be issued by the other city lines. The construction and operation of such a line, however, would be at a loss. The company will not enter into an arrangement that will not in some way protect it from this loss. If the city commission has some other plan that will accomplish this purpose of taking care of the loss that the construction and operation of the line would entail, the company will be glad to consider it.

"The company desires to put squarely up to the commissioners the question whether the construction and operation of the tideflats line for a 5-cent fare with transfers is of more benefit to the city of Tacoma than the gross earnings, taxes and free transportation now received by the city.

"It is all very well to say that if the Tacoma Railway & Power Company receives a fair return on its system as a whole it should build the tideflats line, but the company does not receive a fair return. By reason of unnecessary

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extensions of the city limits, the present transfer system and other conditions, the average distance a passenger is hauled is too great in Tacoma for a 5-cent fare.

"In the last few years the company has been under a very heavy burden in furnishing funds for street paving between its rails. Some of this street paving was not needed. The city imposes a 2 per cent tax on the gross passenger earnings of the company and a 5 per cent tax on the gross freight earnings. The company furnishes to the city 16,000 free city tickets per month, in addition to transporting policemen and firemen in uniform without charge.

"The tideflats line would be a good thing for everybody except the concern which builds and operates it. The company is not in a position to build it unless the city or public will make up to the company the loss that will be incurred not only by the construction of the line but by its operation. If the street car problem is to be worked out to the best advantage for the city and with fairness to the company, the people who ride long distances will have to pay more than 5 cents or the company will have to be relieved from gross earnings taxes and the portion of the paving expenses that is not caused by the company's structures and operation. The company cannot forever furnish more than it gets paid for."

At a special meeting between the Council and the Tideflats Car Line Club on Nov. 15 it was decided unanimously to call a special election on Jan. 3 to submit to the people a proposal to issue $100,000 of bonds to build the tideflats car line. The estimate of City Engineer Raleigh on the cost of the tideflats line is $87,000, but the Council voted to issue $100,000 in bonds to cover any emergency expense that could not be foreseen. The registration books will be closed on Dec. 23, ten days before the special election. As yet only 14,025 voters have registered, less by 1000 than half of the voting strength of the city.

The question of transfers between the proposed city line and the cars of the Tacoma Railway & Power Company was discussed at the special meeting. Mr. Dow expressed the opinion that a transfer agreement might be made, but said that the Supreme Court had ruled that no such agreement could be forced by the city.

C. G. Jacobs, a tideflats worker, took a stand opposing the municipal line, saying that the extra fare, in case no transfer agreement could be made, would be a big drain on the workingmen. It would be better for the Council to accept the offer of the Tacoma Railway & Power Company and relinquish the right to the percentage of the company's earnings, amounting to $20,000 a year.

Rapid Transit Construction Progress in New York

A number of important steps in the carrying out of the dual system subway contracts have been taken by the Public Service Commission for the First District of New York recently.

A contract has been awarded for Section No. 3 of the Seventh Avenue subway in Manhattan, which went to the lowest bidder, the Degnon Contracting Company, for $2,185,063. It is the first contract awarded for the Seventh Avenue subway line, which will be operated by the Interborough Rapid Transit Company in connection with the existing subway. Bids were rejected recently by the commission for Section No. 2, immediately south of Section No. 3. The lowest bidder on this contract was the Thomas J. Buckley Engineering Company, New York, but the chief engineer of the commission refused to recommend the award of the contract to that company on the ground that it did not have the experience and equipment necessary for the successful handling of a very difficult piece of work. Accordingly all bids were rejected and the commission has readvertised for bids, to be opened on Dec. 2. On Nov. 12 the commission opened bids for the construction of Section No. 5 of the Seventh Avenue subway, lying in Seventh Avenue between Sixteenth Street on the south and Thirtieth Street on the north. The lowest bidder was the Canavan Brothers Company, whose total was $2,401,306.75, and the contract has been awarded to the company.

Plans have been announced by the commission for the temporary operation of the Steinway tunnel between Forty-second Street and Lexington Avenue, Manhattan, and Jackson and Van Alst Avenues, Long Island City. The cost of fitting up the tunnel temporarily will be about $500,000, and the bids for its execution will be invited shortly. When the Steinway tunnel line is completed it will stretch on the Manhattan side as far west as Times Square, but the plans for this are not yet drawn. On the Queens side it will connect with the Queensboro Plaza by way of Ely Avenue.

The contract for the construction of the Queens extension of the Steinway Tunnel from its present terminus in Long Island City to the Queensboro Bridge and a connection with the Corona and Astoria rapid transit lines has been awarded to the Degnon Contracting Company, New York, the lowest bidder, for $557,856. The commission has also opened bids for the construction of the proposed elevated railroad in New Utrecht Avenue, Brooklyn, from Thirty-ninth Street and Tenth Avenue to Stillwell Avenue and Avenue Y, near Coney Island. According to unofficial figures the lowest bidders for this work were Post & McCord, Inc., New York, at $1,672,000, to whom the contract has been let.

Losses on Southern Pacific Suburban Lines

The ELECTRIC RAILWAY JOURNAL of Sept. 6, 1913, contained a short reference to facts brought out in a fare hearing before the California State Railroad Commission in regard to losses on the suburban electric service of the Southern Pacific Company. According to the complete report of the commission just received this case dealt with the commutation rate of $3.50 from Fremont Way and Fairfax Avenue to San Francisco and $4.50 from Seminary Avenue to San Francisco. The complainant, the East Oakland Protective League, introduced testimony to the effect that these fares were discriminatory, but the railroad contended that the fares were not unreasonable as compared with other fares for a similar service, that its present fares between San Francisco and Alameda County suburban points did not yield a return sufficient to cover operating expenses and taxes, not considering interest on bonded debt and the return on the investment, and that it was forced by the competition of the San Francisco-Oakland Terminal Railways to establish the present fares to the districts around Thousand Oaks but had not by similar causes been forced to establish lower fares to the points in question.

In answer to various fare comparisons submitted by the defendant, the commission held that most of them concerned cases where conditions and circumstances surrounding the fares are not sufficiently similar to constitute a true standard. The commission also criticised the method by which the company apportioned its expenses between through traffic and local traffic, as given on page 394 of the issue of the ELECTRIC RAILWAY JOURNAL previously mentioned. The company had held that 90 per cent of the expense items were exclusively applicable to the suburban service, as well as a portion of the remaining 10 per cent.

In the opinion of the commission, the basis of apportionment for the expenses of maintaining and operating ferry boats across San Francisco Bay was particularly erroneous and burdened the suburban lines with much expense that should be borne by the main line. The apportionment was made on the basis of the number of passengers carried, the defendant having found that 90 per cent of the passengers using its ferries across San Francisco Bay originate at or are destined for suburban points, while but 10 per cent originate at or are destined for points beyond Alameda County suburban points. The entire expense of maintaining and operating the ferry boats was segregated on these percentages regardless of the fact that many are necessarily operated to carry out their primary purpose of meeting main line trains and would have to be so operated if there were no suburban service. Such suburban passengers as used the boats making connections with main line trains are therefore merely incidental to the trip. The item of maintenance and operation of these vessels being one of the largest items of expense charged against the suburban lines, it followed that any material change in this amount would seriously affect the final results, and for this reason the commission concluded that the exhibit did not present with sufficient accuracy the expenses properly attributable to the suburban lines and the main line.

In its final order, the commission found that the fares

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in question were discriminatory and ordered a monthly commutation fare of $3 to be charged between San Francisco and Fremont Way, Fairfax Avenue and Seminary Avenue, and a one-way fare of 10 cents. There is nothing in the decision, however, to indicate that the commission would not reopen the case for even a horizontal fare raise upon further detailed testimony based upon a different apportionment of the operating expenses between suburban and through traffic.

Financial Aspect of Toronto Purchases

According to John Mackay, the auditor retained by Mayor Hocken of Toronto to advise the city regarding the financial and general merits of the proposed municipal ownership of the Toronto Railway and the Toronto Electric Light properties, there need be no hesitation in the completion of the purchase, provided certain conditions are carried out.

Mr. Mackay's opinion is that the purchase of the Toronto Electric Light Company will justify itself financially and will result in lower rates to the citizens than could ever be afforded on the present competitive basis. The purchase of the railway company, its consolidation with the civic car lines and extension into an ideal system is compared by Mr. Mackay with the non-purchase of the company until the expiration of the franchise in 1921 and the extension of the civic car lines into the best possible system. His opinion is that the former alternative will result in a saving of $3,000,000.

Mr. Mackay figures that, if the Toronto Railway property is bought and the proposed extensions are made there will be by 1921 an accumulated surplus of $11,500,000. This can be used as a sinking fund to retire all but $500,000 of the bonds devoted to the buying of the company's so-called intangible assets, which are valued, as noted in the Electric Railway Journal of Nov. 15, 1913, page 1054, at $10,713,553. In giving these figures Mr. Mackay says he has provided for a system which in 1921 will cover 283 miles of single track. He also has provided for turning into the civic treasury the same percentage of the railway's gross receipts as now prevails under the existing franchise. This item, he says, would amount to $13,000,000 during the period.

If the railway property be not bought, Mr. Mackay asserts, an adequate extension of the present system of civic car lines will involve an accumulated deficit of $3,750,000 in the year 1921. Since, therefore, by buying the railway and amalgamating the systems, the city will by 1921 have got back all but $500,000 of its outlay on the intangible assets, Mr. Mackay claims that the purchase has a financial advantage of $3,250,000, figured as of July 31 last. As of Dec. 31 next, this would be reduced to $3,000,000.

The chief assumptions on which Mr. Mackay bases his calculations are: the continuation of normal industrial conditions; a monopoly of traction in the city; competent management, freed from all municipal or political influence or interference; a satisfactory interpretation of the prevailing Niagara power contracts to be bought; a satisfactory new contract when the present contracts expire; the issue of the purchase payment bonds at par, subject to recall at par; the issue of all further bonds at a price not costing more than 5 per cent and subject to recall at par. Mr. Mackay says in comment:

"I am unable to measure or allow for bad or mediocre management. The city must choose between high-class commercial management, with the results indicated herein, and inferior management, with losses I am not competent to measure. But unless it chooses the former it should abandon the proposal."

Mr. Mackay's report to Mayor Hocken covers eight printed octavo pages, but he says, in conclusion:

"A fuller statement will be presented with all necessary supporting data in my formal report now in course of preparation.'

Mayor Hocken has announced that the report of H. H. Couzens respecting the merits of the Toronto Electric Light purchase from the viewpoint of the Hydro-Electric system would favor the proposition. Mr. Couzens has so assured the Mayor, though his report is not yet complete. The Mayor has therefore decided to recommend that the City Council proceed with the submission of a by-law to the ratepayers on Jan. 1.

Transfer Charge Probable in Cleveland

Peter Witt, street railway commissioner in Cleveland, is quoted as saying that the 1-cent charge for transfers on the lines of the Cleveland Railway may have to be put in force after Jan. 1, 1914, because of the loss incurred by the snowstorm two weeks ago, described in the Electric Railway Journal of Nov. 22, 1913. This was heavy, he says, and inability to tell just what it will be makes it impossible to give a clear statement of conditions now. It will be necessary to await the November report, which will be out in December. By some it is estimated that the total losses due to the storm will aggregate $80,000.

Mayor Baker also stated on Nov. 20 that the transfer charge would probably have to be restored. It is believed, however, that this is due not only to the recent storm but also to the fact that the interest fund will soon be depleted by making good the deficit in the maintenance fund and charging off the value of the plants that are to be scrapped in January, 1914.

Charles W. Stage, who has been appointed director of public utilities by Mayor Baker, of Cleveland, says that he favors the early purchase by the city of the property of the Cleveland Railway. Mr. Stage argues that the property can be purchased with the proceeds of bonds bearing 4½ per cent interest and that the city will be able to operate the property at less expense that the company is now doing. The stock now outstanding totals $21,644,200 and in addition the city would have to pay a premium of $10 a share. While adhering to his idea of municipal ownership, Mayor Baker says that there has been some criticism of the cost of the city portion of the management and as yet there is little talk among the people about putting the whole property under this management.

The Cleveland Automobile Club is preparing to protest against the street railway commissioner's plan for a four-track road on Superior Avenue between East Ninth and East Fifty-fifth Streets, and a meeting will be called soon to discuss the matter.

Southern Pacific Agreement Regarding Seniority and Rates of Pay

The first important decision under the provisions of the federal act of July 15, 1913, commonly called the "Newlands act," which provides mediation, conciliation and arbitration in controversies between certain employers and their employees, has recently been handed down by the board of arbitration appointed by the Commission of Mediation and Conciliation to consider various matters that in their unsettled state threatened to bring about an open strike between the Southern Pacific Company and certain of the organizations of enginemen and trainmen employed in its system. While the only point decided by the board of arbitration was in reference to the difference between street car service and interurban service, as shown by the findings published in the Electric Railway Journal of Nov. 22, 1913, page 1113, complete reports now on hand show that several important points were settled by agreement between the company and the employees before the board of arbitration began its work.

The points in dispute arose in connection with the rates of pay on the company's steam suburban and street car lines. For some time prior to 1910 the Southern Pacific Company was operating a number of suburban steam trains in Alameda County, on which the crews had seniority rights, determined by certain printed schedules, and received rates of pay under these steam schedules, which rates were known as "suburban rates," as distinguished from the main line rates. In 1911 the entire suburban system in Alameda County was converted into electric operation. A large type of cars, known as the "300 class," equipped for either single or multiple unit operation, was installed in place of the former steam suburban service, and the company adhered to the steam suburban rates for engineers who had been transferred to and made motormen on the electric service. While this was going on the company was having built a street car of a type not adapted for suburban or interurban service, but solely a street car of the center entrance type, to be operated under a street car franchise over the same tracks and mingle with the same suburban

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service above referred to. This cross-town street car service has substantial and practical competition in the form of parallel lines of the Oakland Traction Company, manned by platform men who are paid on their schedule of street car wages. In the meantime extensive electric development was going on by the Southern Pacific Company in the Northwest, around Portland. The whole situation caused such apprehension on the part of the organizations that an agitation started which culminated in a strike ballot to call a general strike of the entire Pacific system, from Portland on the north to El Paso on the south and Ogden on the east, unless the Southern Pacific Company should make a formal obligation to extend the main line rights to the street car service.

The Southern Pacific Company appealed to the newly created board of mediation and conciliation, as a result of which Judge Hanger, assistant commissioner, came to San Francisco and obtained mutual concessions.

The agreement made between the company and the organizations settled the following points before the arbitration board met:

1. The company concedes to the organizations the right to negotiate schedules covering rates of pay, rules of seniority and working conditions governing enginemen, trainmen and yardmen, in both steam and electric service.

2. Portions of the Southern Pacific system that have been electrified, any portion that may hereafter be electrified and any new lines constructed for operation in connection therewith will not be segregated in so far as it affects the rights of enginemen, trainmen and yardmen, in either steam or electric service, or of the system general committees to legislate for and represent such employees, and the rates of pay and working conditions provided for in steam service shall apply, subject to agreement provisions.

3. Before an employee in the exercise of his seniority rights can be transferred either to or from the electric or steam service, the company reserves certain rights in the establishment of the qualifications of the man to exercise his seniority rights with safety in the operation of its trains.

It was further agreed that Section 2 should have no reference to street car service. The only question to be determined by the board of arbitration, therefore, was what constitutes street car service as distinguished from suburban electric service. The men who composed the board of arbitrators were: M. E. Montgomery, for the organization; W. R. Scott, general manager, for the Southern Pacific Company, and John F. Davis, appointed at large by the Assistant Commissioner of Mediation and Conciliation, as provided.

Report on Chicago Railroad Terminals

The complete report just received of B. J. Arnold on Chicago terminals, mentioned in the ELECTRIC RAILWAY JOURNAL of Nov. 22, 1913, contains four fundamental principles, as follows: (1) The straightening of the Chicago River and opening up in the congested district of many closed streets. (2) The depression of tracks in the congested district and placing them in covered subways. (3) The development and more efficient use of present railroad property in the business district. (4) Provision for interconnecting the main railway stations with additional suburban station facilities, in a manner to inaugurate through routing between the different railroad systems.

Mr. Arnold's report recommends that the Pennsylvania Railroad passenger station and freight station layout as recommended by J. F. Wallace and the Pennsylvania Railroad be rearranged so as better to conserve the city's interests. Mr. Arnold concludes that any plan contemplating less than three stations would be impracticable, and he recommends the Illinois Central station on the lake front, the present Northwestern station and a new union station to be built south of Harrison Street instead of on Adams Street.

Mr. Arnold disagrees with Mr. Wallace in regard to the use of depressed tracks to the proposed freight station on the ground that these would be as great a barrier as overhead structures and he recommends the use of covered subways. While Mr. Arnold leaves the question of motive power open, still for these freight subways and the subways recommended for the tracks of all steam railroads, with a few exceptions, in the district bounded by Twelfth Street, Halsted Street, Lake Street and the lake front, no power except electricity is yet sufficiently developed.

In connection with the proposed straightening of the Chicago River, Mr. Arnold makes the following specific statement regarding electrification:

"While this class of improvement practically necessitates the electrification of the tracks, the suggestion is not made with the intention of attempting to force such electrification, as almost all progressive steam railroad men now recognize that electrification of terminals must come within a reasonable time, and for the further reason that this subject is now being analyzed, at the expense of the railroads, by the committee on smoke abatement and electrification of the Chicago Association of Commerce, whose report is promised for the near future."

Strike at Schenectady Works of the General Electric Company

On the morning of Nov. 25, after negotiations between the company and representatives of the men, from one-third to one-half of the employees at the Schenectady works of the General Electric Company went on strike. A number of the men have since returned to work. It is estimated that the number who were still out when this issue went to press was about 13,000. The ostensible cause for the strike was the laying off of two workers. Other definite causes which had a potent influence in the matter were the existence of unions among the employees between which there has always been strong feeling. These unions were branches of the Industrial Workers of the World and the American Federation of Labor, between which there is strong opposition. According to reports from Indianapolis, executive officials of the American Federation of Labor sent telegrams from that city to representatives of local unions at Schenectady urging strongly that no strike be called at this time.

Chicago's Terminal and Subway Committees' Inspection Trip

The members of the local transportation committee of the Chicago City Council, accompanied by George Weston, of the Board of Supervising Engineers, have returned from a trip of inspection of the subway systems of New York, Boston and Philadelphia. The purpose of this trip was to obtain further enlightenment before recommending to the Chicago City Council either the comprehensive subway system, as recommended by Mayor Harrison, or the Arnold plan for a downtown system of subways for surface lines. Several of the members of the committee have expressed themselves as favoring the Arnold plan as outlined in the ELECTRIC RAILWAY JOURNAL of Nov. 8, 1913, page 1031.

At the same time the local transportation committee inspected subways, the members of the committee on railway terminals of the Chicago City Council made a trip to New York to inspect the New York Central & Hudson River Railroad and the Pennsylvania Railroad terminal layouts. Bion J. Arnold accompanied the committee on this inspection trip and John F. Wallace met them in New York. The purpose of the trip was to make a careful study of the New York terminal situation with a view of solving the Chicago terminal problem, which is now being considered by this committee. Both Mr. Wallace and Mr. Arnold have submitted reports on the solution of the terminal problem to this committee with recommendations.

Delos F. Wilcox on Cleveland Situation

Delos F. Wilcox, formerly chief of the bureau of franchises of the New York Public Service Commission, First District, has made a supplemental statement in reference to the interview with him on the Cleveland situation published in a Cleveland paper and mentioned in last week's issue of the ELECTRIC RAILWAY JOURNAL. Mr. Wilcox said he did not say that the Tayler franchise should have permitted the company to pay dividends in excess of 6 per cent. He pointed out the recognized fact that the Tayler ordinance fixes the profit on the capital invested, leaving no

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possibility of additional profit to furnish the incentive to economy usually relied on under private ownership. He said, however, that the ordinance attempts to supply a substitute for this motive by means of the arbitrary limit on operating expenses and the powers of supervision given to the city street railroad commissioner. He said that this is a unique experiment which is being watched by the country at large, and it is not for outsiders to go to Cleveland to criticise but rather to learn from the people who are getting the practical experience.

In regard to municipal ownership, Mr. Wilcox called attention to the possibilities of beginning to acquire the property, even under private operation, by means of an amortization fund, without waiting for the time when the city buys the plant for a lump sum representing the full amount of the investment. He said it would be a pity if 3-cent fares came to be a political necessity, as in his opinion the scheme should be worked out along sound economic lines, and the question of the rate of fare, within reasonable limits, should be subordinated to the necessities of service and the policy of making the property pay for itself out of earnings. Mr. Wilcox added that if fares were put so low as to enable the street railway system just to skim along without any surplus for a sinking fund, then in case the city takes the property over and begins to retire the bonds out of earnings, fares will have to be increased, unless the city is able to effect economies in the way of fixed charges or otherwise sufficient to take care of the sinking fund.

Electrification of Charles City Western Railway Proposed.—The Charles City (Ia.) Western Railway contemplates electrifying its line within the coming year, but is not yet ready to award any contracts.

New Oklahoma Road Opened.—The Norman Interurban Railway, controlled by the Oklahoma Railway, Oklahoma City, Okla., has been placed in operation between Norman, Oklahoma City and Edmond. The road is 33 miles long.

Application for Elevated Railway Franchise in Havana.—Joseph E. Barlow, Havana, Cuba, has asked the City Council to grant him a concession for erecting an elevated railway from Havana to Buena Vista, Camp Columbia and other nearby places.

Roanoke Strike Declared Off.—The strike of the employees of the Roanoke Railway & Electric Company, Roanoke, Va., which was begun last May, has been declared off officially. As stated previously in the ELECTRIC RAILWAY JOURNAL, the strike failed shortly after its inception.

Subways Promised for Montreal.—The Montreal (Que.) Tramways recently applied for an extension of its charter, promising underground railways. On Nov. 17 the Canadian Autobus Company also stated that it was prepared to construct tubes serving both the downtown and uptown districts.

Bill to Repeal Massachusetts Trolley Merger.—Representative Thomas A. Niland, of East Boston, has filed with the clerk of the House a bill to repeal the western Massachusetts trolley merger bill, which was enacted at the last session of the Legislature, as mentioned in the ELECTRIC RAILWAY JOURNAL of June 21, 1913, page 1119.

Demand for Two Doors on Near-Side Cars.—Mayor Brock's veto of a resolution ordering the International Railway to place two doors on its near-side cars in Lockport, N. Y., was sustained on Nov. 18 at a meeting of the aldermen by a vote of 5 to 5. Seven votes were necessary to pass over the veto. Later a similar resolution was offered giving the International Railway ninety days in which to place a rear as well as front door on its near-side cars. It was submitted to the committee on ordinances.

Safety Zones Needed at Street Corners for Buses.—At a meeting of the Fifth Avenue Association in New York on Nov. 19 to discuss traffic conditions it was recommended that the police keep clear 25 ft. on Fifth Avenue at the northeast and southwest corners of streets, so that buses may take on or discharge their passengers in safety. It was stated by inspectors that by reason of the curb line being blocked at congested points, the buses were frequently compelled to stop in the moving line of vehicles, thus endangering the lives of those who had to board them.

Tidewater Southern Railroad Opened.—The regular schedule on the Tidewater Southern Railroad between Modesto, Cal., and Stockton, Cal., was started on Nov. 15. Three trains each way will be maintained until Dec. 1, when six trains will be operated. The cars make the trip of 30 miles in one hour and twenty-five minutes with thirty-three stops. About Dec. 12 eight trains will run daily over the line and the regular running time when finally arranged will be one hour and twenty-five minutes between Stockton and Modesto.

Prize for Sales or Advertising Essay.—*Advertising and Selling* has authorized the Associated Advertising Clubs of America to offer a prize of $1,000 in cash, which it will pay at the Toronto convention and every year thereafter until further notice to the person who writes the most vital and helpful essay on a sales or advertising subject. The jury will be the official awards committee of the Associated Clubs and the editorial advisory board of *Advertising and Selling*, consisting of prominent advertising managers. All contributions should be sent to John K. Allen, chairman of the program committee of the Associated Advertising Clubs of America, in care of the *Christian Science Monitor*, Boston, Mass.

Power of Commission to Fix Rates and Remove Officials.—As a result of the decision of the Missouri Public Service Commission that it has power to fix utility rates, regardless of franchise conditions, and also to remove officials of utility companies, an application will be made to the Missouri Supreme Court testing the authority of the commission. The commission, in rendering its decision in the case of citizens of Nevada, Mo., against the Fort Scott & Nevada Heat, Water & Lighting Company, held that it had to go behind franchise rates and establish its own rates, and that it had authority to remove officers of a utility, as noted in the ELECTRIC RAILWAY JOURNAL of Nov. 22, 1913.

New Hydro-Electric Plant in Georgia.—The Georgia Railway & Power Company, Atlanta, Ga., on Oct. 27 began using electricity from its new 80,000-hp hydroelectric plant at Tallulah Falls, the electricity being transmitted 90 miles to Atlanta. The development includes a dam 380 ft. long by 120 ft. high, forming a lake 2 miles long and nearly half a mile wide, with a depth of from 100 ft. to 200 ft. By next March the company expects to complete its dam at Mathis, 5 miles above Tallulah Falls, forming a lake 8 miles long and 2 miles wide. This will be a storage basin for use at low stages of the river. At present the developments at Tallulah Falls, Morgan Falls and near Gainesville will furnish 98,000 hp for transmission to Atlanta and sixteen neighboring towns.

Court of Appeals Upholds Washington Transfer Law.—The Court of Appeals at Washington, D. C., has decided that the law requiring the giving of reciprocal transfers between the Metropolitan Coach Company, operating the line of herdics, and the Capital Traction Company is constitutional and enforceable. The court holds that there is no violation of contract in the amendment of any act of Congress affecting a public utility which uses public spaces, and that in this particular instance there is no ground to view the exaction of free reciprocal transfers as confiscatory and therefore unconstitutional. According to the view of the Court of Appeals Congress can annul the charter of a street railway or any other public utility that uses public spaces for the supposed benefit of the people as well as for profit. The court holds that the granting of the transfers reciprocally between the lines affected is an advantage rather than a disadvantage, inasmuch as each company will presumably benefit through the inducement of traffic.

Toronto Deviation Appeal Decided in City's Favor.—Lord Moulton, of the British Privy Council, recently rendered a decision with costs in favor of the city of Toronto as against the appeal of the Toronto & York Radial Railway in respect to the Yonge Street deviation of the Metropolitan line. The court held that the radial railway was a company which, as far as was material to the present case, might be taken to be the successor in law to the Metropolitan Street Railway, and that it was subject to the jurisdiction of Toronto and other municipalities that had at times been authorized to pass on any agreements

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concerning it. The company was held to be bound by the whole of the obligations of these agreements so far as they related to such portion of the track, there having been no statutory release from those obligations. The court was of the opinion that the proposed line was a new line which the appellants desired to construct and operate without having obtained any franchise or statutory authority to do so.

PROGRAMS OF ASSOCIATION MEETINGS

Southwestern Electrical & Gas Association

The next annual convention of the Southwestern Electrical & Gas Association will be held in Galveston, Tex., May 22, 23, 24 and 25, 1914. Further details as to headquarters, exhibits, etc., will be announced as soon as decided by the executive committee.

Keystone Railway Club

At a joint meeting on Nov. 18 of the executive committee of the Keystone Railway Club and the committee on consolidation which was appointed at the September meeting of the club, it was decided that the members of both these committees should attend the regular annual meeting of the Pennsylvania Street Railway Association in Harrisburg, on Dec. 2, 1913, at which time the members of the Pennsylvania Street Railway Association will decide whether or not they will consolidate with the Keystone Railway Club. The date of the next regular meeting of the Keystone Railway Club has been postponed indefinitely pending the outcome of the consolidation question.

Midyear Meeting American Electric Railway Association

Some details of the banquet to be held on Jan. 29 at the time of the midyear meeting of the American Electric Railway Association were decided at a meeting of the banquet committee in New York on Nov. 25. The committee in charge of the banquet consists of five representatives of the American Electric Railway Association and five of the Manufacturers' Association. The former are: C. Loomis Allen, joint chairman; G. J. Roberts, Frank Hedley, T. S. Williams and L. S. Storrs. The five members of the Manufacturers' Association are: W. L. Conwell, joint chairman; C. R. Ellicott, B. A. Hegeman, Jr., E. H. Baker and H. G. McConnaughy. The meeting was held at the Engineers' Club. Mr. Allen entertained the committee, and, in addition to the members of the committee, H. C. Donecker, H. J. Clark and E. B. Burritt were in attendance. A committee consisting of the secretaries of the two associations, Messrs. Burritt and McConnaughy, was appointed to send out announcements in regard to the banquet and to take charge of registration and subscriptions. These notices will be issued soon. The following committee was then appointed to select the speakers: Frank Hedley, chairman, and Messrs. Allen and Ellicott. It was decided that C. N. Black, president of the American Association, should preside at the banquet, and he will deliver an address. In addition two and perhaps three other speakers will be selected, each address to be about twenty minutes in length. One of these speakers will be selected to represent the interests of the manufacturers in the purposes of the association, and one will probably be of national prominence and not directly connected with the operating or manufacturing field. The following committee was also appointed to have charge of other details of the banquet, such as the selection of menu, seating arrangements, decorations, etc.: W. L. Conwell, chairman, and Messrs. McConnaughy, Baker, Storrs and Roberts, with Secretary Burritt to act as secretary for the committee.

According to a resolution adopted by the executive committee of the association at Atlantic City, this banquet will not be a complimentary one extended to the railway men by the Manufacturers' Association as in the past, but a charge of $10 will be made for each attendant, and those who expect to be present will be asked to notify the committee at as early a date as possible. Another meeting of the full committee will be held at the Engineers' Club Dec. 9 at 6 p. m.

Financial and Corporate

Stock and Money Markets

Nov. 25, 1913.

There was a striking contrast between the volume of trading on the New York Stock Exchange to-day and that of Monday. Almost four times as much business was done to-day as on Monday. There was a brisk demand for the important issues all through the early dealings, and the prices of the principal railroads and industrials made gains ranging from substantial fractions to around one point. Rates in the money market to-day were: Call, 2¾ @ 4 per cent; sixty days, 5 @ 5¼ per cent; ninety days, 4¾ per cent; four to six months, 4½ @ 5 per cent.

The Philadelphia market was strong to-day, with the trading broad. The bond transactions totaled $36,600, par value.

Advances were recorded in the Boston stock market to-day, and at the close prices were at or near the highest of the session.

Trading in Chicago to-day was active and the tone of the market was stronger.

In Baltimore the trading in stocks was dull. The demand for bonds was fair.

Quotations of traction and manufacturing securities as compared with last week follow:

	Nov. 19	Nov. 22
American Brake Shoe & Foundry (common)	87	87
American Brake Shoe & Foundry (preferred)	127	128
American Cities Company (common)	36	36
American Cities Company (preferred)	63½	64½
American Light & Traction Company (common)	339	334
American Light & Traction Company (preferred)	106	106
American Railways Company	38¾	38¾
Aurora, Elgin & Chicago Railroad (common)	41	a41
Aurora, Elgin & Chicago Railroad (preferred)	84	82
Boston Elevated Railway	85	85
Boston Suburban Electric Companies (common)	7	7
Boston Suburban Electric Companies (preferred)	60	60
Boston & Worcester Electric Companies (common)	*6½	*6½
Boston & Worcester Electric Companies (preferred)	38	39
Brooklyn Rapid Transit Company	86¼	87⅛
Capital Traction Company, Washington	112	111½
Chicago City Railway	160	160
Chicago Elevated Railways (common)	25	25
Chicago Elevated Railways (preferred)	75	75
Chicago Railways, ptcptg., ctf. 1	90	90
Chicago Railways, ptcptg., ctf. 2	27	26½
Chicago Railways, ptcptg., ctf. 3	7	5½
Chicago Railways, ptcptg., ctf. 4	2	2
Cincinnati Street Railway	105	105
Cleveland Railway	103¾	104
Cleveland, Southwestern & Columbus Ry. (common)	*5½	*5½
Cleveland, Southwestern & Columbus Ry. (preferred)	*30	*30
Columbus Railway & Light Company	18	18
Columbus Railway (common)	59½	59½
Columbus Railway (preferred)	88	88
Denver & Northwestern Railway	111	*111
Detroit & United Railway	a80	68
General Electric Company	140¼	139
Georgia Railway & Electric Company (common)	119	119
Georgia Railway & Electric Company (preferred)	85	85⅞
Interborough Metropolitan Company (common)	14	14⅛
Interborough Metropolitan Company (preferred)	58⅝	58½
International Traction Company (common)	*40	*40
International Traction Company (preferred)	*95	*95
Kansas City Railway & Light Company (common)	*22	*22
Kansas City Railway & Light Company (preferred)	*30	*30
Lake Shore Electric Railway (common)	*7	*7
Lake Shore Electric Railway (1st preferred)	*92	*92
Lake Shore Electric Railway (2d preferred)	*25	*25
Manhattan Railway	130	130
Massachusetts Electric Companies (common)	11	10½
Massachusetts Electric Companies (preferred)	65	64
Milwaukee Electric Railway & Light Co. (preferred)	100	*100
Norfolk Railway & Light Company	*25¼	*25¼
North American Company	70	70½
Northern Ohio Light & Traction Company (common)	66¼	66¼
Northern Ohio Light & Traction Company (preferred)	97	97
Philadelphia Company, Pittsburgh (common)	39½	39½
Philadelphia Company, Pittsburgh (preferred)	39	39
Philadelphia Rapid Transit Company	19⅛	18⅜
Portland Railway, Light & Power Company	56	56
Public Service Corporation	106	107
Third Avenue Railway, New York	39⅝	39⅝
Toledo Traction, Light & Power Company (common)	a30	30
Toledo Traction, Light & Power Company (preferred)	a80	80
Twin City Rapid Transit Co., Minneapolis (common)	104¼	104
Union Traction Company of Indiana (common)	*13	*13
Union Traction Company of Indiana (1st preferred)	*83	*83
Union Traction Company of Indiana (2d preferred)	*25	*25
United Rys. & Electric Company (Baltimore)	25½	25⅛
United Rys. Inv. Company (common)	18	17
United Rys. Inv. Company (preferred)	34	34
Virginia Railway & Power Company (common)	56	56
Virginia Railway & Power Company (preferred)	96	93½
Washington Ry. & Electric Company (common)	88	86½
Washington Ry. & Electric Company (preferred)	87	86
West End Street Railway, Boston (common)	68	67⅞
West End Street Railway, Boston (preferred)	90	90
Westinghouse Elec. & Mfg. Company	64	65
Westinghouse Elec. & Mfg. Company (1st preferred)	112½	112

*Last sale. a Asked.

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ANNUAL REPORT

Virginia Railway & Power Company

The gross earnings, income and expenses of the combined properties owned, leased and operated by the Virginia Railway & Power Company, Richmond, Va., for the fiscal years ended June 30, 1912 and 1913, after excluding offsetting transactions between companies and departments, are given below:

	1913	1912
Gross earnings:		
Railway department	$2,926,364	$2,746,293
Electric light and power and gas departments	1,937,743	1,758,089
Ferry department	.....	*53,811
Total gross earnings	$4,864,107	$4,558,193
Operating expenses (including depreciation):		
Railways department	$1,670,238	$1,676,310
Electric light and power and gas department	746,750	703,779
Ferry department	.....	*42,814
Total operating expenses (including depreciation)	$2,416,988	$2,422,903
Net from operation	$2,447,119	$2,135,290
Other income:		
Rentals from lands and buildings	$5,396	$7,355
Rentals from pole lines	125	127
Rent of water power	9,394	9,563
Interest on notes receivable and open accounts	20,935	19,333
Interest on investments	9,333	7,444
Interest on deposits	24,131	19,705
Cash discount	3,548	2,615
Revenue from Chesapeake Ferry Company under lease	13,622	2,039
Salvage account Steamer "Maryland"	.....	1,866
Operation of garage	.....	†889
Rental of equipment	220	.....
Total other income	$86,704	$69,158
Gross income	$2,533,823	$2,204,448
Taxes and licenses:		
Railway department	$202,940	$188,474
Electric light and power department	60,419	67,071
Gas department	11,000	10,260
Ferry department	229	983
Total taxes and licenses	$274,589	$266,789
Gross income over operating expenses, depreciation, taxes and licenses	$2,259,234	$1,937,659
Fixed charges and rentals:		
Interest on bonds	$1,086,638	$1,032,923
Sinking fund payments	40,273	39,463
Other interest	.....	151
Rental paid Norfolk Railway & Light Company	99,000	83,875
Total fixed charges and rentals	$1,225,911	$1,156,412
Surplus over fixed charges	$1,033,321	$781,247
Less direct charges:		
Amortization of discount, premium, and expense on bonds sold	$23,681	$18,909
Miscellaneous net charges, not operation, charged direct to surplus by order of board of directors and executive committee	26,463	32,568
Total	$50,145	$51,478
Net surplus before deducting dividends	$983,178	$729,769
Dividends:		
Preferred stock:		
2½ per cent paid Jan. 10, 1913	$192,480	.....
2½ per cent paid July 10, 1913	192,480	.....
Common stock:		
1 per cent paid Oct. 21, 1912	$119,499	.....
1½ per cent paid April 10, 1913	179,250	.....
Total dividends	$683,709	.....
Surplus for the year after payment of dividends	$299,468	.....

*Operated only to May 1, 1912.
†Loss.

Thomas S. Wheelwright, president of the company, says in part: "The operating expenses include a charge of $8,333.33 per month against the Richmond, Petersburg and Interurban divisions to provide for depreciation. This depreciation fund is set aside in cash and is carried in a separate account in the bank. The amount to the credit of this fund for the Richmond, Petersburg and Interurban divisions on June 30, 1913, was $142,782.

"At the time of the merger of the properties of the Norfolk & Portsmouth Traction Company with this company the sum of $415,000 was set aside to provide for the depreciation and the rehabilitation of the properties formerly owned and operated by the Norfolk & Portsmouth Traction Company. The work of rehabilitation of these properties has been steadily progressing and there has been charged against this fund for the fiscal year $197,444.

"There were 913.4 ft. of new single track constructed on the Richmond division; on the Interurban division a siding 433 ft. long was constructed between Stops 14½ and 15—this track is constructed with 60-lb. T-rail, laid on white oak ties, embedded in gravel—and on the Petersburg division the Sycamore Street line was extended 5496 ft. and 343 ft. of siding constructed and the Halifax Street line was extended 1468 ft.

"The track mileage in Richmond and vicinity has been materially decreased by the sale of the Seven Pines line, a small portion of this decrease being offset by the construction of the Franklin Street loop and several sidings. In Petersburg the track mileage has been increased by the construction of extensions of the Sycamore Street and Halifax Street lines. The track mileage in Norfolk and vicinity has been materially decreased by the elimination of the ferries mileage (approximately 16½ miles), the changing of the larger part of the Masons Creek line from double track to single track, the taking up of dead track on Maryland Circle and to the Marine Barracks Reservation and the remeasurement of all the lines in Norfolk and vicinity.

"During the year the new carhouses at Norfolk, contracts for which had been let at the close of the past fiscal year, were completed and the consolidation of the carhouses and shops of the company in that territory together with the construction of suitable operating offices at the carhouses has resulted in great convenience and economy.

"During the year the new twelve-story fireproof office building of the company, at Seventh and Franklin Streets in the city of Richmond, was completed and was occupied by the offices of the company about June 1, 1913. At the close of the fiscal year the greater portion of the offices in this building not occupied by the company had been rented on satisfactory terms. By the construction of this building the company has secured suitable and convenient offices for its business and fireproof vaults for its records.

"During the fiscal year the new power station, as an addition to the central power station of the company at the foot of Twelfth Street in the city of Richmond, was completed. In this plant has been installed one 9000-kw horizontal turbine equipped with surface condensers and auxiliaries, including the necessary switchboards and switching apparatus. There were also installed eight Babcock & Wilcox water-tube boilers of 600 hp each, equipped with superheaters for 125 deg. superheat, with automatic stokers of the Westinghouse type. This building has been so constructed that an additional large unit may be installed at a very low cost whenever the business of the company shall demand additional service. The new unit began operation March 20, 1913, and has proved satisfactory.

"During the year the high-voltage transmission line connecting the water-power station at the Locks power house at Petersburg to the central station of the company at the foot of Twelfth Street, Richmond, a distance of about 24 miles, has been completed and put into operation. The use of this line has already resulted in considerable economy in the production of power in this territory as it renders available the surplus water power of the Petersburg plant for distribution in Richmond and contiguous territory whenever the water-power conditions will permit and, by reversal of current, power generated at the central station in Richmond may be distributed in Petersburg and contiguous territory. In this way the reliability of the service in the entire territory is increased and the old steam plant at Petersburg which has been maintained as an auxiliary is no longer required and has been abandoned.

"Each month the company set aside the following percentages of gross transportation earnings, as a reserve against injuries and damages: Richmond, Petersburg and Ocean View divisions, 3.5 per cent of gross transportation earnings; Norfolk and Portsmouth divisions, 6 per cent of gross transportation earnings, making the total amount reserved for the system for the year ended June 30, 1913, the sum of $131,022. The charges against the injuries and damages reserve for the year ended June 30, 1913, were $146,755, or $15,733 in excess of the amount reserved for the fiscal year. These charges equaled 5.01 per cent of the gross transportation earnings of the system. This increase in expenditures on account of injuries and damages and expenses of the claim department for the fiscal year was largely in the city of Norfolk, where there were a series of

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expensive accidents during the year, the charge on that division being 7.06 per cent of the gross transportation earnings as compared to 3.59 per cent in Richmond and vicinity.

"For several years past there has been considerable agitation in the city of Norfolk looking to the sale of tickets at the rate of six for 25 cents on the cars of the company. The franchises in that city do not require the sale of tickets at all, but provide for a straight fare of 5 cents. During later years, in the adjustment of certain controversies with the city, the company agreed to sell tickets at six for 25 cents at certain fixed points in the city, but not on the cars, but this arrangement has not apparently proved satisfactory to the public. A comprehensive plan for the readjustment of the franchises in Norfolk and the re-routing of the car lines in that city was presented to the Council on March 10, 1913. As a part of this plan, it was proposed to sell tickets at the rate of six for 25 cents on the cars. At the close of the fiscal year this plan was under consideration by a special committee of the Council, and it is hoped that some definite report will be made thereon in the near future."

Comparative traffic statistics contained in the report are as follows:

	1913	1912
Revenue passengers carried	64,532,079	60,500,584
Transfers and free passengers carried	16,117,776	16,833,441
Total passengers carried	80,649,855	77,334,025
Percentage of passengers using transfers	18.90	20.57
Average fare per passenger including transfers	$.036	$.035
Car mileage	12,207,419	12,098,522
Car hours	1,473,940	1,463,349
Passengers per day	220,959	211,295
Passenger receipts per car mile	$.235	$.222
Passenger receipts per car hour	$1.95	$1.84
Total receipts per car mile excluding advertising	$.239	$.225
Total receipts per car hour excluding advertising	$1.98	$1.86
Operating expenses per car mile, including depreciation	$.137	$.139
Operating expenses per car hour, including depreciation	$1.13	$1.15

Alton, Jacksonville & Peoria Railway, Alton, Ill.—F. L. Butler, receiver for the Alton, Jacksonville & Peoria Railway, has announced that he intends to advise the Madison County Circuit Court to order the sale of the railroad.

Boston (Mass.) Elevated Railway.—The stockholders of the West End Street Railway at the annual meeting on Nov. 25 voted to increase the capital stock of the company by issuing 7000 additional common shares, the proceeds to be used to pay Boston Elevated Railway for permanent additions and improvements made to the property of the West End Street Railway. The retiring directors were re-elected. There were 169,820 shares represented at the meeting.

Bowling Green (Ky.) Railway.—Following a judgment for $10,000 in favor of the Fidelity & Columbia Trust Company, of Louisville, trustee for the bondholders of the Bowling Green (Ky.) Street Railway, an order of sale has been entered by the Court of Appeals of Kentucky. Master Commissioner Speck will offer the property, including the franchise and plant, for sale on Dec. 22. The company has been in the hands of a receiver since last March, the final authorization of the receivership being recently secured from the Court of Appeals, as noted in the ELECTRIC RAILWAY JOURNAL of Nov. 15, 1913.

Bristol County Street Railway, Taunton, Mass.—In the case of the Federal Trust Company, trustee, against the Bristol County Street Railway and the Taunton & Pawtucket Street Railway, Judge Pierce of the Superior Court on Nov. 18 rendered a decision denying the motion of the Taunton & Pawtucket Street Railway Company to recommit the master's report and confirming the report. The case involved the rights of bondholders in street railway companies. On May 3, 1904, receivers were appointed for the Bristol County Street Railway, and subsequently its property was sold at receivers' sale, subject to a mortgage and bond issue, and was acquired by the Taunton & Pawtucket Street Railway, which was organized for that purpose. After the sale the Taunton & Pawtucket Street Railway continued to pay the interest on the bonds up to Jan. 1, 1909, when default was first made. The defendant Taunton & Pawtucket Street Railway asserted that certain alleged informalities in connection with the organization of the Bristol County Street Railway and the issue of its stock rendered invalid the mortgage as well as the bonds secured thereby. The master found against this contention and found that the mortgage and bonds constituted a valid lien.

Central Illinois Public Service Company, Mattoon, Ill.—A certificate of increase of capital stock of the Central Illinois Public Service Company from $6,000,000 to $10,000,000 was filed on Nov. 15 in the office of the Secretary of State. The company owns more than thirty public utilities in cities of Central Illinois, including several operating electric railway systems.

Chicago & Milwaukee Electric Railroad, Highwood, Ill.—Attorneys for the reorganization committee of the Chicago & Milwaukee Electric Railroad appeared before Judge Landis of the Federal Court at Chicago on Nov. 24, presenting a motion for direction of the court with reference to the resale of the property of the road. The court replied that pending the decision of the question before Judge Geiger of Milwaukee as to whether the reorganization committee would be allowed to bid at the sale, no directions would be given the master, as it is the intention of the court that both the Wisconsin and the Illinois divisions of the road be sold at the same time.

Detroit (Mich.) United Railway.—Notice is given that the People's State Bank of Detroit will on Dec. 1 redeem and pay for first mortgage 5 per cent gold bonds of the Detroit Railway numbered 51 to 100, inclusive. The total authorized issue under the mortgage securing these bonds is $1,800,000. Of this amount $1,750,000 is outstanding. The bonds are dated June 1, 1895, and are in the denomination of $1,000. Bonds numbered 1 to 600 mature in the order of the numbers at the rate of $50,000 a year, commencing on Dec. 12, 1912. The remaining bonds mature on Dec. 1, 1924.

Dominion Power & Transmission Company, Hamilton, Ont.—The directors of the Dominion Power & Transmission Company have declared a dividend of 2 per cent on the limited preferred stock payable on Dec. 15 to shareholders of record Nov. 30. This stock is entitled to receive total dividends of 10 per cent, after which it becomes common stock. Already dividends of 1½ per cent have been paid and it is expected that the remaining 8½ per cent will be paid in the course of the coming year.

Federal Utilities Company, Inc., New York, N. Y.—The directors of the Federal Utilities Company, Inc., have passed up the quarterly dividend of 1½ per cent due next month on the preferred stock. In explanation of this action De Forest Candee, president of the company, notified shareholders that the income in the ten months ended with Oct. 31 was sufficient to meet dividend requirements, but depreciation in the market value of securities owned and a consequent shrinkage of surplus had caused the directors to conserve resources. The directors of the company considered the matter of the dividend at a meeting on Nov. 25.

Illinois Traction Company, Peoria, Ill.—The shareholders of the Illinois Traction Company have voted to issue one one-hundred-dollar share of new common stock (present authorized issue $15,000,000, outstanding $9,984,000) for each two one-hundred-dollar shares of the $4,521,800 common stock of the Western Railways & Light Company. The preferred stock of the latter company to the amount of $3,169,000 will remain outstanding, the amalgamation involving simply the acquisition of the common shares. As stated in the ELECTRIC RAILWAY JOURNAL of Nov. 8, the management of the two corporations is practically identical. The merger will require an issue of $260,900 additional common stock of the Illinois Traction Company. It is the intention to ask an increase of $5,000,000 in the authorized amount, although no present issue is contemplated beyond the amount required for the purchase of the Western Railways & Light Company's stock.

International Railway, Buffalo, N. Y.—The Public Service Commission for the Second District of New York on Nov. 20 authorized the International Railway to issue $1,111,000 of its 5 per cent fifty-year gold mortgage bonds under an indenture given to the Bankers' Trust Company as trustee, to be sold at not less than 88 per cent of their par value and accrued interest, the proceeds to be used for additions and betterments and to retire certain car trust certificates maturing Dec. 15, 1913. This order super-

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sedes all previous orders of the year. The company was also permitted to issue $620,000 of 5 per cent refunding and improvement fifty-year gold mortgage bonds, the proceeds to be used solely and exclusively for the purpose of paying and discharging certain underlying and prior lien bonds. Permission was also granted to issue $635,000 of 5 per cent fifty-year gold mortgage bonds for proposed expenditures from Jan. 1 to Dec. 31, 1914, and for expenditures to retire certain car trust certificates maturing in March, June, September and December, 1914.

New Midland Power & Traction Company, Cambridge, Ohio.—The New Midland Power & Traction Company has filed a request with the Ohio Public Utilities Commission for authority to sell its electric railway properties in Cambridge and Guernsey County to the Ohio Service Company, recently organized. The sales price is to be $900,000, of which $650,000 is to be in convertible notes bearing 6 per cent interest.

Northern Illinois Electric Railway, Chicago, Ill.—The Northern Illinois Electric Railway has been placed in the hands of Andrew Aschenbrenner as receiver with instructions to continue the operation of the road.

Public Service Corporation of New Jersey, Newark, N. J.—The Public Service Corporation of New Jersey has applied to the Board of Public Utility Commissioners of New Jersey for permission to issue $620,000 of 5 per cent bonds to refund $620,000 of outstanding first mortgage 6 per cent bonds of the North Hudson County Railway dated 1884 and due Jan. 1, 1914. The bonds which it is proposed to issue to refund the bonds about to mature are to run to Jan. 1, 1928.

Stockton Terminal & Eastern Railroad, Stockton, Cal.—New directors have been elected for the Stockton Terminal & Eastern Railroad as follows: George F. Hudson, G. McM. Ross, E. H. McGowan, Amos Jones, John R. Humphreys, J. B. Lundy, John Strohm, Warren V. Clark and Theodore C. Bee.

Toledo & Chicago Interurban Railway, Kendallville, Ind.—In the Superior Court on Nov. 11, in the suit of Josephine B. Hanson, administratrix of the estate of James B. Hanson, deceased, against the Toledo & Chicago Interurban Railway, the final report of the receiver, James D. Mortimer, was filed and approved and the receiver was discharged. The final report and the court's discharge showed that the orders of the court had been complied with; that all the receivers' certificates, preferred claims for injuries and damage claims had been paid, and that all the first mortgage bonds of $1,250,000, except three bonds of $1,000 each and three bonds of $500 each, had been surrendered and were in the hands of the receiver, and that $1,702.20 was on hand to pay the pro rata share of these six outstanding bonds. The new organization, known as the Fort Wayne & Northwestern Interurban Railway, which was mentioned in the ELECTRIC RAILWAY JOURNAL of April 19 as the probable successor of the Toledo & Chicago Interurban Railway, is now free to go ahead with its improvements as soon as its financial arrangements can be completed.

Union Street Railway, New Bedford, Mass.—The Union Street Railway recently petitioned the Public Service Commission to approve the issue of 250 bonds with a par value of $250,000 to meet an outstanding debt of $250,000 maturing Jan. 1, 1914. These bonds are part of an issue of $2,000,000 of twenty-year 4½ per cent mortgage bonds voted by the stockholders of the company at the annual meeting on Oct. 17, as noted in the ELECTRIC RAILWAY JOURNAL of Nov. 1, 1913.

Washington Railway & Electric Company, Washington, D. C.—Officials of the Washington Railway & Electric Company conferred on Nov. 17 with representatives of the Public Utilities Commission regarding the recent action of the company in declaring an extra dividend of 1 per cent on its common stock. The examination thus far has been conducted principally with reference to the facts upon which the decision to declare an extra dividend was based. It is proposed to examine the company's depreciation reserve and other funds and the sources from which they are obtained, and it is thought the inquiry will last a month.

Watsonville Railway & Navigation Company, Watsonville, Cal.—John E. Gardner, Watsonville, Cal., has been appointed receiver of the Watsonville Railway & Navigation Company on the application of the Union Trust Company, San Francisco, Cal., which as mortgage trustee has brought suit in the Superior Court of Monterey County to foreclose the mortgage securing $100,000 of bonds.

Dividends Declared

Baton Rouge (La.) Electric Company, 3 per cent, preferred.

Chicago (Ill.) Elevated Railways, quarterly, $1.50, preferred participating certificates.

Chippewa Valley Railway, Light & Power Company, Eau Claire, Wis., quarterly, 1¾ per cent, preferred; quarterly, 2 per cent, common.

Louisville (Ky.) Traction Company, quarterly, 1 per cent, common.

Northern Ohio Traction & Light Company, Akron, Ohio, quarterly, 1¼ per cent, common.

Portland Railway, Light & Power Company, Portland, Ore., quarterly, 1 per cent.

Washington Railway & Electric Company, Washington, D. C., quarterly, 1¼ per cent, preferred; quarterly, 1½ per cent, common.

ELECTRIC RAILWAY MONTHLY EARNINGS

BANGOR RAILWAY & ELECTRIC COMPANY, BANGOR, MAINE

Period			Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m.,	Oct.,	'13	$68,454	*$27,938	$40,516	$17,354	$23,162
1 "	"	'12	62,964	*26,773	36,191	17,033	19,158
12 "	"	'13	755,084	*343,270	411,814	207,455	204,359
12 "	"	'12	692,630	*310,379	382,251	193,244	189,007

CHATTANOOGA RAILWAY & LIGHT COMPANY, CHATTANOOGA, TENN.

1m.,	Oct.,	'13	$99,358	*$62,447	$36,911	$25,856	$11,055
1 "	"	'12	95,580	*56,606	38,974	22,600	16,374
12 "	"	'13	1,194,265	*709,875	484,390	292,536	191,854
12 "	"	'12	1,040,465	*619,914	420,551	260,971	159,580

CLEVELAND, SOUTHWESTERN & COLUMBUS RAILWAY, CLEVELAND, OHIO

1m.,	Sept.,	'13	$114,659	$66,363	$48,296	$32,329	$15,967
1 "	"	'12	109,713	59,299	50,414	31,886	18,528
9 "	"	'13	939,427	561,884	377,542	284,443	93,099
9 "	"	'12	878,244	512,809	365,435	277,409	88,026

CLEVELAND, PAINESVILLE & EASTERN RAILROAD, WILLOUGHBY, OHIO

1m.,	Sept.,	'13	$43,186	*$21,467	$21,719	$10,396	$11,323
1 "	"	'12	40,240	*19,815	20,425	10,032	10,393
9 "	"	'13	326,712	*175,185	151,527	93,752	57,775
9 "	"	'12	305,603	*172,147	133,456	89,265	44,191

DETROIT (MICH.) UNITED RAILWAY

1m.,	Sept.,	'13	$1,087,267	$729,324	$357,943	$181,322	$176,621
1 "	"	'12	1,076,097	721,612	354,485	175,756	178,729
9 "	"	'13	9,921,795	6,546,019	3,375,776	1,618,714	1,757,062
9 "	"	'12	8,812,968	5,683,248	3,129,720	1,594,583	1,538,137

FEDERAL LIGHT & TRACTION COMPANY, NEW YORK, N. Y.

1m.,	Aug.,	'13	$181,273	$103,564	$77,709	.....	.....
1 "	"	'12	175,008	106,026	68,982	.....	.....
8 "	"	'13	1,546,889	889,973	656,916	.....	.....
8 "	"	'12	1,383,236	812,253	570,983	.....	.....

JOPLIN & PITTSBURG RAILWAY, PITTSBURG, KAN.

1m.,	Oct.,	'13	$49,917	*$31,133	$18,784	$12,542	$6,242
1 "	"	'12	47,358	*27,576	19,782	12,542	7,240
12 "	"	'13	572,315	*344,318	227,997	150,500	77,497
12 "	"	'12	519,697	*306,614	213,083	153,504	59,579

PORTLAND RAILWAY, LIGHT & POWER COMPANY, PORTLAND, ORE.

1m.,	Oct.,	'13	$574,524	*$278,639	$295.885	$174,259	$121.626
1 "	"	'12	565,839	*283,029	282.810	149.291	133.519
12 "	"	'13	6,697,741	*3,317,804	3,379,937	1,959,860	1,420,077
12 "	"	'12	6,582,920	*3,268,162	3,314,758	1,721,380	1,593,378

ST. JOSEPH RAILWAY, LIGHT, HEAT & POWER COMPANY, ST. JOSEPH, MO.

1m.,	Oct.,	'13	$103,814	$61,869	$41,945	$19,818	$22,127
1 "	"	'12	103,953	56.565	47,388	19,631	27,757
12 "	"	'13	1,236,644	703.867	532,777	240,360	292,417
12 "	"	'12	1,164,156	673,444	490,712	235.728	254,984

SAVANNAH (GA.) ELECTRIC COMPANY

1m.,	Sept.,	'13	$67.292	*$44,370	$22.922	$22.666	$249
1 "	"	'12	62,783	*46,599	16,183	16.141	42
12 "	"	'13	808,169	*556,458	251,712	244,170	7,542
12 "	"	'12	736,539	*544,401	192.138	190,767	1.351

TAMPA (FLA.) ELECTRIC COMPANY

1m.,	Sept.,	'13	$73,362	*$39,162	$34,200	$4,431	$29,769
1 "	"	'12	62,989	*33,166	29.823	4,452	25,371
12 "	"	'13	806,676	*433,870	372,806	55,105	317,701
12 "	"	'12	745,289	*392,383	352.906	53,540	299,366

*Includes taxes.

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Traffic and Transportation

Opinion of California Commission on Drinking-Cup Order

Brief reference was made in the ELECTRIC RAILWAY JOURNAL of Oct. 25, page 950, to the order of the Railroad Commission of California directing all steam and electric railways of that State whose schedule between terminals exceeds one hour and thirty minutes to provide sanitary individual drinking cups for passengers at a cost not to exceed 1 cent a cup. The opinion on which the order is based was given in part by Commissioner Gordon, as follows:

"At the hearing the representatives of the different railroad companies testified as to the manner in which they were supplying cups. In most cases where cups are supplied, with the exception of the Pullman Company, they are to be had from the news agents. The Southern Pacific Company has placed a sign on each water tank notifying the traveling public that it is unlawful to provide drinking cups in cars or waiting rooms and that individual drinking cups may be secured from the news agent on the train. This sign lists the different classes of cups that are for sale, together with the prices for the same. The Brown News Company has an exclusive contract with the Southern Pacific Company to barter drinking cups, magazines and the usual merchandise sold by news agents on trains. This company has a package containing four paper cups, which is sold for 5 cents, and prices for cups range from this style, as the lowest, up to 75 cents for a collapsible nickel cup in a leather case. The Brown News Company operates only on the Southern Pacific Company's lines in this State, but there are news agents on the trains of the other large railroad companies in the State who operate in practically the same manner. These news agents sell their produce on a commission basis and naturally endeavor to sell the highest priced article they have, and it is very often the case that the news agent does not display or inform the purchaser that cups may be had at less than 25 cents, and as a great many of the traveling public take only an occasional ride and do not know that cups can be purchased at a lower price, and further, owing to the fact that only an occasional trip is taken and a cup which is permanent in its character and design is not desired, the intended purchaser very often, through ignorance or the high price of the cup, will forego the drink of water.

"At the hearing testimony given by representatives of a great many of the carriers showed that the carriers that had news agents on their trains had for sale sanitary individual drinking cups at a nominal price. In a great many public places automatic cup-dispensing machines are installed, but only one or two of the railroads have tested these machines. One objection to the machine which dispenses the most desirable cup is that the company manufacturing it is having litigation with other cup-vending machine companies for patent infringement, etc.

"Testimony was also introduced as to the prices of cups, and although this evidence was insufficient to determine the cost to the railroad companies of all classes of cups, at the same time the testimony which was given showed that cups could be purchased for from $5.50 to $6 per 1000 cups, depending on the size of the order. This was for a paraffine, pressed-paper cup, probably as inexpensive as any other make of paper cup. Undoubtedly other cup manufacturers would have to sel their cups at as low a figure in order to compete with this cup. No testimony was introduced at the hearing to show how much it would cost the railroad companies to barter these cups. I am of the opinion that the railroad companies should be compelled to place these cups in the hands of the traveling public, and I am also of the opinion that they should not barter said cups for the purpose of making a profit from their sale, but I do believe that the railroad companies should have available for all passengers who so desire a cup at such a price as will not be unreasonable.

"At the present time there are objections to the different types of vending machines, and as these have not been thoroughly tested by the railroad companies in this section of the country. I do not believe that an order should be entered by this commission at this time compelling the railroads in the State to install automatic cup-vending devices. I am also of the opinion that cups should not be required on trains whose schedule run is short. A great many of the companies whose scheduled movement is less than one hour or thereabouts have not provided water tanks in their cars.

"I believe and I find as a fact that the merits of this matter justify the commission in issuing a general order to this effect."

Vandalism of Detroit Patrons.—The Detroit (Mich.) United Railway offers a reward of $25 for information that will lead to the arrest and conviction of any person or persons cutting or otherwise destroying car seats.

Commission Orders Reduced Rates on Atlanta Interurban Line.—Reductions in fares were recently ordered by the Railroad Commission of Georgia along the new Stone Mountain line of the Georgia Railway & Power Company. It was decided, however, that no transfers should be allowed to places along the line.

Warning to Rochester Wagon Drivers on Car Streets.—The Rochester Railway & Light *Bulletin* has appealed to wagon drivers to drive, when possible, on streets where there are no cars. The *Bulletin* says: "Drive between track and gutter whenever possible. When you must drive on tracks, do so for shortest distance possible and pull out at once for cars."

Denver Citizens Favor Skip-Stop.—In response to post cards sent out by John A. Beeler, vice-president and general manager of the Denver (Col.) City Tramway, the patrons of the East Colfax Avenue and Montclair lines have signified their preference for skip-stop operation. Out of a total of 2150 families, representing approximately 10,000 patrons, 60 per cent replied within two weeks as follows: Non-committal, 35, or 3 per cent: against, 512, or 34 per cent; for, 947, or 63 per cent.

Warning to Drivers.—James Gunn, superintendent of the Toronto (Ont.) Railway, issued a special notice recently in the form of a newspaper advertisement addressed to drivers of motor cars and other vehicles. Attention was called to the new Queen and Bay and Queen and Teraubay Street intersections. As the cars rounding curves at these intersections are scheduled not to stop after completing the turn, drivers of vehicles were warned to exercise caution in not driving too near the curves.

New Interurban Magazine Issued.—"The Texas Interurban" for November, a new magazine published by the Interurban Advertising Company, has recently been issued. It is devoted to the interests of patrons and employees and the development of the territory traversed by the Waco-Dallas-Corsicana Interurban Railway and the Denison-Sherman-Dallas Interurban Railway. Bushrod W. Fontaine, Dallas, the president of the new company, was in charge of the adjusting work of the Santa Fé gulf lines for several years.

Illinois System Starts New Service.—The Illinois Traction System, Peoria, Ill., inaugurated on Nov. 20 its new through Peoria-St. Louis service. Six through cars are run daily from each terminal. According to the new schedule the first car leaves Peoria for St. Louis at 6 a.m. and a car leaves every two hours thereafter until 4 p.m. The first car leaves St. Louis for Peoria at 5 a.m. and a car leaves every odd hour thereafter until 5 p.m. The 175 miles between the cities is made in six hours and twenty-five minutes.

Ohio Southeastern System Advertising Campaign.—An advertising campaign has been conducted by the Ohio Southeastern System, Cincinnati, Ohio, by means of a series of little pamphlets. One folder contained a number of brief "safety first" hints to the employees of the company. Another appealed to the public to purchase tickets before entering cars. A third described the scenic beauties of the line. A fourth called attention to the advantages of "Lake Allyn" in Clermont County as a picnic ground. The fifth folder announced special service and excursion rates to a recent fair held at Ripley, Ohio.

Kansas City Automobile Ordinance Interpreted.—A police judge of Kansas City, Mo., has ruled that motorists need not stop 10 ft. in the rear of street cars which are discharging or taking on passengers, and that they are

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complying with the spirit of the ordinance passed recently by the City Council governing the point by running 10 ft. to the right of the car. Eight persons arrested on a charge of violating the ordinance were discharged. The police department has been instructed to observe the ordinance as it stands and some confusion has resulted over the various rulings. Most of the streets, however, are wide enough to allow motorists to pass 10 ft. to the side of cars in the roadway.

Interborough Makes Gift to Wives of Employees.—T. P. Shonts, president of the Interborough Rapid Transit Company, New York, announces that, commencing Dec. 1, 1913, a pass card will be presented to the wife of every married employee who then shall have been in the service one month or more. This ticket will be good for free transportation over the system on which the husband is employed. This privilege is extended as a further step in the work for the welfare of employees. No restriction is made upon the use of the pass, but it is suggested that its use may be of advantage in connection with the stores which the company maintains at various points for the benefit of employees.

Evansville Railways Extend Service.—The Evansville (Ind.) Railways has extended its passenger service by installing a fast motorboat line between Grandview, the eastern terminus of this company's line, and Cannelton, Ind., and Hawesville, Ky., 20 miles up the Ohio River. This fast boat service includes two trips each day with direct connections at Grandview with the interurban cars which operate between that point and Evansville. The motorboat line is operated in the name of the Crescent Navigation Company, which was incorporated by officials of the Evansville Railways. The officers of the navigation company include W. A. Carson, general manager of the Evansville Railways, president; D. C. Powell, general freight and passenger agent of the Evansville Railways, vice-president; G. L. Ford, auditor of the Evansville Railways, secretary, and A. W. Epmeier, treasurer. To advertise thoroughly the new combination service between Evansville, Ind., and Hawesville, Ky., a prize of $10 in gold has been offered to the person suggesting the most suitable name for the boat. The passenger traffic which has been developed by the company up to the present time indicates that the new service will be very popular.

Brooklyn Committee of Public Safety.—The Brooklyn committee of public safety at a meeting held at the Hamilton Club on Nov. 20 completed its organization and elected officers for the ensuing year. The Brooklyn safety committee was originally called together by T. S. Williams, president of the Brooklyn Rapid Transit Company, who requested leading citizens of the borough to co-operate in the campaign which the company was financing throughout the territory in which it operates. Officers were elected for the committee as follows: General George W. Wingate, chairman; Howard S. Hadden, vice-chairman; Walter S. Benedict, treasurer, and Mrs. Jessie P. McCall, secretary. An executive committee composed of chairmen of the various standing committees was chosen, its members being the following: Miss Jessie H. Bancroft, Arnon L. Squiers, D. V. B. Hegeman, Herbert N. Warbasse, J. W. Tumbridge, Frederick B. Pratt, John N. Harman, Judge Norman S. Dike and H. A. Bullock. The sub-committees through which the active work of the committee will be done are those on schools and playgrounds, boy scouts, church and civic organizations, public institutions other than schools, vehicular and pedestrian traffic, structures, pavements and excavations, street railroads, explosives, fireworks and firearms, hazardous occupations, law and legislation, and publicity. The general committee will hold three stated meetings during the year, on the first Mondays of October, February and June, the October meeting being the annual meeting for the election of officers. Between these meetings the affairs of the organization will be in the hands of the executive committee, which will meet once a month at luncheon to hold a clearing house for the business of the various sub-committees. About twenty-five representative men and women responded to the original invitation of the Brooklyn Rapid Transit Company to organize a Brooklyn committee of public safety. At the last meeting forty-two additional members were elected.

Personal Mention

Mr. Charles W. Stage has been appointed director of public utilities under the new city charter of Cleveland, Ohio.

Mr. Henry W. Hays, state engineer in the Attorney-General's office, has been appointed engineer of the Massachusetts Public Service Commission, effective on Jan. 1, 1914.

Mr. W. R. W. Griffin, who resigned as general manager of the Tri-State Railway & Electric Company, East Liverpool, Ohio, last March at the time that he was appointed one of the receivers for the property, continued actively operating the Tri-State property as one of the receivers from that date until Nov. 1, at which time Mr. Horatio G. Lloyd took the active operation of the East Liverpool Traction & Light Company and the Steubenville & East Liverpool Railway & Light Company, which are leased properties of the Tri-State Railway & Electric Company. Mr. Lloyd in turn employed Mr. B. J. Jones to act as his manager. Both Mr. Lloyd and Mr. Griffin continue as receivers for the property. Mr. Griffin is general manager of the Beaver County Light Company, the Steubenville, Wellsburg & Weirton Railway, the Wellsburg Electric Light, Heat & Power Company, the Midland Electric Light & Power Company and the Hancock County Electric Company, none of which properties is in any way concerned in the receivership of the Tri-State Railway & Electric Company.

Mr. Edgar J. Dickson, general manager of the Springfield (Mass.) Street Railway, has been elected vice-president of the International Railway, Buffalo, N. Y., in immediate charge of operation, and will assume the duties of his new position on Dec. 1. Mr. Dickson's railway experience began in 1887, when he became connected with the Chicago, Burlington & Quincy Railroad. He served for fourteen years in various capacities in the mechanical, transportation and freight departments and resigned in 1901 to enter the motive power department of the Northern Pacific Railroad. Between 1904 and 1907 he was in the mechanical and accounting departments of the Lehigh Valley Railroad and in 1907 joined the organization of the New England Investment & Security Company as purchasing agent, with headquarters at Boston. In September, 1907, he was appointed vice-president and general manager of the Milford, Attleboro & Woonsocket Street Railway and the Uxbridge & Blackstone Valley Street Railway. His authority was extended a year later to include the Attleboro lines of the New England company. In the fall of 1909 he was appointed general manager of the Springfield system, and he has served with marked success as the chief operating officer of the lines in central Massachusetts embraced in this organization.

E. J. Dickson

Mr. John G. Baukat has been appointed electrical engineer of the National Steel Car Company, Ltd., Hamilton, Ont., in charge of the company's coach department and the design and building of cars. The present capacity of the plant is thirty-five cars a day. Mr. Baukat has long been connected with railroad and electric railway work. He was born in 1870, and from 1887 to 1895 worked as a machinist and studied engineering. From 1895 to 1898 he was engaged in drafting, and mechanical engineering on marine work, automatic machinery and general machine work. From 1898 to 1899 he was connected with the Port Chester (N. Y.) Railway as assistant engineer in charge of power and equipment. He next became connected with the railway department of the General Electric Company, Schenectady, N. Y., as designing engineer, including test work. He served this company from 1899 to 1902. He then became

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chief engineer of the Schenectady Railway in charge of rolling stock, repair shops, track work, trolley lines and construction work, and during his connection with the company supervised the construction of 30 miles of high-speed interurban railway, and the building of new carhouses and a power house. From 1905 to 1909 he was connected with the New York Central & Hudson River Railroad as assistant superintendent of electrical equipment in charge of the electric rolling stock, repair shops and inspection sheds. After serving for a short time as chief engineer in the development work of the Miami Valley Construction Company, New York, Mr. Baukat in 1910 accepted the position of mechanical engineer of the Wilmington-Philadelphia Traction Company, Wilmington, Del., in charge of the rehabilitation of rolling stock and equipment. He next became superintendent of equipment of the Lehigh Valey Transit Company, Allentown, Pa., which he served from 1911 to 1913, during the period of its important extensions to Norristown and Philadelphia. He has recently been connected with Day & Zimmerman, engineers, Philadelphia, Pa., on general electric railroad engineering work.

OBITUARY

John Donovan, formerly president of the St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., is dead. Mr. Donovan was fifty-nine years old. He was interested in a number of other enterprises besides the railway, light and power company. Mr. Donovan is survived by a widow and a daughter.

W. E. Dunbar, assistant electrical engineer in charge of substations on overhead lines of the Aurora, Elgin & Chicago Railroad, Wheaton, Ill., died at his home in Elgin, Ill., on Nov. 15. Mr. Dunbar and his assistant were making an inspection trip on a gasoline speeder on Nov. 6, when the car jumped the track at Ingalton, Ill., fatally injuring Mr. Dunbar and instantly killing his assistant.

Mr. J. C. Calisch, special agent of the railway department of the General Electric Company, died in New York on Nov. 28. Mr. Calisch was graduated from Stevens Institute in 1887, and served his apprenticeship with the Electric Storage Battery Company in Philadelphia. In 1890 he entered the New York office of Edison General Electric Company and remained with this company when it was merged with the General Electric Company in 1892. In 1895 Mr. Calisch was appointed manager of the Pittsburgh office, and in 1899 manager of the Buffalo office. In 1906 he resigned to become vice-president and general manager of the Buffalo & Lake Erie Traction Company. In 1911 he resigned from this company to return to the General Electric Company in the capacity of special agent in its railway department. Mr. Calisch was forty-six years old.

E. A. Ziffer, the dean of the European electric railway fraternity and Edler von Teschenbruck, died at Vienna, Oct. 27. Despite his eighty-one years, Mr. Ziffer had remained in harness not only as the operating head of several electric and steam railways but as a most active publicist and railway association worker. Age could not wither his youthful enthusiasm for all progress in his craft, and one of his last papers was an elaborate study for the members of the International Street & Interurban Railway Association on self-propelled cars. An abstract of this report and abstracts of earlier reports were published in this paper. Mr. Ziffer has also contributed a number of original articles to the columns of this paper on electric railway practice in Austria-Hungary. At the time of his death he was president of the Royal Lemberg-Czernowitz-Jassy Railway, the Bukowina Local Railways, the Lemberg-Belzer Railway, the Kolomaer Local Railways and the Lemberg-Jaworow Local Railway. As an association man, he was president of the Austrian City & Interurban Railway Association, a member of the executive committee of the International Street & Interurban Railway Association and was also a member of several local technical bodies. As a publicist, he edited the monthly journal of the Austrian Association, often being the chief contributor of original articles and translations as well. The Austrian government recognized his valuable services by conferring upon him the Order of Francis Joseph and the Order of the Iron Crown. An account of Mr. Ziffer's earlier career was published in the STREET RAILWAY JOURNAL for June 18, 1904.

Construction News

RECENT INCORPORATIONS

***Mount Vernon Traction & Car Company, Mount Vernon, Ill.**—Incorporated in Illinois to operate an electric railway and other public utilities in Mount Vernon. Capital stock, $40,000. Officers: Louis G. Pavey, Mount Vernon, president; Earl Green, Mount Vernon, vice-president and treasurer; Charles C. Baldwin, Mount Vernon, secretary and chief engineer; John Emerson, St. Louis, purchasing agent.

***Cherry River & Southern Railroad, Ronceverte, W. Va.**—Chartered in West Virginia to build a 40-mile steam or electric railway from the junction of Cranberry and Gauley Rivers to Ronceverte. Capital stock, $5,000. Headquarters, Charleston. Incorporators: H. L. Kirtley, George W. McClintic and W. G. Mathews, Charleston; A. Bringardner, Columbus, Ohio; Samuel W. Richey, Cincinnati, Ohio.

FRANCHISES

Glendale, Cal.—The Pacific Electric Railway has received a fifty-year franchise from the Council to double-track Broadway from Glendale Avenue to Brand Boulevard in Glendale.

East St. Louis, Ill.—The East St. Louis & Suburban Railway will ask the Council for a franchise on Twenty-fifth Street south from Lincoln Avenue to Caseyville Road in East St. Louis.

Galesburg, Ill.—The Rock Island Southern Railroad, Monmouth, has received a franchise from the Council to cross seven streets in entering Galesburg. The line will enter Galesburg on its own right-of-way.

Jacksonville, Ill.—The Jacksonville Railway & Light Company has asked the Council for a twenty-five-year franchise in Jacksonville.

Quincy, Ill.—The Quincy Street Railway has received a franchise from the Council to extend its line from the Gardner governor works to the Weiss paper mills in Quincy.

St. Joseph, Mo.—The St. Joseph Railway, Light, Heat & Power Company will ask the Council for a franchise to extend its Frederick Avenue line to the state hospital for the insane in St. Joseph.

Gowanda, N. Y.—The Hamburg-Falconer Electric Railway has asked the Council for a franchise in Gowanda. This is part of a plan to build an electric railway between Falconer, Buffalo, Ellington, Leon, Wesley, Dayton and Gowanda. L. R. Simons, Gowanda, is interested. [E. R. J., June 21, '13.]

Dallas, Tex.—An order was passed by the County Commissioners Court permitting the Dallas Southwestern Traction Company to amend its franchise to the extent of laying rails along the new cut-off just opened up by the county from the West Dallas pike as an extension of Fisher Avenue to Cement City. [E. R. J., Oct. 18, '13.]

Port Arthur, Tex.—The Port Arthur Traction Company has received an extension of its franchise to extend its line on Procter Street from De Queen Boulevard to Van Der Voort Boulevard in Port Arthur.

Tacoma, Wash.—The Seattle-Tacoma-Olympia Railway, Seattle, has received a franchise from the Council in Tacoma for an electric elevated line from Eleventh Street across the middle waterway to the tideflats in Tacoma. W. D. Hall, Seattle, president. [E. R. J., Nov. 1, '13.]

***Casper, Wyo.**—E. Richard Shipp, Casper, has asked the Council for a franchise in Casper. This is part of a plan to build a street railway from the Burlington depot to the southern boundary of Casper, via the Butler addition and McKinley Avenue, to connect with a cross town line which extends from Capitol Hill to the Midwest refinery. Application for a charter will soon be made. It is planned to use storage-battery cars.

TRACK AND ROADWAY

Rome & Gadsden Railroad, Gadsden, Ala.—No definite plans have yet been made as to when construction will be begun on this 60-mile line to connect Rome, Cave Springs,

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Center, Forney Key, Rock Run and Gadsden. Louis S. Daniel, Rome, secretary. [E. R. J., July 5, '13.]

Decatur, Moulton & Russellville Railway, New Decatur, Ala.—This company states that the project to build this 60-mile line to connect Decatur, New Decatur, Newburg, Mount Hope, Landersville, Danville, Jesseton and Russellville is still in a preliminary stage. W. J. Cottingham, New Decatur, is interested. [E. R. J., April 30, '10.]

Calgary (Alta.) Municipal Railway.—During 1914 this company will award contracts to build about 10 miles of new track.

Nelson (B. C.) Street Railway.—Plans are being made by this company for certain improvements and extensions of its lines in Nelson.

British Columbia Electric Railway, Vancouver, B. C.—This company is negotiating with the Great Northern Railway for the purchase of the abandoned right-of-way of the Cloverdale-Blaine line from Hazelmore to the Canadian boundary at Blaine, Wash. Bids are being asked by this company for the construction of an interlocking tower at the Esquimalt & Nanaimo Railway crossing on the Esquimalt road.

Northern Electric Railway, Chico, Cal.—Plans are being made by this company to enter Napa Valley and give the city of Napa its third direct connection with San Francisco, via Vallejo.

San Rafael & San Anselmo Valley Railway, San Rafael, Cal.—In a decision rendered by the State Railroad Commission, authority was granted this company to issue $55,000 of stock and $45,000 of bonds for the purpose of constructing an electric line from the Union depot in San Rafael through the business section of that town to San Anselmo and Fairfax. E. S. Rake, San Rafael, president. [E. R. J., Oct. 18, '13.]

Sacramento Valley West Side Electric Railway, Willows, Cal.—Plans are being made by this company to begin work in January on the first section of its line from Woodland to Rio Vista. This 160-mile railway will extend through the west side of the Sacramento Valley. C. L. Donohoe, Willows, president. [E. R. J., Oct. 25, '13.]

Waterbury & Milldale Tramway Company, Waterbury, Conn.—This company has placed in operation its new line in Waterbury.

Deep Lake Company, Fort Myers, Fla.—About 2 miles of track has been laid by this company on its 13-mile line from Deep Lake to the Everglades. Gasoline motor cars will be used. H. McCormack, Everglade, president. [E. R. J., May 3, '13.]

Savannah (Ga.) Electric Company.—Extensive improvements will be made by this company early next year on its lines in Savannah.

Nezperce & Idaho Railroad, Lewiston, Idaho.—This company states that its 75-mile line between Nezperce, Vollmer, Waha and Forest will be operated by steam. [E. R. J., May 10, '13.]

Southern Illinois Railway & Power Company, Chicago, Ill.—This company has made a proposition to the city of Herrin looking toward the extension of its line from Eldorado through Harrisburg, Carrier Mills and Johnston City to Herrin. The company asks $50,000 stock subscription, 2½ miles of right-of-way and a franchise into Herrin in consideration of the building of the line to Herrin.

Union Railway & Power Company, Chicago, Ill.—This company, which plans to build a 6-mile line between South Chicago and Hammond, Ind., and a 7-mile line from Hervey, Ill., to Hammond, Ind., has completed surveys from South Chicago to Hammond and surveys are now being made between Harvey and Hammond. Construction will be begun as soon as a franchise can be obtained in West Hammond. F. Arthur Jost, 715 Royal Insurance Building, Chicago, president. [E. R. J., May 24, '13.]

Decatur, Sullivan & Mattoon Transit Company, Mattoon, Ill.—At a recent meeting of the directors of this company at Mattoon the following officers were elected: J. McFall, Mattoon, president; George B. Spittler, Mount Zion, vice-president; J. G. Thode, Mattoon, treasurer and secretary. [E. R. J., June 28, '13.]

Chicago, Peoria & Quincy Traction Company, Quincy, Ill.—At a special meeting of the stockholders of this company to be held on Dec. 6 a bond issue for $8,000,000 will be asked for by the company. Surveys have been nearly completed and construction will soon be begun by this company on its line between Quincy and Peoria. C. A. Van Ness, Quincy, secretary. [E. R. J., Nov. 8, '13.]

Tri-City Railway, Davenport, Ia.—It is reported that negotiations are under way by this company for a right-of-way for extensions next spring to Hampton, Rapids City, and Port Byron.

Union Electric Company, Dubuque, Ia.—During the next few months this company will award contracts to build 1 mile of new track.

Detroit, Almont & Northern Railway, Detroit, Mich.—Contracts for grading have been awarded by this company to W. E. French & Company, Detroit, and construction will be begun in the spring on this 9-mile line between Romeo and Almont. This line will be built entirely on private right-of-way adjacent to the main highway between Romeo and Almont. The following officers have been elected: F. W. Brooks, 12 Woodward Avenue, Detroit, president; J. C. Hutchins, vice-president; A. E. Peters, secretary, and Irwin Fullerton, treasurer. All are associated with the Detroit United Railway. [E. R. J., Nov. 1, '13.]

Minneapolis, Minn.—Plans are being made by the City to build a 1½-mile electric line in Minneapolis from the terminus of the city lines to the filtration plant. This line will be used for passenger as well as freight service. W. R. Young, Minneapolis, registrar. [E. R. J., Oct. 11, '13.]

Jefferson City Bridge & Transit Company, Jefferson City, Mo.—This company, which plans to build a line between Jefferson City and Columbia, has filed with the Circuit Court at Jefferson City a certificate of power granted by the Public Utility Commission, authorizing it to operate an electric line in Callaway, Cole, Boone and other counties.

***Kingston, Mo.**—H. L. Gilbert and David Miller, Kansas City, are back of a project to build an electric line from Hamilton to Kingston, Mo., a distance of 9 miles. The question will be submitted to the voters at a special election on Dec. 1. The Councils of the two towns already have approved plans.

Brazil, Devil's Lake & Minneapolis Electric Railway, Brazil, N. D.—This company has placed in operation its 5-mile gasoline and steam line in Devil's Lake. The line will be extended to North Chautauqua, Fort Totten, Brazil and Bismarck, N. D., and to Minneapolis, Minn. Capital stock authorized, $100,000; issued, $30,000. Bonds authorized, $100,000. The company operates eleven cars and its repair shops are located at Devil's Lake. A. B. Fox, Brazil, president and general manager. [E. R. J., May 31, '13.]

Devil's Lake & Chautauqua Electric Railway, Devil's Lake, N. D.—This company has under construction its line between Chautauqua, Devil's Lake and Fort Totten. It will furnish power for lighting purposes. Officers: Joseph M. Kelly, president; H. E. Kenner, secretary; J. M. Thompson, treasurer; E. M. Lewis, general manager, and P. S. Dunn, superintendent and purchasing agent, all of Devil's Lake. [E. R. J., May 31, '13.]

Gallipolis & Northern Traction Company, Gallipolis, Ohio.—This company, a subsidiary of the Kanauga Traction Company, has placed in operation its 5-mile line between Gallipolis, Ohio and Point Pleasant, W. Va. Its power station and repair shops are located at East Gallipolis. It operates eight cars and furnishes power for lighting purposes. Capital stock authorized, $50,000; issued, $50,000. Bonds authorized, $50,000; issued, $50,000. Officers: T. W. Jackson, Belpre, president of the Kanauga Traction Company, president; H. L. Lambert, Pennsboro, W. Va., vice-president; C. R. Cunningham, secretary and treasurer; H. Marsh, Parkersburg, general manager and purchasing agent, and A. E. Gorby, chief engineer. [E. R. J., Oct. 18, '13.]

Cleveland-Sharon Railway, Cleveland, Ohio.—Plans are being made up to finance this company, which was organized several years ago to build an electric line between Cleveland and Sharon, Pa. The company finished the

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grading of 26 miles of its line and then suspended work, going into the hands of a receiver. Plans of the company contemplate the construction of a line between Sharon and Middletown and using the Cleveland & Eastern Traction Company between Middletown and Cleveland. [E. R. J., Aug. 31, '12.]

*Lima, Ohio.—A company with a capitalization of $100,000 has been organized by Lima citizens to build an electric line in Lima to compete with the city railway as a result of differences between the latter and citizens over the fare charges. No names are yet given of those interested in the project.

Ohio River Electric Railway & Power Company, Pomeroy, Ohio.—This company is building a ¾-mile extension from its present terminus in Middleport to Hobson to connect with the Kanawha & Michigan Railway and extending to its repair shops and yards. Material has been purchased.

Kingston, Portsmouth & Cataraqui Electric Railway, Kingston, Ont.—During the next few months this company plans to award contracts to build ½ mile of new track, using 90-lb. A. S. C. E. section.

International Transit Company, Sault Ste. Marie, Ont.—Plans are being made by this company to build a line in Steelton. All work will be done by the owners. Rails will be supplied by the Lake Superior Corporation, Sault Ste. Marie.

St. Thomas (Ont.) Street Railway.—Estimates have been prepared on the cost of extending this company's line in St. Thomas from the end of the Ross Street line to Pinafore Park.

Toronto (Ont.) Railway.—The City Council has referred to the Board of Control a resolution that negotiations be opened with the Toronto Railway for the extension of the Harbord Street line from its present terminus at Bloor Street north on Ossington Avenue to Hallam Street, thence west to Dufferin Street, and along Lappin Avenue to connect with the Lansdowne Avenue line in Toronto.

Lehigh Valley Transit Company, Allentown, Pa.—The new concrete arch bridge, ½ mile long and 138 ft. high, between Allentown and South Allentown, which will be used by this company, was opened to traffic on Nov. 18.

Harrisburg (Pa.) Railways.—Work has been begun by this company on the extension of its Reservoir Falls line from Prospect Street to Twenty-first Street, Bellevue Park. The company plans to begin work at an early date on its extension from Rockville to Dauphin.

Mahoning & Shenango Railway & Light Company, New Castle, Pa.—Plans are being considered by this company for extensions and improvements of several of its lines in New Castle.

Montreal (Que.) Tramways.—The tramway engineer of the Montreal Council has prepared a report outlining additional lines required in the outer wards in Montreal, but the Montreal Tramways has declined to consider any building of new tracks until the company obtains more facilities for handling traffic in the center of the city. Notwithstanding this, the Board of Control has been authorized to continue negotiations with the company.

Cross Anchor, S. C.—Plans are being considered to build an electric line from Spartanburg to Clinton, via Walnut Grove, Nesbitts, Hobbysville, Cross Anchor and Musgrove Mill. The line will be built if right-of-way and $100,000 can be secured. W. B. Patton, Cross Anchor, and J. W. Copeland, Clinton, are interested.

Jackson Railway & Light Company, Jackson, Tenn.—This company has been asked by the Board of Trade of Jackson to build a suburban line to Bemis, Tenn., but has decided that the project is not feasible. Plans are being made by the company to begin work on an extension of 1¾ miles to West Jackson.

Southwestern Traction Company, Temple, Tex.—The board of directors of the Chamber of Commerce in Temple has indorsed the proposed extensions of this company's lines to Waco and Austin and will assist in raising $75,000 in stock subscriptions for the line in Temple.

Lynchburg Traction & Light Company, Lynchburg, Va.—This company is arranging to extend its Fort Hill line from the Fair Grounds to the Lynchburg Fort in Lynchburg.

Yakima Valley Transportation Company, North Yakima, Wash.—Plans are being considered by this company for a 3-mile extension into Wide Hollow to the Tieton district. It is planned to connect the Summitview line, which extends 3 miles west, with the Harwood branch of the Wide Hollow-Ahtanum line.

Seattle-Tacoma-Olympia Railway, Seattle, Wash.—An agreement has been signed by this company with the Tacoma City Council to build a railway on the tideflats between Lincoln and Puyallup bridges within six months. If the line is completed within that time, long-term franchises will be given to the company. J. S. Wheeler, 507 New York Building, Seattle, general manager. [E. R. J., Nov. 1, '13.]

Northwestern Electric Company, Vancouver, Wash.—This company has filed for record mortgages to secure an issue of $10,000,000 of bonds. It is reported that the company will build a line from Portland to the North Fork of the Lewis River, Clarke County, Wash., via Vancouver. [E. R. J., June 28, '13.]

SHOPS AND BUILDINGS

Pacific Electric Railway, Los Angeles, Cal.—This company's carhouse at Seventh Street and Central Avenue in Los Angeles was damaged by fire on Nov. 12. The loss is estimated to be about $24,000.

Southern Pacific Company, San Francisco, Cal.—This company has opened new offices at the corner of Thirteenth Street and Franklin Street in Oakland.

Detroit, Almont & Northern Railway, Detroit, Mich.—This company plans to build a new passenger and freight station at Romeo in the spring.

Hattiesburg (Miss.) Traction Company.—This company's carhouse at Hattiesburg was damaged by fire on Nov. 11.

Omaha & Lincoln Railway & Light Company, Lincoln, Neb.—This company has completed its new 32-ft. x 180-ft. carhouse in Lincoln.

Brooklyn (N. Y.) Rapid Transit Company.—It is reported that this company has purchased 50 acres of land at Coney Island on which it plans to build a terminal.

North Carolina Public Service Company, Salisbury, N. C.—This company has awarded a contract to build a new carhouse in Greensboro.

Bartlesville (Okla.) Interurban Railway.—This company has completed its new carhouse in Bartlesville. The structure is 150 ft. x 50 ft. in size.

Citizens' Traction Company, Oil City, Pa.—During the next few months this company plans to build a natural-gas-heating plant for its carhouse in Oil City.

POWER HOUSES AND SUBSTATIONS

Little Rock Railway & Electric Company, Little Rock, Ark.—The American Cities Company, New York, N. Y., has authorized the Little Rock Railway & Electric Company to expend $3,500,000 for development of the Ouchita River water-power near Little Rock. It is proposed to furnish power to operate the street-railway lines in Little Rock, together with the proposed interurban lines, and also to supply power for Memphis.

London (Ont.) Street Railway.—This company has practically arranged with the city's hydoelectric department to use its power, the terms being that the company shall take a minimum of 1000 hp. This, however, is for direct current, and in order to convert the hydro-power alternating current a rotary generator will have to be installed at a cost of about $20,000. The agreement is to run for twelve years, to the end of the present franchise of the company in London.

Citizens' Traction Company, Oil City, Pa.—This company is installing a 1500-kw turbine in its power house in Oil City.

Charleston-Isle of Palms Traction Company, Charleston, S. C.—During the next eight weeks this company will award contracts to build a new substation at Mount Pleasant. The structure will be 20 ft. x 30 ft. and of brick construction.

Tazewell (Va.) Street Railway.—This company expects to purchase one 150-hp horizontal tubular boiler for its power house in Tazewell.

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Manufactures and Supplies

ROLLING STOCK

Portland (Maine) Railroad has ordered ten cars from the Wason Car Company.

Albany (Ga.) Transit Company is reported as being in the market for new cars.

Omaha & Lincoln Railway & Light Company, Omaha, Neb., expects to purchase one double-truck passenger car.

Oakwood Street Railway, Dayton, Ohio, has practically completed plans for four new cars which will be built in its own shops.

Bartlesville (Okla.) Interurban Railway has purchased one single-truck car from the St. Louis Car Company to be used for city service.

Ogden (Utah) Rapid Transit Company expects to purchase six or eight city cars between Nov. 15, 1913, and Jan. 1, 1914, and twelve motor and six trailer interurban cars between Nov. 15, 1913, and March 1, 1914, for the new interurban extension to its present line.

Minneapolis (Minn.) Water Works are in the market for car equipment to be used on its new line running from the terminus of the city lines to the filtration plant, which will be operated for passenger service as well as shipping of carloads of material from the railway to the filtration plant.

TRADE NOTES

Canadian General Electric Company, Ltd., Toronto, Ont., has elected J. K. L. Ross, Montreal, a director, to succeed his father, the late James Ross.

Northey-Simmen Signal Company, Ltd., Indianapolis, Ind., will open an additional office and warerooms during the latter part of December at Buffalo, N. Y.

Railway Supply & Curtain Company, Chicago, Ill., has received an order from the Chicago City Railway Company for complete curtain equipment for 180 cars.

Railway & Traction Supply Company, Chicago, Ill., has received an order from the Brooklyn Rapid Transit System for 904 additional Wyoming vacuum sanders. This makes a total of 2032 sanders of this type now installed on the Brooklyn system.

Sterling Varnish Company, Pittsburgh, Pa., has appointed J. H. Shugg as its engineer of insulation. Mr. Shugg was formerly superintendent and engineer of winding at the Schenectady works of the General Electric Company and has been twenty-four years in charge of insulation of that company.

Universal Safety Tread Company, Boston, Mass., has recently received orders for its "Anti-slip" metal tread and for its standard universal tread to be installed in 500 to 600 cars of electric railways. The company also reports orders from public service corporations in Boston, New York, Philadelphia and Chicago.

National Steel Car Company, Ltd., Hamilton, Ont., has appointed John G. Baukat to take charge of its coach department, looking after the designs, the building of cars and also helping out on the sales end of the business. This company, which has a plant costing approximately $2,000,000, manufactures trolley cars and wood and all-steel passenger coaches for steam railroads.

H. W. Johns-Manville Company, New York, N. Y., has recently been obliged to provide larger quarters for several of its subsidiary offices in Ohio. The Columbus office and contract department are now on the ground floor of the new Peters Power Building, 45 West Long Street, with large warehouse facilities half a block distant. The Toledo office and warehouse have been moved to 213 Water Street. The Cleveland branch has just leased another larger warehouse on Front Street, which, when remodeled, will give the branch larger and better storage and shipping facilities.

Laconia Car Company, Boston, Mass., reports net earnings of $103,109 for the fiscal year ended Sept. 30 last, or a balance of $33,109 after payment of 7 per cent in dividends on the 10,000 outstanding preferred shares. Owing to the few large orders for cars placed in the New England States during the past two years, it has been compelled to manufacture many classes of cars, having delivered seventeen types during the year. Constantly increasing demand for all-steel cars has necessitated many additions to the company's equipment and forces, the company having in former years been engaged chiefly in manufacture of wooden cars. On the company's board, William C. Endicott, Donald M. Hill and Spencer R. Hill have succeeded Parker W. Whittemore, Robert Treat Paine, Jr., and the late W. H. Hill.

Union Switch & Signal Company, Swissvale, Pa., has awarded, through R. W. Day, general manager of the Scranton & Binghamton Railroad, a contract for automatic block signals on that line between Rock Switch and Factoryville Junction. This signaling will protect 10½ miles of track divided into nine siding-to-siding blocks, employ absolute signals and provide two blocks for following cars and one block for opposing cars between sidings. The signals will be of the Union Style "B," two-position, 0 to 60 deg., upper left-hand quadrant, semaphore type at the sidings and Union Model 13 light type intermediate to the sidings. The signal control will be secured by continuous a.c. track circuits. Including this contract, the Union Switch & Signal Company has installed or under construction 104 miles and fifty-one siding-to-siding blocks employing this particular scheme of single-track signaling. Signal locations have been staked out and the first shipment of material is now on the ground.

Railway Supply Exhibit Association, Chicago, Ill., has been organized by approximately eighty manufacturers and jobbers of railway supplies with offices on the twelfth floor of the Karpen Building, Chicago. The purpose of this association is to promote the interests of its members in the steam and electric railway fields and serve as a local aid to the national associations of the same character in bringing conventions and exhibits to Chicago and then furnishing all the assistance possible to make them a success. The following officers and board of directors were elected at the first meeting of this association: president, A. F. Young, International Harvester Company; vice-president, J. W. Johnson, Pyle-National Electric Headlight Company; secretary and treasurer, W. F. Hebard, of the W. F. Hebard Company. The board of directors include the officers of the association and H. E. Peare, Calumet Supply & Manufacturing Company; F. E. Wade, Fairmont Machine Company; F. C. Fenn, Crane & Company; J. W. Mack, Specialty Device Company; F. C. Dinsmore, National Refining Company; W. B. Wood, Forest City Paint & Varnish Company; H. A. Smith, *Railway Review;* Henry Fischer, Verona Tool Company, and A. B. Cross, Cross Paint & Manufacturing Company.

ADVERTISING LITERATURE

Ingersoll-Rand Company, New York, N. Y., has issued a catalog describing its "Little David" pneumatic drill.

Morrison Boiler Company, Sharon, Pa., has issued a catalog describing and illustrating its water-tube boilers.

Delta-Star Electric Company, Chicago, Ill., has issued Bulletin No. 8, describing its unit-type high-tension wet process busbar supports.

MacGovern & Company, New York, N. Y., have issued a catalog listing their electrical and steam machinery, electric cars and car equipments.

Chicago Pneumatic Tool Company, Chicago, Ill., has issued a catalog describing its "Chicago Pneumatic" Corliss steam-driven compressors.

Hess-Bright Manufacturing Company, Philadelphia, Pa., has issued a catalog describing its ball bearings and their application to axle generators.

Sprague Electric Works of General Electric Company, New York, N. Y., has issued a catalog describing and illustrating the application of its round type direct current motors to a wide variety of uses.

John A. Roebling's Sons Company, Trenton, N. J., has issued a catalog entitled "The Wire Rope at Panama," which is an article that will appear in the "History of the Panama Canal, Its Construction and Builders." The catalog contains photographs illustrating various applications of heavy twisted wire rope to the work of constructing the Panama Canal.

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HIGHER RATINGS FOR STEAM BOILERS

Less than ten years ago manufacturers and conservative engineers in general looked askance at the comparatively few adventurous spirits who maintained that operation of steam boilers at 200 per cent rating was eminently proper and who drew specifications calling for operation at 150 per cent of normal manufacturers' rating. This view has now been very widely accepted, yet to-day conservatism in this regard seems to be just as far behind the leaders as it was five years ago. Since the possibilities of compactness possessed by the underfeed stoker have become evident the evaporation of 7 lb. of water per square foot of heating surface is no longer an upper limit, as rates of 15 lb. are within easy reach. On the Interborough Rapid Transit Company boiler operation at 300 per cent of rating is a normal condition during the rush hour and 400 per cent is so common that it ceases to excite comment. Yet it has been found at these supposedly extreme rates of driving that actually fewer flues are lost than under the old conditions where boilers hardly ever exceeded their manufacturers' rating. In the three Interborough power stations, totaling over 90,000 hp of boilers, only about twenty-four flues are taken out per year, notwithstanding the fact that the boilers are of the standard type which a few years ago would have been operated at one-fourth of the present rate. In the light of these results it behooves every steam user to change his opinions about boiler rating if he has not done so during the last decade.

MUNICIPAL OR STATE CONTROL

The judgment of the committee on franchises of the National Municipal League is that the regulation of public utilities in large cities should be divided between purely local authorities and a state commission. As shown in the abstract published last week, the committee believes in effect that a state commission should have control over the issue of securities, the system of accounts and reports and fundamental questions relating to integrity of the investment, but that the city should have power to control matters relating to occupation of the streets and the character of service rendered and should be in a position to municipalize utilities when it desires so to do. Rates would be made by co-operation of both bodies. We think that purely local regulation of public utilities has been proved to be ineffective. A body exercising supervision over an entire state is in a position to administer its duties without regard to local claims or prejudices. A local body would be likely to be swayed by the clamor of the community. The suggestion of the committee is open to the criticism that if a local community has control over service it might so regulate that service as to make the rates inadequate. If this occurred, the return on the securities outstanding might be affected. There would then be a situation where the local commission was demanding a service greater than the rates would justify, with the result that the return on the investment would be endangered or lowered. A system of single control is better than one of dual form because it does place a measure of responsibility for the success of operation upon the body which exercises control over service. A community should not seek both to exercise broad powers and to escape responsibility for its action. We do not believe this is the purpose of the plan recommended in the report, but it appears to be the effect of it.

ADVERTISING IN "AERA"

The November issue of *Aera* contains a large number of articles which are excellent arguments for fairer treatment of the electric railway companies at the hands of the public authorities. Editor Clark has evidently returned from the Atlantic City convention with renewed inspiration for the work which he has been selected to direct. We regret, however, that the *Aera* advisory committee considers it necessary to solicit advertisements again to obtain the funds to continue this work. This same feeling of regret, we understand, is shared by the chairman and all of the other members of the *Aera* advisory committee, and the plan was adopted only as a last resort. The plain facts are these: The association requires about $18,000 a year to carry on the publicity work which it is endeavoring to accomplish through *Aera* and has been able to find no other way of defraying this expense. The committee in charge of the magazine has announced that it has no intention or desire to spend any part of this money in publicity which can be secured by the association without cost. Instead, and this statement is made on the authority of C. Loomis Allen, chairman of the advisory committee, the pur-

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pose is to devote the magazine to the cause of securing better relations between the public and the railway companies and to the furtherance of the interests of the association. As soon as this work can be carried on by the association without the financial aid obtained from advertisements in *Acra* the advertising will be discontinued, for, obviously, the magazine, from an ethical viewpoint, would be in a much stronger position if it should carry no advertising. This announcement, we are confident, will be gratifying to many members of both the Manufacturers' and the American associations, who have felt that it was not wise for the American Association to embark in the publication of a commercial magazine.

A PIECEWORK DILEMMA

The point is often made that the trade union with its day-rate minimum assumes that all of its craftsmen are equally efficient and that they should be paid accordingly. Employers are not likely to admit this allegation, but sometimes they act as if they also believed in a dead level among workmen. A case in point is afforded by the president of a large electric railway system who is consistently opposed to piecework or premium systems. His opposition is not based on any fear of labor troubles or the special conditions of electric railway maintenance but simply on the assumption that no shopman can possibly be worth more than $2 to $2.50 a day. The shop superintendent of this railway has been able to strengthen his argument for a piecework system by making a careful study of practices in other shops, and he has concluded that a large increase in the production of motor coils and other well-defined jobs could be brought about by some form of premium system. In fact, he has calculated that the abolition of the day rate would produce a net saving of about 20 per cent in labor cost. He is also convinced that the piecework system would actually result in better workmanship because the present day rates are too low to appeal to good shopmen. This has been the result on most roads where the piecework system has been introduced. But it seems to take a long time to overcome the prejudice against a workman earning more than the ordinary wages of his craft even when his production is correspondingly greater. After all, the prime concern of an economical management as related to shop accounts should not be the wages of individuals but the total cost of maintenance per car mile.

PREDETERMINATION OF ENERGY TO PROPEL CARS OR TRAINS

The problem of predetermining the energy required to propel a car or train according to a given schedule is one of great importance in the design of electric railways, as upon its correct solution depends the power capacity of motors, locomotives, substations, transmission lines and power stations.

Like most problems which have been solved for the benefit of the electrical industry, it has been independently attacked by a number of engineers, each contributing a part of the complete solution, the names of A. H. Armstrong, S. T. Dodd, C. T. Hutchinson and C. O. Mailloux being particularly conspicuous. The complete solution of the problem was given in 1902 by C. O. Mailloux in a now classical paper read before the American Institute of Electrical Engineers. Since that date a number of others have attacked the problem from various aspects, notably C. T. Hutchinson, G. H. Anderson, W. S. Valentine, L. A. Freudenberger and F. W. Carter, not to mention others.

The essential features of the problem are as follows:

A train run is made up of four periods which must be treated separately and then combined. These are the controller, free motor, coasting and braking periods. The run over a given distance, in a given time, against given resisting forces, may be accomplished by various combinations of these four periods. For example, we may have a run at a low maximum speed but with rapid acceleration and braking, or at high maximum speed with slow acceleration and braking, and yet make the same average speed. The energy consumed by the car or train in making the run will depend upon the acceleration or retardation during each period and the duration of each period.

Two problems immediately arise out of this: first, to determine the energy consumption for a given equipment and, second, to determine what motor equipment will give the most economical run, considering both energy losses and fixed charges on equipment. It is, therefore, obvious that any exact solution of these problems must consider not only the dynamical relations involved but also the electrical characteristics of the equipment. Neither of these problems has ever received an exact direct solution, although exact cut-and-try and approximate direct methods are available.

The nature of the dual problem may be realized if we consider an attempt by an imaginary motorman to make the run between two stations in a given time. A motorman trying to accomplish this feat will not know how long to accelerate on controller and motor or how long to coast and brake. He will, in nearly every case, arrive too early or too late, and only after repeated trials can he make the run in the exact time required. Suppose the motorman repeats this performance, accelerating or braking each time at different rates, until he finds a combination which will enable him to make the run in the specified time with the least energy consumption. Finally, imagine him to repeat the entire performance several times with different motors on the car each time. The problem we are now considering, then, is how to accomplish what this imaginary motorman has done, but without the use of actual cars and motors.

The cut-and-try method of predetermining train performance, described in Mr. Mailloux's paper, is a semi-graphical and semi-analytical process of imitating the above-described performance on paper, using curves showing the motor characteristics instead of the motors themselves and the mathematical expression of the laws of motion instead of the natural operation of those laws. The method is an extremely ingenious one, not difficult to apply, and should of course be exact as it is based upon all the essential elements in the case, although values must be assigned to such factors as train resistance, braking characteristics, efficiency of motorman, etc. But, as some engineers who have had continuous work of this kind have found this method somewhat long to apply, efforts have been made toward an em-

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pirical process for every-day use, using as a basis the principles described in Mr. Mailloux's paper.

Thus, in 1903, C. T. Hutchinson, in a paper read before the American Institute of Electrical Engineers, attempted to do this by substituting for an indefinite number of motor curves a single set of motor curves representing an average for all motors, although it may be noted that recent motors do not all conform with these curves. In the same year G. H. Anderson, utilizing a principle developed in 1902 by Mr. Hutchinson, introduced another short cut by showing that with speed-time curves of a given shape, whatever their scale, the energy consumption in watt-hours per ton mile is the same for any given product of the average speed and the square root of the number of stops per mile, thereby making one calculation serve for several runs.

Shortly after the appearance of Mr. Hutchinson's paper, F. W. Carter, of Rugby, England, brought out an approximate analytical method, based upon the use of empirical formulas representing the relations between tractive effort and speed and between current and speed. These formulas were used instead of motor curves, resulting in a purely analytical treatment of the subject (*Journal I. E. E.*, 1903). Later D. C. Woodbury devised a similar, though unpublished, method, using empirical formulas for speed-time and speed-current curves. Neither of these methods attained much vogue owing to their complicated and empirical nature.

Numerous minor refinements of the Mailloux and Hutchinson methods have been published in this journal and elsewhere, but they have been rather in the nature of short cuts in the calculations than developments in the fundamentals of the process.

Within the last year or two the subject of train dynamics has become connected with the battle of the systems. This occurred in England, when Philip Dawson published the results of energy tests on the electrified zone of the London, Brighton & South Coast Railway, which employs a single-phase system.

F. W. Carter promptly questioned these results, on the ground that when checked by simple dynamical formulas they showed an impossibly high efficiency. The vigorous defence of the original figures and the sustained activity of Mr. Carter's attacks have afforded our English friends some very interesting reading. This debate has served to bring the dynamical aspect of the problem to the front, where it has been kept by Mr. Carter in a series of able contributions to the Institution of Electrical Engineers and the technical press of Great Britain.

The empirical method published in our last issue by Messrs. Del Mar and Woodbury is evidently inspired by Mr. Carter's insistence upon keeping the dynamical elements of the problem in view. It has been used for several electrification estimates of importance and, we understand, has proved itself of great use if its approximations are not overlooked. This method undoubtedly affords the shortest path yet devised from the timetable to the load diagram. It also enables the calculator to traverse this path without ever losing sight of the fundamentals of the problem and, at the same time, affords him a ready means of ascertaining the effect of altering any of the variables.

It is to be hoped that the authors will amplify their statements about motor and controller efficiencies by showing how these quantites vary with the type and length of run. The method at present assumes an average efficiency of 70 per cent for motors and controller. If this could be replaced by figures, dependent on the type and length of run, the method would be materially improved. We understand that the authors are working on this phase of the problem.

SPECIAL-CAR SERVICE

Too much care cannot be taken to insure that special-car service shall be maintained at high standards, once the tariff for such accommodations is fixed at levels which provide a fair profit above the cost of the facilities rendered. In some cases appearances indicate that the provision of a special car merely calls for manning the first available piece of rolling stock of the desired capacity with a crew picked up at random in the lobby nearest the loading point and turning the outfit loose upon the system with the least possible margin of time in which to make the assigned schedule. It should be borne in mind by operating officers that no matter how much indifference the public may exhibit in its regular journeys, the average man expects something a little out of the ordinary when he rides on a special car. The extent to which luxuries of various kinds may be introduced into such service naturally depends upon local conditions. One party may be made happy for the evening by the provision of a home-made buffet in one of the vestibules, and another may become enthusiastic in support of the company by virtue of a conductor well informed on the historic or other interesting places along the route. There is almost no limit to the variety of special features which may be turned to account, but it is not these matters that we wish to emphasize. What is important is the maintenance of the best possible normal service in special-car operation.

By this is meant a thorough inspection of every such car before it moves out of the house, a degree of cleanliness which leaves nothing to be desired, the selection of trim, neat motormen and conductors for such runs, the adjustment of seats, cushions and windows to meet the legitimate requirements of comfort-loving patrons, the removal of loose signs and notices which add nothing to the convenience or pleasure of the trip, and the provision of ample illumination. The use of a car sorely needing paint inside or outside, or the furnishing of one with old-fashioned carbon incandescent lighting on a scale that prevents anything but heroic attempts to read on an irregular stretch of track, is more likely to discourage further patronage of special-car service than to stimulate its growth.

Some consideration should also be given to the kind of people who are to use such a car when rolling stock is assigned to this class of service. A women's club traveling 20 or 30 miles will sing the praises of the company for months if wicker chairs and a neat strip of carpeting or matting are installed in place of the usual equipment, while a glee club of college boys traveling to give a concert in a neighboring suburb will vote every time for the street railway which assigns one of its fastest and most up-to-date cars for its use, with all the latest engineering "wrinkles," these always proving of absorbing interest to

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youthful individuals of the male sex. Strict attention to punctuality is as important in making special-car service a success as in the operation of regular schedules, and the handling of the pecuniary side of the case, while businesslike, should preferably be conducted in an inconspicuous way. With a fixed price for special-car service the ordinary fare restrictions and limits may be set aside so far as external appearances go, and the company's patrons should be encouraged to realize their independence of regulations necessary for the conduct of traffic upon the usual lines of travel.

CHEMISTRY IN THE BOILER ROOM

At the last meeting of the New England Street Railway Club, reported in last week's issue, attention was called to the really great desirability of utilizing the services of the industrial chemist in connection with street railway work. One of the many examples cited in support of the contention was the fact that much money is wasted in buying coal without any accurate knowledge of its composition and heating value, and that fuel consumption may readily be decreased by intelligent selection under existing conditions.

The point in general is manifestly well taken. Nothing is less businesslike than to buy coal without clearly established specifications, which provide a basis for periodical analyses of the fuel as it is delivered, and where power is produced in reasonably large amounts it is possible to effect large savings through allowances for variations in quality which occur even in coal from a single mine. Without an analysis, in cases of this kind, the purchaser would be penalized with no warning other than possible indefinite complaints made by the firemen or that his weekly coal bills were running higher than usual. Of course, the coal might from time to time have a higher heating value than that of the sample upon which the contract was awarded, but this contingency is hardly likely to occur very often.

On the other hand, it is unwise for the manager or engineer of a railway to consider that a chemical analysis only is sufficient to settle problems surrounding the actual selection and combustion of fuel, as might be implied from the general statement as to its undoubted value. As a matter of fact, such an analysis ends with a determination of heating value and chemical composition of the coal. But the details of the best methods of combustion are largely also a matter of mechanics, and, to secure the best results the special knowledge growing out of practical experience in the boiler room is also required, so that, relatively speaking, the chemical reactions involved are subordinate in character.

From the purely chemical point of view, for example, one would be warranted in abandoning the use of a coal with an ash which fused at a temperature of 2300 deg. Fahr. if the boiler furnaces produced a temperature of 2800 deg. Yet a capable operating engineer would know that it was necessary to change neither the fuel nor the furnace under such conditions, and without any analysis of the reasons for the procedure would keep the grates cool by a steam jet and would avoid disturbing the fire with a slash-bar so that the ashes would stay at all times in the cool zone below the point of most active combustion. Clinkers would still be formed, but they would be so small that they would not cause trouble in cleaning fires nor would they be likely to affect the efficiency by clogging the air passages in the grates.

Again, from the standpoint of chemical analysis the ash content of any coal is quite valueless. Yet on chain grate stokers a coal with but little ash may heat the grates to such an extent as to raise the repair bill to impossible proportions, and a change from a comparatively low-grade fuel to one containing only 4 per cent or 5 per cent of ash might be prohibited in a plant equipped with chain-grate stokers even though the latter coal gave more heat units for each dollar expended than did the former. Under such conditions the expedient of feeding in a layer of ashes under the coal has met with success in some cases, the layer of ashes keeping the grates reasonably cool. But in either case the ash is a distinct if indirect necessity, so that its presence from a practical standpoint can hardly be said to be detrimental.

PERPETUAL INVENTORY PLAN

As a rule, the work of making a stock inventory causes a complete though temporary halt in the storeroom routine and is a source of no end of worry and extra work for the storehouse department. In many instances, where the quantity of material is large, extra help is required to complete the annual or semi-annual inventory within a reasonable time. The added expense due to the extra help and the innumerable opportunities for error in rushing through a tedious task of this kind result in an inaccurate check of the actual quantities of material on hand at any given time. A few of the larger electric railway companies have recently introduced what is termed a perpetual inventory plan which has removed most of the difficulties and inaccuracies belonging to the usual method of taking inventory, and it has proved very satisfactory in operation.

To adopt the perpetual inventory plan, one must first ascertain the number of kinds of material in the stockroom. With this information, it is possible to arrange a schedule whereby only a few items are inventoried each day during the year, with the result that no extra effort is required. Then, too, the work may be done by the stock clerks, who are thoroughly familiar with the different materials handled almost daily in filling orders. There is no real reason why an accurate check on all the material in the storeroom should be desired at any particular time. If the storekeeper has a check, from time to time, of the stock on hand to compare with his book records, it is just as practical as though all his information was supplied to him at one time. On the other hand, the perpetual inventory plan has many advantages in that it does not interfere with the routine filling of orders, it does not require the employment in the storeroom of additional help unacquainted with the materials in stock, and there need be no rush on the part of the bookkeeping department to bring the stock ledgers up to the particular day or date upon which a complete inventory was taken.

In actual operation, the plan is not only feasible, but it has proved most desirable from an efficiency and economy standpoint.

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THE TREND OF HEAVY ELECTRIC TRACTION IN EUROPE

Within the past year there have been numerous discussions abroad upon the methods and apparatus of heavy traction. We have commented upon them from time to time, but it may not be out of place here to summarize the situation as it now exists.

After the general introduction of electric traction for service the main growth for the heavier service was naturally along lines upon which experience had already been obtained, and such problems of heavy traction as presented themselves for solution abroad, as here, were dealt with as extensions of ordinary tramway service; that is to say, at 500 volts or 600 volts direct-current service, with occasional excursions into slightly higher voltages still conveniently applicable to motors of the ordinary type. Perhaps the first large project which looked away from this precedent was the electric road planned by the late Dr. Adams between Chicago and St. Louis, a project frost-bitten by the financial stress of 1893. It therefore came about that the chief advances in heavy traction in this country followed, from lack of better precedent, the development of interurban service, and the earlier efforts culminated in the Baltimore & Ohio tunnel locomotives.

Abroad, engineers began to consider traction by the then comparatively new three-phase motors, which had constituted part of the Adams project. And the first serious beginning in traction by other means than by direct current was made in the electrification of the Italian lines on the basis of three-phase methods. These roads, although subject to the initial difficulties that beset all new projects, were worked out to successful operation and have since been largely increased in mileage and traffic. The famous Berlin-Zossen experiments of ten years ago gave a further impetus to work in this direction. Meanwhile, nothing much was being done abroad in heavy direct-current work, although the encouraging results which were obtained in America stimulated interest in the matter. Then came the single-phase railway motor, worked out almost simultaneously on both sides of the Atlantic. The work done in this country put a.c. traction to the front here, and the activities of the Italian, French and German engineers soon brought the same system into prominence there. Meanwhile there had been side channels taken, like the application of the Ward-Leonard system with conversion on the locomotive, and the French rectifier locomotive which came at a little later period.

With this hasty sketch of the development of affairs we may turn to consider the situation as it now exists abroad. The Italians still adhere in the main to the three-phase lines, although single-phase work is making an appearance. From an operative standpoint the results seem to continue excellent, and the big locomotives of the Simplon tunnel make it perfectly evident that the system is thoroughly operable and reliable; but north of the Alps the compensated series single-phase locomotive in one or another of its protean shapes seems to occupy the center of the stage. It is no easy matter to ascertain what particular form of compensated motor is in use in any given installation. In published descriptions of apparatus the details of the winding are generally suppressed, and all that can be said is that the motors belong to the compensated single-phase group in some one of its half-dozen varieties, sometimes more than one type of connection being used in the same apparatus as it changes from starting to running conditions. The new Lötschberg road, with its 2500-hp locomotives, is perhaps the most conspicuous of the single-phase roads, although there are several other admirable lines with somewhat lighter service on the Continent and in Scandinavia, where the system has been taken up seriously. The rectifier scheme seems rather to have dropped out of sight, although it has not been entirely abandoned in France. As regards the operative characteristics of the single-phase locomotive, they are generally conceded to be good, the chief criticism directed at them being their weight and some reported difficulties from heating and commutation during the period of acceleration. It is generally believed, however, that these latter difficulties are not serious, and it has been the pretty general experience on the single-phase European lines that the operative results have been on the whole excellent. Obviously, the chief advantage of the single-phase and the three-phase systems is the extremely important one of high voltage on the trolley wire and, consequently, the great simplification and reduction of cost in the conducting system. As the matter stands at present, then, it may be summarized in saying that the tendency all over Europe is strongly toward the single-phase equipment, the three-phase not being at all abandoned but less frequently apparent in connection with new projects.

Meanwhile what about the direct-current system at increased voltage? In brief, it occupies somewhat the same position that it does in our own country, strongly advocated by engineers used to d.c. practice, occasionally employed on a modest interurban scale, working admirably as a rule but not yet adopted to any great extent on the heavier work here. There are some capital high-voltage d.c. lines in Europe, most of them at voltages under 1200, like the very interesting Bernese-Oberland Railway, but occasionally going higher. At least one big and admirably designed locomotive for 2400 volts total has been constructed and tested, and the reports from it are good. Neither here nor abroad, however, has the system had a really thorough tryout on a considerable scale, a scale comparable, for example, with the larger single-phase and three-phase roads now in operation.

Just why the case should stand thus is not altogether evident. If it is that 2400 volts is still somewhat too low for efficient current collection and distribution, such a condition should simply be a spur to higher voltages. Indeed, with the present experience in building high-voltage d.c. machinery and the use of interpole construction which has so facilitated its design, better things should be possible. The experience of M. Thury with large high-voltage d.c. machines makes it altogether evident that the limit of the commutator has not yet been reached in railway work. When somebody really gets at the problem and puts out a big locomotive operating with not less than 5000 volts on the trolley wire, things will look differently from the d.c. standpoint. A comparison between such a locomotive and a high-voltage single-phase locomotive would be most instructive.

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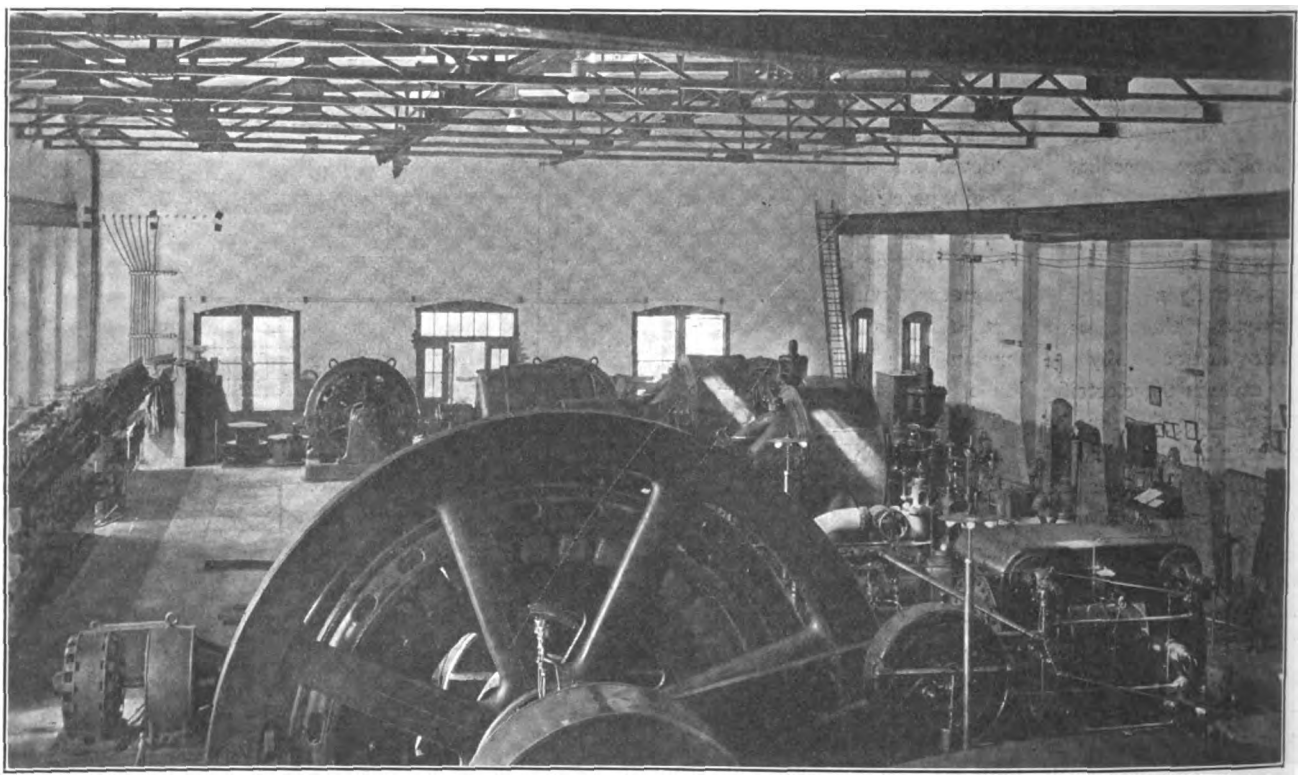
Recent Improvements on the Berkshire Street Railway

This Article Describes the Power Generation and Transmission and Distribution System, Including Work Now Under Way

One of the longest electric interurban transportation systems in New England is the Berkshire Street Railway, which operates about 135 miles of track in western Massachusetts, Connecticut, Vermont and New York. This road has recently been greatly extended and improved so that it is now one of the interurban lines in the East whose engineering features are essentially a product of the last two or three years. The Berkshire Street Railway operates a frequent interurban schedule between Pittsfield and North Adams, Mass., and cares for passenger and freight business in the valleys of the Housatonic and Hoosac rivers. Its territory embraces the popular watering places of Lenox, Stockbridge and Great Barrington. The length of the main line from Canaan, Conn., to Hoosick Falls, N. Y., is 97 miles. The company is controlled by the New York, New Haven & Hartford Railroad under a special act of the Massachusetts Legislature and is operated along the advanced lines of practice developed by the electric railway branch of the larger organization.



Berkshire Improvements—Remodeled Plant, East Street Station, Pittsfield, Showing the Later Installation of Mixed-Pressure Turbines

OUTLINE OF IMPROVEMENTS

Within the past two years the system of power supply has been greatly improved, substations and transmission lines have been built and the carhouse facilities have been much extended. In addition, a line of high-grade construction is now being built between Lee and Huntington, Mass., to provide a connecting link between the Berkshire system and the electric railway network of central and eastern Massachusetts. Extensions to South Egremont, Mass., and Canaan, Conn., have been completed. These betterments have all been planned and supervised by the engineering organization of the company.

EARLIER POWER SUPPLY

Prior to March, 1911, the Berkshire system received power from a main generating plant at Pittsfield over 13,200-volt transmission lines, the local car service being cared for by 600-volt d. c. distribution from substations at Housatonic, Lee, Pittsfield and Pownal. Two 300-kw rotaries were in service in all substations except the last named, where the unit was 200 kw. A small amount of power was obtained from a 500-kw engine-driven plant at Hoosick Falls, N. Y. With the completion of the Hoosac Tunnel electrification by the Boston & Maine Railroad and the establishment of a modern high-class steam turbine station at Zylonite, near North Adams, Mass., for the tunnel service, provision was made for the operation of a portion of the Berkshire load by the new plant; the transmission lines were rebuilt and extended and a standard 33,000-volt service was inaugurated between the southern part of the system and Zylonite. The Pittsfield plant was rebuilt sufficiently to permit its operation in multiple with the Zylonite station on the high-tension side, and new rotary converter substations were erected at Sheffield, Lee and Cheshire. The Housatonic and Pownal substations were retained in service and plans have since been made for an open-air substation at Otis for the Lee-Huntington extension. North of Zylonite the transmission voltage was standardized at 11,000 volts, which is the pressure used in the Hoosac Tunnel electrification.

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PRESENT HIGH-TENSION SYSTEM

The accompanying diagram of the existing transmission lines of the Berkshire system shows the general scheme of power supply. Two 33,000-volt trunk lines are run from Zylonite through Pittsfield to Lee, and these lines will shortly be extended eastward to Otis, where two 300-kw rotaries will be installed. The distance from Zylonite to Pittsfield via the high-tension lines is 18 miles and from Pittsfield to Lee the line length is 15 miles. South of Lee there are two lines, one operated at 13,200 volts and serving the Housatonic substation, and the other operated at 33,000 volts and supplying energy to the Sheffield substation, near the Connecticut state line. A single line is carried northward to the Pownal substation, in Vermont, from Zylonite. The capacity of substations now in service or planned for the immediate future is as follows:

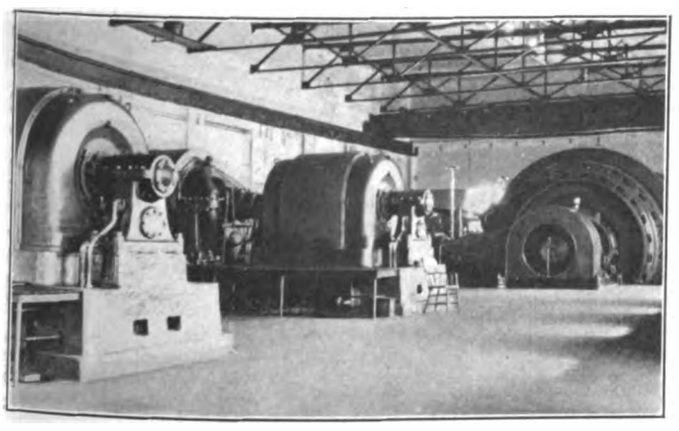
Location	No. Rotaries	Kw Capacity
Pittsfield	3	2250
Zylonite	3	1300
Lee	2	600
Sheffield	2	600
Otis	2	600
Housatonic	2	600
Cheshire	2	600
Pownal	2	400
Total	18	6950

The company also has a 200-kw portable substation which is ordinarily located near Williamstown, Mass., while a second will be utilized in the Huntington district after the extension from Lee is completed.

The Zylonite station now contains two 5000-kw, 11,000-volt, twenty-five-cycle Westinghouse turbo-generators, and the Pittsfield station contains four units aggregating 3166 kva. Two of these are revolving-field generators direct-driven by horizontal cross-compound condensing engines, the other two being mixed-pressure turbo sets of Westinghouse make which are ordinarily operated in connection with the engines and utilize the exhaust of the latter. The entire output of the Pittsfield station is used by the Berkshire Street Railway, while about 1500 kw maximum is drawn by the road from the Zylonite station.

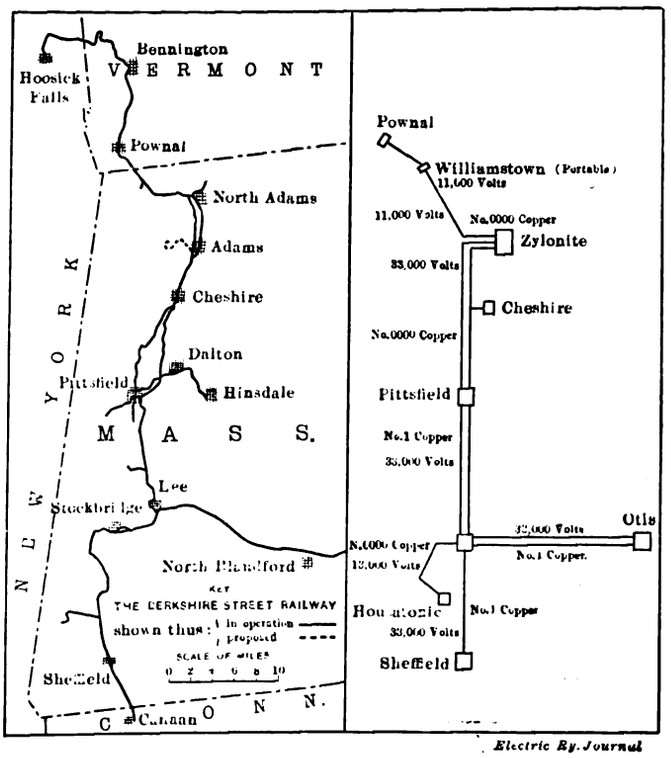
PITTSFIELD GENERATING PLANT

The Pittsfield station improvements include the rewinding of the engine-type generators from 13,200 volts to 370 volts; two additional 380-hp Aultman & Taylor water-tube boilers, two additional mixed-pressure turbo units, an additional feed-water heater, pumps, and the installation of three rotary converters, with switchboard changes and remote control for operating oil circuit-breakers in a new transformer station adjacent to the generating plant.



Berkshire Improvements—Mixed-Pressure Turbines and Engine-Type Generator at East Street Station, Pittsfield

The plant is located about 1 mile outside the business center of Pittsfield and adjacent to the operating headquarters and principal carhouse and repair shop of the system. Coal is delivered by gravity to a storage yard of 8000-ton capacity paralleling the main line of the Boston & Albany Railroad. The station is 144 ft. long over all and 104 ft. wide, and in addition to the four generating units mentioned above contains six 380-hp boilers hand-fired and equipped with Reagan grates, Westinghouse-LeBlanc condensers for service with the mixed-pressure turbines and



Berkshire Improvements—Maps of System and Distribution Lines

Warren jet condensers connected with the engine installation. The latter are not used except in emergencies. A general plan of the remodeled station is shown.

MIXED-PRESSURE TURBINES

Coal is delivered in the boiler room by hand cars of 2600-lb. capacity running upon a 20-in. gage industrial railway and passing over a set of platform scales at the entrance. Natural draft is provided by a brick stack 175 ft. high and 10 ft. inside diameter. The boilers are arranged in three batteries on one side of a firing aisle 18 ft. wide, and the new feed-water heater and pumps are located at the west end of the room, with space for an office in one corner. The plan shows in a striking manner the compactness of a turbine as compared with an engine installation, all the auxiliary condensing equipment being located in the basement. The mixed-pressure turbines were installed 20½ ft. apart on centers to provide ample space for auxiliaries below the engine-room floor. Each of the engine-driven generators is rated at 750 kva and operates at 96 r.p.m., the turbine-driven generators being rated at 833 kva each and running at 1500 r.p.m. All deliver three-phase energy at 370 volts to the bus to give direct supply to the three local 750-kw rotary converters. All the d. c. feeders centering in Pittsfield are supplied from these rotaries, the outgoing cables being tagged by 3-in. x 6-in. tabs for convenience in repairs or testing as shown in the accompanying halftone. The engine room is served throughout its entire area by a 15-ton hand-operated crane of 61-ft. span.

The station burns Cambria coal and operates upon a live steam pressure of 160 lb., from 10 lb. to 20 lb. back pressure (absolute) being used between the low-pressure engine cylinders and the turbines. The turbine bearings are lubricated by an oil-pressure system operated at 5 lb., the governors being of the oil-pressure type and operated at 40

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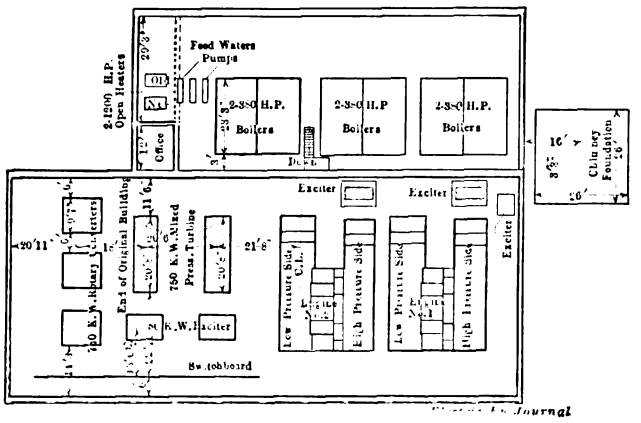
lb. per square inch. The supply of live steam to the turbines, in case the engine exhaust is insufficient, is obtained through a reducing valve and automatic valve actuated by the governor. The auxiliary oil-pumping equipment of these turbines is self-contained and with the incidental piping is largely placed outside the machine casings under

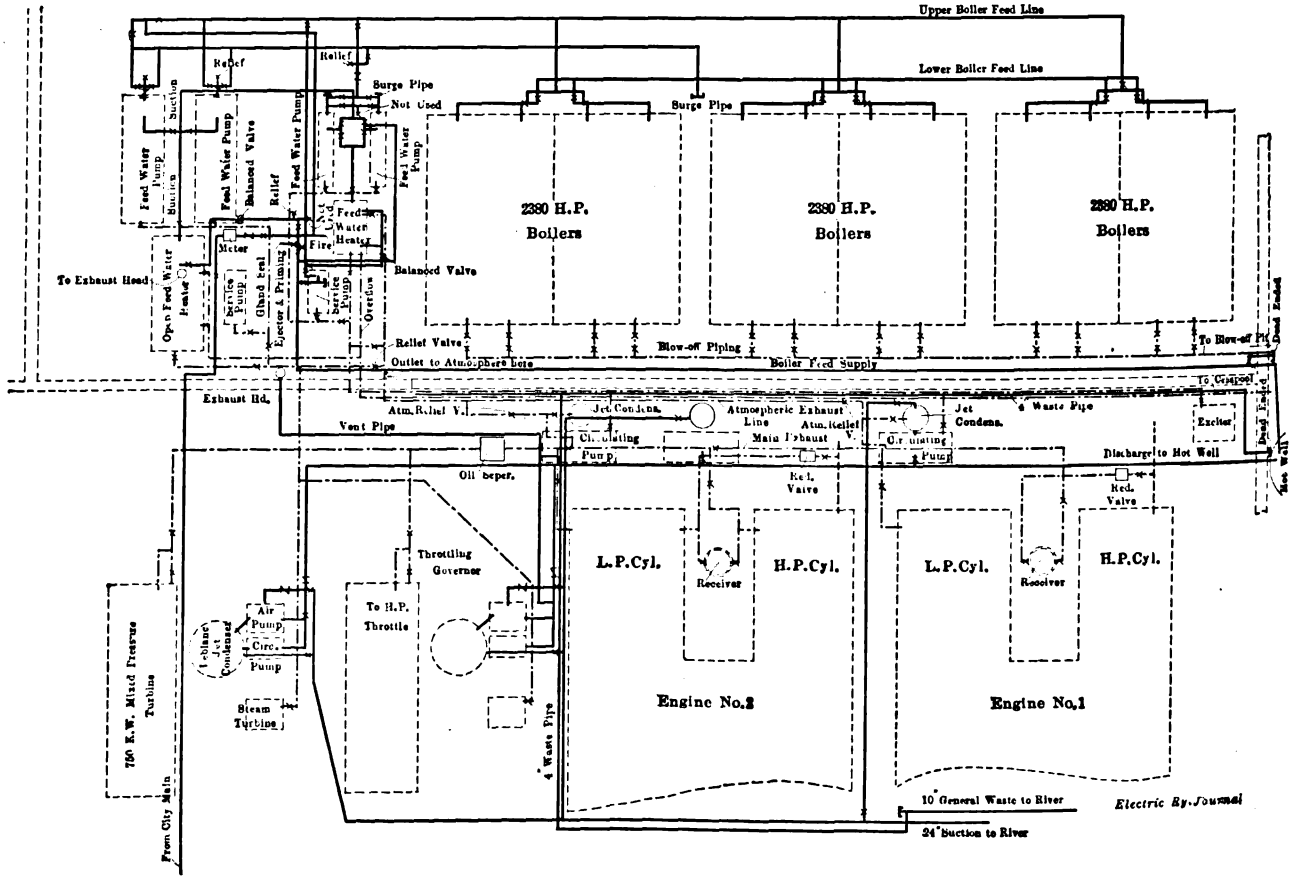


Berkshire Improvements—Plan of East Street Power Station, Pittsfield

an open platform just below the bedplate edges, insuring economy in space requirements. Air for generator ventilation is drawn into the machines through screened intakes on the west and south sides of the building at the ground level. The air ducts are run along the basement ceiling to

PIPING ARRANGEMENT

The piping arrangements in connection with the station improvements were planned for flexible operation. The engines take live steam from a 14-in. main header running the entire length of the boiler batteries, and the turbines are connected with the main header by 6-in. pipes, appropriate reducing valves being provided for the turbine service. The water piping provides for boiler feed either from the city mains or from a hot well which receives the condensation from the turbine as shown in the accompanying diagram. Condensing water is drawn from the Housatonic River through a 24-in. suction pipe leading to the Le Blanc condensers, and the boiler-feed system is laid out with more than the usual care to forestall interruptions. Duplicate feed lines are run to each battery. In normal operation water from the hot well is pumped through a National heater of the open type by one or both Blake feed pumps, city water being used only for make-up necessities. Two other feed pumps and a Cochrane heater formerly used in connection with the engine-driven plant are also located in the pump section of the boiler room, and either set of pumps may be operated upon either or both sets of boiler-feed lines. The feed lines are equipped with balanced valves controlled by floats in the heaters. As the heaters fill, the valves are automatically closed, throwing pressure back upon the pump governors and cutting down the rate of water input from the pumps. Oil from the engines which passes through the turbines into the hot well is separated from the water of condensation by gravity and discharged through an overflow into the river. The water in the hot well is maintained at a depth of about 6



Berkshire Improvements—Water and Exhaust Piping Plan of East Street Power Station, Pittsfield

the generators, and the discharge of heated air from the latter is into the basement, which is 12 ft. high and provided with several openings into the engine room. The capacity of the plant was increased about 70 per cent for a given fuel consumption by the installation of the mixed-pressure turbines.

ft., and the feed-water suction line enters the well near the bottom. By this means no trouble is experienced from the oil in the operation of the boilers. Service and fire pump connections are made in the boiler room on the inside of the city meter.

The exhaust piping provides for the usual disposal of

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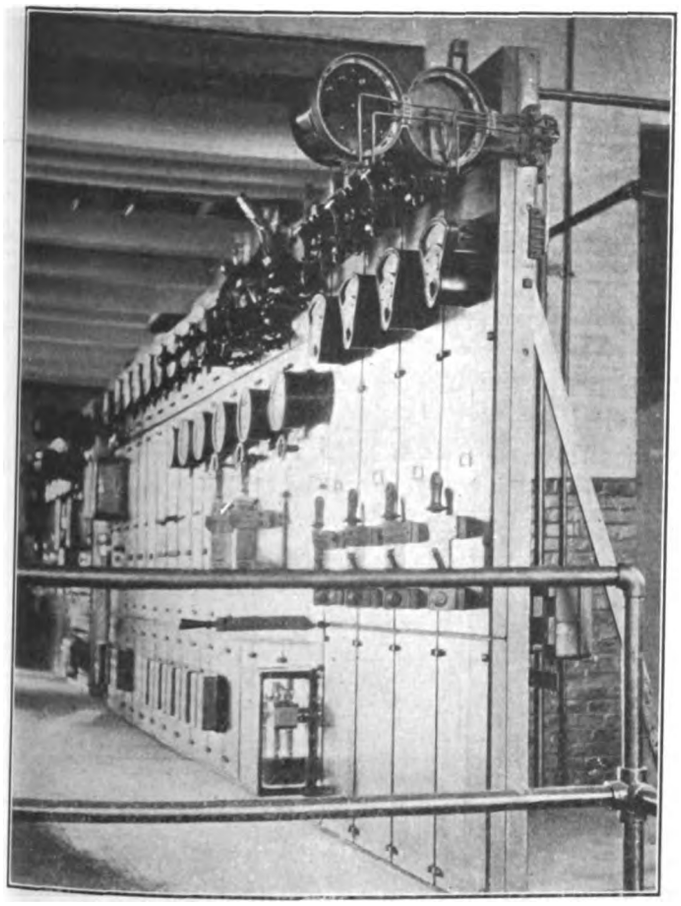
steam from pumps and auxiliary apparatus by connections with the feed-water heater lines, and a complete system of heater overflow lines is provided. The exhaust from the low-pressure engine cylinders is turned into a main in the basement and passed through an oil separator before being delivered to the turbines. Auxiliary steam connections at the engines permit live steam at reduced pressure to be turned into the low-pressure cylinders in case of trouble on the high-pressure side of the engine.

EXCITER PLANT

Five exciters are in service at the East Street station. In normal operation the load is carried by two 50-kw sets of the motor-driven type. One 50-kw and two 20-kw steam-driven exciters are installed, and all these machines deliver current at 125 volts to the exciter bus. The motor-driven units are each operated from the 370-volt, three-phase bus, induction motors being used. The two smaller steam-driven exciters are run by turbines, the large unit being engine-driven. Auto-transformers for the rotaries are located in the basement between the foundations of these machines, and in starting a 125-volt current is applied by means of a double-throw switch, a transfer being made to the 370-volt bus as soon as the rotary reaches full speed. The turbine room is illuminated by five 5-amp, 110-volt multiple inclosed flaming-arc lamps suspended from the roof.

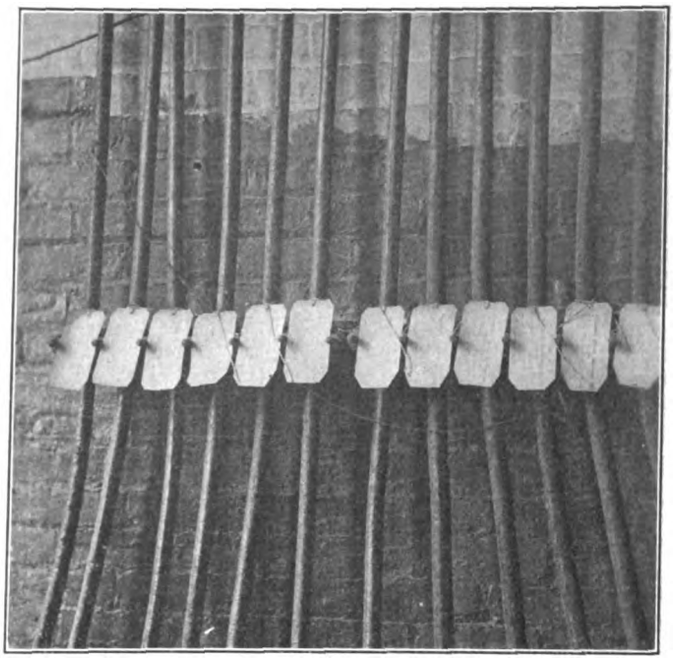
OPERATING FEATURES OF SWITCHBOARD

From the generators and rotaries the conductors are carried to the station switchboard in fiber conduit laid in the floor. The switchboard consists of an a.c. and d.c.



Berkshire Improvements—Railway Feeder Panels on Extension of Switchboard Platform, Zylonite Substation

section. Inside the East Street station there is now no high-tension apparatus, as all the transformer and line equipment associated with the 33,000-volt transmission is located in a fireproof substation on the opposite side of the street. No oil circuit-breakers are required in the power station proper. The high-tension lines and bus connections to the transformers, raising the station voltage to 33,000, are governed by remote-control switches mounted on the a.c. board in the engine room, the oil switches in the high-tension leads being mounted on a gallery in the transformer house. These circuit-breakers are of the solenoid type. The station is operated continuously, but



Berkshire Improvements—Tagging Feeders for Convenient Reference at East Street Power Station, Pittsfield

between 12:15 a. m. and 5:20 a. m. daily the generators are shut down and one rotary is allowed to maintain voltage on the trolley and supply any local lighting required, the machine being run off the 33,000-volt transmission lines through the transformer station and 370-volt bus. The Zylonite power station generating equipment is never entirely shut down intentionally, as the demands for service in the Hoosac Tunnel are particularly heavy during the night hours, when the volume of freight traffic on the Boston & Maine system reaches a maximum.

HANDLING HIGH-TENSION ENERGY AT PITTSFIELD

The Pittsfield transformer station is 47 ft. long x 41.5 ft. wide inside, its height being about 45 ft. In general design it has many features in common with the company's typical substation at Lee, which will be described later, but the absence of rotary converter and switchboard equipment in the building materially simplified the arrangement. There are two floors in the structure in addition to the roof. It contains two banks of transformers, each composed of three 500-kva oil-cooled units, located on either side of a middle aisle 11 ft. wide, on the first floor; six sets of solenoid type oil circuit-breakers mounted on the second floor, and four sets of lightning arresters of the aluminum-cell type located on the roof. The frame of the brick-walled building is composed of steel columns and I-beams, with reinforced concrete second floor and roof. The ground floor is of concrete without reinforcement, and the walls are carried on concrete footings 4 ft. square at the bottom, 5 ft. 6 in. deep, 22 in. square at the top and reinforced by two discarded steel rails in each case A hand-operated traveling crane of 8-ft. span traverses the center aisle and serves the first and second floors.

All high-tension exposed conductors are of copper tubing. The installation provides a common three-phase bus for four 33,000-volt lines, two of which connect with Zylonite and two with Lee and other substations at the south of Pittsfield. Each line has an independent set of lightning arresters and oil circuit-breakers, the usual dis-

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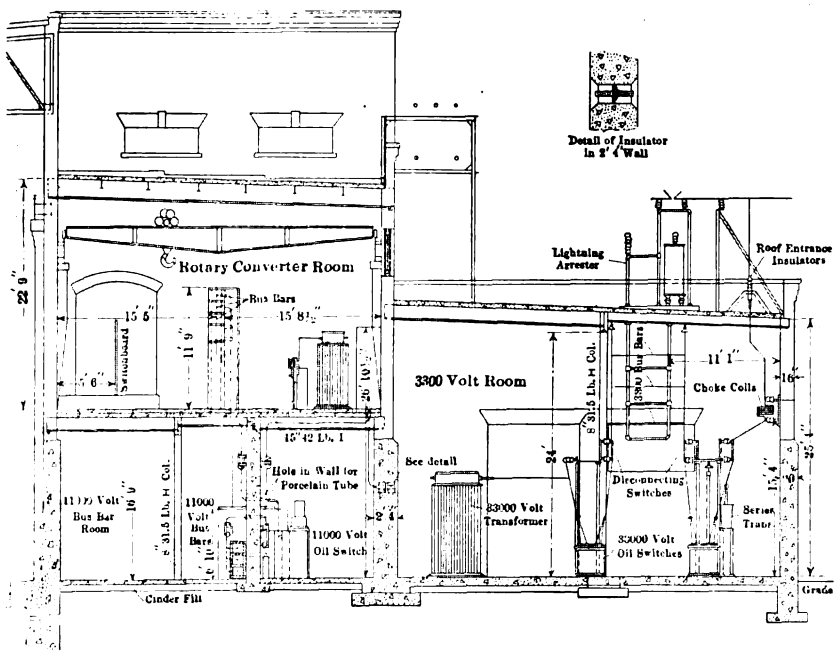
connecting switches being installed on each side of the oil breakers. All the lines are paralleled on the transformer station bus, which extends around three sides of the building. The 370-volt cables from the East Street station are carried under the street to the transformer house in 3-in. socket-jointed fiber conduit laid in concrete, sixty ducts being provided for the anticipated service requirements. The remote control and pilot wires, current transformer leads, etc., are also carried in these conduits to the main switchboard. The connections enable the substations south of Pittsfield to be fed directly from Zylonite or directly from Pittsfield without connection with the former station, in addition to the normal scheme of multiple operation.



Berkshire Improvements—Cross-Section of Two-Story Zylonite Substation

ZYLONITE SUBSTATION

The Zylonite substation is formed by a steel-framed extension of the tunnel power house, which was illustrated in the Electric Railway Journal for Sept. 16, 1911. In general, the installation permits the operation of one 300-kw and two 500-kw rotary converters for local d.c. railway service and the supply of 33,000-volt energy to the two transmission lines feeding the substations south of this point. One 11,000-volt line serves the portable substation near Williamstown and the fixed substation at Pownal, Vt. The transformer and oil-switching arrangements to handle these services required the building of a somewhat complex substation structure at Zylonite to secure safe and convenient operation with so many high-voltage and low-voltage circuits.

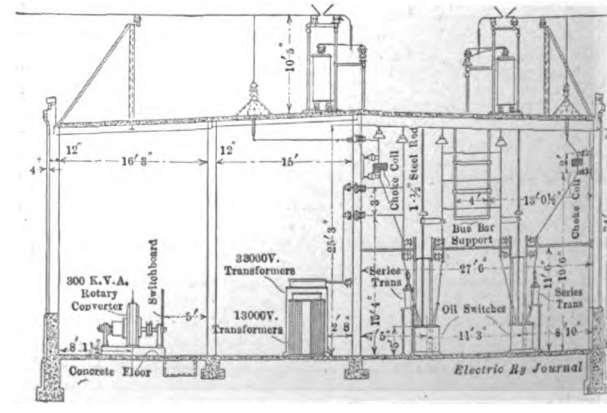
The substation is two stories in height and contains a switchboard extension, the three rotary converters, their starting panels and reactances, with a bank of three transformers for each machine on the upper floor, which is on substantially the same level as the main turbine room of the station, the ground floor being occupied by an 11,000-volt bus room, an 11,000-volt oil-switch room and a 33,000-volt transformer, oil-switch and bus room. The main station buses are carried horizontally in concrete compartments built on the second floor at the rear of the main switchboard. From these leads are run downward to an operating 11,000-volt bus on the ground floor, an oil circuit-breaker being provided between the main and lower buses so that the street railway service may be entirely disconnected when desirable. From the lower buses cables are run through disconnecting and oil switches to the rotary converter transformer banks on the floor above. From the latter cables laid in floor conduits connect with the rotaries, disconnecting switches being provided only between the rotaries and the transformer secondaries. Short runs of cable then connect the rotaries with the d.c. buses at the rear of the switchboard in the usual manner. Two three-phase, 11,000-volt lines leave the substation, one serving the Boston & Maine Railroad passenger station and shop power demands and the other supplying the northerly substations of the street railway. The local d.c. requirements are met by four 500,000-circ. mil feeders supplying current at 600 volts to the trolley lines on the east and west sides of the Hoosac River and to the local lines in the cities of Adams and North Adams, the villages of Blackinton and Sands Springs. The substation is about 54 ft. x 74 ft. in plan.

HANDLING HIGH-TENSION LINES AT ZYLONITE

The high-tension transformer and oil-switch installation provides for the single or multiple operation of two banks of 500-kva oil-cooled transformers upon a common low-tension primary bus and a common high-tension secondary bus, the outgoing 33,000-volt lines being taken off the latter with bus sectionalization. High-tension oil switches are installed in the outgoing lines between the transformer secondaries and the bus and also between the bus and the lightning arrester equipment, which is of the usual Westinghouse aluminum-cell type, and with choke coils located on insulated supports carried on the interior wall of the high-tension room. The spark gaps and arresters are situated on the roof, as shown in one of the accompanying drawings.

SWITCHBOARD OPERATION AT ZYLONITE

The operating switchboard has auxiliary remote control switches governing the entire a.c. installation and a complete set of instruments for measuring and recording all energy delivered to the substation. Current for the remote-control system is obtained from a storage battery. Synchronizing plugs and indicators are provided in connection with the tying together of the Zylonite and Pittsfield plants at this point, and all direct current delivered to the trolley feeders is passed through an integrating wattmeter before it leaves the switchboard. A 10-ton Whiting hand-operated crane serves the rotary room. The rotaries are of the six-phase type, as they handle the unbalanced load of the system better than three-phase machines. The tunnel electrification imposes an unbalanced load of about 10 per cent upon the station, one phase of the Y-winding of each turbo-generator being grounded.



Berkshire Improvements—Cross-Section of Lee Substation

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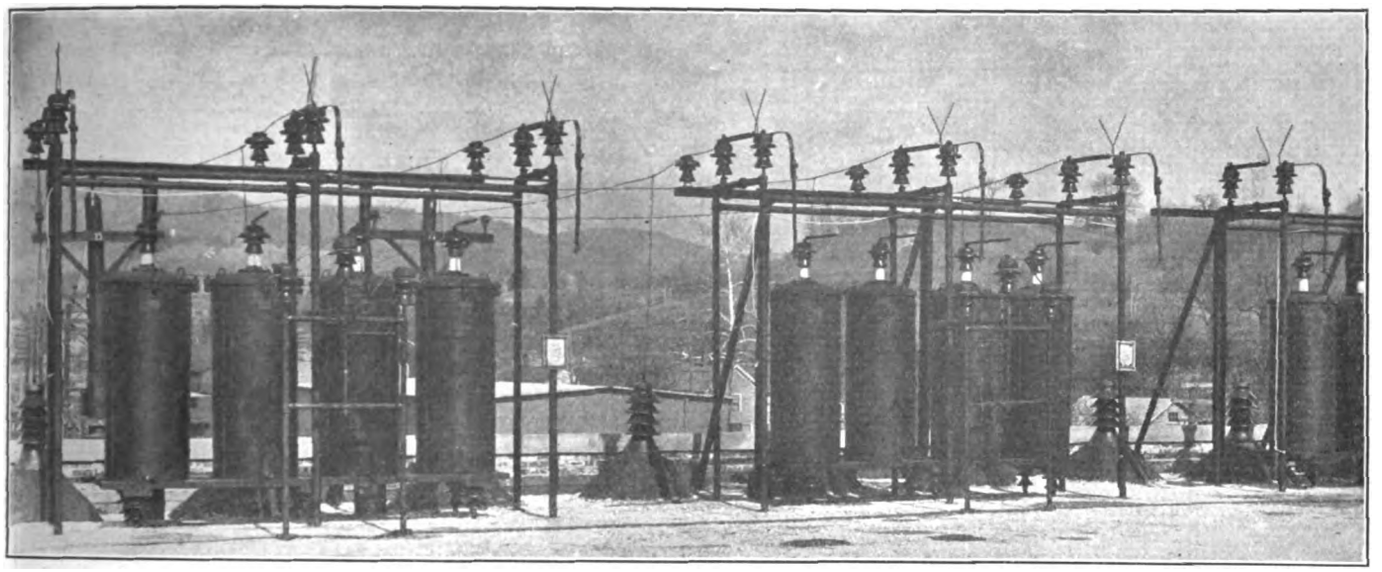
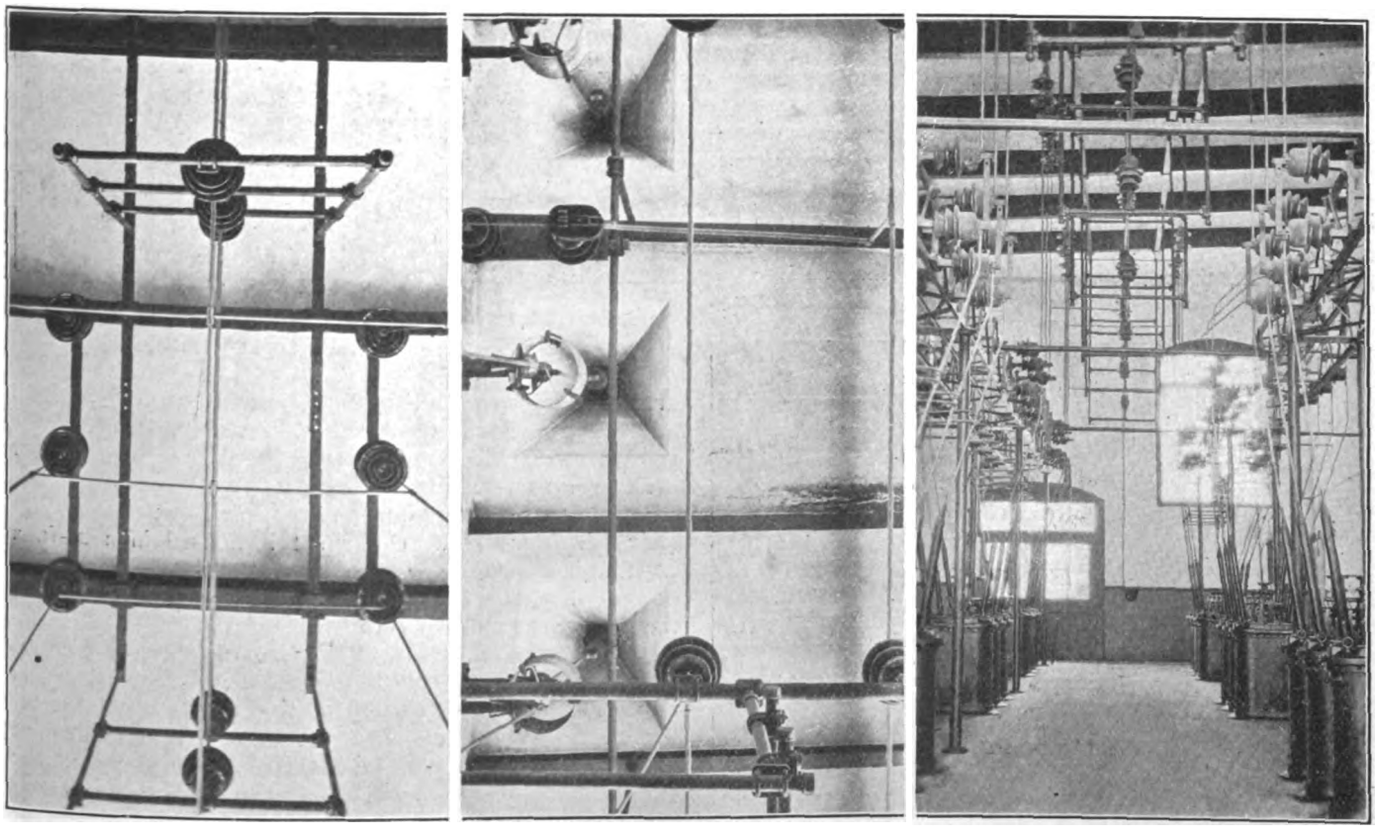
TYPICAL 33,000-VOLT SUBSTATION OF COMPANY'S DESIGN

The company's substation at Lee, Mass., is the most important electrical operating point south of Pittsfield and typifies in every detail its most recent indoor construction for high-voltage work. At this substation two 33,000-volt lines enter from Pittsfield; two 33,000-volt lines leave for the Otis substation on the so-called Springfield route; one 33,000-volt line continues to Sheffield, and one 13,000-volt line is carried to the Housatonic substation. As at Pittsfield, the 33,000-volt lines are all brought to a common bus, and the local transformers and rotary converters are supplied from this. The 13,000-volt line to Housatonic substation is fed through two banks of 110-kw, three-phase transformers supplied from the 370-volt rotary converter bus of the substation.

The chief interest of the substation is its high-tension line construction. The building is about 64 ft. x 81 ft. in plan, one story in height, the distance from the floor to the roof beams being about 25 ft. It is a steel-framed structure with brick walls, concrete, tar and gravel roof and concrete floor and foundations. The design is such as to avoid doubling back of circuits, and the advance of energy through the building is continuous. There are three fireproof sections, one 27.5 ft. wide, devoted to buses and high-tension oil switches; one, 15 ft. wide, to transformer banks, and the third, 16 ft. wide, to the rotaries and switchboard. The roof is occupied by the incoming and outgoing lines and their lightning arrester equipment. The 33,000-volt lines from Pittsfield are dead-ended on insulators supported on steel framing about 10 ft. above the roof, the spark gaps for the lightning arresters being mounted on insulators just beyond the dead-ending frames and supported on



Berkshire Improvements—Lightning Arresters at Lee Substation



Berkshire Improvements—Views from Below of the High-Tension Buses and Entrance Cones, Sheffield Substation; General View of the Bus and Oil-Switch Layout, Lee Substation

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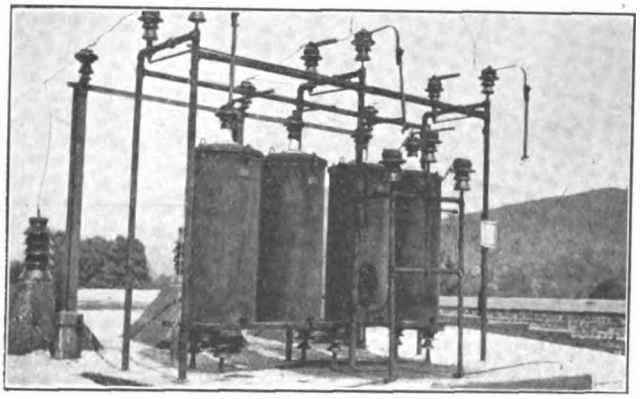
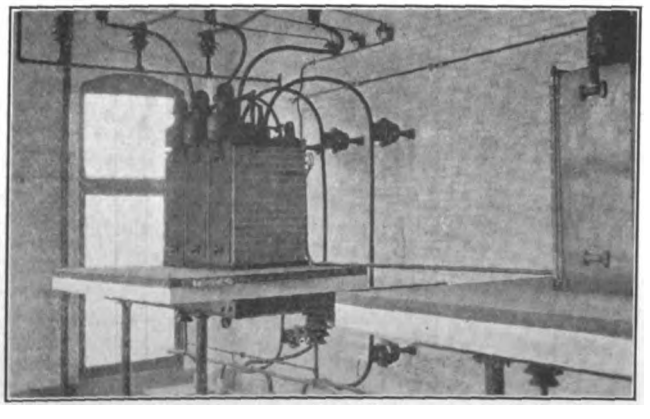
piping set into an insulated platform carrying the arrester cells. Vertical drop leads are taken off the incoming lines and carried through special reinforced concrete roof entrances provided with a five-part Locke No. 304 porcelain insulator to the bus room interior, whence they connect with choke coils, disconnecting switches and oil switches before leading to the buses.



Berkshire Improvements—Lightning Arresters at Sheffield Carhouse

The disconnectors are mounted on pin-type insulators set on horizontal axes and attached to a box girder structure composed of steel channel irons supported on vertical pipe standards. Current transformer connections are made around Ohio Brass No. 9462 insulators inserted in the high-tension leads, which are all of ¼-in. hollow copper tubing. The oil switches, which are of the usual solenoid-operated, remote-controlled type, are mounted in rows upon the floor under the disconnecting switch structures on each side of the high-tension bus supports and about 12 ft. below them. The bus tubing is carried horizontally upon pin-type Thomas insulators supported on pipe framing hung from the roof, and the leads from the switches to the buses are anchored to the ceiling structure by two-part suspension insulators, lateral taps being made at the level of the buses to the latter. All current transformers in the high-tension leads are mounted on platforms 5 ft. above the floor, the platforms being carried in each case by four 3-in. iron pipes.

From the buses the 33,000-volt energy is led through

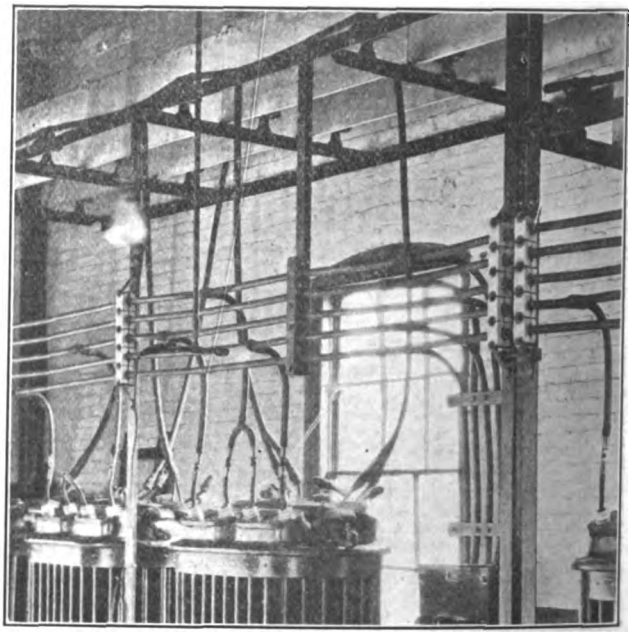


Berkshire Improvements—Oil Switch, Special Mounting at Cheshire Substation

disconnecting and oil switches to the outgoing lines and to the transformer banks for rotary converter service. In the latter case the leads are carried through a 12-in. brick fire wall separating the bus room from the transformer room, Ohio Brass insulating bushings being used. In general, a spacing of 3 ft. is maintained between adjacent high-tension conductors throughout the substation. From the transformer secondaries 370-volt cables are run to the rotary starting panels through floor ducts, and thence to the rotaries. A covered trench 3 ft. wide and 2 ft. deep is located behind the switchboard to facilitate access to the cables. The d.c. side of the installation contains no features of unusual character. The local feeder service is handled by three 500,000-circ. mil cables running respectively north, south and east from the substation and supplying the nearer portions of the main line and Huntington extensions with 650-volt energy. All the oil switches have overload relays.

OTHER SUBSTATIONS

The Sheffield, Cheshire and Pownal substations need no extended description. At Sheffield a building 40 ft. x 38 ft. in dimensions houses two rotaries and two banks of 110-kva transformers, with two sets of oil switches, there being two rooms in the installation with a 12-in. fire wall between. The high-tension leads are brought into the building through multi-petticoated insulators and entrance cones, the latter being shown in a worm's-eye view herewith. No oil switches are provided in the incoming line between the



Berkshire Improvements—Protecting 11,000-Volt Buses by Asbestos Boards, Pownal (Vt.) Substation

arrester equipment and the high-tension bus, but the usual automatic breakers are inserted between the latter and the transformers. Separate starting panels are provided for the rotaries in this installation.

NOVEL OIL-SWITCH INSTALLATION

At Cheshire all the equipment is housed in a 20-ft. x 42-ft. room, the noteworthy feature being the installation of the oil switches on reinforced concrete platforms above the transformer banks because the substation was originally designed for 22,000-volt instead of 33,000-volt operation. The details of the oil-switch supports are shown in the accompanying halftone, the platform in each case being 10 ft. above the floor, carried on I-beams and pipe stands and consisting of a concrete slab and granolithic surface 9 ft. long x 8.5 ft. wide, with reinforcing bars as indicated. Six 125-kw transformers are in service, and the local feeders consist of one northbound and three southbound cables. In the Pownal substation asbestos panels separate the 11,000-volt buses as shown in the accompanying photograph. Two sets of 75-kw transformers are in service, the oil switches being located at the rear of the switchboard in the single operating room of the substation.

NEW OPEN-AIR SUBSTATION OF COMPANY'S DESIGN

A departure from previous standards of design is shown

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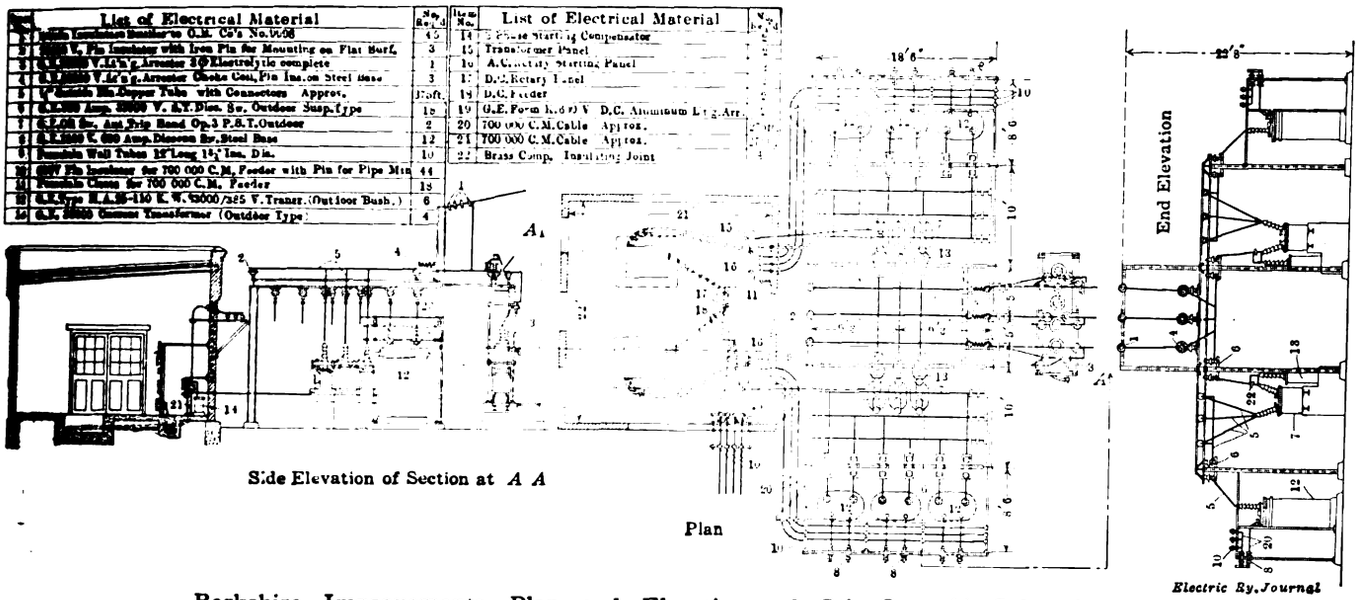
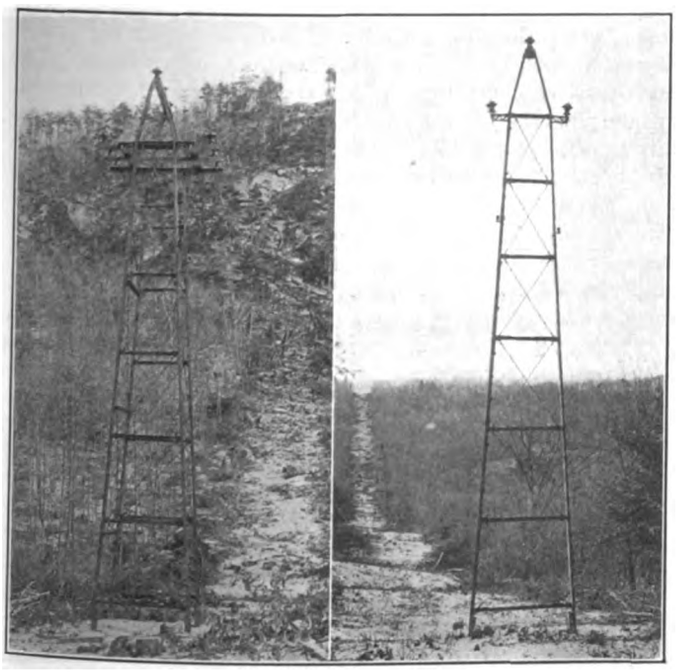
in the Otis or Summit substation now under construction by the company. As shown in the accompanying drawing this installation will house two rotary converters, a d.c. switchboard and two starting panels in a brick building 21 ft. x 22 ft. in plan, all of the high-tension apparatus being located out of doors within an inclosure of I-beam and 370-volt and 650-volt circuits, the latter connecting the rotaries with the operating switchboard's d.c. bus section and thence with the outgoing feeders. Strain insulators will be extensively used in supporting the high-tension conductors within the inclosure; the oil switches will be of the automatic type with manual re-setting from the substation



Berkshire Improvements—Plan and Elevations of Otis Open-Air Substation

pipe-frame construction. After passing through lightning arrester choke coils attached to pin-type insulators on an overhead platform the incoming current is to be delivered to a set of horizontal buses composed of 7/8-in. hollow copper tubing and attached to GE outdoor disk type switch insulators, one set being on each side of the main inclosure. At the above insulators connections will be made to disconnecting switches controlling the supply of energy to corresponding oil switches and auxiliary bus tubing. From the latter connection will be made through additional disconnecting switches to the transformer banks, beyond which will be located the 370-volt cable connections leading into the substation building and ending at the rotary starting panels. The usual floor ducts will care for the starting panels, and transformers, oil switches and lightning arresters will be mounted on heavy concrete foundations raised from 6 in. to 30 in. above the ground. The incoming 33,000-volt leads will be spaced 5 ft. apart outside the inclosure, and from 26 to 33 in. apart in bus sections.



Berkshire Improvements—Part of Longest Span on Berkshire System—Single-Circuit Tower Line in Great Barrington

STEEL TOWER LINES

In connection with the installation of the 33,000-volt lines the company has adopted steel tower construction as its standard, and for double-circuit supports it is using an Archbold-Brady A-frame, upon which the bottom wires are carried 36 ft. from the ground on pin-type insulators, the vertical spacing between conductors being 42 in. They carry two circuits of No. 1, seven-strand copper and are set a standard distance of 400 ft. apart. The towers are in general set 5 ft. 6 in. in the ground, the principal members being 7-in., 9.75-lb. channels, with 5/8-in. diagonal brace rods between the horizontal frame members. Views are given of a number of special towers used where long spans were required. The longest span on the system is one of 1025 ft., in Great Barrington, Mass., where a square tower for each end, 48 ft. high, was built in the field from two standard A-frames. Another square tower near Lenox, Mass., is used at each end of a 620-ft. span. In the former case three and in the latter two insulators in seriatim were used for the mechanical support of each phase. Much of the tower construction is located upon a private right-of-way 50 ft. wide. On single-circuit towers the line wires are carried in 36-in. equilateral triangles. On square towers, which are also used at angles in the line, the conductors are clamped to steel straps which span the tops of the insulators. Locke No. 319 triple-petticoated insulators are used on the lines.

LOG SHEETS AND LOAD CURVES

In both generating plants a daily log sheet is kept to show labor and material costs and quantities required in regular operation, with the totals and unit costs per kilowatt-hour. The peak load in the afternoon ordinarily runs between 3000 kw and 3500 kw, and about half the requirements of the system are supplied by each of the two generating stations. Between midnight and dawn the load is carried by the Zylonite station, one rotary converter being operated at Pittsfield.

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Contracts for Purchased Power

Several Typical Forms of the Agreements Between Electric Railways and Power Companies to Cover the Purchase of Power for Operating Cars Are Outlined and Compared in Detail

Within the last few years there has existed a decided tendency for electric railways to purchase power from local power companies instead of generating it themselves. One reason for this is the fact that the low cost of operation of large central stations coupled with the opportunity for obtaining a diversity of load and reducing the maximum peak permits power to be sold in many cases at a rate lower than the cost of generation in electric railway power plants. In addition, the purchase of power relieves the railway of a considerable portion of the initial investment necessary to establish its business and this, especially at the present time, is an item of no mean importance. Another incidental advantage is the opportunity which is afforded to the railway for having the undivided attention of its staff devoted to the problems of transportation. Since the practice of obtaining power from outside sources has passed the experimental stage, giving a reasonably well-defined set of standard prices to the consumer, the custom has been taken up, within the past five years, by a large number of electric railways.

The companies which have entered into such contracts have by no means been limited to those of any given size nor indeed to those of any particular location, although the availability of cheap water power seems to act as a decided stimulus in producing contracts. An example of this will be found in New York State, where the presence of a number of large hydroelectric power plants has reduced the cost of electricity to unusually low figures. In the Electric Railway Journal for June 7, 1913, a list of the railways purchasing power within that State was published, together with the prices which were paid by them for electricity, and this list shows that the magnitude of the railway system was an immaterial factor, as properties of the smallest as well as of the largest size are included.

Power appears to be almost universally purchased in alternating-current form, owing, no doubt, to the fact that the substations for supplying the direct-current overhead lines of street railways have to be located solely with regard to the requirements of the railway, as well as the fact that 600-volt rotary converters are not available for any use other than that of railway service. There are, however, several cases where power companies have been in position to build and equip certain substations mainly to carry the direct-current load of a railway, and in such special cases no difficulties either in operation or in arrangement of terms for the service to the railway have been apparent.

BASIS FOR MAKING POWER RATES

The item of the cost of power is a much more important matter upon the larger city systems with their long hauls and liberal transfer privileges than it is upon the smaller, shorter roads, and on the systems which have arranged for a large block of purchased power the details of the contract under which it is purchased have necessarily had to be worked out with considerable care. In general, such contracts take the form of an agreement whereby the final price paid by the railway is based upon a combination of charges, one of which is made to cover the interest and depreciation of the power company's plant and is really independet of the amount of power furnished.

This is variously called the demand charge, the service charge or the primary charge. It is established by the maximum amount of energy which is demanded by the railway. In other words, the charge is made because of the fact that the power company is holding itself in readiness to serve the railway with a certain amount of energy and for that reason is presumably reserving a certain amount of steam and electrical equipment to carry the railway load whether the railway is using power or not.

This demand charge appears to be fairly well established at a figure close to $1 per month, or $12 per annum, per kilowatt of demand. This provides theoretically for a return of 12 per cent upon the investment of $100 per kilowatt capaciy of the equipment which has to be installed to take care of the maximum peak load called for by the railway, and in large power stations a cost of $100 per kilowatt of maximum capacity, including transmission lines to the railway substations, is certainly liberal. At a cost of $83.50 per kilowatt of normal capacity, the estimated investment required for the latest and largest station of the Commonwealth Edison Company in Chicago, a return of $12 per annum amounts to 14½ per cent.

In practice, however, the actual rate of return from the demand charge is subject to a number of important factors. The maximum demand seems never to be based upon the instantaneous peaks and but seldom upon the one-minute or five-minute peaks, the hourly basis affording a simpler method and one less liable to material errors. Naturally the establishment of the maximum peak from the average load during an hour places the burden of carrying the sudden swings which always occur in railway loads upon the power company without compensation. Approximately speaking, the necessity for providing for the instantaneous peaks eliminates the possibility of rating the generators upon their maximum momentary capacity, as much of this overload capacity of the machines is thus absorbed.

Another factor influencing the real percentage of return afforded by the demand charge is the necessity for providing spare units as a reserve against break-down. This excess of capacity may, of course, be reduced in the cases of the very large stations, but even in plants of 80,000-kw to 100,000-kw capacity a margin of about 10 per cent seems to be considered to be the minimum. The proper amount of reserve capacity is, of course, actually dependent upon the size of the units in proportion to the total capacity of the plant as well as upon the relation of the overload capacity of the prime movers to the extent by which the maximum swing is in excess of the hourly peak or whatever other arbitrary figure is used as a basis for the demand charge.

KILOWATT-HOUR CHARGES

In addition to the demand charge there is another component which enters into the final price paid for purchased power. This is variously called the energy charge, the unit charge, the kilowatt-hour charge or the consumption charge. It consists of a charge made for each unit of energy, or kilowatt-hour, actually used by the railway, and for large consumptions it is usually made as a flat rate per kilowatt-hour.

There is, of course, an opportunity for wide variations in the establishment of the energy charge. With large plants the over-all efficiency is approximately constant, and the labor charge for operation can vary but little even in widely separated localities where wage scales are radically different. The cost of fuel, however, comprises a large part of the energy charge, in some cases even 70 per cent, and as the price of coal is subject to wide variations in accordance with the locality, the energy charge is really not capable of being estimated, even roughly, for any particular case without a knowledge of all conditions surrounding it. It is, however, an interesting fact that in three of the largest

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power contracts yet made the energy charge amounts to about 0.4 cent per kw-hr. consumed.

The use of the combination of the demand charge and the energy charge automatically takes care of variations in load factor. A railway load with very high peaks in the rush hour will naturalily have a high demand charge, and the final price paid for power will be larger than that paid when the demand charge is relatively small owing to low rush-hour peaks and a relatively high load factor. With a load factor of 30 per cent and a demand of 1 kw, the monthly energy consumption will be 216 kw-hr. and the energy charge at 0.4 cent per kw-hr. will amount to 86.4 cents per month, the number of kilowatt-hours per month being determined by multiplying the total number of hours in a month by the demand in kilowatts and by the load factor, or $720 \times 1 \times 0.30$. If the demand charge is $1 per kilowatt of demand per month, the total cost of power will be made up by adding the two charges together and will amount to $1.864. As the energy consumption amounts to 216 kw-hr., however, the final price will amount to $1.864 divided by 216, or 0.863 cents per kw-hr.

If, under the same conditions, the load factor is raised to 50 per cent by reducing the demand to 0.60 kw and maintaining the energy consumption at the original figure of 216 kw-hr., the demand charge is reduced to 60 cents per month, while the energy charge remains at 86.4 cents per month. The total cost of power per month will then be $1.464, and this divided by the monthly consumption of 216 kw-hr. gives a final price of 0.678 cent per kw-hr. This final price per unit of energy is more than 20 per cent below that obtained in the former case, where the load factor was only 30 per cent. Both prices are based upon charges which should be obtainable under all ordinary circumstances when power is purchased in quantities, such as would be represented by demands of, say, 10,000 kw or over.

POWER CONTRACT FORMS

The basis for power contracts described in the preceding outline is so widely used that in some respects it may be considered as a standard at the present time. Actual contracts, however, modify the figures to some extent and provide for contingencies in a much more elaborated form. To present an example of the general trend of these elaborations, the power contracts of the Chicago City Railway, the Cleveland Railway Company and the Philadelphia Rapid Transit Company have been compared, and in the following paragraphs extracts from all of them are cited to show the methods used in establishing a working agreement.

The contract of the Chicago City Railway was made in 1908, and those of the Cleveland and Philadelphia systems were closed during 1912. The life of contract in all three cases is, however, specified as ten years. This period would seem to be the most satisfactory for several reasons, prominent among which is the fact that it assures a reasonably long period of earning for the generating machinery which must be installed by the power company for the sole purpose of carrying the railway load. On the other hand, a longer period of time might eventually require the railway company to pay an unreasonably high price for power on account of developments which are unforeseen at the present time and would very materially reduce the market value of electrical power. The period of ten years for the life of a power contract may, in fact, be said to be long enough to insure stability and a proper return for the power company, but not so long as to involve the railway improperly.

The character of current supplied by the power company is, of course, so thoroughly standardized under present methods as to require little more than formal mention. At Chicago and Philadelphia current is supplied in three-phase, twenty-five-cycle form. At Cleveland three-phase, sixty-cycle current is furnished, the substations of the railway company being equipped with specially designed 1500-kw rotary converters suitable for this frequency, as described in the ELECTRIC RAILWAY JOURNAL for April 5, 1913.

The voltages for the three systems are respectively 9000, 13,200 and 10,000-11,000. In the Cleveland contract the indefinite specification for voltage is modified by a clause to the effect that the voltage shall have "reasonably close regulation for railway purposes, provided the apparatus of the railway company is of approved design and pattern and in accordance with good practice for such operations." At Philadelphia a 3 per cent variation above or below is permitted from the normal periodicity of twenty-five cycles, and also from the normal voltage of 13,200.

The power factor specified at Chicago and Philadelphia is 100 per cent, approximately, and this, considering the extent of standardization existing in twenty-five cycle rotary converters, is a perfectly normal proposal. At Cleveland, however, the power factor is guaranteed by the railway company at 90 per cent or better, although apparently no specific penalty is imposed if the guaranteed figure should not be maintained. But a penalty and bonus clause is added to the paragraph on this subject which states that if the average monthly power factor varies from 90 per cent in computing the monthly settlement the actual demand as measured in kilowatts shall be arbitrarily increased or decreased in inverse proportion to the variation of the load factor from 90 per cent. This puts a premium of very material value upon the maintenance of a high load factor, for the demand charge amounts to about one-half of the total charge for power, and at Cleveland the maintenance of a 99 per cent power factor will reduce by 9 per cent the figure upon which the demand charge is based. Under ordinary circumstances this will reduce the power bill nearly 5 per cent.

The treatment of the power factor in the Cleveland contract is also unusual because the method of measurement is specified. The tangent of the average monthly angle of lag is determined by multiplying, by the factor 1.732, the ratio of the sum and the difference of the readings of two single-phase watt-hour meters installed on the supply circuit. From the tangent of the angle of lag the cosine of the angle of lag, or power factor, is determined by reference to the standard tables.

The "demand," or the figure from which the demand charge is calculated, is in all three cities established each month from hourly peaks of any three consecutive days of the month which may be selected by the power company. At Cleveland only one hour from each of the three consecutive days is selected, and this must be an even clock hour, as from 5 p. m. to 6 p. m. At Chicago and Philadelphia two hours are selected on each of the three days, one in the morning and one in the evening. The average of these hourly readings is used as the demand for the month. The arrangement works out very much to the advantage of the railway company, for it hardly ever happens that the three heaviest peaks in any month occur on consecutive days. The Philadelphia and Chicago contracts also have the advantage that they include in the average the figures from both the morning and the evening peaks, and, as is well known, the morning peak is by no means as severe as that in the evening. At Chicago the original contract has recently been modified in some respects, and one of the changes provides that the extra power required for heating cars when the outside air is below a temperature of 15 deg. shall be excluded in determining the maximum demand.

At Cleveland maximum and minimum figures are specified as limits for the demand, namely, 15,500 kw and 10,000 kw, and the minimum demand charge made by the

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power company is based on the latter figure, whether the power is required or not. In this contract, however, there is another clause which provides that when the demand for power in any month has increased beyond 14,300 kw the minimum which shall be paid for during any succeeding month when the load may be light shall be 70 per cent of the highest demand previously made by the railway company. In other words, the final basis for the minimum demand allows for periods of light traffic a margin of 30 per cent below the heaviest previous monthly demand.

In the Philadelphia and Chicago contracts, however, the minimum guaranteed demand which must be paid for by the railway, whether the power is supplied or not, is equal to the maximum demand which has been established in any previous month. The Philadelphia contract obligates the railway to pay for 15,000 kw, and if during any month the demand, as determined by the previously described method, shall exceed 15,000 kw, this increased demand, until it is exceeded by a subsequent still greater demand, shall represent for that month and every succeeding month the minimum demand for which the railway is obligated to pay. On Nov. 15, 1913, the railway company has agreed to take an additional 5000 kw, making the arbitrary minimum demand equal to 20,000 kw. The permissible normal increase in demand beyond 20,000 kw is not definitely stated in this contract, so that it would appear that both power company and railway had been satisfied that the estimates of the demands would prove to be very close to the results obtained in actual operation.

At Chicago the provisions for minimum or guaranteed demand are quite similar to those in the Philadelphia contract. The former contract, however, states that the power company shall stand ready to supply an increase of 10 per cent in excess of the arbitrary minimum, which is set at 30,000 kw for the last nine years of the contract. This excess, however, must not be used by the railway for supplying large numbers of new cars nor for the acquisition of new lines.

From the foregoing it is evident that the Cleveland contract has a distant advantage for the railway in the matter of demand charge. The reduced load in the warm months permits a corresponding reduction in demand charges during these months, while in the other two contracts a high peak in any one month establishes a guaranteed demand for all time in the future, which must be paid for whether the energy is needed or not. The point is an important one and constitutes a marked difference between the contract forms.

For large increases in the demand for power such as would be required for a new substation or for new cars or new lines, all three contracts require written notice in advance from the railway companies. At Chicago and Cleveland a notice of five months is specified for increases up to 4000 kw, and ten months' notice is required for any amount greater than this. At Philadelphia a longer time is evidently considered desirable for the installation of new machinery, so that six months' notice is required for a 3000-kw increase and twelve months' notice for more than that. An interval of five months between written notices of increases in demand is required at Philadelphia and Chicago. Ten months is specified at Cleveland.

PURCHASED POWER PRICES

The demand charge for the original Chicago contract is based on a flat rate of $1.25 per kw per month. This, however, has been reduced in a subsequent modification of the contract so that it now provides for a sliding scale as follows:

Demand in Kw	Demand Charge per Kw
Up to 30,000 kw	$1.25
Excess over 30,000 kw up to 60,000 kw	1.00
Excess over 60,000 kw up to 90,000 kw	0.91⅔
Excess over 90,000 kw up to 120,000 kw	0.87½
Excess over 120,000 kw	0.83⅓

At Cleveland also the demand charge is based upon a sliding scale, although the effect of the higher rates for the first blocks of power is absolutely negligible in the large figures which are actually involved. The demand charge for the first 500 kw is $1.475 per month, and for the second 500 kw, $1.45 per month. For all service in excess of 1000 kw the demand charge is $1 per kw per month, and this makes practically a flat rate for the demand charge. At Philadelphia the demand charge is made on a flat rate of $1 per kw per month without any exceptions.

The charges for energy in the original Chicago contract are 0.415 cent per kw-hr. during the first one and one-half years of the contract, and thereafter 0.4 cent kw-hr. The Philadelphia contract also specifies an energy charge at a flat rate of 0.4 cent per kw-hr. In the recent modification of the Chicago contract a sliding scale is used which begins with a rate of 0.4 cent per kw-hr. for the first 5,000,000 kw-hr. consumed. For each successive block of 5,000,000 kw-hr. consumed in addition up to 40,000,000 kw-hr. the price for that block is cut 0.005 cent, so that for any monthly consumption in excess of 40,000,000 kw-hr. the price for the excess is 0.36 cent. Another novel feature in the modified Chicago contract is a provision for an extra charge to be made in case the price of coal of customary heating value exceeds $1.90 per ton, the normal price in Chicago. This additional charge is obtained in dollars by dividing the total number of kilowatt-hours consumed in two years by 1000 and multiplying the result by the average excess in price over $1.90 per ton, the result being based on a consumption of 2 lb. of coal per kw-hr. In case the price should drop below $1.40 per ton, the power company is to pay an equivalent rebate to the railway.

At Cleveland a sliding scale is used which specifies an energy charge of 0.95 cent for the first 50,000 kw-hr. used in any month; 0.90 cent for the next 50,000 kw-hr.; 0.45 cent for the next 400,000 kw-hr., and 0.40 cent for the next 1,800,000 kw-hr. For any monthly consumption in excess of 2,300,000 kw-hr. the price for the excess amount is 0.38 cent per kw-hr.

At Cleveland and Philadelphia a minimum load factor of 35 per cent is definitely specified, and if this is not maintained, the energy charge will be based upon this instead of the actual energy consumption. At Cleveland the load factor is defined by the "quotient obtained by dividing the kilowatt-hours consumed in any month by 720 times the maximum demand for such month," thus permitting a comparatively wide range for the minimum energy charge.

In the Philadelphia contract the 35 per cent load factor is defined as that number of kilowatt-hours which will equal 35 per cent of the total number of kilowatt-hours which would be produced in any month if the energy represented by the maximum demand for that month was exerted during every hour of the month. This calculation involves the consideration of the varying number of days in the month, which, in the Cleveland contract, is approximated by the use of the figure 720, the number of hours in a thirty-day month. Otherwise it establishes the minimum number of kilowatt-hours which must be paid for at a practically constant figure, because the maximum demand, upon which the 35 per cent load factor is based, is likely to be fixed by the record load of some preceding month. At Chicago no provision is made for maintaining a minimum load factor with the exception that after the seventh year of the contract the railway is permitted to utilize sources of power other than those of the original contracting power company, but if it does so, the load factor must be maintained at 35 per cent under penalty of paying for an equivalent number of kilowatt-hours whether they are used by the railway or not.

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TRANSMISSION AND MEASUREMENT

Underground transmission lines are, in all three cases, maintained by the power company, but the substations including the transformers are operated and maintained by the railway. At Cleveland and Chicago the power is measured by instruments at the switchboard of the power company, but the transmission loss is guaranteed by the power company to be not more than 5 per cent. At Philadelphia, and also in the new Chicago contract, power is measured at the railway company's high-tension busbars in the substations, and in consequence the power company very properly stands the transmission loss. The measuring instruments in this case are maintained by the power company.

Duplicate high-tension lines or their equivalent are required at Philadelphia, but at Cleveland the interruption of supply is covered by a clause requiring due diligence on the part of the power company in maintaining service and providing a rebate on the demand charge for any interruption in excess of five minutes. Length of transmission lines to new substations is covered at Cleveland only indirectly by the call for a minimum demand of 2000 kw for each new station built. At Philadelphia the railway is required to pay 10 per cent per annum on the cost of all such lines having a length in excess of the length of the existing lines.

In all cases meters are read at noon on the last day of the month. Their accuracy is required to be within 2 per cent, and they are to be tested each month in the presence of the railway's representative at the expense of the power company. The Cleveland contract, in addition, permits testing on demand but not more often than bi-weekly except at expense of the railway. Special tests may be made at any time upon written request. Corrections which are made in readings on account of errors in meters in excess of 2 per cent are to apply to the previous month only.

MISCELLANEOUS CONSIDERATIONS

At Cleveland and Philadelphia an arbitration board composed of three members is specifically outlined for the purpose of settling questions as to the meaning of the contract. The resale of power is prohibited in every case, and the power companies are not held responsible for non-delivery of power due to causes beyond their control, although the railway companies are to have rebates equivalent to the demand charge during the period of interruption. In the Philadelphia contract a period of ninety days is allowed to the power company before the contract may be canceled to permit it to effect a remedy of any trouble which is covered by a decision of the arbitration board.

NIAGARA POWER CONTRACT FORMS

The contracts outlined in the foregoing paragraphs are designed upon a basis especially suitable for ordinary industrial and railway power supplied from a steam station. Such service involves moderately low load factors, and the steam stations supplying the power are not required to carry an unusually heavy overhead charge due to an enormous first cost. However, the same conditions do not apply to hydroelectric projects where the actual cost of producing electricity is almost nothing, but where the overhead charges on the station site and machinery are exceedingly high.

Owing to the totally different set of conditions which faced their operation the large hydroelectric stations at Niagara Falls developed, after their installation, a method of making prices for purchased power which was radically different from the customary plan of using a combination charge to cover separately the interest on investment and the actual cost of operation. The new method, which is to a large extent peculiar to the Niagara Falls projects, is designed to encourage the building up of twenty-four-hour loads. Industries with even the moderately high load-factor of 33 per cent would naturally keep the expensive machinery in the hydroelectric stations idle for two-thirds of the time, and in consequence would have the equivalent effect of tripling the investment in an initially costly plant. The matter could naturally have been settled by charging prices high enough to cover the overhead charges on investment, but this would not have distinguished sharply between the twenty-four-hour loads which were desired by the power company and the ten-hour loads which were not, so that there was developed the plan of giving a very low rate as a readiness-to-serve charge, which had to be paid whether or not any power was consumed.

This standard rate, generally called the "firm power" rate, is a yearly charge, although it may be divided up and paid in monthly instalments. It is generally based on the horse-power-year, the mechanical unit being used instead of the kilowatt presumably for ease in comparison with engine-driven plants where the substitution of electric power was under consideration. There are a number of contracts outstanding in which the annual rate for firm power is only $16 per hp, equivalent to 0.245 cent per kw-hr., if used on load factor of 100 per cent, or equal to a monthly service charge of $1.79 per kw. This extremely low charge has led to the development of a large industrial load of which a good portion is composed of electrochemical projects which maintain a continuous draft of current, and the result has been that the load factor of the Niagara stations is over 80 per cent.

When this power is supplied to street railways an extra charge at a higher rate is made to cover the peaks in the load. The extra charge is made in two ways, one as an additional price charged for every kilowatt-hour consumed and the other as an excess price charged only for the peaks which extend above the firm power line. In the former case the firm power is based on the average of the highest daily one-minute peaks, and the additional charge approximates 0.5 cent, so that the final price is somewhere between 0.5 cent and 0.75 cent, depending upon the load factor. Where the additional charge is made to cover the peaks beyond the firm power line the excess kilowatt-hours cost about 1 cent, so that the final price lies between this figure and 0.245 cent. In order to take full advantage of the latter price, it is customary in the district served by the Niagara companies to keep steam stations and even small hydroelectric plants of their own floating on the line to help out during the peaks of the rush hours.

SPECIFICATIONS OF BROOKLYN RAPID TRANSIT LOCOMOTIVES

The Brooklyn Rapid Transit System, noted in the ELECTRIC RAILWAY JOURNAL of Nov. 8, 1913, as having purchased two 55-ton electric locomotives from the General Electric Company, has specified that these locomotives will be similar to those which the company is now operating for switching and light freight service, but that they will vary somewhat in construction. They will be equipped with four GE-212 200-hp, 600-volt, box-frame commutating-pole motors and will be operated by Sprague-General Electric type M control. A feature of these locomotives is the fact that the control provides for three speed connections. There are seven steps in series, six steps in series-parallel and five steps in parallel, which permits operating over a wide range in speed. They are equipped with both overhead trolley collectors and third-rail shoes. The control allows for the usual multiple-unit operation if desired. The service for the locomotives consists of hauling trains which have been made up at the Bush Terminal docks in Brooklyn to deliver freight to the outlying manufacturing districts.

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Service Order for Milwaukee Lines

Decision of Railroad Commission of Wisconsin Directs Increase in Service to Meet New Prescribed Standards of Loading—Margin Over Allowed Rate of Return Deemed Sufficient by the Commission to Warrant Changes

An order was issued by the Railroad Commission of Wisconsin on Nov. 25 prescribing an increase in service on the Milwaukee city lines of The Milwaukee Electric Railway & Light Company. The order is the result of an extended study of traffic conditions by the engineering staff of the commission. In connection with the standards of service which it directs, the decision considers the financial position of the company as a result of the decreased rates of fare placed in effect by order of the commission. It concludes, however, that there is a sufficient margin over a return of 7½ per cent on the valuation fixed by the commission to justify an enlargement of service. An abstract which gives the principal points of the decision, except those relating to the re-casting of the statement of income account and the valuation and similar aspects of the case, follows:

"In the course of the hearings, traffic data covering each of the company's lines and resulting from an extended series of observations made by members of the commission's engineering staff during the summer of 1912 and the winter, spring and summer of 1913 were introduced by C. M. Larson, chief engineer of the commission, who explained in detail the methods of investigation used. Several trips were made over each line, and a record was kept of the number of passengers in the cars at various points. The points of greatest load were selected for making traffic counts. Men were stationed at the designated street corners and instructed to record for each passing car the car number, the run number, the time of arrival or departure, the line and destination and the number of passengers riding. The number of passengers was ascertained by actual count or by estimate. The observers were informed as to the seating capacity of each type of car in operation, and with this information they were able to estimate very accurately the number of passengers on a car, whether at light, medium or heavy load. In order to ascertain the accuracy of those taking the count, tests were made by having two men observe the same car, one counting the number of passengers exactly and the other estimating the number on the basis of his knowledge of the seating capacity, adding the number of persons standing or deducting the number of vacant seats. It was found that the observers were very accurate in their estimates.

"In addition to the data gathered by the commission's staff, the company and the city both offered the results of traffic counts on the various city lines. The company's observations, which were usually for a one-day period only, were made by employees, and the results were submitted in evidence in the form of charts comparable with those introduced by the commission. The counts taken by the city were made under the assumption that each car had a seating capacity of forty-eight. In making use of these data they have been corrected to allow for the proper seating capacity.

"There are about 374 rebuilt and old-type cars (numbered from 1 to 500), and these have a seating capacity of forty-two in the summer and forty in the winter, owing to the space occupied by the stove. There are 100 cars numbered from 501 to 600, which are known as the '500' type and have seats for fifty passengers at all seasons. The cars numbered 601 and over are known as the '600' type, and there are about sixty of them. They seat fifty passengers in summer and forty-eight in winter.

"The observations show clearly that on a number of the company's lines excessive crowding has occurred day after day during the rush hours. Many cars with seats for only forty passengers were observed carrying eighty, ninety, 100 or 110 persons.

STANDARDS OF SERVICE FOR NON-RUSH HOURS

"A public service corporation which undertakes to supply street railway service should furnish sufficient equipment to supply seats for all passengers who desire such service, unless there exist operating or financial conditions which make it impossible or impracticable to do so. The testimony and the numerous exhibits offered in this proceeding disclose no conditions which warrant a deviation from this principle, except during three relatively short periods of the day, which may be designated as the morning, noon and evening rush hours. For the remainder of the day adequate service should contemplate the operation of a sufficient number of cars so that all passengers desiring to occupy seats may reasonably expect to do so, except under abnormal conditions.

"The traffic data before the commission show that on some of its city lines the company has voluntarily provided for a considerable part of the non-rush period more service than is necessary to comply with this standard and still maintain a reasonably frequent movement of cars. On other lines passengers have been obliged to stand day after day during the non-rush hours, when the traffic demand could have been readily foreseen and provided for. It appears from the testimony that the company has used as a basis for its non-rush hour schedules a load factor of 100 per cent for hourly periods. At the hearings and in its brief the position was taken that this standard is consistent with reasonably adequate service. It was argued that the flow of traffic is naturally uniform, and that variations in the flow causing crowded conditions on cars are due almost entirely to distortions of headway which are the result of bridge and railroad crossing delays not subject to the company's control.

"Study of data, however, makes it evident that the variation in the loading of cars cannot be attributed entirely to distortions of headway, although this factor undoubtely has some influence in the matter. The company has, in our opinion, emphasized too strongly the importance of railroad crossing and bridge delays as affecting it.

"Delays at railroad crossings continue throughout the year and undoubtedly cause considerable distortion of headway at times, but within the next year or two it is expected that the grade crossings which cause the greatest complaint will be eliminated. The company has argued at length that delays from these sources and the consequent distortion of headway are not within its control, and that it should not be penalized by the requirement that sufficient service be provided to give all persons a seat under such conditions. It is apparent, however, that these conditions are within the company's control at least to a considerable extent. Separation and re-routing of lines would help overcome such difficulties. But even though some causes of distortion should exist which cannot be changed by the company, it should not regard itself as penalized if some additional service is required to alleviate such conditions. The traffic data show clearly that there is a wide variation in the loadng of cars during the non-rush hours, and whatever the cause of this condition may be, while it exists it must receive consideration in determining the amount of service necessary.

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"With this variation of loading in mind, it is obvious that if on the average in a given period only 100 seats are provided for every 100 passengers riding, a large number of persons will be obliged to stand day after day. The traffic data submitted by the company, as well as those gathered by the city and the commission, show that this has been the case in the past under schedules drawn on the basis of a load factor of 100 per cent. This standard is, in our opinion, too low for adequate service. A greater number of seats per passenger on the average must be supplied in order that all passengers may be properly accommodated.

"As a result of the calculations made by the engineering staff of the commission, which cover thousands of observations on all of the Milwaukee lines, and from which abnormal conditions have been eliminated, it appears that during the non-rush hours an average of 133 seats for every 100 passengers demanding service should be provided in order to fulfil the requirements of adequate service.

"On several of the city lines the amount of travel at some periods of the day is so light that if only sufficient cars were operated to supply 133 seats for every 100 passengers riding, the time interval between cars would be too great to accommodate the public properly. For this reason it is necessary to specify what shall be the minimum headway at such periods.

STANDARDS OF SERVICE FOR THE RUSH HOURS

"The testimony shows that at the peak of the evening rush period the company now operates about 242 per cent as many cars as are used normally in the non-rush hours. This great increase in the number of cars is necessary to supply fifty seats for every 100 passengers on the average during the period of maximum strain. If the standard which we have fixed for the non-rush hours in order to provide a seat for each passenger—namely, 133 seats for every 100 passengers on the average—should be applied to the evening peak period, it is obvious that the number of cars operated would have to be about two and two-thirds times as great as at present. It would be impossible to operate this number of cars through the center of the city on the existing tracks without very seriously congesting the street traffic, and it is doubtful whether, even with additional track facilities, it would be practicable from an operating standpoint so to increase the service.

"But aside from all financial considerations it is improbable that the residents of Milwaukee would ever be satisfied with such an arrangement during the rush hours. Speed is an important consideration when people are going to and from their work, and comparatively few persons would be content to see cars go by in which there is comfortable standing room available and to be obliged to wait until a car arrived with some vacant seats in it. Observations in Milwaukee show that many passengers insist on boarding the first car which comes along even though it is crowded. This habit, however, may be accentuated by the fact that in the past passengers have had no reason to believe that the next car would be less crowded than the one they were trying to board; and the operation of more cars may mitigate this tendency. With these operating, financial and social considerations in mind, it is, in our opinion, impracticable, if not absolutely impossible, to supply every passenger with a seat during the period of maximum loading, and any order requiring such service would not be reasonable under the existing conditions. However, we believe that a much larger proportion of the passengers riding in the rush hours can be supplied with seats than was the case at the time the traffic data were taken.

"The company's assistant general manager testified that he regards as proper, fair and equitable, and not as a crowded condition for the peak period, a load in which one-half of the passengers are obliged to stand. He asserted that on some of the Milwaukee cars an even greater load than this can be carried without serious discomfort to passengers. The company introduced the report of the Chicago Board of Supervising Engineers, in which an average load for half-hour periods in the rush hours of seventy passengers for cars having a seating capacity of forty, or a load factor of 175 per cent, was recommended as a basis for rush-hour schedule making in Chicago. It also placed in evidence and quoted with approval the report of Ford, Bacon & Davis to the Pennsylvania Railroad Commission in 1911, in which 4 sq. ft. of aisle and platform space per standing passenger was recommended as furnishing comfortable standing room.

"The commission's engineers later conducted a series of observations in order to ascertain how many passengers can comfortably stand in the various types of cars and still allow for the free movement of persons boarding or alighting from cars under ordinary operating conditions. These observations were made on cars in regular operation during the morning and evening peak periods, and the passengers observed included various classes of people such as mechanics, clerks, business men and shoppers. The observers passed through the cars during the various stages of loading and noted the number of persons in each part of the car when, in their opinion, the inclusion of any more would seriously retard the free circulation of passengers. This estimate of a reasonable standing load is based upon an even distribution of standing passengers throughout the various parts of the car. If this even distribution is not maintained, fewer passengers can be allowed to stand without causing material delay, due to the retardation of the movement of passengers boarding and alighting from cars.

"The commission's estimate of seating capacity does not agree with the company's estimate. It is conceded that it is possible to seat passengers according to the company's estimate by crowding the short longitudinal seats. The commission's estimate of forty-two, fifty and fifty is an average between the two extremes. Under winter conditions there are two seats less in the rebuilt and '600' type cars, making the average forty, fifty and forty-eight respectively.

"In considering the comfort of passengers and efficiency in the movement of cars in Milwaukee, the conditions on cars of different types in other cities and recommendations with regard to them have had very little weight. The testimony does not show that the cars used in Philadelphia or Chicago are comparable with the cars used in Milwaukee in this regard, and without a careful comparison of dimensions and the arrangements of platforms and seats any conclusions drawn from such sources would be unsafe. We regard the total capacity of the various types of Milwaukee cars, as ascertained by our engineers from actual observations on cars in operation, as the maximum loads which cannot normally be exceeded without subjecting passengers to unreasonable discomfort and delay. The maximum comfortable loads for winter and summer are as follows: rebuilt and open platform, winter 70, summer 72; '500' type, winter 93, summer 93; '600' type, winter 93, summer 95.

"Having thus determined the maximum loads, it becomes necessary to ascertain what average loading should be adopted in drawing schedules in order that under normal conditions few cars, if any, shall exceed the maximum. The company throughout this proceeding has taken the position that the flow of traffic in the rush period is naturally uniform and that most of the variation in loading is due to bridge and railroad crossing delays and the consequent distortion of headway, which are not subject to the company's control. It is expected that delays at railroad crossings will soon be largely eliminated by the process of grade separation. It also appears that too much importance has been given by the company to bridge openings as affecting distortion of headway in the rush hours.

"It should also be noted that many of the trippers oper-

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ated in the rush hours start from the business district and are not affected by either bridges or railroad crossings. Furthermore, as pointed out with reference to the non-rush hours, the effect of such delays can be mitigated to a considerable extent by changing the routing of a number of lines.

"The company argues, on the presumption that the flow of traffic is naturally uniform, that it is reasonable to use the maximum comfortable loading as an average for arranging schedules. In other words, it maintains that if a load of 100 passengers on a car with seats for fifty is fixed upon as the maximum load consistent with the comfort and free movement of passengers, it is reasonable to schedule only enough cars to supply on the average fifty seats for every 100 passengers riding in a given period. In support of this position reference was made to the report of Ford, Bacon & Davis to the Pennsylvania Railroad Commission, which was introduced in evidence. An examination of the full report, however, shows that Ford, Bacon & Davis recognize a distinct variation in the flow of traffic in the rush hours. The use of the maximum comfortable load based on 4 sq. ft. of aisle and platform space per standing passenger as an average load for schedule-making purposes was recommended only as a temporary expedient pending the construction of additional equipment.

"The commission's engineering staff had made a comprehensive study of all of the traffic data submitted in this case in order to ascertain how much variation in the flow of traffic exists in Milwaukee during the rush hours under normal conditions. From this study it is very clear that the flow of passengers during the peak period is far from regular. Its irregularity, in fact, appears to be so great that under normal conditions it will be difficult to prevent some cars being loaded beyond their comfortable carrying capacity without placing an absolute restriction upon the load which any car may carry, or without much more complete supervision than is now afforded by the company. It is our judgment that the minimum standard for the rush hours consistent with adequate service is a standard under which for the half-hour of maximum travel in each rush period an average of sixty-seven seats shall be provided for each 100 passengers demanding service.

TRANSITION BETWEEN RUSH HOURS AND NON-RUSH HOURS

"The company's assistant general manager in discussing standards for service for the rush hours in his testimony expressed the opinion that the maximum load factor should apply only to the fifteen-minute period representing the peak of the traffic curve. From this point, he said, the ratio of seats to passengers should gradually increase so as to conform to the non-rush standard at the beginning and end of the rush hours. This principle, we believe, is substantially correct. It is certainly true that no more passengers should be required to stand than is necessary, and the standard applicable to the period of maximum strain should not be applied when the strain is less great immediately before and after the peak. However, it is practicable to maintain the non-rush standard of 133 seats for every 100 passengers over a part of the rush hours without materially increasing the cost of service. This can be accomplished by adding sufficient cars, as the traffic increases, to maintain the non-rush standard until the full quota of cars necessary for the rush-hour standard in the peak half-hour is in operation. These cars can then be run until the traffic falls off to such an extent that the non-rush standard is being complied with, after which they can gradually be taken off until at the end of the rush hours only the normal non-rush equipment will be in operation. This arrangement will increase the period during which trippers are used and will make necessary the operation of a somewhat greater total number of cars during the entire rush period than would be necessary to give the required service for the maximum half-hour. It will therefore increase the platform duty of tripper crews, but, as pointed out by the company, these crews are now employed for such a short period that in order to secure sufficient men a somewhat higher wage than would be needed for a longer spread of duty is required. However, this method of transition between the two standards will make appreciably shorter the period during which some passengers must stand.

SUPERVISION

"Traffic officers with authority over trainmen should be stationed at the important transfer intersections and at such other points as will materially assist in the movement of traffic and the maintenance of schedules during the rush hours. These officers should, in so far as practicable, limit the loads on individual cars to the comfortable carrying capacity of the various cars. From forty to forty-five such traffic officers as a minimum will be necessary properly to supervise the Milwaukee system.

"The fare collectors now stationed at a number of important loading points to allow passengers to enter at the front door of cars have added much to the efficiency of the service by facilitating the movement of cars. The number of fare collectors should be increased so that at all important loading points passengers may enter the cars at the front door as well as at the rear door in rush hours.

SCHEDULES

"In its brief and in its oral argument the city of Milwaukee has taken the position that to be effective the order of the commission should specify definite schedules for each city line in addition to fixing standards of service for rush and non-rush periods, for the purpose of accurately checking the service. The company, on the other hand, has laid great stress upon the necessity of a flexible schedule and has taken the position that schedule making is a managerial detail which should be left for the company to control. The company's position in this regard we believe to be correct.

OTHER FEATURES OF SERVICE

"Much testimony was introduced with regard to car construction as affecting the comfort and convenience of passengers. Criticism was directed against the bar and chain which are placed on the small platforms of the rebuilt cars, presumably for the purpose of separating incoming from outgoing passengers. Since these bars and chains cause much inconvenience to passengers and serious delay in loading and are in no sense beneficial to passengers, they should be removed. All cars in service will be required to carry both dashboard route signs and roof destination signs. In view of the complaints relative to the width of seats, the height of steps and other features of car construction, we regard it as necessary that in the future all plans for new passenger cars and for the remodeling of old passenger cars shall be submitted to the commission for approval with regard to such matters as are, in its opinion, important as affecting adequate service. Proposed changes in signs on the cars now in service should be submitted to the commission for approval.

DOUBLE TRANSFERS

"The question of double transfers in Milwaukee has been considered by the commission in previous decisions. On the basis of the investigation made by the staff in this case, it is our opinion that in order to facilitate travel and relieve congestion in the downtown district it is now necessary that this matter should receive general consideration. The company should make a study of the matter and extend the double transfer system where it is necessary to secure the desired results, and if this is not accomplished in a satisfactory manner, it will be necessary for the commission to make further investigations and formally consider this question.

NEW EQUIPMENT

"Our engineering staff has estimated the number of cars which are necessary to comply with the standards of service ordered herein, under the traffic conditions shown by

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this proceeding, and it appears that with the addition of the thirty new cars this fall a sufficient number will be available to care for the traffic conditions disclosed by this investigation. The flow of street car travel has probably been augmented since these traffic counts were taken and it will unquestionably continue to increase with the growth of population and the extension of the city boundaries. To comply with the standards the company will be obliged to add more equipment as the traffic conditions demand it."

REVISED INCOME ACCOUNTS

The commission presented analyses to show the reasons why it readjusted the earnings, operating expenses and valuation of the company. Such income accounts for the years 1912 and 1913 are given in the accompanying table:

READJUSTED ACCOUNT

	1912	1913*
Revenues	$4,131,811	$4,181,016
Total expenses	2,827,012	2,983,213
Maintenance of way and structures	130,454	142,412
Maintenance of equipment	262,103	261,756
Power	390,334	364,689
Conducting transportation	1,064,844	1,094,746
Expense burden	106,191	184,973
Injuries and damages	185,931	198,474
Other reserves	35,000	35,000
Taxes	207,601	227,774
Depreciation	444,554	473,389
Surplus available for return on investment	1,304,799	1,197,803
Fair value	11,600,000	12,000,000
Return on investment at 7½ per cent	870,000	900,000
Excess above return	434,799	297,803

*Year ended June 30, 1913.

The order of the commission continues:

"The surpluses have been gradually decreasing from year to year. This is shown by the fact that they amounted to $691,819 in 1911, $559,534 in 1910, $619,897 in 1909 and $477,903 in 1908. The operating expenses have increased more rapidly than the earnings, partly because of gradually increasing prices in material and labor, although these increases have been less since 1907 than they were for an equal period preceding that year, and partly because of expenditures for deferred maintenance. The charges for interest and profit during the past few years have also been above normal, owing to the fact that the company had reached the point where increases in the business required greater than the ordinary expenditures for new property or extensions. During the three years preceding Jan. 1, 1910, for instance, the city company expended $1,208,630 in new additions for railway purposes, while during the three years following this date it expended $3,173,969.

"The present value of the property as given or used herein is also about $600,000 greater than it would have been had it been determined on the straight-line rather than on the sinking fund basis. For growing utilities, where rate adjustments cannot in the very nature of things be of very frequent occurrence, and for which, owing to the law of increasing returns, the net earnings both actually and relatively are gradually increasing, fairness often demands that the returns allowed for the first year or at the time the rates are adjusted should be below rather than above the normal figures. As the commission in its order allowed something above 7.5 per cent for returns on what may be regarded as a high value of the property used, it is a question whether on facts now before it the commission was not more liberal toward the company than it should have been.

"From the facts at hand it also appears that the reductions in the earnings by the order will be offset by the natural increase in the gross earnings of the company within a little more than one year after the said reduction in the rates in question went into effect. It is difficult to see in what respects the commission went further on the reductions provided in the rates in the fare case than was its plain duty under the circumstances.

"The surpluses above operating expenses and returns on the investment should be reduced by about $35,000 for increases in wages; by about $50,000 for interest and depreciation on the paving which the company must put in under the late decisions of the courts; by about $21,000 in 1913 and about $63,000 in 1912 for reductions in earnings due to the order in the fare case, which reductions as thus given are based upon the company's experience during the past year and are somewhat lower than the estimates made by the commission at the time the fare case was decided, and by certain rentals for 1912 arising out of the extension of single-fare limits in the fare case.

"These reductions from the surplus when taken together amount to about $106,000 for 1913 and $161,000 for 1912. When these amounts have thus been deducted from the surplus of $297,803 for 1913 and $434,798 for 1912, the balances which remain for improvements in the service and other purposes amount to $191,803 for 1913 and $273,798 for 1912. These surpluses, even if somewhat overstated, because of the fact that the experience of the company during the past year may not fully show the effect of the reductions in the rate by the order in the fare case, are considerably greater than the additional cost of needed improvements in the service. It does not appear to us that the allegations of the company to the effect that the order of the commission in the fare case is unreasonable and unjust are sustained by the facts.

COST OF ADDITIONAL SERVICE

"In a brief submitted by the company the contention was made that the cost of each additional car for peak-hour service would be $2,804. This figure requires revision as it is based upon the assumption that each car added will cause a pro rata increase in all operating expenses and investment costs. For instance, it is contended that an increase of $1,000 for housing facilities and $3,200 for power plant capacity will be incurred for each additional car; that the allowance for general expenses per car added would be $226, and that all expense of superintendence and supervision would be proportionately increased.

"Now, it is certain that in a street railway plant as large as the one in question there is a considerable margin between the rendition of a minimum and maximum amount of service with a given plant capacity and a given operating expense budget, and that with a disproportionate increase in the investment costs and operating expense the service can be increased to a certain extent for a few hours during each peak-hour day.

"A memorandum submitted by the engineering staff based upon a field investigation held that new additions to carhouses would not be required owing to the installation of about a 10 per cent addition to rolling stock. As to power plant capacity the memorandum stated as follows: It appears to us that an allowance of approximately $15,000 should be made for the installation of a 1000-kw rotary and its accessory apparatus in the Oneida Street station. With this addition it is believed that the situation will be handled in a satisfactory manner as far as concerns any increase of cars which the commission may order on the basis of our service investigation.

"An outlay of $15,000 exclusive of rolling stock appears to be the requirement. The brief of the company placed the cost per car at $6,500, and this figure will be accepted for the computation in this study.

"In regard to operating expenses, it is considered that the depreciation on buildings, fixtures, poles, feeders, underground and overhead transmission, paving and telephone system which primarily is due to weather will not be affected by an increase in traffic, while the depreciation due to wear on track, trolley, cars, generators and prime movers will be affected. Allowing for depreciation in total on the new equipment in cars and the rotary, the depreciation on all other equipment was accordingly placed at 35 per cent variable and 65 per cent non-variable. These percentages were established by a detailed examination of

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each group of property contained in the appraisal of Jan. 1, 1910, and subsequent appraisals.

"Regarding other expenses the same policy was pursued. A detailed study was made of the company's classification of accounts and a segregation was made on the basis of the three years 1910, 1911 and 1912. These studies resulted in placing the percentages for the three years as follows: 1910, variable 75.58 per cent, non-variable 24.42 per cent; 1911, variable 79.82 per cent, non-variable 20.18 per cent; 1912, variable 79.41 per cent, non-variable 20.59 per cent.

"The above percentages exclude power and a separate study of this item placed the variable proportion at 90 per cent and the remainder, 10 per cent, non-variable with peak-hour service. In arriving at the divisions such expenses as superintendence of way, equipment, transportation and traffic, together with maintenance of paving, removal of snow and ice, maintenance of buildings, fixtures and grounds, tickets, transfers, maintenance of overhead and underground transmission systems, miscellaneous and general expenses were obviously considered non-variable within the limits of this study.

"In computing the cost per car per annum for peak-hour service in the first instance, 3.77 hours was taken as the average duration of peak service, and this with 250 peak service days and a speed of 8 m.p.h. resulted in 7540 car miles per annum per car. After making allowance for the fact that about 10 per cent of the cars would be shopped continually for overhauling, and after revising the total expenses upon a normal basis with proper apportionments between the city and traction companies, the variable costs per car mile for operating expenses amounted to an average of 13 cents. The total variable expenses per car per annum upon the above basis total $980. The investment costs, after allowing 5 per cent for depreciation, 1.8 per cent for taxes and 7½ per cent for returns, average $935 per car per annum. The total cost when allowing for 7.54 car miles per peak day is a little over $1,900 per car per annum. Assuming an addition of thirty cars for peak service, the total annual outlay would be about $57,000, and upon the addition of fifty cars the total cost would approximate $95,000. Assuming an average of 275 peak days, the annual cost for thirty additional cars would slightly exceed $60,000 and for fifty cars would equal about $100,000. Upon the basis that the additions for service will require about 1600 car miles additional per day, the total cost would equal about $99,000 with 250 peak days and $104,000 with 275 peak days.

"It will be seen that the car service requirements which are ordered herein will consume but a portion of the excess available for additional service and leave a considerable margin for other purposes."

HOME-MADE COMMUTATOR SLOTTING MACHINE

The slotting machine employed by the Duluth Street Railway Company, Duluth, Minn., has given most effective service for a number of years. It was designed and built by the mechanical department at a cost of approximately $75, exclusive of the cost of the second-hand motor which drives it. The machine consists of a wooden horse provided with adjustable bearings to support the armature and sliding mandrel for the saw attached to it by a bar-iron frame. The saw is driven by a 550-volt d. c. motor at about 1500 r.p.m. Each end of the armature shaft rests on a pair of 2-in. rollers, which may be raised and lowered. The saw shaft bearing casting is mounted on two slide bars with adjustable stops which give any length of stroke up to a 10-in. maximum, and it is moved back and forth by a long hand lever. A 6-in. fan has been applied to the shaft just inside the slotting saw to blow the mica and copper dust away from the commutator when the machine is in operation. A GE-213 motor can be slotted in twelve minutes.

ENGLISH RAILROAD OFFICIALS INVESTIGATING ELECTRIFICATION IN THE UNITED STATES

As noted elsewhere in this issue, A. H. Stanley, general manager London Underground Railway, is escorting through the United States a party of officials of the Midland Railway, one of the great trunk lines of England, for the purpose of studying American electrification. Some interesting particulars on the plans of this company and its operating conditions were obtained by a representative of this paper this week in an interview with Sir Guy Granet, general manager of the Midland company. Sir Guy said that the electrification question had become an acute one with his company, partly on account of the recent acquisition of the London, Tilbury & Southend Railway, a system with some 70 miles of route. At the present time the facilities of the company for handling its very heavy suburban traffic in and out of London are very limited, and some of it is being conducted over the Whitechapel & Bow extension of the Metropolitan & District division of the London Underground Railway.

The problems which his company has before it, he said, are three in number. First comes the electrification of the Tilbury line, which must be electrified on account of its very congested condition. Second, but more remote, is the electrification of the main line of the Midland Railway from London to Bedford, a distance of 50 miles. In this instance the electrification would be undertaken chiefly to build up still further a rapidly growing suburban traffic. A third proposition, and one which appeared extremely attractive although probably still more remote, is the substitution of electric for steam traction on certain sections with heavy mineral traffic to make possible the handling of bigger trains over heavy grades. As he expressed it, the Midland Railway passes over the backbone of England, and in the mining districts it has grades much more severe than are common on other British railways.

He had already seen the New York Central and New Haven installations at New York and was very much impressed with them. The use of electric switching locomotives was of special interest to him in connection with his freight service. While he had come to no conclusions on the subject of system, it was reasonable to suppose that the choice in each case would depend upon the kind of traffic to be served. At London, for instance, it might be desirable to choose a system of propulsion and rolling stock which could be used in connection with the local underground railways. An important question was that of clearances because the standard size of cars could not be used in the London tubes. However, the question of having the local underground railways serve shorter suburban sections was under consideration. The sentiment among steam railroad men in England at this time was not for the general electrification of railways but for its application to relieve congestion and for suburban lines where electrification would permit more trains and consequent increase of commuter traffic. He added that much steam railroad electrification was under way or in contemplation at London.

It is the purpose of Sir Guy and his party to visit all the important electrifications as far as Chicago and to return to England about the end of the year. The system of which he is general manager operates more than 1400 miles of track, exclusive of 600 miles or more of lines over which the Midland Railway has running powers. Among other questions which Sir Guy will consider on this trip will be those of using steel cars in place of wooden cars, the elimination of grade crossings and the relations between the railroads and public utility commissions.

It is expected that the first section of the electric underground railway between the Plaza de Mayo and Plaza Once, Buenos Aires, Argentina, will be opened for public service toward the end of November of this year.

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Maintenance of Way in Syracuse

On the Syracuse Lines of the New York State Railways Special Attention Has Been Paid to Systematization of the Work of Track Maintenance—An Outline of the New Procedure Is Published Together with Schedules of Operations of the Department

In and about Syracuse the New York State Railways operates more than 90 miles of track of varied type and condition. The greater portion is of modern construction employing 90-lb., 9-in. girder or tram rail on stone or gravel ballast. The total number of rail sections used, however, is nearly thirty. Nearly one-half of the track is in brick-paved streets, the rest being divided among earth or gravel, asphalt and medina stone paving in the order named. More than one-tenth of the track is on the side of streets or in parking. Most of the joints are of the channel type.

On Jan. 1 of this year a new plan of inspection and report was put into operation so that the work of maintenance and improvement can go on in a more systematic manner. The schedule of items in this system was as follows:

NEW YORK STATE RAILWAYS—SYRACUSE LINES

Maintenance of Way Department—Schedule of Reports and Inspections.

Jan. 1.....Submit statistical track report to general manager
Budget to general manager city and interurban lines.

Sept. 15 to 30.....Inspection of joints by general foreman, city lines.

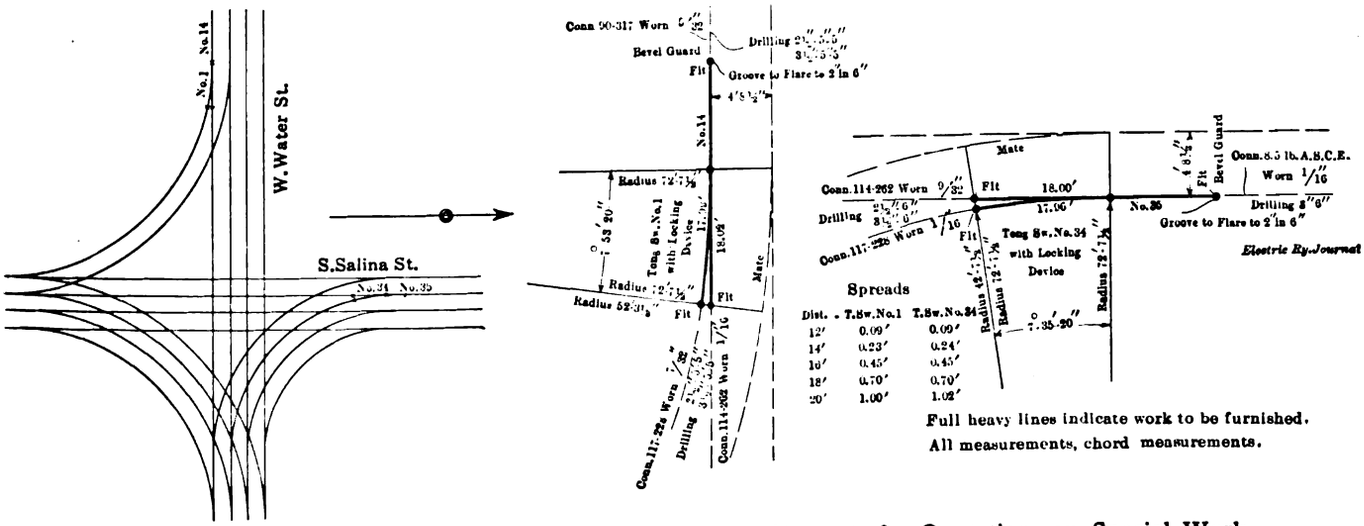
October.....General improvement inspection by general manager, if necessary.
Inspection of rail, joints, ties, ballast, cattle guards, fences, miscellaneous, interurban lines, by roadmaster.
Inspection of bridges, platforms, miscellaneous, city and interurban lines, by engineer maintenance of way.
Report of inspection of joints, city lines, to engineer maintenance of way, by general foreman.

Nov. 1.....Report of inspection of rails, joints, ties, ballast, cattle guards, fences, miscellaneous, interurban lines, to engineer maintenance of way, by roadmaster.
Inspection of track and pavement, city lines, by engineer maintenance of way.

Nov. 1 to 15.....Inspection of rail, joints, ties, ballast, cattle guards, fences, miscellaneous, interurban lines, by engineer maintenance of way.
Inspection of special work, all lines, engineer maintenance of way.

Nov. 15.....Report of inspection of special work to general manager.

Nov. 15 to 30.....Inspection of bridges, platforms, miscellaneous, city and interurban lines, by general manager, if necessary.
General check inspection, four times during year.



Syracuse Track—Typical Drawing Made Up to Accompany Requests for Quotations on Special Work

Jan. 15.....Submit general annual report of work done to general manager.
Revise maps on walls in general manager's office and engineer maintenance of way's office.

April 1 to 15.....Inspection of joints, track, pavement, city lines, by general foreman.
Inspection of bridges, platforms, miscellaneous, interurban lines, by roadmaster.
Inspection of rail, joints, ties, ballast, miscellaneous, interurban lines, by roadmaster.

April 15.....Report of special work, city lines, with estimates to general manager.
Report of inspection of track and pavement, city lines, to engineer maintenance of way, by general foreman.
Report of inspection of rail, joints, ties, ballast, miscellaneous, interurban lines, to engineer maintenance of way, by roadmaster.
Report of inspection of bridges, platforms, miscellaneous, interurban lines, by engineer maintenance of way.

April 15 to May 1...Inspection of track and pavement, city lines, by engineer maintenance of way.
Inspection of bridges, platforms, miscellaneous, interurban lines, by engineer maintenance of way.
Inspection of joints, ties, ballast, rail, miscellaneous, interurban lines, by engineer maintenance of way.

May 1.....Report of inspection of joints, city lines, by engineer maintenance of way.
Report of rail, joints, ties, ballast, miscellaneous, interurban lines, with estimates to general manager.
Report of bridges and platforms, city and interurban lines, with estimates to general manager.

August.....Inspection of bridges, platforms, miscellaneous, city and interurban lines, by assistant engineer and roadmaster.

September.....Report of inspection of bridges, platforms, miscellaneous, city and interurban lines, to engineer maintenance of way, by assistant engineer and roadmaster.
General improvement inspection by engineer maintenance of way.

In addition to the regular schedule, the engineer of maintenance of way has tabulated the steps to be taken in connection with different features of the work in order that no essential item may be overlooked. This table is also given herewith.

NEW YORK STATE RAILWAYS, SYRACUSE LINES

Proceedings to be followed in connection with relaying tracks in city where T-rail is used:
First.—Submit plan of desired form of construction to city engineer.
Second.—Have resolutions passed by common council giving permission to use T-rail.

Proceedings to be followed in connection with unpaved city streets which are to be paved:
First.—If it is desired to use T-rail, proceed as above.
Second.—Notify the city engineer whether or not we intend to do our own work within four months after receiving plans and specifications of the work from the city.

Extensions of tracks in city streets:
First.—Prepare necessary plans and submit resolutions to the common council for a franchise.
Second.—Get consents from property owners.
Third.—Get necessary permission from the Public Service Commission.

Extension of tracks in towns:
First.—Get franchise from the town.
Second.—Get consents from property owners, if necessary.
Third.—Get necessary permission from the Public Service Commission.
Fourth.—If track is to be built on a state highway, get permission from the state highway commission.

Extensions of tracks in villages:
First.—Get franchise from the village.
Second.—Get consents from property owners.
Third.—Get necessary permission from the Public Service Commission.
Fourth.—If track is to be built on a state highway, get permission from the state highway commissions.

In Syracuse the every-day routine inspection is performed by two switch repairmen, who regularly inspect all

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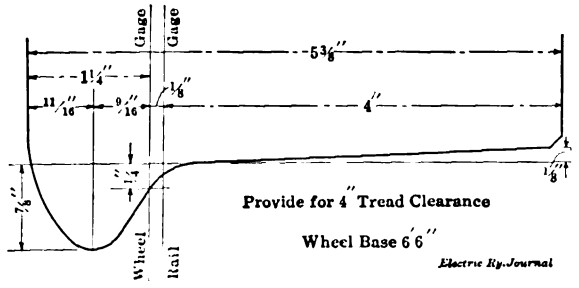
switches, and a track walker who examines joints, paving, etc., for defects and the track for correctness of gage. The switch repairmen are provided with a wagon and they cover a section of the track daily, reporting every day upon their work. The regular track walking is a new feature recently added to the work of the department. The track walker is followed by a force of two repair men who have with them a two-wheel cart containing tools and the small supplies ordinarily needed, such as tie rods, bolts, etc. In case the repair is too large for them they report the condition to the foreman. The men are expected, however, to reduce the work of the large repair force.

An emergency trackman is also kept at one of the carhouses at night to take care of trouble reported by telephone. If a repair is too large for him to handle, he calls out the necessary help. This man is very useful in winter in watching for snowstorms, as, while the ordering out of plows and sweepers is the work of the transportation department, the way department must be prepared to remove snow from the streets. The night man reports daily as to conditions met during the preceding night.

In order that the engineer of maintenance of way may keep in touch with the day's work, the foremen and roadmaster report at his office in person between 5:30 p. m. and 6 p. m. daily. They state where they are to be the next day and what work will be under way. Each foreman also turns in a daily report on a regular form showing the actual work accomplished, the number of men employed and the time put in so that the costs of the work can be calculated.

In the case of large repairs or of new work an inspection form is turned in when the work is complete. In addition to spaces for the description and location of the work, the job order, the date and general remarks, spaces for brief comment are provided for grading, ties, rails, rail fastenings, surface, concreting, drainage, paving, clearance manholes, joint bonds, cross bonds, special work cables, pole rake, ground around poles, joints in span wire, clamps, strain insulators, ears, splice sleeves, anchor plates, trolley alignment, trolley height, guys, feeder insulators, feeder ties and tree insulation.

The matter of derailments has been given special attention by the way department in recent years. In Syracuse a number of different sizes of flange must be provided for, as several interurban lines use the track. In the case of derailments, no matter how trivial, reports are made by the car crews to the claim department, which in turn reports to the way department. The cause of the trouble is investigated and reported back to the claim department. If no definite cause appears from the above investigation the general superintendent is notified and a special study of the

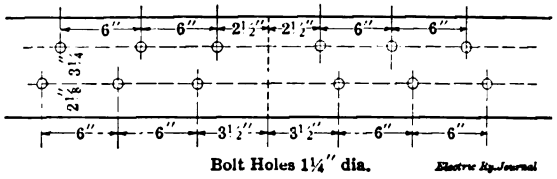


Syracuse Track—Standard Tire Contour Shown as Part of Specifications for Special Work

case is made, often an experimental one. In most cases the trouble is found after a short study.

In repairing small track defects, 4-ft. sections of new rail are inserted and the joints are ground to a smooth surface. This is done in the case of broken rail heads and with joints too badly battered to warrant grinding. In making scattered repairs to brick or broken stone paving, good results have been secured by the use of paving pitch instead of cement for resetting. The pitch hardens immediately and the expense of stationing watchmen at the repaired work to prevent wagons from breaking up the paving is thus eliminated.

All materials for the way and other departments are received about 2 miles from the center of the city at the



Syracuse Track—Standard Drilling for Joints Shown as Part of Specifications for Special Work

Eastwood yard. The yard has an ideal location to permit interconnection of the adjacent steam and electric railways. There is ample storage track for freight cars and convenient spaces for the piling of supplies. At one end is the concrete pole yard in which the supply of poles for Syracuse and Utica is produced. The yard is provided with a derrick having a 60-ft. boom operated by a 20-hp electric hoist. This is used for unloading rails and special work. A cement house having a capacity for 1000 barrels is conveniently located.

Special work is purchased under standard specifications with which are included sketches showing the general arrangement and location for the replacement and a diagram showing the exact dimensions for the material to be furnished. A typical sketch sent out with special work specifications is shown in the accompanying illustration. The general specifications which are sent out to all contractors for special work are given in full in the accompanying table:

NEW YORK STATE RAILWAYS—SYRACUSE LINES

General Specifications for Special Work

Frogs and switches: Bid on both hard center and solid manganese construction.
Angle blocks: To be of such length as will measure not less than 6 in. across end. All filiers to be bolted or cast in place.
Bolts: All bolts to have hexagon nuts.
Drilling: Bolt holes as shown in accompanying drawing.
Rails: To be 9-in. groove girder unless otherwise specified.
Quoting: In quoting prices give section of rail to be used in work.
Tie rods: Furnish tie rods spaced 6 ft. apart, ⅜-in. x 2-in. section.
Manufacturer must furnish three prints of each order and must give all data given on company's prints. Show sketch of drilling in new work.
Manufacturer will not allow for joints where rail lengths are given.
All compromise joints to be numbered on work and drawing.
Place our drawing number on your drawing.
Plane out guard on outside rail.
Plane out head on inside rail.
Numbers of pieces to be painted on web of rails.
Drill four 1-in. holes in bed of tongue switches.
Track is to gage 4 ft. 8½ in. unless shown otherwise.
Standard wheel tread as shown in accompanying drawing.
Groove openings to be as follows:

Radii:	Inside	Outside
35 ft. to 39 ft. inclusive	1¼ in.	1⅜ in.
40 ft. to 50 ft. inclusive	1 11/16 in.	1½ in.
51 ft. to 71 ft. inclusive	1⅝ in.	1 11/16 in.
72 ft. to 95 ft. inclusive	1 9/16 in.	1 11/16 in.
96 ft. straight	1½ in.	1½ in.
Straight:		
50 ft., switch and mate	1 11/16 in.	1¾ in.
75 ft., switch and mate	1 9/16 in.	1 11/16 in.
100 ft., switch and mate	1½ in.	1⅝ in.

The Town Council of Bristol (Eng.) has recided to apply to Parliament for powers to raise money to purchase and work the tramways if deemed advisable. The tramway system is owned and operated by the Bristol Tramways & Carriage Company. The Corporation has an option to purchase the tramway in 1915 as it existed before the 1904 extension of the city boundaries. The city portion of the Hanham Light Railway, however, cannot be purchased until 1928, while the portion of this light railway outside the city and the other tramways owned by the company (except 1 mile) can be purchased in 1946 at their fair market value as a going concern.

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EQUIPMENT DEFECT RECORDS OF THE SAN ANTONIO TRACTION COMPANY

Car equipment service records are as essential on a small railway property as on a large one, but there is a question as to the extent to which it will pay a small company to conduct such investigations. The San Antonio (Tex) Traction Company, however, has enjoyed very profitable results from the adoption of the simple record forms hereinafter described. The data for these records are obtained largely from the heads of the different shop departments and incidentally they serve as reports of work done. The information originates at three sources, namely, from the trainmen, the inspectors and the downtown trouble man. A trainman's car report of the usual form is placed in each car at the beginning of the day. At the close of a run the defects of the car are checked off by the crew, which thereupon delivers the report to the carhouse foreman for transmission to the master mechanic's office. The inspector who receives the trainmen's reports notes the actual defects, if any, in the allotted spaces on the back (Fig. 1) of the trainmen's card, and the car is taken out of service. The necessary repairs are made the following day, and a report which covers them in detail is prepared and signed by the day shop foreman. Space for his report also is provided on the back of the trainman's car report form. As these cards are filed each day they are used to form a complete record of work done by months. In addition to this form, check reports of pull-ins are made out and sent to the master mechanic's office by both the dispatcher and the carhouse foreman. A report containing a description of the small repairs made by the downtown trouble man is also received daily.

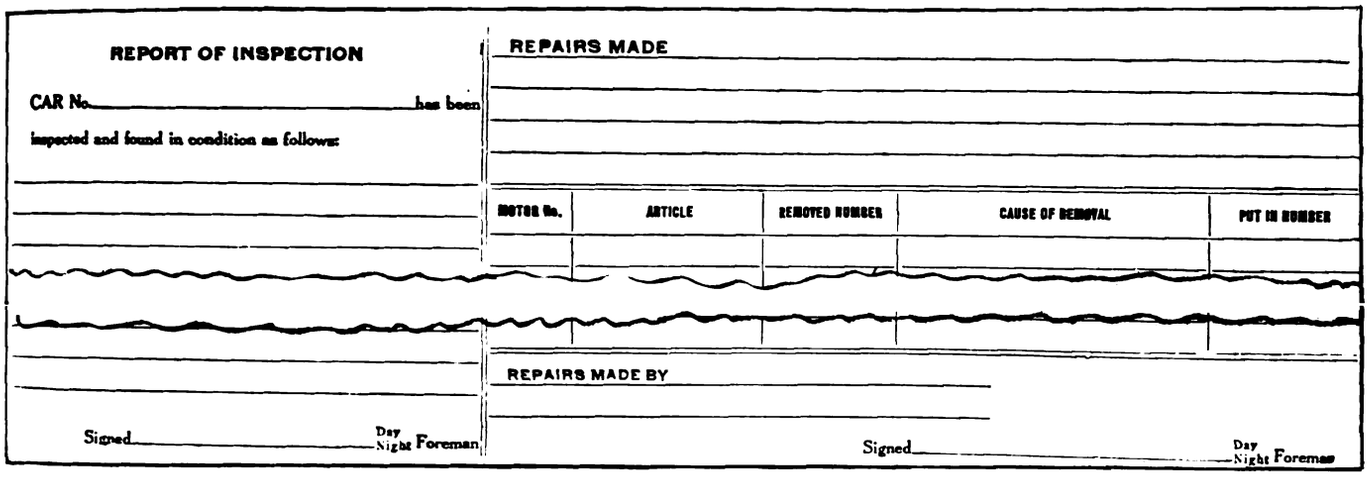

Fig. 1—Foreman's Report of Work Done on Shopped Cars

To identify every armature removed for repairs, a tag containing two detachable coupons is tied to it upon removal, and a record of the number, type, number of car from which it was removed, motor number, date taken out and cause of removal is filled in. After the armature has been returned to service a description of the repairs made is furnished. The two coupons are then detached, one remaining in the office of the armature repair department for record and the other going to the master mechanic's office. From the latter coupons the office card record (Fig. 2) of armature repairs is compiled at the end of each month. The back (Fig. 3) of the armature card is used for the pinion record. As the pinions are removed when the armature is in for repairs the two records may logically be kept on the same card. When the pinion mileage is desired, it is

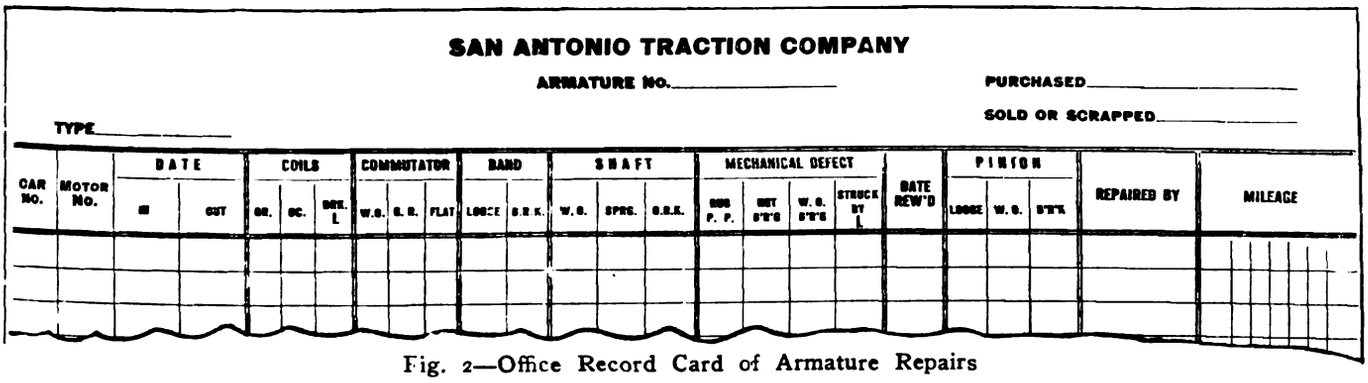

Fig. 2—Office Record Card of Armature Repairs

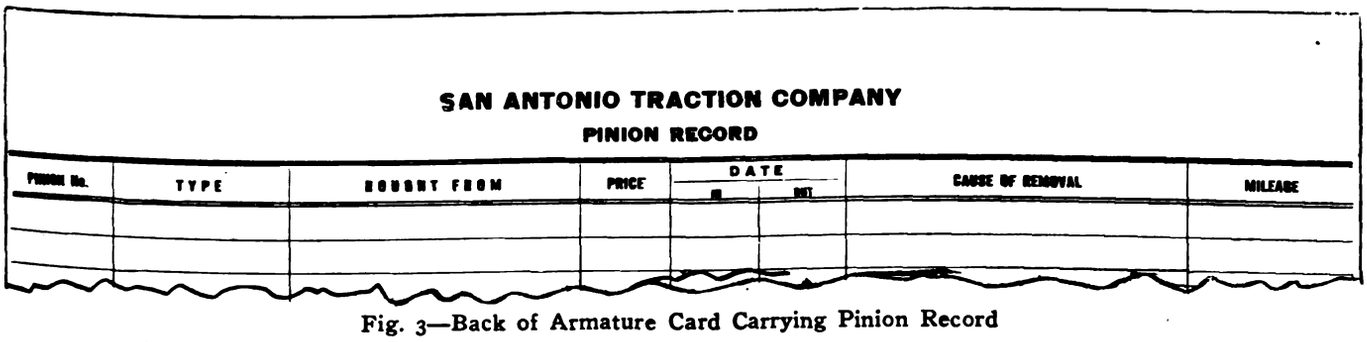

Fig. 3—Back of Armature Card Carrying Pinion Record

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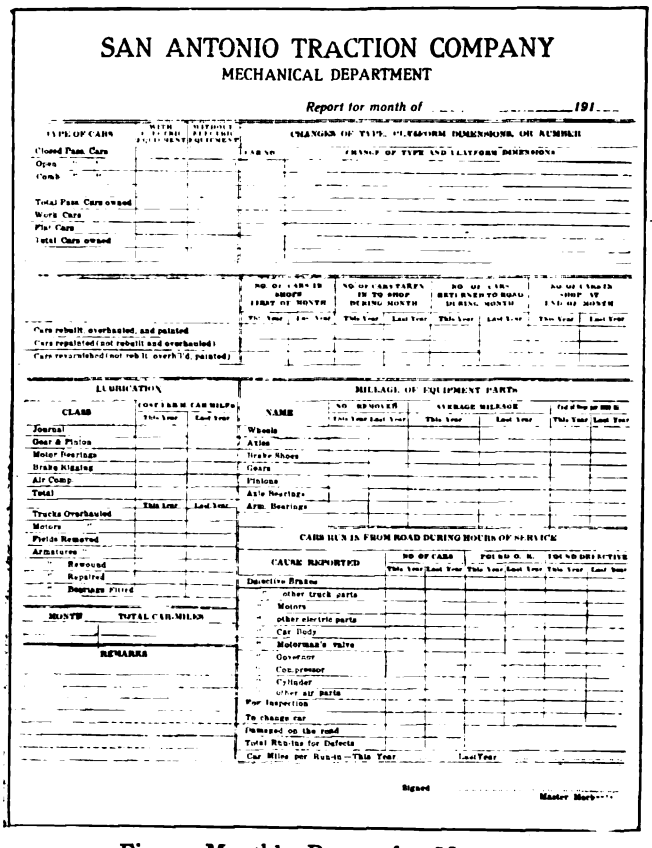
necessary only to compute the armature mileage up to the date the pinion was removed. Similar service records of wheels, axles, gears and air compressors or armatures are obtained from the trainmen and carhouse foreman's reports.



SAN ANTONIO TRACTION COMPANY

MECHANICAL DEPARTMENT

Report for month of _____ 191__

TYPE OF CARS | WITH ELECTRIC EQUIPMENT | WITHOUT ELECTRIC EQUIPMENT

Closed Pass. Cars
Open "
Comb "
Total Pass. Cars owned
Work Cars
Flat Cars
Total Cars owned

CHANGES OF TYPE, PLATFORM DIMENSIONS OR NUMBER

CAR NO. | CHANGE OF TYPE AND PLATFORM DIMENSIONS

	NO. OF CARS IN SHOPS FIRST OF MONTH		NO. OF CARS PASSED IN TO SHOP DURING MONTH		NO. OF CARS RETURNED TO ROAD DURING MONTH		NO. OF CARS IN SHOP AT END OF MONTH	
	This Year	Last Year	This Year	Last Year	This Year	Last Year	This Year	Last Year
Cars rebuilt, overhauled, and painted								
Cars repainted (not rebuilt and overhauled)								
Cars overhauled (not rebuilt, overhauled, painted)								

LUBRICATION

CLASS	COST PER M CAR MILES	
	This Year	Last Year
Journal		
Gear & Pinion		
Motor Bearings		
Brake Rigging		
Air Comp.		
Total		

	This Year	Last Year
Trucks Overhauled		
Motors "		
Fields Removed		
Armatures "		
Rewound		
Repaired		
Degrease Filled		

MONTH _____ TOTAL CAR MILES

REMARKS

MILEAGE OF EQUIPMENT PARTS

NAME	NO. REMOVED		AVERAGE MILEAGE		Total No. on Hand at End of Month	
	This Year	Last Year	This Year	Last Year	This Year	Last Year
Wheels						
Axles						
Brake Shoes						
Gears						
Pinions						
Axle Bearings						
Arm. Bearings						

CARS RUN IN FROM ROAD DURING HOURS OF SERVICE

CAUSE REPORTED	NO. OF CARS		FOUND O. K.		FOUND DEFECTIVE	
	This Year	Last Year	This Year	Last Year	This Year	Last Year
Defective Brakes						
" other truck parts						
" Motors						
" other electric parts						
" Car Body						
" Motorman's valve						
" Governor						
" Compressor						
" Cylinder						
" other air parts						
For Inspection						
To change car						
Damaged on the road						
Total Reasons for Defects						
Car Miles per Run-in — This Year		Last Year				

Signed _____

Master Mech.

Fig. 4—Monthly Report for Manager

A daily report of car miles run is supplied by the dispatchers. This form contains the number of all cars in operation classified as to service. The report contains the total mileage for each car, that for all cars and that for all cars up to the day of the month the report is made. The total service mileage for any part of the equipment may be computed from this report.

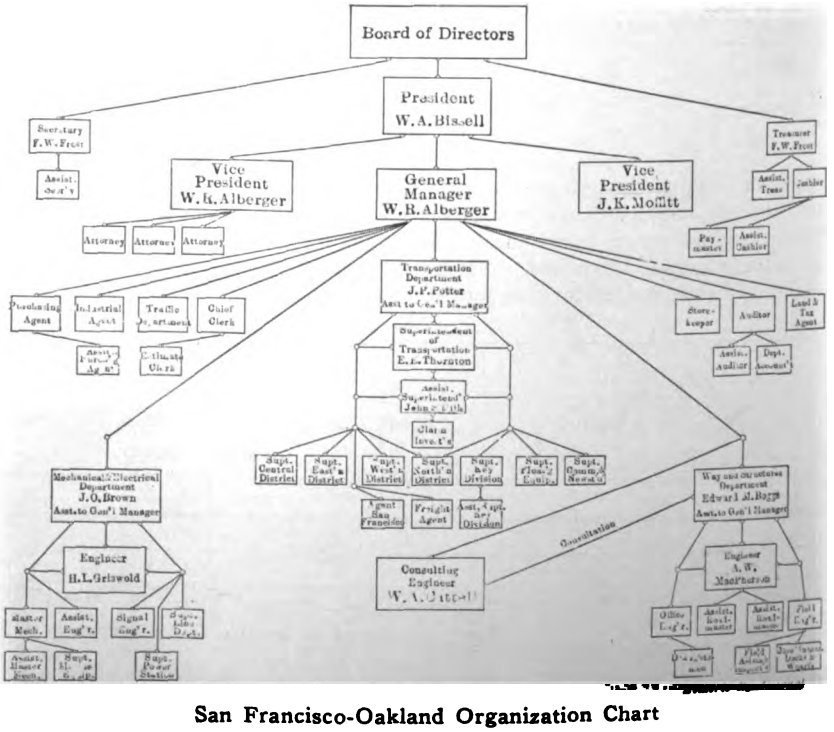
It will be seen from the foregoing that data on all important parts of the rolling stock are secured with little clerical work either on the part of department heads or the man who compiles the data. A complete record of each car is tabulated also when a new car is received for service to serve in part as a check on the accuracy of repair reports in which the types of equipment are named. The back of this card is used for recording the car-painting data as well as information regarding damage in service.

A basis of comparison for efficiency is obtained from the monthly service record. This form records day by day the number of each class of defects which led to run-ins and also shows the number of cars returned to service in each instance. On the back of the same card a similar record is made to cover motor troubles. A daily total of the mileage run by all cars, as taken from the dispatcher's daily car-mile sheet, is written on a loose-leaf sheet, and this with the defect record forms the basis of the monthly statement showing defects per car mile. At the end of each month a classified report of defects (Fig. 4) and of work done in the shops is compelled for the office of the general manager. This is an abstract of the card record of all defects and gives comparative figures for the same month of the preceding year.

The use of these records has given the hint for a remarkable improvement in all parts of the equipment. For instance, the bearing mileage of the fifty-six double-truck 4400-lb. and forty-nine single-truck 25,000-lb. cars has been increased in two years from 4994 miles to 26,094 miles and the pinion mileage from 18,778 miles to 38,634 miles, while at the same time the cost of lubrication has been reduced from 34 cents per 1000 motor-car miles to 23.9 cents per 1000 motor-car miles. The bearing mileage improvement represents results gained for GE 54, 52 and 800 motors. The very low mileage discovered by means of the earlier records, compared with those of other companies for similar equipment, showed the master mechanic that something must be wrong with his upkeep methods. Hence he studied each defect carefully and bettered his shop methods accordingly. The bearing mileage, for instance, has been increased by keeping up dowel pins, by machining motor caps so as to hold bearings rigidly and by keeping dust caps in place. The improvement in the mileage of general electric grade F pinions is explained by better lubrication. The life of chilled-iron wheels also has been increased from 18,000 miles to 40,000 miles by changing from a ¼-in. gage allowance to pressing exactly to gage. From these few examples it will be seen how important service records proved to this company in giving such a significant basis for comparison with other properties.

ORGANIZATION CHART AT OAKLAND

Through the courtesy of W. R. Alberger, general manager San Francisco-Oakland Terminal Railways, the accompanying organization chart of that company is presented. This chart has recently been compiled, and copies have been made for use in the offices of the company. It will be found of interest in connection with other charts of operating organizations which have been published in this paper.



San Francisco-Oakland Organization Chart

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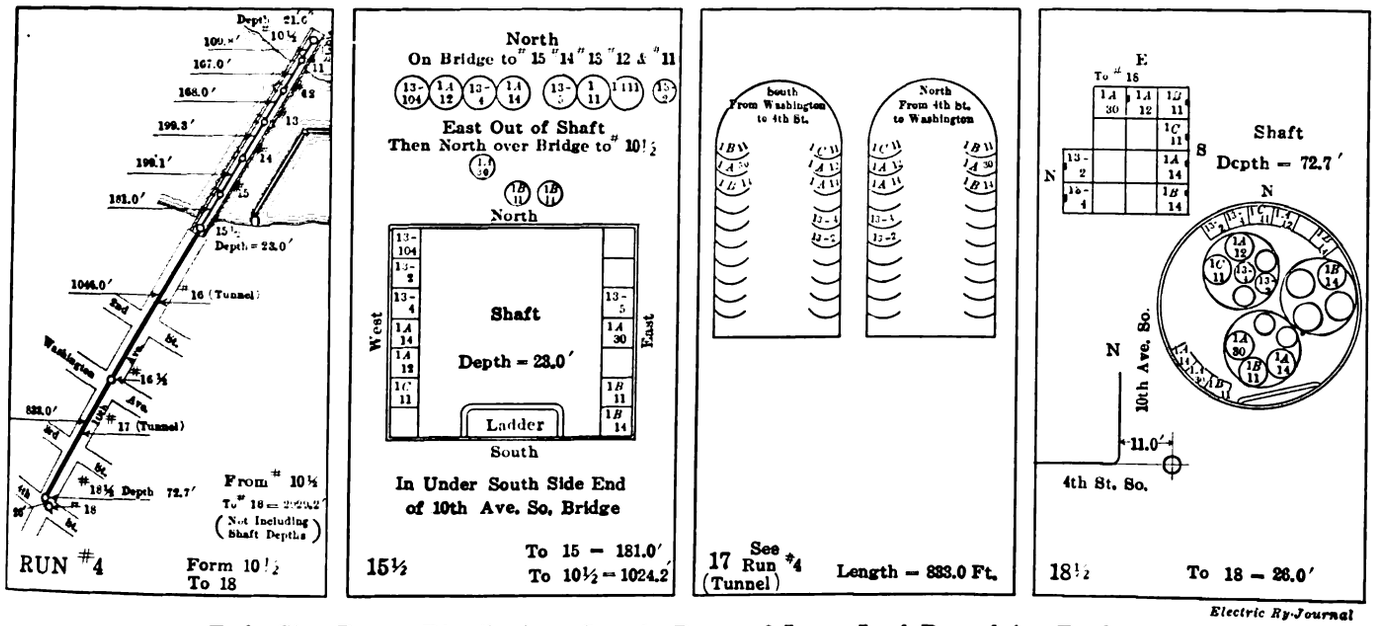
POWER DISTRIBUTION ON THE TWIN CITY SYSTEM

The steam power plant which supplements the output of two water-power plants from which the system of the Twin City Rapid Transit Company is supplied with power has been undergoing material changes. The plant originally contained four 5000-hp vertical reciprocating engines, which have been replaced by one 14,000-kw turbine and three 15,000-kw turbines, and the space originally planned for a fifth engine has been occupied by two 5000-kw turbines for the past eight years. The distributing system has also been improved by the addition of two new substations, Girard and University, while new equipment has been installed in the Snelling substation to replace that removed to furnish the newer and smaller substations. As the system as a whole is in excellent form to handle the rapidly increasing demands for power and as the distribution system has never been fully described, some details are given in the following paragraphs.

In the first place it should be noted that the power situation in the Twin Cities is rather unusual. The Mississippi River flows through both cities and in Minneapolis falls about 70 ft. in a distance of half a mile. While the flour mills have prior rights to a part of the available water-power, there is still enough water for several thousand kilowatts left for the railway company. The company utilizes the full flow of the river at a head of from 16 ft. to 20 ft.



Twin-City Power Distribution—Sample Pages of Loose-Leaf Record for Feeders

SUBSTATION EQUIPMENT, TWIN CITY RAPID TRANSIT COMPANY

Substation	Location	No. of Rotaries	Capacity of Rotaries Each	Capacity of Rotaries Total
11	Eleventh Street	5	1,500	7,500
13	Lower dam power plant	4	600	2,400
14	Lake Street	2	1,500	3,000
15	College Avenue	5	1,500	7,500
16	Snelling Avenue	2	3,000	6,000
20	Wildwood	2	600	1,200
21	Stillwater	2	600	1,200
23	Hopkins	3	600	1,800
25	Excelsior	3	600	1,800
28	Thirty-second Avenue	2	1,500	3,000
29	Hope Street	2	1,500	3,000
30	Minnehaha	2	1,500	3,000
31	University	2	1,500	3,000
32	Girard Avenue	2	1,500	3,000
	Total			47,400

in the "lower dam" plant and also the surplus available at St. Anthony Falls above that required by the flour mills at about 50-ft. head. The railway company also has a 60,000-kw supplementary steam plant located close to the water-power plants. The power generation is thus concentrated at a central point convenient for transmission in all directions. The district served covers an area 16 miles by 48 miles in extent, containing a population of 600,000 and served by 402 miles of track.

There are, in addition to the city lines, four interurban lines connecting the Twin Cities and two suburban lines, one running to Stillwater and South Stillwater, the other west to Excelsior and Deephaven. Fourteen substations are now in operation with the equipment shown in the table.

With the exception of the new 3000-kw units in the Snelling Avenue substation, the rotary converters are all of the non-interpole type. Barring a few of the 600-kw size, they are all six-phase. The frequency of the system is thirty-five cycles, and the transmission voltage is 13,200. Air-blast transformers are used in all substations.

The latest substation put into commission is the one on Girard Avenue, and, while substation construction is now so well standardized that a detailed description is unnecessary, a few points in connection with this one will be mentioned. The general arrangement of the station is standard as far as the placing of converters, reactances, transformers, oil switches, blowers, etc., is concerned. The cells for the oil switches are of concrete, cast in place in sections of three, six or nine. Alberene stone slabs, 2 in. thick, are placed on top of the cells. The high-tension bars are of ⅝-in. round copper. They are placed in the basement below the switch cells and are not inclosed.

In spite of the large size of the rotaries, due to their being of the non-interpole type, the capacity of the substation is good for its size, 44 ft. x 44 ft. outside. The capacity can be doubled without great expense by extending the rear, space having been reserved for this purpose between the building and the operator's residence which the company has constructed at the back of the lot.

At the Snelling substation, about midway between the centers of St. Paul and Minneapolis, 1500-kw rotaries have been replaced with the latest type of G. E. 3000-kw commutating-pole machines. These occupy no more space than their predecessors. The commutating poles are provided with two windings, the usual series coils and an auxiliary adjusting shunt winding. The series coils have the usual resistance and inductive shunts. The rotaries have fourteen poles and operate, therefore, at 300 r.p.m. on thirty-five-cycle current. A new type of air-blast transformer having no outside casing is used. The direct exposure of the active iron to the outside air assists the ventilation. These transformers are rated at 1050 kva each and are provided with 15 per cent reactance. Ventilating air at 1⅛ ounces pressure is furnished by a duplicate blower set located in the basement.

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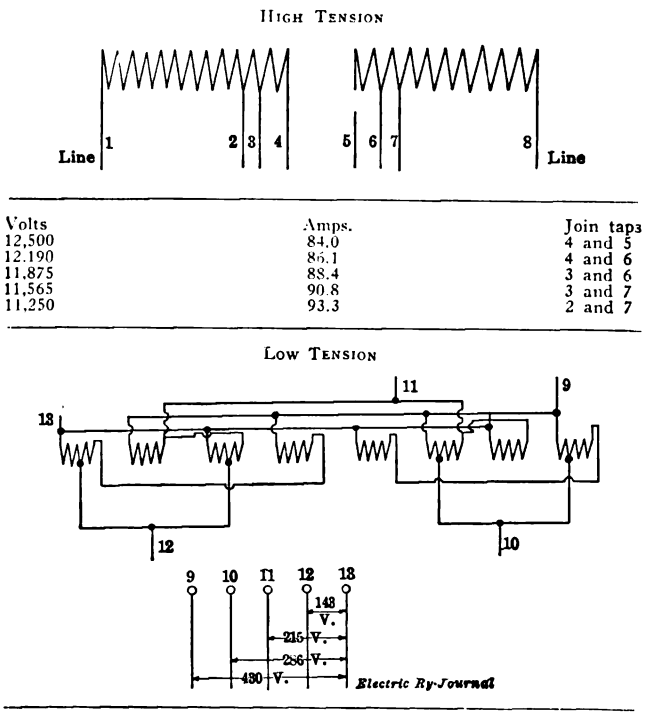
The transformer connections are arranged for multiple-voltage starting of the rotaries, the secondaries being divided into eight sections, as shown in the accompanying diagram, so as to give 143, 215, 286 and 430 volts. Of these voltages 143, 286 and 430 are used in starting by manipulation of switches on the low-tension board. The high-tension side has taps for five voltages between 12,500 and 11,250. In addition to the rotary converter equipment this substation, which is adjacent to the large car shops of the company, contains two 300-kw induction-motor d.c. generator sets to provide shop power. The motors take three-phase a.c. power from the low-tension side of the transformers at from 430 volts to 440 volts, and the generators, which are of the three-wire type, deliver direct current at 220 volts between outside wires, 110 from each to neutral.

In all but a few of the high-tension lines from power house to substation more than one connection is furnished,



Volts	Amps.	Join taps
12,500	84.0	4 and 5
12,190	86.1	4 and 6
11,875	88.4	3 and 6
11,565	90.8	3 and 7
11,250	93.3	2 and 7

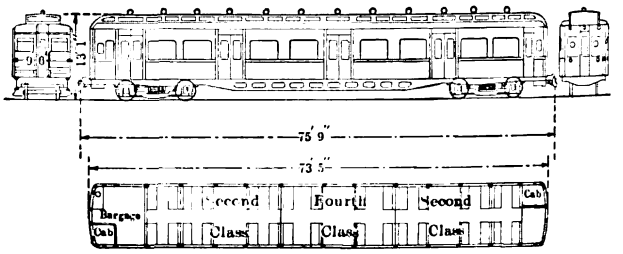
Diagram and Table of Transformer Connections, Snelling Avenue Substation

the exceptions being at points where substations can assist each other over the d.c. lines. Three-conductor cable is used, and No. 0000 is the standard size of wire. The cable system is so extensive that a card catalog for keeping track of it has been devised. Each cable section has its history recorded separately, and the record is kept up to date. By the use of the plan of using few sizes and keeping close watch of the condition of the cables it has been found possible to provide for emergencies with a stock of reasonable size. At the substations home-made pot-heads of spun copper are used with entire satisfaction.

In the lower dam power plant the eight a.c. generators are divided into two equal groups, and the corresponding busbars are connected by sectionalizing switches. Jumpers are provided on two units in each section by means of which they can be connected direct to rotary converters, cutting out the busbars entirely. In the Hennepin Island plant the four generating units are divided into two equal sections also. In the steam plant the switching arrangements are more elaborate. The generators buses for the one 14,000-kw and two 15,000-kw turbine units are in three sections with sectionalizing switches between. The two 5000-kw turbine units and the one 3500-kw engine unit are paralleled on a separate bus section. Three feeders are taken off from each large turbine bus and four from the small turbine-engine bus. There are also two separate sets of feeder buses. By means of a double set of switches connected to each large turbine unit these may be connected around their own buses to the separate feeder buses and the small turbine-engine unit buses respectively. By this very complete system of interconnection of busbar sections any desired combination of feeds and generating units can be obtained. Motor-driven exciters are operated from two different bus sections, to one of which is also connected a large neutral-grounding transformer. This is used because delta connection of transformers is used in the old lower dam plant, which may, at times of light load, be called upon to carry it all, thus leaving the lines without any grounding connection. A 600-kw, three-phase, oil-cooled transformer with primary star-connected and secondary delta-connected is grounded at the neutral and used for this purpose.

D. C. MOTOR CARS FOR FRENCH STATE RAILWAYS

The French State Railways recently decided to electrify a number of important suburban lines in the vicinity of Paris. The first order of the department is for eighteen motor cars which are to go on the Paris-Invalides-Versailles division. These cars, as shown in the accompanying drawings, are of the multi-side-door type, four pairs of sliding doors being used on each side to give access to one baggage and three passenger compartments. End doors are also provided. Each car is equipped with cross seats



Elevations and Plan of French D. C. Motor Car

with a total capacity for sixty-four passengers. As the traffic is of heavy suburban character, the cars have been equipped with Sprague-Thomson-Houston direct-current multiple control similar to that already used on the systems of the Metropolitan and Nord-Sud Railways at Paris. The car body is built of steel, composition flooring and other fireproof materials. The sides are double, air being used as a heat insulator. The heaters are placed under the seats. The interior finish of the car is in green. Boirault automatic couplers are used.

The motor equipment per car consists of two 230-hp field-control, commutating-pole units mounted on one truck. Current is taken from a 650-volt protected third-rail by means of a shoe which is designed for both bottom and top contact service. The weight of the motor car completely equipped is 68 metric tons. The main dimensions of the car are as follows: length over couplers, 75 ft. 9 in.; length of body, 73 ft. 5 in.; width, 9 ft. 6 in.; height, 13 ft. 1 in.

The next motor cars to be furnished will be mounted on three axle trucks and carry four 165-hp motors. These cars will weigh 83 metric tons when fully equipped.

The Argentine government has been authorized to grant concessions to the Lacroze Tramway Company for constructing branches to its existing electrical tramway system, the branches to be not more than 12.4 miles each in length. The company has forwarded plans for twelve such branches, and the necessary contract will be prepared.

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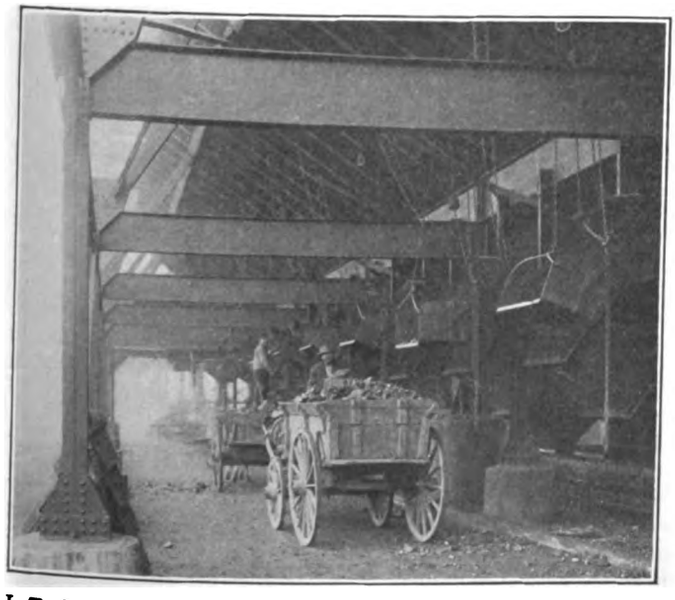
COAL-HANDLING PLANT OPERATED BY THE ILLINOIS TRACTION SYSTEM AT ST. LOUIS

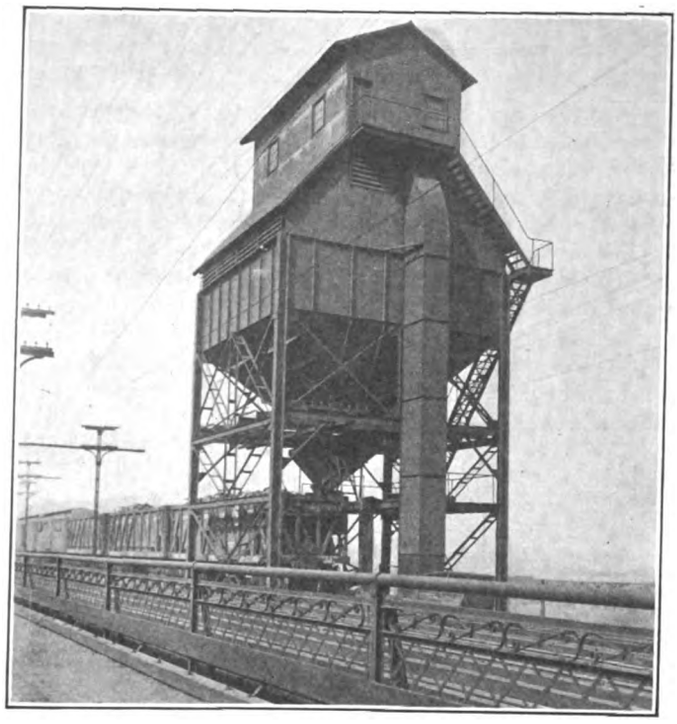
The St. Louis Consumers' Coal Company, a subsidiary of the Illinois Traction System, has installed a coal-handling plant at St. Louis, Mo., to remove screenings from run-of-mine coal. The conditions which made such a move advisable were as follows: The St. Louis Consumers' Coal Company was originally incorporated for the purpose of supplying coal from Worden, Ill., to the Illinois Traction System's generating station at Venice, Ill. Its output of run-of-mine coal was larger than that needed by the generating station, but to haul the excess amount to the next station at Riverton, Ill., a distance of 100 miles, would have increased its cost above the price at which fuel could be obtained from mines near Riverton. Hence the company decided to carry the coal to Venice, use the screenings at its generating station there and sell the rest of the output across the river in St. Louis, where it could be disposed of profitably to the retail trade.

I. T. S. Coal-Handling Plant—Weighing Office

This double arrangement not only meant a saving in transportation charges, but it also met most satisfactorily the fuel requirements of the coal trades served. The St. Louis coal trade demanded lump coal. At the same time better economy would be possible at the Venice generating station if screenings were supplied in sufficient quantity to make the crushing of lump coal unnecessary. The only thing lacking, therefore, was the installation of a coal-handling plant in St. Louis to remove screenings from the run-of-mine coal or lump coal transmitted a long distance. Accordingly a new coal-handling plant has been equipped to do this work, and as a result all the coal for the retail trade in St. Louis finds a ready market because of its freedom from screenings. The quantity of fine coal obtained by this plan is almost sufficient to equal the demand of the Venice generating station for that kind of fuel, but some is purchased from other mines in the vicinity of St. Louis.



I. T. S. Coal-Handling Plant—Loading Spouts Underneath Bridge



I. T. S. Coal-Handling Plant—Reloading Tipple as Seen from Bridge Deck

The new plant has been constructed under the St. Louis approach to the McKinley Bridge over the Mississippi. This location permits drop-bottom cars to discharge the coal into bunkers from a third track at the bridge level. The accompanying illustration show the plant, the type of car used in coal delivery service and also the office building. This building conforms to the standard architecture used by the Illinois Traction system.

The plant embraces six coal bunkers situated under the third track and having a total storage capacity of 600 tons. Coal is dumped from special 80,000-lb.-capacity drop-bottom cars through the bridge approach deck to the bunkers below. These bunkers in turn discharge over screens which permit the fine coal to fall through to spouts feeding a continuous bucket conveyor. The lump coal flows by gravity to other spouts provided with a hopper arrangement. This, when opened by a hand lever, dumps the coal into the retail delivery wagons stationed underneath. Teamsters desiring coal are required first to drive over a scale beside the office in one corner of the plant. From this point a paved loop leads under the loading spouts back to another scale at the office, where the loaded wagons are weighed and the tare deducted. The convenience of being able to obtain a wagon load of coal without shoveling has greatly increased the retail trade of the company in St. Louis.

To avoid the expense of operating the conveying system continuously to remove the screenings to an overhead tipple, bins have been provided under each screen with a storage capacity of approximately 4 tons. When several of these storage bins become full the conveyor is put into operation, and the screenings are removed to a reloading tipple at one end of the plant. At this point the screenings are elevated to a bunker set over the same track that is used for unloading the cars. This bunker has a storage capacity of approximately 200 tons. When a sufficient

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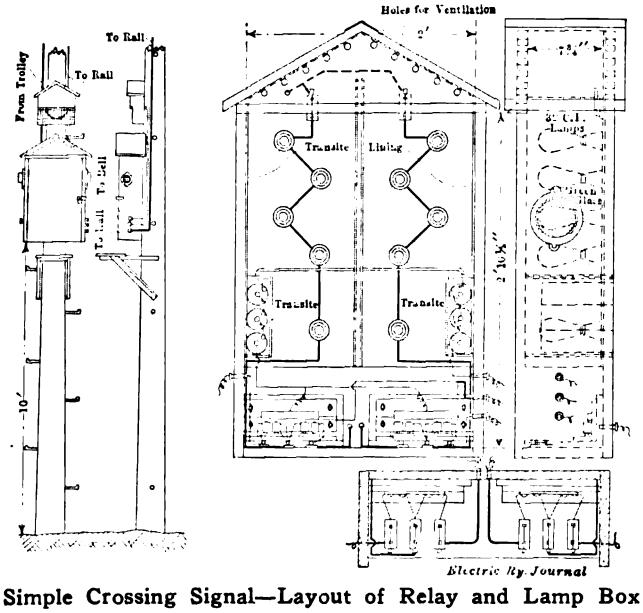
quantity of screenings have accumulated to make several carloads, the cars are run under the bunker and loaded for the Venice generating station. Both the horizontal and the vertical conveyors are driven by a motor housed in the loft over the bunker in the reloading tipple.

A HOME-MADE CROSSING SIGNAL

Just before leaving the New York State Railways W. J. Harvie, now with the Hagerstown (Md.) & Frederick Railway, designed a simple and inexpensive crossing signal which has since been constructed and placed in successful operation on the former system. The principle of this crossing is shown in the accompanying wiring diagram. The signal is set by a mechanically operated track switch, placed about 1000 ft. from the crossing, which grounds a wire connected with the winding of a relay. It is disconnected from the trolley by means of a second track switch placed beyond the crossing.

The track switch consists of a standard wing rail such as is used in making up frogs, a simple contact box and a mechanical connection between the two. The wing rail is

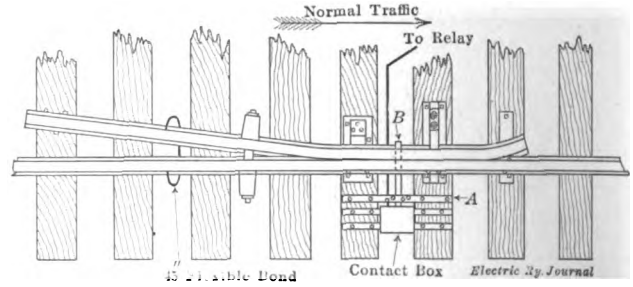


Simple Crossing Signal—Layout of Relay and Lamp Box and Installation of Same on Pole

pivoted at the entering end by means of three spikes and it is held in contact with the rail by means of soft rubber bushings. The wing rail slides on steel plates, one of which is provided with a strap passing through a slot in the web of the wing rail to hold it down.

The contact box contains two copper contact strips mounted on a wood block at such an angle that the contact-making piece can slide without danger of sticking. Under the contact strips is a brass connecting plate bent to the contour of the block. The contact box is supported on two steel straps which are bolted to the ties. A third strap carries a guide for the contact bar, one end of which is bolted to the base of the rail, being bent over into a hook form to secure a good hinge joint. The other end of the contact bar carries a small brass contact piece.

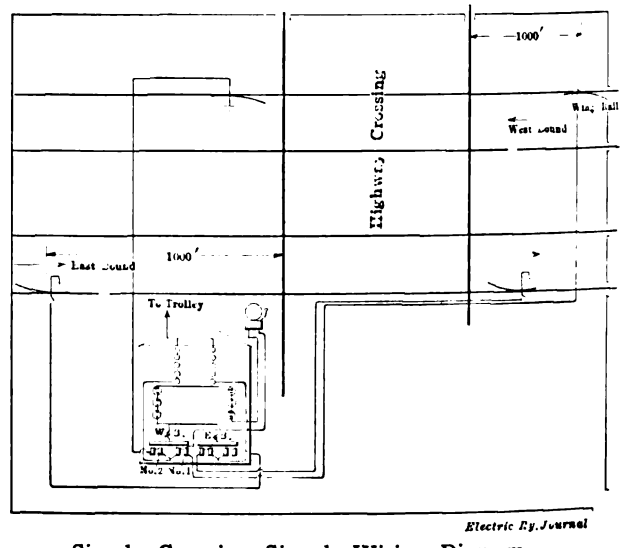
The relays, as indicated in a third drawing, consist of double pairs of bobbins—in fact, bell magnets—each pair when energized through the track switch pulling on one end of a pivoted iron armature which also acts as a contact maker. Referring to the wiring diagram, it will be noted that a west-bound car, on entering the signal section, energizes magnet No. 1 of relay *WB* which completes the local gong circuit. In this is a dry battery. A set of signal lamps, connected in the track-switch circuit, is lighted directly through the track switch. It also furnishes resistance to limit the relay current. The lamps are lighted only during the short duration of contact of the track switch. They serve, however, to give an indication to the motorman that the switch has been operated. After the contact-making end of the relay armature has been pulled down by magnet No. 1 it remains down by virtue of the facts that it is carefully balanced and that considerable



Simple Crossing Signal—Assembly of Track Switch

magnetism remains in it. The gong circuit is opened by the energizing of the second magnet, No. 2 in the figure, by the track switch located just beyond the highway. For the purpose of testing out the relay circuits small knife switches are located in the bottom of the relay box.

The equipment as described has been in experimental operation for a year or so and has proved its essential effectiveness. Two faults developed which have been remedied by simple expedients. The location of the batteries in the lamp box was found to be unsatisfactory because the heat from the lamps dried the cells out rapidly. A separate lamp box was, therefore, found necessary. Another fault was that the relay armature was found to be unreliable in its action owing to the uncertainty of its residual magnetism. It is proposed to remedy this difficulty



Simple Crossing Signal—Wiring Diagram

by means of a metal ball rolling in a channel on the upper side of the armature. This will descend to the low end of the armature, retaining the latter in either position and supplementing the force due to the residual magnetism. This crossing signal has not been patented by Mr. Harvie.

The Public Service Commission has published statistics showing that 312 persons lost their lives on steam lines and 53 on street railways in Pennsylvania during the months of July, August and September. The number of injured in street railway accidents was 949, the report showing an increase of six in the number killed and a decrease of 166 in the number of injured. On both steam and electric lines the killed numbered 365 and injured 4009.

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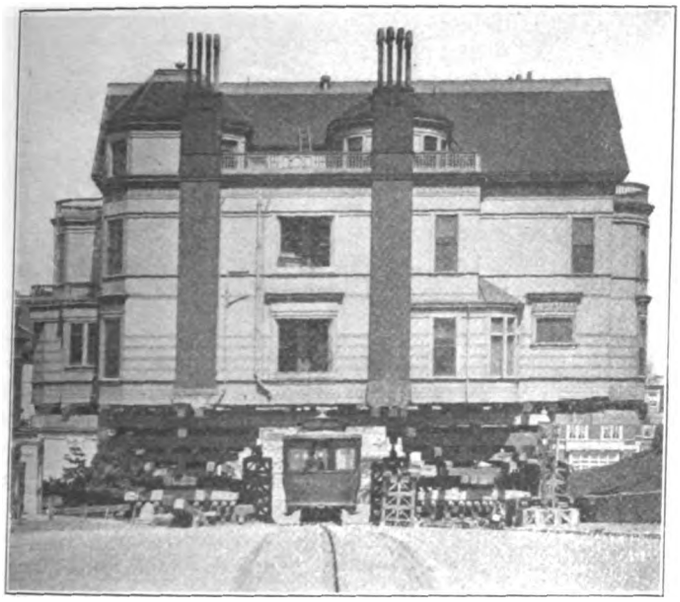
MOVING HOUSE OVER STREET CARS IN OPERATION

The accompanying halftone shows how a large house was moved along a narrow street without blockading street-car or vehicle traffic. The house is a private residence which was moved from its location on Washington Street between Octavia and Gough Streets, San Francisco, to a new site in the adjoining block. The width of the street



Moving Large House Over Single-Track Cable Line in San Francisco

along which the house was carried is 68 ft. 9 in. between property lines and 38 ft. 9 in. between curb lines. A single-track cable line runs along the center of the street, and the width of the house was too great to permit of its being moved longitudinally along either side of the street at ground level without obstructing the car track. The street railway objected to any interference with its service, so the contractor resorted to the expedient of jacking the structure to a sufficient height to permit cars to pass beneath it. Cribwork was then placed on the skids to support the house in the position shown, and moving operations were performed in the ordinary way. In this manner the house was moved down a 16½ per cent grade.

SAWDUST FOR EXTINGUISHING OIL FIRES

In a paper presented before the American Society of Mechanical Engineers at its annual meeting held during the past week Edward A. Barrier said that sawdust was an excellent extinguishing agent for fires in volatile liquids, especially those of a viscous nature. The efficiency of the sawdust, was, he said, undoubtedly due to its blanketing action in floating upon the surface of the liquid and thus excluding the oxygen of the air, and its efficiency was greater on viscous liquids than on thin liquids since it floated more readily on the former than on the latter. Sawdust itself was not easily ignited and when it did become ignited it burned without flame and the burning embers did not have sufficiently high temperature to reignite the liquid. The character of the sawdust, whether from soft or hard wood or whether or not it contained very much moisture, was apparently of little influence, so that the drying out of sawdust which was kept in manufacturing establishments did not affect its efficiency.

It was found that the addition of sodium-bicarbonate greatly increased the efficiency of sawdust, as shown both by the short time and by the decreased amount of material necessary to extinguish fires. A further advantage of the addition of bicarbonate of soda was that it decreased the possible danger resulting from the presence of sawdust in manufacturing plants, as after its addition it would be difficult, if not impossible, to ignite the mixture by a carelessly thrown match or any other ready source of ignition.

MEETING OF THE ALABAMA ASSOCIATION

The annual meeting of the Alabama Light & Traction Association was held on Nov. 21, 1913, at the office of the Mobile Gas Company. R. L. Ellis, manager of the Selma Lighting Company, was elected president of the association; T. K. Jackson, manager of the Mobile Electric Company, was elected vice-president, and H. O. Hanson, assistant manager of the Mobile Gas Company, was re-elected secretary and treasurer. The names of the members of the executive committee of the association elected at the meeting follow: A. H. Ford, manager of the Birmingham Railway, Light & Power Company; C. C. Henderson, the former president of the association; C. E. White, manager of the Montgomery Light & Water Power Company; R. L. Rand, manager of the Anniston Electric & Gas Company, and A. R. Smith, general manager of the Demopolis Electric Light & Power Company. The session of the association was concluded with a banquet on the evening of Nov. 21 in the Cawthorn Vineyard, tendered to the delegates by the officers of the Mobile Electric Company and the Mobile Gas Company. After the address of C. C. Henderson, president of the association, R. H. Smith, manager of the Greensboro Water & Light Company, read a paper on "The Operation of a Power Plant in a Small Town." T. K. Jackson introduced the subject of "Some Pertinent and Impertinent Questions." R. L. Ellis read a paper on "The Oil Game." The pulmotor was demonstrated for the benefit of those present by employees of the Mobile Electric Company.

MEETING OF PENNSYLVANIA ASSOCIATION

About a score of members of the Pennsylvania Street Railway Association attended the annual meeting of that body, held at the Harrisburg Club, Harrisburg, Pa., on Dec. 2. Charles O. Kruger, Philadelphia, presided in the absence of the president, H. R. Fehr, of Allentown. No papers were read, but there was a general discussion of the "safety first" question. Mr. Kruger told about the work being done in Philadelphia along that line. He advocated greater publicity as a means for the prevention of accidents. Others who spoke on the subject were C. L. S. Tingley, Philadelphia, and Gordon Campbell, York.

Another important subject under discussion was the proposition of amalgamation with the Keystone Railway Club, an association composed of master mechanics, engineers, accountants and other officials of street railways of Pennsylvania. The preponderance of sentiment was favorable to this proposition and the furtherance of the merger was left with a committee composed of Capt. W. S. Rockwell, Pottsville; C. L. S. Tingley, Philadelphia, and Gordon Campbell, York. The members of this committee will arrange a meeting later with a committee of the Keystone Railway Club. A meeting of the two organizations will be held next spring to ratify any action taken by the committees.

The following officers were elected for the ensuing year: President, C. L. S. Tingley, Philadelphia, vice-president American Railways; vice-president, W. A. Rigg, Reading, vice-president Reading Traction Company; secretary and treasurer, Dr. Harry M. Stine, Harrisburg; executive committee, the president and vice-president, and F. B. Musser, president Harrisburg Railways; T. B. Donnelly, West Penn Railways, Connellsville; H. F. Crowley, American Railways, Philadelphia, and W. S. Rockwell, Eastern Pennsylvania Traction Company, Pottsville.

The election of officers was followed by a luncheon.

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NEW COMMITTEES OF THE ACCOUNTANT ASSOCIATION

The following committees of the American Electric Railway Accountants' Association have been appointed to serve during the 1913-14 year:

COMMITTEE ON A STANDARD CLASSIFICATION OF ACCOUNTS

H. L. Wilson, chairman, Boston Elevated Railway.
W. F. Ham, Washington Railway & Light Company.
W. B. Brockway, with Ford, Bacon & Davis, New York.
W. H. Forse, Jr., United Traction Company of Indiana.
F. E. Smith, Chicago Railways Company.

COMMITTEE ON INTERLINE ACCOUNTING

L. T. Hixson, chairman, Terre Haute, Indianapolis & Eastern Traction Company.
Irwin Fullerton, Detroit United Railway.
E. L. Schmock, Cleveland, Painesville & Eastern Railroad.

SPECIAL COMMITTEE FOR STUDY OF BEST METHODS OF COLLECTING AND ACCOUNTING FOR VARIABLE RATES OF FARE, ACTING WITH COMMITTEE ON COST OF PASSENGER TRANSPORTATION SERVICE

M. R. Boylan, chairman, Public Service Railway, Newark, N. J.
C. H. Allen, with Stone & Webster, Boston, Mass.
W. B. Brockway, with Ford, Bacon & Davis, New York, N. Y.
R. J. Clark, Kansas City Railway & Light Company.

COMMITTEE ON OVERHEAD CHARGES

P. S. Young, chairman, Public Service Railway, Newark, N. J.
Edwin Gruhl, Milwaukee Electric Railway & Light Company.
A. L. Linn, Jr., Harrison Williams, New York, N. Y.

SPECIAL COMMITTEE ON PREPAYMENT-CAR OPERATION, ACTING WITH COMMITTEE ON FARES AND TRANSFERS OF THE TRANSPORTATION & TRAFFIC ASSOCIATION

M. R. Boylan, co-chairman, Public Service Railway, Newark, N. J.
C. N. Huggins, Portland Railway, Light & Power Company.

COMMITTEE ON EDUCATION

F. J. Pryor, Jr., chairman, American Railways Company.
F. B. Lasher, Harrison Williams, New York, N. Y.
J. H. Neal, Boston Elevated Railway.
W. H. Forse, Jr., Union Traction Company of Indiana.
N. E. Stubbs, United Railways & Electric Company, Baltimore, Md.

COMMITTEE TO REPRESENT ASSOCIATION AT CONVENTION OF RAILROAD COMMISSIONERS

W. F. Ham, chairman, Washington Railway & Electric Company.
C. N. Duffy, Manila Electric Railroad & Light Company.
N. E. Stubbs, United Railways & Electric Company, Baltimore, Md.

COMMITTEE CO-OPERATING WITH THE UNITED STATES BUREAU OF THE CENSUS

A. L. Linn, Jr., chairman, Harrison Williams, New York, N. Y.
W. H. Forse, Jr., Union Traction Company of Indiana.
M. R. Boylan, Public Service Railway, Newark, N. J.

JOINT COMMITTEE WITH THE ENGINEERING ASSOCIATION ON ENGINEERING ACCOUNTING

F. B. Lasher, co-chairman, Harrison Williams, New York, N. Y.
J. A. McGowan, Terre Haute, Indianapolis & Eastern Traction Company.
J. M. Joel, New York State Railways.
J. C. Collins, New York State Railways.
M. W. Glover, Mobile Light & Railroad Company.
J. H. Hanna, co-chairman, Capital Traction Company, Washington, D. C.
H. H. Adams, Chicago Railways Company.
E. O. Ackerman, Columbus Railway & Light Company.
John Sibbald, Fonda, Johnstown & Gloversville Railroad.
George Weston, Board of Supervising Engineers, Chicago, Ill.

JOINT COMMITTEE WITH ENGINEERING ASSOCIATION ON LIFE OF RAILWAY PHYSICAL PROPERTY

R. N. Wallis, co-chairman, Fitchburg & Leominster Street Railway.
A. R. Patterson, Stone & Webster, Boston, Mass.
H. E. Weeks, Tri-City Railway & Light Company.
Martin Schreiber, co-chairman, Public Service Railway, Newark, N. J.
R. B. Rifenberick, Detroit United Railway.
Edwin Gruhl, Milwaukee Electric Railway & Light Company.

JOINT COMMITTEE WITH TRANSPORTATION & TRAFFIC ASSOCIATION ON EXPRESS AND FREIGHT ACCOUNTING

Walter Shroyer, co-chairman, Union Traction Company of Indiana.
E. L. Kasemeier, Ohio Electric Railway.
H. H. Read, Bay State Street Railway.
J. K. Choate, co-chairman, J. G. White Management Corporation, New York, N. Y.
G. H. Harris, Birmingham Railway, Light & Power Company.
E. C. Springer, Lehigh Valley Transit Company.

HANDLING TRAFFIC AT HARVARD-YALE FOOTBALL GAME

At the recent Harvard-Yale football game at Cambridge, Mass., the Boston Elevated Railway Company transported about 22,000 people to and from the Harvard Stadium without the slightest congestion on either its surface or rapid transit lines. The accompanying photograph shows a trainload of passengers arriving at the Stadium station, which is a special out-door installation equipped with a single platform and with numerous exits which are converted into entrances and manned by extra ticket sellers at the close of games in the Stadium. The station occupies one side of the storage yard for subway trains adjacent to the company's Eliot Square shops, and in the football season trains are looped through the yard from Harvard Square before returning to Park Street, Boston. The running time from Park Street to the Stadium station was 10 minutes. At Park Street the trains were run upon both sides of the loading platform during the period of heaviest traffic, and another factor in the smooth handling of the service was the opening of five entrances and the manning of twenty-three ticket offices at this station when the travel was at its

Football Crowd—Arriving at Stadium Station for Game

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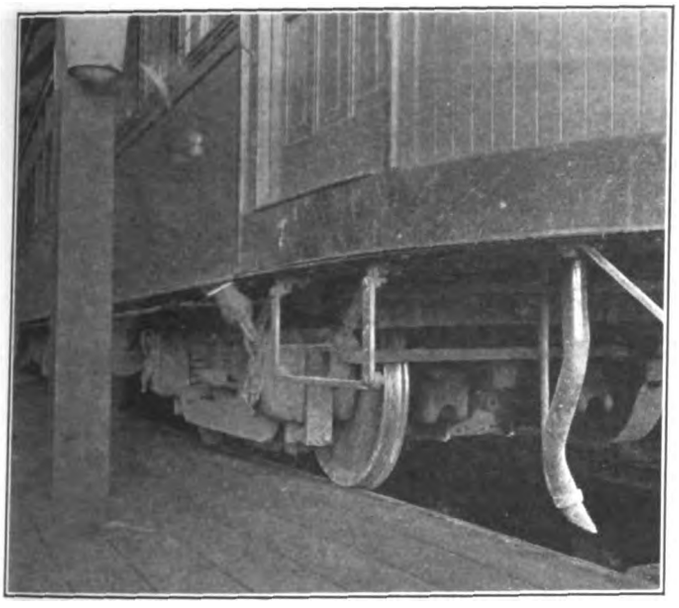
height. It is estimated that nearly a half hour was saved to those who used the Cambridge subway compared with the time formerly required by passengers to make the trip to the Stadium in Cambridge from Boston via surface lines exclusively.

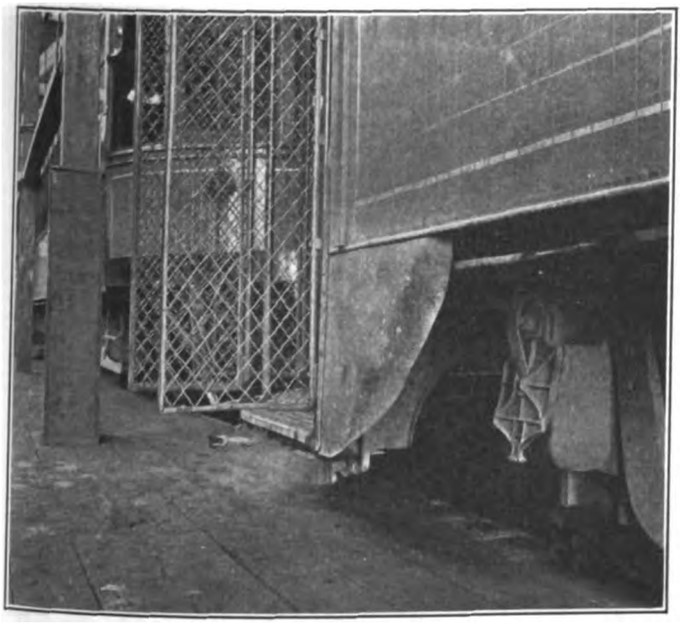
SHEAR PLATE AND FOLDING STEPS IN DULUTH

The Duluth Street Railway Company has had considerable difficulty in the past with collisions between its cars and wagons in which the front and rear steps of its single-end cars have been damaged or torn away. To eliminate this



Folding Steps in Two Positions on Duluth Cars

trouble a folding step has been adopted for the front end of the car and a shear web has been applied just in front



Shear Plate on Duluth Cars

of the rear step, and this construction has been adopted as standard on all cars.

The step at the front end of the car is of the stirrup type, purely for the use of the motorman, as the car is of the single-end type, and, when folded, this step is high enough so that a wagon wheel hub will pass under it. The step is of bar iron and is pivoted at the points of attachment to the car body and between the horizontal bar and the uprights. This permits the step to collapse under the car side sill when struck by a wagon wheel. The view shows it in both positions, it being supported in the collapsed position by a hand.

The shear plate at the rear step is simply a protective device to force a wagon wheel away from the step and gates. It is bolted to the side sill and end sill in the vertical angle formed by the side sill and steps and is held rigidly in position by a forged bracket. The web is triangular-shaped with the hypothenuse of the triangle dished or rounded into the center of the car body so that the shearing action is away from the car. A view of the shear plate is also published.

DINNER OF PUBLIC POLICY COMMITTEE OF N.E.L.A.

The public policy committee of the National Electric Light Association, of which Arthur Williams is chairman, gave an informal dinner Dec. 4 at the Union League Club, New York, and had as its guests the public relations committee of the American Electric Railway Association and representatives of the telephone interests, the gas interests and the steam railroad interests. The dinner was followed by an informal discussion as to the best means of telling the story of public utility corporations in a manner to lead the public and the municipal, state and federal authorities to see the difficulties and problems in the operation of public utilities so that the corporations should receive fair treatment at the hands of the public and authorities. The general sentiment expressed was that the public intended always to be fair and acted fairly when it had full information upon which to base its judgment.

The work accomplished by the public policy committee of the National Electric Light Association during the past several years was briefly outlined by Arthur Williams, who acted as toastmaster, and the statement was made by several of those who spoke that the National Electric Light Association, although the youngest of the public utilities, had led in this work; that it had recognized from the start that regulation by state and municipal authorities had come to stay and that by accepting the policy of regulation the industry had profited. The work of the public policy committee of the National Electric Light Association in educating its own members in the proper methods of dealing with the public and authorities was also emphasized.

Howard Elliott, president of the New York, New Haven & Hartford Railroad, briefly outlined the work done in this connection by the Northern Pacific Railroad while he was president of that company. T. N. Vail, president of the American Telephone & Telegraph Company, and U. N. Bethel, president of the New York Telephone Company, described the work along similar lines done by the telephone interests. Others who spoke were George B. Cortelyou, president of the Consolidated Gas Company, of New York; Charles L. Edgar, president of the Edison Electric Illuminating Company of Boston; O. D. Young, vice-president of the General Electric Company, and Charles A. Stone and Edwin S. Webster, of Stone & Webster.

All present seemed deeply impressed with the importance of the subject discussed and to feel that the effect of the meeting would be reflected in improved relations between the public utility companies and the public.

Those in attendance included Walter R. Addicks, U. N. Bethell, H. G. Bradlee, Everett W. Burdett, Robert A. Carter, George B. Cortelyou, Henry L. Doherty, Charles L. Edgar, Leavitt L. Edgar, Howard Elliott, W. W. Freeman, Lewis B. Gawtry, H. J. Hemmens, Samuel Insull, Julius Kruttschnitt, John W. Lieb, T. C. Martin, Joseph B. McCall, James H. McGraw, J. B. Murray, Thomas E. Murray, E. W. Rice, Jr., Samuel Scovil, Charles A. Stone, Guy E. Tripp, Theodore N. Vail, Edwin S. Webster, Arthur Williams, Col. T. S. Williams and O. D. Young.

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COMMUNICATIONS

COUNTING NICKELS BY WEIGHT

QUINCY RAILWAY COMPANY
QUINCY, ILL., Nov. 21, 1913.

To the Editors:

On page 987 of your Nov. 1st issue we note a description of a weighing and counting machine. For a small property we have found it very convenient to use ordinary grocers' scales in sacking our nickels. When we count our fare boxes we find it convenient to hold fifty nickels in the counter's hand at one time. This, being $2.50, is contained ten times in $25, the amount of nickels we put in each sack.

In counting the fare boxes each handful is deposited in the scales, and the conductor receives the credit for $2.50 in the count. The last handful that is put in the scale tips the balance, which is set at 5 lb. 6 1-4 oz. The scoop is then emptied into a sack which is marked with the company's name, and "$25" is stamped on it. The odd change, such as nickels which do not amount to $2.50, also dimes and pennies, is put into trays, the same as were used with the old method of counting. Our fare boxes are of the ordinary type which will take any size of coin including tickets. W. A. MARTIN, Superintendent.

PROPOSED ASSOCIATION OF PURCHASING AGENTS

ROCKFORD & INTERURBAN RAILWAY COMPANY
ROCKFORD, ILL., Nov. 28, 1913.

To the Editors:

I note various opinions as to the advisability of the formation of an Electric Railway Purchasing Agents' Association in your issue of Nov. 22, and I believe that the organization of an electric railway purchasing agents and storekeepers' association along the lines of the steam railroads' Railway Storekeepers' Association would be a good thing. Much benefit should result from the interchange of ideas as to the most efficient methods of handling stock and in the establishment of standards for purchases, etc.

The purchasing and storekeeping departments of the electric railways have not received in the past the recognition which their relative importance to the entire organization merits. This is not the case on the steam roads of the country, where the full development of these departments has been encouraged. CHARLES A. INGLE,
Assistant Purchasing Agent.

PRESENTATION OF THE GRASHOF MEDAL

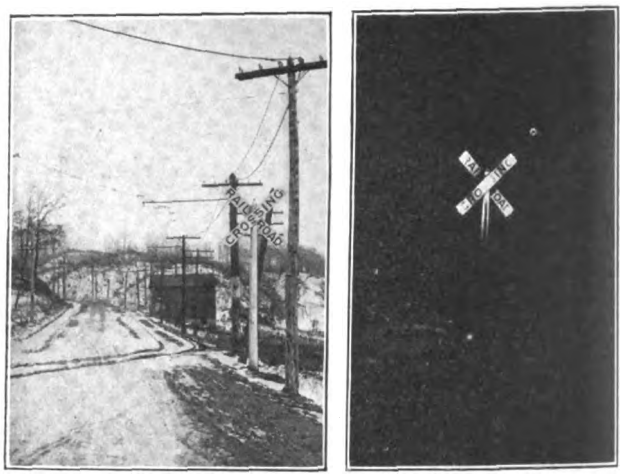
On Wednesday, Dec. 3, the Grashof Medal, given by the Verein Deutscher Ingenieure for accomplishment in the field of engineering, was formally presented through the American Society of Mechanical Engineers to George Westinghouse. At the presentation, which was held in the auditorium of the Engineering Societies Building in New York City, Dr. W. F. M. Goss, retiring president of the American Society of Mechanical Engineers, presided, and he introduced as the first speaker Col. E. D. Meier, who explained that the possession of the medal, coming as it did from the greatest engineering association of the world, was one of the highest honors to be attained in the profession and gave an account of the announcement of the award of the medal last summer in Germany.

Colonel Meier was followed by Herr Fr. Romberg, Privy Councilor of the German Empire, who addressed the meeting in a speech which was replete with feeling and which was received with vigorous applause from the large audience. Mr. Westinghouse was, unfortunately, prevented by illness from attending the presentation and, in consequence, Dr. Goss, in the name of the American Society of Mechanical Engineers, delivered the medal to James Hartness, president-elect, for transmittal to its new owner.

ILLUMINATED CROSSING SIGN ON NEW YORK STATE RAILWAYS

On the Rochester division of the New York State Railways a very satisfactory method has been devised for illuminating the crossing signs which are set up at intersections of country roads with the company's suburban or interurban lines. The plan consists in placing six incandescent lamps on both sides of the customary cross-arm signs, one lamp being located at each end of each cross-arm with a pair of lamps at the intersection. The six lamps on each side of the sign are divided into groups of three and connected together so that three lamps on each side are in series on a separate circuit. In consequence, if one lamp should burn out or a circuit should otherwise be broken, the six lamps on the other circuit would still illuminate the sign on both sides and give warning in both directions.

This scheme provides an unusual degree of illumination, much better in fact than is obtained by a bank of lamps set together and throwing their light on the sign, as it has been found that the signs are easily visible from a distance



Illuminated Crossing Sign on New York State Railways

of one and one-fourth miles. The introduction of the new method of illumination has, therefore, created very favorable comment from the public and has undoubtedly served in the reduction of crossing accidents. Two views of one of these crossing signs are shown, one having been taken in the daytime and the other at night when the sign was illuminated, the latter demonstrating the brilliance with which the sign stands out.

UNUSUAL SUIT FOR DAMAGES

A remarkable suit for damages for injury by shock has recently been brought against the New York Railways and is being tried in Part V of the Supreme Court of New York. The plaintiff, Isaac Kaufman, claims to have received the shock from stepping on a slot rail on Thirty-fourth Street near the corner of Broadway. The testimony for the defense showed that both slot rails are effectively grounded by tie rods to the outside rail, by bolts which hold the slot rail to a cast-iron yoke every 5 ft. and by the fish-plates which connect the ends of the slot rails. Moreover, the point where the accident is said to have occurred is a point of great traffic, where vehicles with steel tires are constantly spanning both slot rails. Nevertheless, the attorney for the plaintiff is claiming that through rust the rail may have become insulated from the ground and become charged through a defective insulator underneath. Among the witnesses before the defense were W. B. Potter, Thomas F. Mullaney, Prof. George A. Seaver and Prof. Samuel Sheldon.

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A WIDE-ANGLE SIGNAL LENS TEST

A test of lenses for railway signal lights was recently held at the grade crossing at Oak Island, N. J., of the Central Railroad of New Jersey and the Lehigh Valley Railroad, for the purpose of comparing the effectiveness of the spheroidal lens made by the Armspear Manufacturing Company, New York, with that of the standard railway signal or marker lens. The weather during the tests was clear and cool with a full moon. It was found that the standard red rear-end marker lights were visible for 1847 ft. along a line measured on the extreme edge of the zone of light. This angle of visibility was 23 deg. on one side of the track. Under the same conditions the spheroidal lens showed at 2973 ft. with an angle of visibility of 53 deg. on one side.

A standard 4-in. green lens for a switch lamp was found to carry 1319 ft. with a 16-deg. angle, as against 2428 ft. by a spheroidal lens with an angle of visibility of 55 deg., and a standard 5-in. white semaphore lens carried 1699 ft. over an angle of 21 deg. on one side, an equivalent spheroidal lens giving a distance of 2622 ft., with an angle of 51 deg. In a test for the range of visibility on straight track, or along the center line of the lens, the red spheroidal train marker lens was found to be lost as a signal only after a distance of 7077 ft. had been covered.

A NOVEL DESIGN FOR TRAVELING CRANES

The Brown Hoisting Machinery Company, Cleveland, Ohio, has recently placed upon the market a single I-beam crane with a unique design of truck or end frame. The construction which is shown in the accompanying illustration permits the crane to be used under conditions of very limited head room, making it especially suitable for use in power houses, storerooms, substations and similar structures where the height of building is largely determined by crane clearances.

The I-beam is of the usual size sufficient for the required

Cast-Steel Truck for Single I-Beam Crane

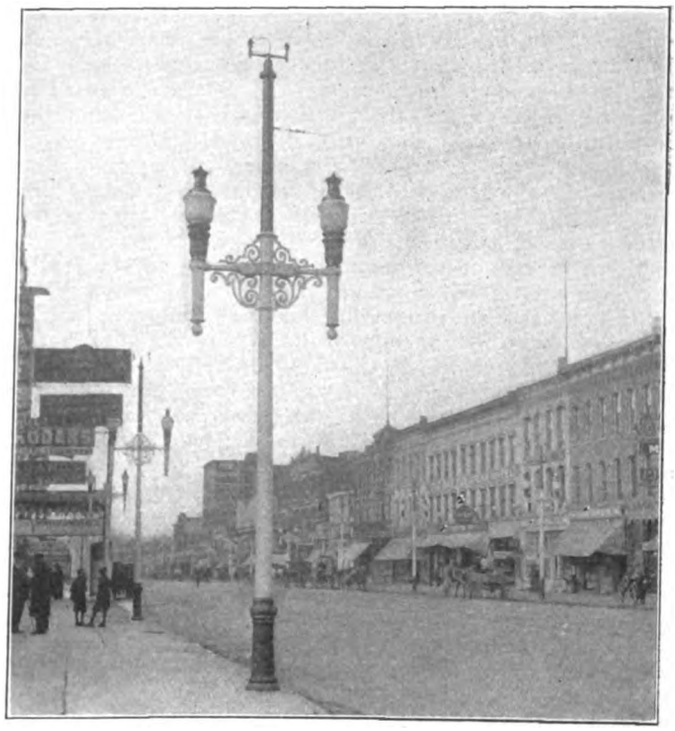
capacity and span, and on its lower flanges is carried the trolley with a chain hoist or electric hoist to lift the load. The end frames or trucks are, however, made from a one-piece steel casting of light weight, and they support the I-beam on planed surfaces in the center, the point of support being well below the level of the truck axles. The I-beam is bolted to clips attached to the upper part of the truck and is also held in place by a dowel on the truck frame, which fits into a small recess on the underside of the bottom flange of the I-beam. Each truck is supported on two truck wheels and has a bearing on each side of the wheels, thus permitting the use of very small axles.

On account of the simple construction the crane may be easily and quickly erected even in close quarters, and on account of the flexibility no part appears to be subject to undue strain even on uneven rails. A squaring shaft is, however, extended across from one truck to the other, connecting with one wheel of each truck, and this insures uniform travel of both ends of the crane. The smaller cranes up to 1-ton capacity and with spans below 20 ft. have no traveling mechanism, being propelled by pushing or pulling on the load, but for the larger sizes a hand travel chain and sprocket is provided, and this for the largest capacities is fitted with double reducing gears so that the heaviest weights may be moved with ease.

COMBINATION LIGHTING AND TROLLEY POLES IN NIAGARA FALLS, N. Y.

The International Railway, of Buffalo, N. Y., recently made an installation of combination lighting and trolley poles on the main street of the city of Niagara Falls under somewhat unusual circumstances. The poles, which were purchased by the city from the Electric Railway Equipment Company, of Cincinnati, are shown in the accompanying illustration, and they are provided with slots below the ground line so that if desired in the future the feeders now carried upon them may be placed in conduit below sidewalk level. The material used in the pole construction is 7-in., 6-in. and 5-in. standard-weight tubing.

The poles were installed in Falls Street in accordance with a plan for lighting which had been under consideration in Niagara Falls for many years and which was crystallized by a comparatively recent offer of the Hydraulic



Combination Lighting and Trolley Pole

Power Company to furnish free electric current for the lighting system. Early last June the city asked E. G. Connette, president International Railway Company, if the trolley poles could not be removed from the street in furtherance of the plan. Mr. Connette consented not only to remove the trolley poles but to place the new poles for the city and to transfer the trolley wires and feeders to them without charge. The work of installation was commenced last August and was completed inside of three months' time.

The installation consists of 112 poles, each of which is equipped with a double bracket for supporting a pair of G. E. inverted arc lamps of about 800 cp each. The poles are spaced at 70-ft. intervals, thus giving one of the best street-illuminating systems in the country.

In an attempt to operate a spare steam turbo-alternator as a synchronous motor to improve the power factor care should be taken to see that the best possible vacuum is maintained at all times. The reason for this is that if the turbine blades revolve in air inside the turbine casing they soon get extremely hot from friction with the air. In a perfect vacuum, of course, this would not occur so that when a turbo-generator is used for this purpose the condenser air pump must be operated.

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LONDON LETTER

(From Our Regular Correspondent)

Application has been made to the Light Railway Commissioners for permission to construct a new tramway to link up the colliery villages between Barnsley and Mexborough. The urban councils of Wombell, Wath-on-Dearne, Bolton-on-Dearne and Thurnscoe have formed themselves into a joint board to build the lines. The population of the district to be served is about 135,000. Although Barnsley is the largest town in the district to be served by the line, it has refused to co-operate with the other towns. The estimated cost of construction is £100,000.

Glasgow has not yet come to an agreement with the counties of Lanark, Renfrew and Dumbarton in regard to extensions which it desires to make into these counties. A conference has been held between a sub-committee of the Glasgow Corporation Tramways and representatives of the counties, who have made demands that the Corporation should bear the whole cost of road widening, a large portion of the cost of the up-keep of the roads in which the tramways are operated and make an annual payment for any extra expenditure necessary by the counties. The committee has replied that it can only recommend the Corporation to treat each case of road widening on its merits, and that it cannot recommend the Corporation to maintain any portion of the road outside that on which the tramway track is laid and 18 in. beyond each of the outer rails, as under the general tramways act of 1870, and that it cannot recommend the Corporation to make any payments to the counties.

Glasgow has an interesting problem before it in the proposed extension of one of its tramway routes under Gilmore Hill, on which Glasgow University is situated. The line would extend in a tunnel from Gibson Street about half a mile under the hill to Byres Road, where tramways already exist. If it is decided that the line should follow the route of University Avenue, the Corporation will communicate with the university authorities in regard to the precautions which it proposes to take to minimize the disturbance from electrical current and vibration.

The City Council of York has decided to obtain parliamentary powers for running trolley buses on one of its routes, at a cost of about £4,300, and has agreed to a system of trolley buses on a new route which will cross the River Ouse on the proposed new bridge. This route is to cost about £3,000 for equipment. It has also been decided to insert in the bill a provision to give the Corporation general power to provide and run buses in the city.

The proposal of the National Electric Construction Company to insall a system of petrol-electric tramcars in Oxford has been rejected by the Oxford Corporation.

The borough electrical engineer, the borough surveyor and the town clerk have reported to the Stirling Town Council in regard to the proposal to have the Corporation purchase the existing tramway and equip it with electricity. The report deals with a system of municipal tramways between Bridge of Allan and Bannockburn and considers the question of further extension to Cowie, Denny, Dunblane, Tullibody, Cambus and Alloa, Blairlogie, Menstrie, etc., serving a total population of 65,261. The estimated cost of the line between the Bridge of Allan and Bannockburn is £78,100, and the yearly income is estimated at £9,744. The operating expenses are placed at £4,981.

The Gloucester City Council has decided to combine the electrical supply and the tramways undertakings under one management, the general manager of the tramways system having been appointed to the general managership of the Southampton Corporation Tramways.

In regard to the application by the Aberdeen Suburban Tramways for permission to run trail cars on its lines, the Board of Trade has stated that it has no objection to the use of trail cars on tramways as proposed, provided suitable arrangements are made for turning.

The Greenock Corporation has decided against the proposal to purchase the Greenock & Port Glasgow Tramways.

The plan to construct an electric railway under the Tyne, between North and South Shields, has been revived. The Tyne is about 1200 ft. wide at the site of the proposed railway and the only communication between North and South Shields is by ferry service, which last year was utilized by more than 6,000,000 passengers. The length of the proposed railway would be about three-quarters of a mile, and a single train would maintain a six minutes' service.

The efforts of the London County Council to increase its traffic receipts are meeting with success, and for some weeks the receipts have been up by about £2,000 a week. It is a striking justification of the policy of cheaper fares, the issue of return tickets at reduced rates and a more vigorous policy of advertising. The Council intends to make another effort to bring its tramways into the heart of London. Parliamentary sanction will be sought in the forthcoming session for three short extensions which would make the system on the north side of the Thames much more valuable. Efforts will be made to extend the tramways from the present terminus in Farrington Road to a point near Ludgate Circus. The Council also will make an effort to extend its tramways from the present terminus at Aldgate to Mark Lane Station and from Aldgate to Aldgate Station. Similar attempts have been defeated in Parliament on two previous occasions, and the motor bus continues unchallenged in the city proper.

The Council of London reports that the experiment with trail cars, which have been running under the provisional sanction of the Board of Trade, has been a success, and the consent to the running of trail cars on the Merton circular route, which was received for three months last June, has now been extended without any definite limit. The Council will apply for permission to adopt the trail cars as desired for the whole of the tramway system. The Council is gradually removing the colored headlights on tramcars and substituting numbers in their place.

The Midland Railway will ask for permission at the next parliamentary session to electrify the London and Tilbury section of its line. This section was transferred to the company a year and a half ago. The transfer was sanctioned by a House of Commons committee on the condition that the company would apply to Parliament in 1914 for powers to electrify and to carry out the electrification within seven years of obtaining these powers. The chairman of the Midland Railway recently stated that this would involve an expenditure of about £1,000,000. As noted elsewhere in this issue, officers of the company are now in the United States studying electrification.

It was announced recently that the Underground Railways was prepared, on conditions, to continue its Bakerloo tube railway from the present terminus at the Elephant and Castle Station to the Crystal Palace, thus providing South London with a much needed quick service. In the meantime the Kearney High-Speed Railway has decided to postpone the presentation of a bill for the construction of a railway from the Strand to the Crystal Palace.

Work has now been commenced in the vicinity of Teddington in connection with the electrification of the London & Southwestern Railway. The Kingston circular route will be the first section to be electrified, and it is hoped that this line will be in operation before the end of next year. Electric services on the Hampton Court and Shepperton branches, and on the Hounslow loop line, will be added as soon after as possible, and eventually the electrification will be extended to Guildford. In designing the new rolling stock, the company has adhered to the compartment type of vehicle, although the almost universal practice on electric railways is to use the long car with vestibule entrances at each end. This has been considered almost necessary in electric traction owing to the greater acceleration of electric trains, as it is thought dangerous to have so many doors to handle at each stopping as would be necessitated by the compartment type of vehicle. The compartment type of coach is doubtless the most popular in England, but considering the fact that the trains can attain a speed of from 20 to 30 m.p.h. before clearing a station the question of doors becomes an important one.

The agitation in Birmingham in favor of all-night tramcars for the convenience of night workers and night travelers has assumed definite shape, and it is expected that the subject will be laid before the City Council at an early date by way of the presentation of a memorial.

A. C. S.

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News of Electric Railways

Low Fare Ordinance Passed in Toledo

The Council of Toledo, Ohio, has passed and the Mayor has signed an ordinance to require the Toledo Railways & Light Company to establish a 3-cent fare on all its lines after March 27, on which date the franchise for the so-called Robinson lines in Toledo expires. The ordinance was introduced by City Solicitor Schreiber, was placed on passage without going to a committee and was enacted with only one dissenting vote and almost without discussion. The measure follows:

"That upon the following terms and conditions, and upon no other, consent, permission and authority are hereby granted to the Toledo Railways & Light Company to continue from day to day only after March 27, 1914, to operate its cars on the streets and portions of streets whereon franchises expire on said March 27, 1914, the operation to be in conjunction with all the rest of the street railway lines of the Toledo Railways & Light Company in Toledo, so that the whole system will be operated as a unit and as one continuous system.

"The operation of street cars after March 27, 1914, on the streets and parts of streets whereon franchises expire on March 27, 1914, shall be subject to the same terms and conditions as prevailed thereon under the grants prior to March 27, 1914, and shall be further subject to all of the conditions imposed on the said Toledo Railways & Light Company by an ordinance passed July 26, 1911, pertaining to operation of street cars by the Toledo Railways & Light Company, and shall be further subject to the condition that the charge which the said Toledo Railways & Light Company may name and receive for one continuous passage over the entire or any part of its street railway system, including the streets upon which franchises have expired and those upon which franchises shall not have expired, shall not exceed the sum of 3 cents for each passenger, nor the sum of 1 cent for each child under eight years of age, children in arms free, and that any passenger demanding a transfer ticket at the time of paying his fare shall be entitled without extra charge to a transfer from the route upon which he shall have paid his fare to any other route except in a substantially opposite direction on a route parallel or substantially parallel to said first route, and to ride continuously to any point upon such second route within the limits of the city, provided he transfer to the first car with adequate accommodations that runs past the point of transfer.

"This ordinance is subject to revocation or amendment in whole or in part, expressly or by implication, at any time at the will of Council, and the Council may at any time increase the obligations of the company for permission to operate upon said lines covered by said franchises, and the continuing by said company of the operation of its cars on lines covered by said franchises expiring March 27, 1914, shall be deemed an acceptance of this ordinance and all the terms hereof.

"In case the Toledo Railways & Light Company refuses or fails to comply with the terms of this ordinance promptly and according to the tenor and effect thereof, then the city solicitor shall be, and he is hereby, authorized and directed to take such legal action as may be proper and necessary to enforce the provisions of this ordinance or require the company to abandon the streets covered by the franchises above mentioned."

The rates of fare under the present temporary agreement are 3 cents between 5.30 a. m. and 7.30 a. m. and between 4.30 p. m. and 6.30 p. m., and six tickets for a quarter at other hours.

F. R. Coates, president of the company, has written a letter to the Council protesting against the ordinance. He says that the action of the Council was unfair and that the company cannot operate its cars under the provisions of the new ordinance without jeopardizing the investment represented by the company's property. After reciting the events leading up to the agreement between the company and the city to permit accountants in the employ of the city and under salary from the company to inspect the books of the company to ascertain how 3-cent fares four hours a day worked out, Mr. Coates wrote:

"In view of the fact that there could be no purpose in this examination, made, as we have said, by accountants appointed by the city, unless the same was to be used as a basis in arriving at an ordinance, we beg respectfully to suggest that your action, taken without any consideration of the accountants' report and without any notice to this company, was somewhat hasty and we respectfully protest against the same. Since the writer's connection with this company it has received fair treatment from this administartion, and we believe on second thought you will consider your action hasty, and in the interests of fair play repeal the same."

The communication from Mr. Coates has been referred to the committee on railroads and telegraph of the Council.

Extension to Michigan Central Depot in Detroit

On the evening of Nov. 24 the Common Council of Detroit, Mich., reversed its decision of the week previous and by a vote of twenty-eight to four gave the Detroit United Railway permission to build a loop to the new Michigan Central Railroad station as an extension of Michigan Avenue. Alderman Reid made the motion to reconsider the vote on the question, which had been originally defeated by a vote of sixteen to fourteen. He also made the motion to adopt the committee report containing the Michigan Avenue loop recommendation.

Officials of the Detroit United Railway stated recently that work on the Michigan Avenue extension to the new station will be commenced within a few days and that the rails will be down within three weeks if the weather is favorable. All material, rails, ties, switches and the like, is already on hand, but it is the intention of the company to construct a temporary track at present. Work on the permanent track will be begun as early in the spring as possible.

Henry B. Ledyard, chairman of the board of the Michigan Central Railroad, said that trains will not be run into the station until street-railway connections are completed.

In order to learn the first cost of construction, the Street Railway Commission has asked the city accounting department and the engineer's department to furnish men to check up the work on the loop as it is done. The accounting department will keep up a complete set of books and these must correspond with the report of the engineers, who will check all the material used as well as the work done on the extension.

Newark Franchises Advanced

All but two of the twenty-nine franchise ordinances granted by the Board of Works of Newark, N. J., to the Public Service Railway for the improvement of its transportation facilities have been approved by Philander Betts, chief engineer of the State Board of Public Utility Commissioners, in a report made to that body. Four of the ordinances are vital to the plan of the proposed terminal building in Park Place, Newark, which calls for the expenditure of several million dollars. These are all approved by Mr. Betts, who concluded his recommendations as follows:

"Personally I should be inclined to continue efforts to have the city make the necessary changes in the city plan to provide more parallel routes. The company, on the other hand, has chosen to go ahead with the plan for a terminal, and as the responsibility for street railway service is, in the first instance, with the company, I believe it should be allowed to proceed with its plans.

"I therefore recommend that the board give its approval to ordinances Nos. 1, 2, 3 and 4, which are necessary for connections to the terminal building.

"I repeat my recommendations that the board give its approval to ordinances Nos. 10, 11, 13, 14, 15, 20, 21, 26 and 27.

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"I repeat my recommendation for the approval of ordinances Nos. 16, 22, 23 and 24.

"I strongly advise rearrangements of routes, and therefore now recommend that the board give its approval to ordinances Nos. 5, 6, 7, 9 and 12."

Mr. Betts then makes additional recommendations as follows:

"(1) That the ordinance providing for the terminal should be immediately approved in order that work may be commenced as soon as possible.

"(2) That the ordinance providing for re-routing in so far as recommended above be approved.

"(3) That Bloomfield, Paterson and Central Avenue cars be immediately re-routed in accordance with the arrangement recommended above.

"(4) That the track connections in Washington Street be arranged for without delay and, if possible, constructed this winter.

"(5) That the track connections through Kinney Street, Van Buren Street and Gotthart Street be constructed so as to be available for use during the next summer season."

Compensation for Joint Use of Poles Fixed

The decision in the arbitration proceedings to determine the terms and conditions upon which the city of Richmond, Va., and the Virginia Railway & Power Company are to make joint use of poles has been rendered by Judge Beverly T. Crump, who, as sole arbitrator, has fixed the rental at $1 a year for each pole used. The question arose with the building of the city electric plant. The city, in order to avoid the duplication of poles in the city streets, made use of the poles of the Virginia Railway & Power Company in stringing its transmission lines. It was agreed by both parties to submit the terms for the joint use of each other's poles to arbitration. Acting in pursuance of a Council joint resolution authorizing the city engineer to name a suitable disinterested person to act as arbitrator, Mr. Bolling recommended the appointment of Beverly T. Crump, at that time a private practising attorney. The recommendation was approved by both the Council and the power company, and hearings in the matter began on Sept. 11, 1913.

Judge Crump finds that the city used 1201 of the power company's poles in 1911. In 1912 the city used 1886 poles. Under the $1 a year rental determined upon in the award, the city owes the Virginia Railway & Power Company $3,087 in pole rentals to Jan. 1, 1913. The annual rental of $1 entitles the licensee to the use of one pole for the space of one standard eight-pin cross arm, not to exceed 10 ft. in length, the cross arm and attachments not to occupy more than 26 in. of the pole. Additional space on the pole, it is provided, shall be charged for at the rate of 40 cents for each 13 in. Additional cross arms are to be spaced at 26 in. and are to cost the licensee 80 cents each a year. The award provides in detail for the various contingencies that may arise in the joint use of poles. The company contended that the fee for the use of each pole should be $2, while the city contended that a rental of 75 cents a year for each pole used jointly by the licensee and the owner was adequate compensation to the owner.

Proposed New Haven Readjustment

A conference was held at Washington on Dec. 1 in regard to the measures to be taken by the officers of the New York, New Haven & Hartford Railroad for the readjustment of the company and its subsidiaries to bring the properties into compliance with the Sherman anti-trust act as interpreted by Attorney-General McReynolds. The conference was participated in by the Attorney-General; Howard Elliott, chairman of the board of directors of the New York, New Haven & Hartford Railroad; E. D. Robbins, general counsel of the company; Edgar J. Rich, general counsel of the Boston & Maine Railroad; L. S. Storrs, vice-president of the Connecticut Company, and John W. Crim, of counsel for the New York, New Haven & Hartford Railroad. Later the representatives of the company conferred with T. W. Gregory and Jesse C. Adkin, assistants to Mr. McReynolds. It is understood that the Attorney-General desires the separation of the New York, New Haven & Hartford Railroad from the Boston & Maine Railroad, the separation of the New Haven railroad from the Connecticut Company and the Rhode Island Company, the relinquishment by the New Haven railroad of its control of steamship lines and the nullification of the New Haven railroad's agreement with the Boston & Albany railroad. The hope is expressed that the representatives of the Department of Justice and the officers of the New Haven railroad and other companies will be able to agree upon a plan for dismemberment. If such an agreement for dismemberment is reached and the New Haven railroad and the other companies comply with it in the time fixed under an "agreed decree" by some United States district court, further civil proceedings will not be undertaken on behalf of the government against the company.

Labor Developments in Indianapolis

Immediately following the conclusion of the strike in Indianapolis, J. J. Thorpe, of the Amalgamated Association, and other labor organizers attempted to unionize the city and interurban trainmen of the Terre Haute division of the Terre Haute, Indianapolis & Eastern Traction Company, proceeding in much the same manner as with the Indianapolis city men. The company, however, had already completed an agreement with the men of the Terre Haute division drawn in the same form as that which was signed by the interurban men of its other divisions. All of the employees expressed themselves as desiring to enter into this agreement with the company, which would give them the right to submit matters to the Public Service Commission of Indiana if they could not be adjusted between themselves and the company, and the agreement, which was dated Nov. 11, 1913, was finally executed by Governor Ralston, Robert I. Todd, president of the Terre Haute, Indianapolis & Eastern lines, and each of the city and interurban trainmen of the Terre Haute division of the company. At the same time the following statement was published, signed by every employee of the company and addressed to the public:

"We, the undersigned, employees of the Terre Haute division, Terre Haute, Indianapolis & Eastern Traction Company, desire to state that we are satisfied with our wages, hours and conditions of service. The company has treated us well and we desire to continue in our places without interruption from any source.

"There is no trouble or controversy between the company and its own employees on the subject of wages or anything else. Threats have been made and are being made that we will be forced to abandon our positions by outside persons, not employed by the company, on account of the labor conditions prevailing in Indianapolis and elsewhere.

"We ask the sympathy and protection of the public officials and the law-abiding citizens of Terre Haute, so that we may continue to do our duty to the company and the traveling public and support our families."

Attempts were made by the labor organizers to induce the men to repudiate their agreement with the company and to organize and strike, but these efforts met with no success. On Nov. 29 officials of the United Mine Workers and the American Federation of Labor submitted a form of agreement to the company through officials of the Chamber of Commerce, the latter explaining that they were transmitting the document merely through request of the labor officials. This paper provided that the employees should be allowed to form an organization without any interference, that men discharged for activity in attempting to form a union should be reinstated, etc. The company replied to the officials of the Terre Haute Chamber of Commerce, explaining the terms of the agreement which had been entered into between the company and its employees, to which agreement the Governor of Indiana was a party, and further stated that there was no controvery between the company and its employees. The company expressed its opinion that from years of actual experience of persons charged with the responsibility of operating properties of like character it was not in the interest of the trainmen, the company, its patrons or the public that the men should be members of labor organizations; that the company had in a proper and lawful way made known its feeling on the question, but beyond that had never interfered and would not in the future inter-

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fere either directly or indirectly with the action of its employees in regard to that question. The company then stated that no employee had been discharged on acount of his affiliation with any labor organization and that every employee who had been dismissed was discharged for some specific breach of duty or discipline.

On Nov. 29 the labor officials and organizers notified the Governor, the city officials of Terre Haute and merchants in that city that, following a mass meeting to be held that day, a strike would probably be called. As nothing has developed to this date, it seems evident that they reconsidered their action in the matter and decided that it would be inadvisable to take any such step.

The Public Service Commission of Indiana, after conferring with attorneys representing the Indianapolis Traction & Terminal Company and its employees, announced the date of the first hearing of the grievance presented recently by the employees to the company and referred to the commission as Dec. 4. The hearing was continued on Dec. 5 and then an adjournment was taken to Dec. 9. The commission expects to devote four days of each week to the hearing until it is completed, reserving Mondays and Saturdays for other business. The sessions will be held in the Senate Chamber of the State House and will be open to the public.

The Chicago, South Bend & Northern Indiana Railway has executed agreements with the employees of its city lines in South Bend and the interurban divisions, including the lines of the Southern Michigan Railway. These agreements, to which Governor Ralston is a party, have been signed by every employee of the company and are practically the same in form as the agreement executed between the Terre Haute, Indianapolis & Eastern Traction Company and its employees, providing for arbitration by the Public Service Commission of all matters which may arise in the future and which cannot be adjusted between the company and its employees.

All of the grievances submitted by employees of the Indianapolis & Cincinnati Traction Company have been adjusted amicably between the trainmen and the company, with the exception of the demand for a flat wage scale of 35 cents an hour and a rearrangement of schedules on the two divisions. These matters have been referred to the Public Service Commission. The men withdrew several demands, and others in regard to operating conditions were modified and agreed to by the company. The demand for the right to organize and wear union buttons was revised and agreed to as follows:

"The treatment of its trainmen by the company and its negotiations, conferences and agreements with them shall be without difference or discrimination of any kind, on the part either of the company or any of its trainmen, on account of membership or non-membership or former membership or non-membership in any organization. The fact of such membership or non-membership shall not, by the wearing of badges or other insignia or otherwise, be advertised by any of the trainmen or in any way control or affect their treatment of or dealings with each other, in connection with the operation of the road."

The company also agreed that regular runs by regular trainmen of less than nine hours should be paid for as nine hours. The demands for time and one-half for overtime and that all straight runs should not be over ten and one-half hours were amended as follows:

"Pay time and one-half shall be allowed for all time worked by regular men other than on their regular scheduled runs; but this shall only apply to cases where before or after their regular runs regular men are called to do additional extra work, either on extra runs or other regular runs.

"All straight passenger runs shall not be over twelve hours. This shall not apply to swing passenger runs or to freight runs."

The other demands were in regard to local operating conditions, choosing of runs, time for reporting, etc., and were amended and adjusted without difficulty.

The trial of the thirty-three policemen who rebelled when instructed to ride on cars during the recent strikes in Indianapolis ended rather spectacularly on Nov. 24, when two of the three members of the Board of Safety voted to reinstate the policemen. Superintendent of Police Hyland at once tendered his resignation, after thirty years' service in the police department, and immediately afterward William E. Davis, chairman of the Board of Safety, resigned, both stating that they could not remain longer in their respective offices and retain their self-respect. Corporation Counsel Kealing and City Attorney Walker made strong pleas for the dismissal of the men. The evidence during the hearings, which lasted several days, disclosed the fact that Mayor Shank was responsible for the condition of affairs which existed during the strike of the car men, and that while he had not issued direct orders, he had personally told the men that they would not be expected to ride on cars or endanger their lives in protecting property or employees of the Indianapolis Traction & Terminal Company. Public sentiment was very strong against the Mayor when it was seen that it was largely due to his interference that the lack of protection by the police had permitted the tie-up of the city lines during the strike, and a committee of prominent business men, representing the commercial organizations, at once demanded the resignation of Mayor Shank, stating that if the then impending teamsters' strike was called he would be impeached.

On Nov. 28, after being informed by the labor men organizing the teamsters that further labor trouble was imminent, Mayor Shank resigned, and the office of Mayor fell automatically upon City Controller Harry R. Wallace, who at once took oath of office. Mayor Wallace at once appointed a new Board of Safety and confirmed the appointment of Acting Superintendent of Police Coffin. An almost entire reorganization of the police force followed, and men with military training were appointed to command the squads of police. When the teamsters' strike was called on Dec. 1 positive orders were issued by the Mayor, Board of Safety and Superintendent of Police that no interference with business would be permitted, and as a result, while a much larger body of men is on strike than during the street railway troubles, sympathizers who congregate on the streets are promptly dispersed by the police. Mayor Wallace has made it known that in the event of any further trouble developing on account of the street railway organizers attempting to bring about a sympathetic strike, policemen must absolutely obey orders and ride upon street cars and wagons if instructed to do so.

Method of Procedure of Washington Commission

H. C. Eddy, engineer of the Public Service Commission of the District of Columbia, has issued the following statement summarizing the methods of procedure of the department of the commission under his jurisdiction:

"Up to the present time the work of the department has been confined chiefly to matters relating to street railway operation and construction and the investigation of accidents occurring in connection with the operation of the various utilities in the District. In connection with the street railway work the department is divided into two bureaus, known as the bureau of traffic and the bureau of equipment. The former makes all investigations and handles all complaints relative to service, and the latter relative to maintenance of cars, tracks, etc.

"Two inspectors are constantly employed making observations of traffic conditions on various lines. Records are taken at the most congested points of the number of cars operated, schedules maintained, seating capacities of the cars and number of passengers carried. This is done not only during rush-hour periods, but at all hours of the day and night. Observations are sometimes taken simultaneously at two or three points on the same line, in order to ascertain traffic conditions. These observations are recorded on regular forms and filed in the office. Where service is found to be inadequate the matter is taken up with the company concerned, and the operation of additional cars has frequently resulted. By means of these observations and others taken at the ends of lines, a check is kept on the companies' schedules and on orders of the Interstate Commerce Commission and Public Utilities Commission, of which there are many now in effect on the various lines in the District.

"In order to ascertain conditions of traffic throughout the city, now that winter travel has reached the normal point, observations are being taken on all lines. One hundred and seventy-four observations have been made

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since Oct. 15. Inspectors also are continually on the alert to see if the regulations of the commission are being complied with. The bureau of equipment makes inspection of cars both in course of operation and at the carhouses. Cars in operation are inspected at terminals, when safety appliances are tested. Carhouse inspections consist of minute inspection of entire equipment. All these inspections are made at uncertain and unexpected moments. Defects found are generally reported to the companies with direction to repair them.

"All accidents in which persons are killed or injured are reported to the commission on forms provided by the board. These forms are required to be returned within three days of the date of an accident. When it is deemed necessary and advisable, a thorough investigation of the accident reported is made by representatives of the engineering department, the information thus obtained being for the commission's own use."

Experimental Farm Proposed by Electric Railway

In order better to promote the agricultural interests of those living along the line of one of its suburban lines, and incidentally to lay the foundation for a constantly increasing freight traffic over the line, the directors of the Bangor Railway & Electric Company, Bangor, Maine, have voted to purchase a farm and conduct it as an agricultural experimental station. A few years ago the Bangor Railway & Electric Company took over the Bangor & Northern Railway, which was being operated at a loss, and by changing the power and doing missionary work in the territory served by the line turned it into a paying proposition. The farm which the company proposes to take over consists of 125 acres about 6 miles from Bangor, and an engineer is now engaged in laying it out so that it may be used to the best advantage for demonstration purposes. There will be one-acre plots, highly cultivated for raising various kinds of crops. The farm will be equipped with driveways about the acre plots so that they may be easily seen at all times and the company will reconstruct the roadway in front of the farm in a manner best suited for a Maine highway. Model farm buildings will be erected, including a dairy and barns. The barns will represent the last word in sanitary equipment and hygienic arrangement. The foundation and floors will be of concrete, and electricity will play an important part in the operation of this department. Electric milking machines will be introduced, and the churns and other equipment for the dairy will be operated by electricity.

Settlement of General Electric Strike

A settlement between the General Electric Company and the striking employees at the Schenectady works was reached on Nov. 20. As a result the employees returned to work on Dec. 1. There was no disorder at any time and, so far as the demeanor of the men went, it remained to the last more of a "demonstration," as the men called it, than a strike. The announcement of the committee of employees in regard to the settlement follows in part:

"We do not question the right of the company to reduce its force when necessary in such manner as may be deemed best by the management. After careful consideration we believe that the action in calling a strike was largely due to a misunderstanding. Such employees as remained at work are to be subjected to no annoyance and every effort will be made to maintain cordial and loyal relations with the company."

The company agreed on its part to reinstate in other places within a week the two employees who were laid off and in whose behalf the "demonstration" of employees was called and agreed further not to discriminate against any of its employees on account of their participation in the strike.

Boston Elevated Wage Arbitration.—The arbitration board which heard evidence in the case of the employees of Boston Elevated Railway has extended for one week the time within which briefs of counsel must be filed with the board. The date now is Dec. 6.

Hearing in Regard to Batavia Purchase Postponed.—Capitalists of Batavia, N. Y., who are planning to buy the Buffalo & Williamsville Electric Railway, have asked for an extension of time to consider the purchase, and for that reason the hearing before the Public Service Commission of the Second District of New York on the application of the present owners to abandon the franchise in Batavia has been adjourned until Dec. 20. The hearing was scheduled for Nov. 28.

Contracts to Be Let for San Francisco Municipal Lines.—M. M. O'Shaughnessy, city engineer of San Francisco, announces that contracts will let about Jan. 1, 1914, for a second municipal carhouse, to cost $150,000, and for equipment to the following amounts: Rails, rail joints and fastenings, $250,000; tie rods and nuts, $5,000; tie plates, $20,000; rail spikes, $5,000; redwood cross ties, $50,000; copper rail bonds, $10,000; track special work, $200,000; trolley poles, $40,000; cars, $700,000; total, $1,280,000.

Revision of Banking Laws.—The sub-committee on savings banks of the Van Tuyl Commission appointed to prepare a revision of the laws of New York State relating to banking has under consideration recommendations to permit savings banks to make loans on Stock Exchange collateral, which would make them a factor in the call money market; authorizing the investment of savings deposits in equipment trust obligations of railroads, as well as general mortgage bonds, and requiring the gradual accumulation of larger surpluses of guaranty funds.

Conscience Money Letter.—T. J. Minary, president of the Louisville (Ky.) Railway, has received a letter postmarked Grand Rapids, Mich., inclosing $70, which is to reimburse the company for thefts committed while the writer of the letter was in its employ as conductor. The letter follows: "Dear Sir: It greatly worried me; was constantly on my conscience. Could not live happy until it's paid. Took it all—nickel at a time, while conductor. Pay you good interest on principal. Inclosed find $70. All I ask is to forgive me. Wish I had a job now—be honest as the days are long. Very respectfully yours, An Honest Thief."

Statement Regarding Pittsburgh Subway Ordinance.—The Pittsburgh (Pa.) Subway Company has concluded as follows a statement which it has issued explaining the application presented to the Council by the company asking for franchise rights: "The ordinance which we have presented represents our idea of a proper franchise. We think the simple form adopted by us is far better than the complicated and incomprehensible one that has become a fashion in subway ordinances in Pittsburgh. We believe that the ordinance advocated by us would be far more effective in protecting the city than any ordinance that has been presented before, while it would not hamper the company as much as the others in doing good work. We commend the new ordinance to respectful consideration."

Right of Company to Lay Tracks on Highway.—The Kentucky Court of Appeals has reversed the Jefferson Circuit Court of Louisville in dissolving an injunction against the fiscal court of Jefferson County in favor of the Louisville & Interurban Railroad. The question involved was the right of the traction company to lay tracks on a public highway. The company had secured a right-of-way covering the highway from the fiscal court; but this was later revoked, and the laborers employed by the company were arrested when they began construction work. The Court of Appeals holds that if in its double-tracking it encroached upon the highway to any unreasonable extent it was violating the law. The interurban company must now either build only a single track or secure right-of-way on the other side of the line.

Federal Regulation of Stock and Bond Issues Proposed.—Representative Sims, of Tennessee, introduced in the House on Nov. 29, 1913, a bill providing for federal regulation of the stock and bond issues of all interstate carriers, but aimed only at issues which post-date the enactment of the proposed legislation. It prohibits any such company from issuing stocks or bonds without the approval of the Interstate Commerce Commission after investigation by a public hearing. The bill, however, would exempt from its provisions notes issued by the carrier which mature not more than one year after their date, but such notes are not at any time to aggregate more than 5 per cent of the total of the stocks and bonds of such carrier which may have been

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issued and are outstanding. Representative Esch, of Wisconsin, has introduced a bill proposing a method of federal control of railway securities.

Conservation Through Electrification.—G. Percy Cole, of the Canadian General Electric Company, addressed the members of the Canadian Railway Club recently on "The Conservation of Natural Resources Through the Electrification of Railways." He spoke of the enormous cost of running locomotives by coal and estimated that the annual consumption of coal by locomotives in Canada and the United States is approximately 110,000,000 tons. He said that if it were possible to reduce this consumption two-thirds a yearly saving of $147,000,000 would be effected. Dr. L. A. Herdt and Professor McKay, of McGill University; L. C. Ord, of the Canadian Pacific Railway; W. H. Winterrod, electrical engineer of the Canadian Pacific Railway, and R. H. Wheeler, electrical engineer of the Canadian Northern Railway, took part in the discussion.

Well Equipped and Managed.—The Decatur *Daily Democrat* contained in its issue of Nov. 25, 1913, an article, "Well Equipped and Managed," in which the attention of the readers was called to the efficient organization which the company has built up. Referring to the personnel of the company, the article said: "Mr. Quinn, the receiver, does not take very much of the credit for the present conditions, but in his modest way gives full credit to the men who have had actual charge of the work. W. H. Fledderjohann, manager of the road, is a persevering and never-tiring worker and he is a real manager with an eye on every department every minute. He deserves to win out and everybody believes he will. He is assisted in his work by competent help. The only idea in this article is to impart to our readers information in regard to the plant and the management and to impress you with the idea that it is safe and a pleasure to travel over the Decatur interurban. We believe the road has a future, and we are sure it is well managed in every department.'

Decisions by United States Supreme Court.—In the case brought by the Kansas City Southern Railway, which alleged that the section of the interstate commerce act which authorizes the commission to require the carriers to conform to a uniform system of accounting is an unreasonable regulation, the United States Supreme Court on Dec. 1 held that the system is a reasonable and necessary regulation. The Supreme Court in a decision rendered on Dec. 1 also upheld a decree which had denied a petition of the Louisville & Nashville Railroad to have an order of the Kentucky Railroad Commission set aside. The railroad attacked the validity of the McChord law, under which the railway commission had acted, on the ground that the law conferred on the State commission powers that the railroad called "judicial." Justice Hughes delivered the opinion, in which he held that the right of a carrier to make intrastate rates is subject to the authority of the State. He declared that the proceedings prescribed by the McChord law to ascertain the facts on which a rate is to be judged as to its reasonableness are not judicial as the railroads contended, but legislative.

Franchise Draft for Kansas City Voters.—Acting under instructions from Judge William C. Hook, Robert J. Dunham and Ford F. Harvey, receivers of the Metropolitan Street Railway, Kansas City, have notified all registered voters that they will receive shortly a condensed draft of the proposed new franchise as well as the ordinance in full. The receivers asked the voters to read the grant carefully and form an opinion on its merits or demerits. Judge Hook recently advised the receivers to inform the Kansas City public fully regarding the proposed franchise. The public attended the recent meetings of the Council committee and advanced suggestions. The committee in urging all who are interested in the franchise to attend the meeting even placed advertisements to this effect in the daily papers. The question of whether or not street cars shall be allowed on the plaza in front of the new Union Depot is still pending. It appears likely, however, that cars will run to the door of the depot on one or two lines, at least. Various improvement associations of Kansas City have asked that the lines be designated on which extensions will be made under the new franchise. The ordinance now provides for extensions without naming the districts.

Arnold and Wallace Agree on Chicago Terminal Recommendations.—John F. Wallace, employed by the terminal committee of the Chicago City Council, and Bion J. Arnold, employed by the terminal plan committee, an independent organization, as experts to investigate and make recommendations on the rearrangement and development of Chicago steam railroad terminals, have reconciled the differences between their two reports. As a direct result of this agreement the terminal committee unanimously voted to permit the new Pennsylvania station to be erected at the site desired by the company. The committee based its decision for action upon that part of the agreement covering the desirability of two central stations in addition to the present Northwestern station. Although the committee acted unanimously on this proposition, it was provided that the ordinance should embrace a number of concessions to the city before it would be voted to send it to the City Council for final passage. The drafting of the ordinance governing the location of the Pennsylvania passenger and freight terminals was put in the hands of a commission consisting of five members of the terminal committee and the corporation counsel. These are to be assisted by John F. Wallace, Bion J. Arnold and Walter L. Fisher, representing the citizens' terminal committee; Paul Lazenby, chief engineer of the Chicago Plan Commission, and Robert Redfield, special attorney for the Pennsylvania Company.

PROGRAMS OF ASSOCIATION MEETINGS

New York Electric Railway Association

As announced previously in the ELECTRIC RAILWAY JOURNAL, the eighteenth quarterly meeting of the New York Electric Railway Association will be held in assembly room No. 1 on the fifth floor of the Engineering Societies Building, 29 West Thirty-ninth Street, New York, on Dec. 9, 1913, at 10 a. m. Luncheon will be provided by the association and served in an adjoining room at 1 p. m. There will be no informal dinner the evening previous to business session. The general subject of the meeting will be public relations and the introductory remarks will be made by C. Loomis Allen, chairman of the committee on public relations. Addresses will be made by Edward E. McCall, chairman of the Public Service Commission of the First District of New York; C. S. Sims, second vice-president of the Delaware & Hudson Company, Albany, N. Y.; J. C. DeLong, president of the Syracuse (N. Y.) Lighting Company; J. H. Pardee, president of the J. G. White Management Corporation, New York, N. Y., and Joseph K. Choate, vice-president of the J. G. White Management Corporation, New York, N. Y. An open discussion by those in attendance will follow.

Central Electric Railway Accountants' Association

The annual meeting of the Central Electric Railway Accountants' Association will be held at the Hollenden Hotel, Cleveland, Ohio, on Dec. 12 and 13, 1913. The executive committee of the association will meet at 10 a. m. on Dec. 12, and at 1 p. m. the regular business session will begin. During the session there will be presented the address of the president, the report of the standing committee on freight accounts, the report of the standing committee on passenger accounts and the report of the committee on query box questions. The session will be concluded with the following address:

"Proposed Changes in the Classification of Accounts of Electric Railways," by W. H. Forse, Jr., treasurer of the Union Traction Company of Indiana.

The program of addresses for the session of the association on Dec. 13 follows:

"New Federal Income Tax Law," by L. T. Hixson, auditor of the Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., and by H. B. Cavanaugh, auditor of the Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio.

"Some Essentials of Public Service Accounting," by A. F. Elkins, auditor of the Columbus, Delaware & Marion Railway, Cincinnati, Ohio.

General discussion: "Proper Method of Accounting for Flood Losses," led by A. F. Elkins.

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Financial and Corporate

Stock and Money Markets

Dec. 3, 1913.

In the late trading on the New York Stock Exchange to-day buying orders on a large scale were executed, with the result that advances of from one to two points were recorded in a number of issues. These advances were shared in by the low-priced industrials, and they made gains proportionate with the rest of the list. The steady accumulation of New Haven resulted in a further advance in that issue. Rates in the money market to-day were: Call, 5 @ 6 per cent; sixty days, ninety days and four months, 5 @ 5¼ per cent; five and six months, 4¾ @ 5 per cent.

Considerable strength was displayed in the trading in Philadelphia to-day. The market was broad and the demand for bonds was good.

A strong tone featured the stock market in Chicago to-day and the leaders scored gains. Bonds were steady.

In Boston the tone of the market was strong to-day and with few exceptions advances were recorded. There was little demand for bonds.

Trading on the Stock Exchange in Baltimore to-day was narrow and dull. The bulk of the transactions was in United Railways & Electric.

Quotations of traction and manufacturing securities as compared with last week follow:

	Nov. 22	Dec. 3
American Brake Shoe & Foundry (common)	87	87
American Brake Shoe & Foundry (preferred)	128	127
American Cities Company (common)	36	36
American Cities Company (preferred)	64½	64
American Light & Traction Company (common)	334	333
American Light & Traction Company (preferred)	106	106
American Railways Company	38¾	38
Aurora, Elgin & Chicago Railroad (common)	a41	a42
Aurora, Elgin & Chicago Railroad (preferred)	82	82
Boston Elevated Railway	85	85
Boston Suburban Electric Companies (common)	7	7
Boston Suburban Electric Companies (preferred)	60	60
Boston & Worcester Electric Companies (common)	*6½	*6½
Boston & Worcester Electric Companies (preferred)	39	39
Brooklyn Rapid Transit Company	87⅛	87⅛
Capital Traction Company, Washington	111½	110
Chicago City Railway	160	160
Chicago Elevated Railways (common)	25	25
Chicago Elevated Railways (preferred)	75	75
Chicago Railways, ptcptg., ctf. 1	90	90
Chicago Railways, ptcptg., ctf. 2	26½	28
Chicago Railways, ptcptg., ctf. 3	5½	7
Chicago Railways, ptcptg., ctf. 4	2	2
Cincinnati Street Railway	105	110
Cleveland Railway	104	104¼
Cleveland, Southwestern & Columbus Ry. (common)	*5½	*5½
Cleveland, Southwestern & Columbus Ry. (preferred)	*30	*30
Columbus Railway & Light Company	18	18
Columbus Railway (common)	59½	59½
Columbus Railway (preferred)	88	88
Denver & Northwestern Railway	*111	*111
Detroit & United Railway	68	80
General Electric Company	139	139
Georgia Railway & Electric Company (common)	119	118¾
Georgia Railway & Electric Company (preferred)	85⅞	85
Interborough Metropolitan Company (common)	14⅛	14¼
Interborough Metropolitan Company (preferred)	58½	58¾
International Traction Company (common)	*40	*40
International Traction Company (preferred)	*95	*95
Kansas City Railway & Light Company (common)	*22	*22
Kansas City Railway & Light Company (preferred)	*30	*30
Lake Shore Electric Railway (common)	*7	*7
Lake Shore Electric Railway (1st preferred)	*92	*92
Lake Shore Electric Railway (2d preferred)	*25	*25
Manhattan Railway	130	130
Massachusetts Electric Companies (common)	10½	10½
Massachusetts Electric Companies (preferred)	64	66¼
Milwaukee Electric Railway & Light Co. (preferred)	*100	*100
Norfolk Railway & Light Company	*25¼	*25¼
North American Company	70½	70
Northern Ohio Light & Traction Company (common)	66¼	66¼
Northern Ohio Light & Traction Company (preferred)	97	97
Philadelphia Company, Pittsburgh (common)	39½	39
Philadelphia Company, Pittsburgh (preferred)	39	39
Philadelphia Rapid Transit Company	18⅜	18¼
Portland Railway, Light & Power Company	56	56
Public Service Corporation	107	107
Third Avenue Railway, New York	39⅝	40¼
Toledo Traction, Light & Power Company (common)	30	30
Toledo Traction, Light & Power Company (preferred)	80	80
Twin City Rapid Transit Co., Minneapolis (common)	104	105
Union Traction Company of Indiana (common)	*13	*13
Union Traction Company of Indiana (1st preferred)	*83	*83
Union Traction Company of Indiana (2d preferred)	*25	*25
United Rys. & Electric Company (Baltimore)	25⅛	25⅛
United Rys. Inv. Company (common)	17	19
United Rys. Inv. Company (preferred)	34	35½
Virginia Railway & Power Company (common)	56	56
Virginia Railway & Power Company (preferred)	93½	93½
Washington Ry. & Electric Company (common)	86½	86½
Washington Ry. & Electric Company (preferred)	86	86
West End Street Railway, Boston (common)	67⅞	68½
West End Street Railway, Boston (preferred)	90	90
Westinghouse Elec. & Mfg. Company	65	64⅞
Westinghouse Elec. & Mfg. Company (1st preferred)	112	112

*Last sale. a Asked.

ANNUAL REPORTS

New South Wales Government Railways & Tramways

The report of the New South Wales Government Railways & Tramways for the year ended June 30, 1913, contained the following financial statement:

	1913		1912	
	Railways	Tramways	Railways	Tramways
Earnings	£6,748,985	£1,754,566	£6,491,473	£1,581,393
Working expenses	4,644,881	1,572,190	4,169,591	1,331,413
Balance	£2,104,104	£182,376	£2,321,882	£249,980
Interest on capital	1,917,200	214,832	1,906,369	192,284
Surplus	£186,904	*£32,456	£415,513	£57,696

*Deficit.

The total capital expenditure on tramway lines open for traffic on June 30, 1913, was £6,699,305. The expenditure charged to the tramway capital account during the year amounted to £1,034,981. The total tramway earnings amounted to £1,754,566, as compared with £1,581,393 the previous year, being an increase of £173,173, or 10.95 per cent. The tramway working expenses amounted to £1,572,190, as compared with £1,331,413 for the previous year, or an increase of £240,777. The percentage of expenditure to receipts is 89.61 per cent, as compared with 84.19 per cent the year before. The net result, after providing for working expenses and interest on the capital invested, is a tramway deficit of £32,456, as compared with a surplus of £57,696 the previous year. During the year 294,455,452 passengers were carried, as compared with 266,789,546 in the previous year, or an increase of 27,665,906, without any tram accident resulting in loss of life to any of the passengers. The earnings per tram mile during both 1912 and 1913 were 1s. 3½d. The working expenses per tram during 1913 were 1s. 2d. and during 1912 1s. 1d., giving a return per tram mile during 1913 of 1½d. and during 1912 of 2½d. The tram mileage during 1913 was 26,954,767 and during 1912 24,362,219.

The permanent way, works, buildings, rolling stock, machinery and plant were maintained in good working condition. In connection with the maintenance of the tramway tracks 57,500 tons of road metal were used, and 162,490 sq. yd. of wood paving and 53,460 sq. yd. of macadam were top-dressed with tar, while 8 miles 13 chains of track were treated with carborundum rail grinder for corrugation. Thirteen miles 67 chains of line have been relaid. 4 miles 3 chains duplicated, and a number of connections, storage sidings, loops, etc., have been provided at various points to facilitate the running of the cars. Nine new waiting rooms at various points and water tanks at St. Leonard's and Kensington were erected.

During the year 157 eighty-passenger bogie motor cars, eighteen fifty-passenger four-wheeled motor cars, nine ballast trucks, seven trail ballast trucks and two motor-driven water sprinklers have been added to stock. Four steam trail cars, two trail water sprinklers and one steam motor were condemned and two trail cars were sold, the original cost in each case being written off from capital to working expenses. One four-wheeled motor car was converted to a service vehicle. There were 389 electric cars overhauled and repainted; 650 electric car trucks received overhaul and general repairs; 2597 armatures were rewound, and a large number of others received minor repairs.

One 7500-kw turbo-alternator, with auxiliary motors, has been installed and was brought into operation on Dec. 25, 1912, and one 500-kw turbo-alternator is being erected. Two 850-kw direct-current generators have been replaced by three 1000-kw rotary converters with the necessary switch gear and transformers, and two additional 1000-kw converters are now being erected. The total electric current output for the year was 89,113,036 kw-hr., of which the alternating-current supply was 78,090,695 kw-hr. and the direct-current 11,022,341 kw-hr., being a total increase over the figures for the previous year of 11,578,757 kw-hr., or 14.93 per cent.

The total staff employed on June 30 numbered 41,322, the average throughout the year being 39,831, viz.: railways, 30,661; tramways, 9170, as compared with 26,574 and 7921 respectively for the previous year, or an increase of 5336.

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The value of the concessions and advances made to the whole of the staff, whether engaged on capital or working expenses account, represent a cost at the rate of £282,230 per annum, in which the wages staff participates to the extent of £226,378 per annum.

Keen interest in ambulance work continues to be displayed by the staff generally. The total strength of the corps is now 7014, as compared with 5988 last year—an increase of 1026, or 17 per cent. Ambulance instruction classes have been established at 175 places and the attendance of members has been good. Complete ambulance equipment has been provided at all depots and important stations, as well as in the brake vans of all main line and through trains, the total appliances distributed for use being 524 stretchers, 242 chests, 152 small boxes, seven hand-wheel litters, one ambulance wagon and equipment for surgeons' first-aid purposes at Sydney, Newcastle and twelve important country stations.

The statement for the year of the government railways superannuation account shows that the contributions to the account at June 30, 1913, numbered 24,026. The number of employees retired from active service and placed on pensions during the year was 282 and the total number of pensioners on the fund at June 30, 1913, was 709. There was paid in pension allowances during the year the sum of £37,698, making a total of pensions paid since the inception of the account of £61,191. There remains a credit balance June 30, 1913, of £60,210.

Cape Electric Tramways, Ltd.

The profit and loss statement of the Cape Electric Tramways, Ltd., Cape Town, S. A., for the twelve months ended June 30, 1913, follows:

Profits of the Cape Town and Port Elizabeth Companies	£83,268
Interest on investments, etc.	2,441
Transfer fees	35
Total	£85,744
General and office expenses: Rent, rates and taxes, salaries, professional and legal charges, cables and telegrams, traveling expenses, printing and stationery, income tax, etc.	£3,266
Directors' fees	1,300
Trustees' fees	200
Total	£4,766
Net income	£80,978
Interest on debentures	£25,077
Amount set aside for redemption of 6 per cent mortgage debentures	11,900
Amount set aside for redemption of "B" 5 per cent mortgage debentures	11,050
Premium on 6 per cent mortgage debentures redeemable July 1, 1913	714
Total	£48,741
Profit for period	£32,237

L. Breitmeyer and S. W. Jameson, chairman and secretary of the board of directors, respectively, say in part:

"After taking into account the balance brought forward from last year, a net credit balance of £35,079 remains in the profit and loss surplus. From this sum the reserve fund has been credited with the sum of £8,000, leaving a balance of £27,078.

"The result of the operations for the past year continues to show a further increase in earnings on the figures of the previous year in both Cape Town and Port Elizabeth, and enables the directors to recommend the payment of a dividend of 5 per cent free of income tax on the ordinary share capital of the company. This will absorb the sum of £24,561, and the balance of £2,517 it is proposed to carry forward to next year's account.

"During the past year the tramways in Cape Town carried 14,779,709 passengers and the receipts amounted to £144,222, as against 13,733,656 passengers earning £135,369 for the year 1911-12.

"In Port Elizabeth 4,155,711 passengers were carried, earning £43,036, as against 3,747,913 passengers earning £39,823 for the year 1911-12. To meet the expansion of the traffic in Port Elizabeth, arrangements have been made to increase both rolling stock and power plant."

Extracts from the reports of the general managers at Cape Town and Port Elizabeth for the year ended June 30, 1913, were attached to the above report, giving greater details as to the workings of the companies.

J. A. Barkley, general manager of the Cape Town Companies, says in part:

"The total revenue for 1913 was £144,222, as compared with £135,369 in 1912; the operating expenditure in 1913 £77,858, in 1912 £70,736, and the gross profit in 1913 £66,363, in 1912 £64,633, an increase of £1,730.

"A substantial increase has been made in the operating expenditure, owing largely to the increase in the rate of wages. The increased price of fuel has also been a serious factor in the increased expenditure, while the age of the rolling stock and permanent way has necessitated the increase in their cost of upkeep in order to give and to maintain the efficient service demanded by the Cape Town public.

"There has also been a large increase in the number of passengers carried as compared with former years. This growth of traffic has necessitated additional rolling stock, the requisition for which was made by the company early in January.

"The power station expenditure shows an increase of £1,869. This is partly due to the increased power consumption, due to the increased traffic and mileage, the output totaling 3,434,309 units, an increase of 212,067 units over the previous year. The increased cost of fuel accounts for approximately £1,268.

"Many of the older and larger cars need to be gradually overhauled and repaired, and this can be done more efficiently when new cars now on order are received. As regards the permanent way, the time has now arrived when provision will have to be made for renewing the older portion of the track, which will require to be relaid within the next four or five years.

"A number of unavoidable accidents occurred during the year, but the large majority were trifling in character. The total amount paid on this account was £304.

"The mileage of the company shows an increase of 32,838 miles over the previous year. At the golf links 675 ft. of track was completed at a cost of £411; of this the permanent way cost £336 and the overhead line £75.

"During the year under review the total revenue amounted to £43,036 and was earned as follows: Traffic receipts, £42,283; miscellaneous receipts, £753, or a total of £43,036. These figures show an increase as compared with the previous year of £3,277 and a decrease of £64 in miscellaneous receipts.

"The operating expenditure for the year was £25,311, or 58.8 per cent of the revenue, and an increase of £2,648 over last year. The increase in earnings of the company was £3,213, or 8.069 per cent, an average monthly increase of £268.

"During the year considerable progress was made in the beach improvement scheme at Humewood. Some 1400 ft. of promenade has been made up and further extensions are in progress. A fine new bathing house is in course of construction, and considerable improvements in the surroundings are being carried out. The Humewood track was extended about 1400 ft. along the promenade at a cost of £842, and was opened for traffic on Dec. 25, 1912."

Allgemeine Elektricitäts Gesellschaft

The report of the Allgemeine Elektricitäts Gesellschaft, Berlin, Germany, for the fiscal year ended June 30, 1913, shows that during the year the company manufactured electrical apparatus with a total rating of 2,533,985 kw. This output included one 20,000-kw, three 15,500-kw and four 11,500-kw turbo-generators. The total business was $15,000,000 in excess of the preceding year. The net earnings of $7,226,121 enabled the company to pay a dividend of 14 per cent on a capitalization of $38,725,000, to add $250,000 to the employees' welfare fund, to give $300,000 in premiums to officials and to make other payments, including taxes and reserve. The report states that the development of metallic filament lamps has decreased the output of carbon lamps and arc lamps. The new ½-watt nitrogen lamp is making very gratifying progress and is now manufactured in capacities of 600 cp to 3000 cp. The electric railway business is also very satisfactory, particularly in orders for high-tension d.c. apparatus and for single-phase heavy railway equipment. Orders are in hand for twenty-seven electric locomotives.

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Columbus Railway & Light Company Reorganization

The committee of ten having in charge the reorganization of the street railway and electric light properties of Columbus, Ohio, at a meeting held on Nov. 26, 1913, declared the plan operative as modified by the circular letter sent out on Nov. 10. Meetings of the stockholders of the various companies concerned have been called and as a sufficient number of shares of stock have been deposited with the committee to carry out the plan, it only remains for the legal formalities to be complied with to bring about this reorganization, which has been under consideration for some months past.

The plan as modified contemplates the union of the Columbus Railway and the Columbus Edison Company properties with the Columbus Railway, Power & Light Company property.

The Columbus Light, Heat & Power Company property will be controlled under the lease to the Columbus Railway & Light Company as it has been for some years past.

Modification of the plan will cause some change in the arrangement by which stockholders of the Columbus Railway & Light Company were to receive stock in the new company on the dissolution of the Columbus Railway & Light Company, but the committee is working out a plan which, it is believed, will be satisfactory to these stockholders.

Special Stock Exchange Committee to Study Financing Abuses

The governors of the New York Stock Exchange have adopted the following resolutions calling upon the president to name a committee of five or more members to make a special study of means for remedying the abuses of corporation financing:

"Whereas the questions involved in the incorporation, promotion and capitalization of corporations and the flotation of their securities vitally affect the securities listed on the New York Stock Exchange, as well as the great quantity of securities not so listed; and

"Whereas it is the desire of this exchange to co-operate as far as possible in bringing about the adoption of uniform measures for the greater protection of the investing public through more careful supervision of corporate organization with greater publicity and fuller and more frequent reports of operations than has been customary with many companies in the past, now, therefore, be it

"Resolved, That a committee of five or more be appointed by the president to make the above-mentioned matters the subject of special study, with the object of aiding in such solution of these questions as will tend to increase the safety and integrity of American investments and at the same time afford every encouragement to legitimate enterprise.

"Said committee shall report from time to time to the governing committee."

Canadian-American Power Hearing Concluded

The hearing on the application made by the Canadian-American Power Corporation to the Public Service Commission of the Second District of New York to capitalize its contract with the Niagara Falls Development Company at $3,000,000 and import 46,000 hp from Niagara Falls, Ont., was closed on Dec. 1. Martin S. Decker, chairman of the commission, made this explanation:

"The matter is closed on the records of the commission. The Buffalo & Lake Erie Traction Company no longer figures in the application now before the commission, and for that reason the commission cannot see why this matter should not be closed and eliminated from its records."

This means that if the majority bondholders of the Buffalo & Lake Erie Traction Company desire to reorganize the company and then acquire the capital stock of the Buffalo, Lockport & Rochester Railway another application will have to be filed with the commission.

Decision was reserved by the commission on the application of the Canadian-American Power Corporation.

The plan of reorganization of the Buffalo & Lake Erie Traction Company as modified some time ago provided for the acquisition by that company of the securities of the Canadian-American Power Corporation and the property of the Buffalo, Lockport & Rochester Railway.

Corporation Expense Returns in Massachusetts

The Massachusetts Public Service Commission has ruled that each company subject to its supervision shall after Oct. 1, 1913, submit, in form the commission prescribes, a sworn quarterly statement showing:

All payments by it, directly or indirectly, to any newspaper, periodical or advertising agency, or any employee thereof, with all other payments for advertising or other publicity, excluding expenses of timetables, telephone directories, circulars and pamphlets of information.

All salaries and expenses of regular legal department, not including payments for damages and payments for legal services, to any person resident or doing business for the company in Massachusetts although not regularly connected with its legal department.

All payments for any services in connection with legislation in Massachusetts, or action of any public officer.

All sums paid directly or indirectly for influencing nominations or elections of any political party or policy.

Sworn statement of all contracts as to advertising, publicity, legal work or work connected with legislation or influencing opinion, with copies of such contracts and of all votes of directors in respect to the same.

All other payments charged by steam railroads to "other expenses" and by street railways to "general expenses," and by other corporations expenses of the same general nature. Such statement is to show the name and address of payees, amounts and dates of payment and nature of services.

Any company having annual gross of or less than $50,0000 may, on application, in discretion of the commission, be excused from this order on substitute terms the commission may designate. Any corporation having annual gross greater than $50,000 may, for good cause shown, be so excused, the commission reserving right to make such substitute order as special conditions require.

Bristol & Plainville Tramway, Bristol, Conn.—Richter & Company, Hartford, Conn., are reported to have secured control of the Bristol & Plainville Tramway through the purchase of the 819 shares of the outstanding capital stock of the company held by the New York, New Haven & Hartford Railroad through one of its subsidiaries. The authorized capital stock of the Bristol & Plainville Tramway is $1,000,000, of which $375,000 is outstanding. The company paid dividends of 7 per cent in 1910 and 8 per cent in 1911 and 1912. The book value of the stock of the company held by the New York, New Haven & Hartford Railroad was given recently as $127,428.

California Railway & Power Company, San Francisco, Cal.—A circular is being sent to the holders of the prior preference stock of the California Railway & Power Company advising that the company proposes to redeem 1000 shares, as provided by the certificate of incorporation. The certificates to be redeemed will be decided by lot at the offices of the Bankers' Trust Company, New York, on Jan. 2. Stockholders of record of Dec. 31 will be permitted to participate.

Eighth Avenue Railroad, New York, N. Y.—On the application of the Eighth Avenue Railroad the Public Service Commission for the First District of New York has authorized the issuance by that company of $750,000 in certificates of indebtedness to refund similar certificates in the same amount, issued in 1884 and due Feb. 1, 1914. The new certificates are to be limited to five years instead of twenty years, as requested by the company, and are to be issued only to the holders of the outstanding certificates they are intended to retire.

Empire United Railways, Inc., Syracuse, N. Y.—The Public Service Commission of the Second District of New York has authorized the Empire United Railways, Inc., to execute a trust deed to secure an issue of approximately $20,000,000 par value of 5 per cent bonds. Of the $20,000,000 permission is given to issue under the new mortgage bonds to the par value of $9,617,000, the major portion of the proceeds of which will be used to retire obligations of the

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Rochester, Syracuse & Eastern Railway, the Syracuse, Lake Shore & Northern Railroad and the Auburn & Northern Electric Railroad. Bonds to the par value of $5,000,000 are to be reserved to refund, exchange, purchase or otherwise retire $5,000,000 par value, first mortgage, 5 per cent forty-year bonds of the Rochester, Syracuse & Eastern Railway; $2,500,000, par value, will be reserved to refund or otherwise retire an equal amount of bonds of the Syracuse, Lake Shore & Northern Railroad, and $280,000, par value, will be used to retire $250,000 of the Auburn & Northern Electric Railroad. In addition to these reservations, other proceeds of the new issue will be used for the retirement of other outstanding obligations of the companies constituting the Empire United Railways, including the 6 per cent three-year notes of the Rochester, Syracuse & Eastern Railway. The new $20,000,000 mortgage will be known as a first and refunding mortgage and is arranged to provide funds in the future for the purpose of carrying on extension and construction work.

Ephrata & Lebanon Street Railway, Ephrata, Pa.—H. P. Taylor & Company, Pittsburgh, Pa., have purchased $200,000 of first mortgage 5 per cent bonds of the Ephrata & Lebanon Street Railway due in 1942 covering at $10,000 per mile the line connecting the cities of Ephrata and Lebanon and fourteen intermediate towns.

Erie (Pa.) Southern Railway.—The Erie Southern Railway, successor to the bankrupt Erie, Cambridge, Union & Corry Traction Company, has filed notice of the authorization of a funded debt of $2,000,000.

Federal Light & Traction Company, New York, N. Y.—A meeting of the stockholders of the Federal Light & Traction Company has been called for Dec. 12, 1913, to vote on the following propositions: (1) The execution of a trust agreement with the Columbia-Knickerbocker Trust Company, New York, N. Y., as trustee, to be dated Dec. 1, 1913, under which may be issued ten-year gold notes of not exceeding the aggregate of $10,000,000, dated Dec. 1, 1913, to bear such rate of interest not exceeding 7 per cent per annum, and to be redeemable on thirty days at such amount not exceeding 105, as may be fixed by the board from time to time and designated in such notes when issued. (2) To approve the offering to the stockholders for subscription at par and interest of $725,000 of such notes. (3) To approve the execution of an agreement with a syndicate for the sale to the syndicate at par and accrued interest of all of such $725,000 as shall not be subscribed and paid for by the stockholders and to pay to said syndicate a compensation for said agreement. (4) To approve the issuance with such $725,000 of notes to be presently issued and sold of option warrants for common stock of equal par amount entitling the holders to obtain such stock at par at any time prior to Dec. 1, 1923; payment for such stock to be made in cash, or in lieu of such payment, by surrender of notes issued under said trust agreement dated Dec. 1, 1913, that have been outstanding not less than two years and have not been called for previous redemption.

Fresno, Hanford & Summit Lake Interurban Railway, Fresno, Cal.—The directors of the Fresno, Hanford & Summit Lake Interurban Railway have decided to issue at this time $71,000, par value, of 7 per cent preferred stock under the recent order of the Railroad Commission authorizing the company to issue $225,000 of preferred stock.

Hillsboro (Ill.) Railway.—The Sangamon Valley Railroad and the Hillsboro Railway have been absorbed by the Southern Illinois Light & Power Company.

Jefferson City Bridge & Transit Company, Jefferson City, Mo.—The McKinley interests through the Western Railways & Light Company have purchased the property of the Jefferson City Bridge & Transit Company, consisting of a bridge across the Missouri River valued at more than $250,000 and 6 miles of street railway operating in the state capital and vicinity. It is said that the McKinley interests propose to extend the Jefferson City line to Columbia and Mexico, Mo. Plans for these extensions, made by the Jefferson City Bridge & Transit Company before the purchase, were approved by the Public Service Commission. Several franchises along this new proposed line have been obtained. The Jefferson City Bridge & Transit Company has applied to the Public Service Commission of Missouri for permission to issue $1,500,000 of bonds to provide funds for extensions and improvements.

Manchester Traction, Light & Power Company, Manchester, N. H.—The stockholders of the Manchester Traction, Light & Power Company have voted to purchase the $600,000 of stock of the Nashua Light, Heat & Power Company.

Mexico Tramways, Mexico City, Mex.—The stockholders of the Mexico Tramways have authorized an increase in the capital stock of the company from $20,000,000 to $30,000,000 and supplementary letters patent have been issued at Ottawa, Ont. It is proposed to devote $6,000,000 of the additional stock to the conversion of 6 per cent three-year notes and reserve the remaining $4,000,000 for future needs.

New York (N. Y.) Railways.—Permission was recently granted to the New York Railways to purchase certain traction securities of a face value of $4,500,000 for a sum not to exceed $1,805. These securities, nearly all practically worthless, were once in the possession of the Metropolitan Street Railway, and on May 19 were sold at public auction by William L. Turner, the special master in the traction cases. They eventually passed into the ownership of William W. Ladd, receiver for the New York City Railway. To avoid any risk of their ownership giving opportunity to any one to cause trouble to the New York Railways it sought approval of its purchasing them.

Norwich & Westerly Traction Company, Norwich, Conn.—A meeting of the stockholders of the Groton & Stonington Street Railroad has been called to pass upon the proposal of the Norwich & Westerly Traction Company to lease the property for ten years and assume the payment of fixed charges and a rental of $36,000 a year.

Piedmont & Northern Railway, Charlotte, N. C.—The stockholders of the Piedmont & Northern Railway will vote on Dec. 20 on the question of increasing the capital stock of the company from $5,000,000 to $15,000,000 as part of a plan to merge with the company the Piedmont Traction Company and the Greenville, Spartanburg & Anderson Railway.

Regina (Sask.) Municipal Railway.—According to a new statement of income, profit and loss recently issued by the Regina Municipal Railway for the eight months ended Aug. 30, 1913, the gross income of the company amounted to $115,102 and the expenditures for the period $102,615, leaving a surplus from operation of $13,276. Interest on the monthly capital credit balances from Jan. 1 to Aug. 31 to the amount of $4,936 gave a total income of $18,213, from which capital charges of $50,086 were deducted, leaving a deficit of $31,872.

Third Avenue Railway, New York, N. Y.—According to a decision recently handed down by the United States Supreme Court, receivers of insolvent corporations are not required to pay the corporation tax imposed by the Paine-Aldrich law. This decision was in the case of the Third Avenue Railway and the Metropolitan Street Railway as noted in the ELECTRIC RAILWAY JOURNAL of Oct. 25, 1913. The contention of the companies that they were not "doing business" within the meaning of the law was sustained.

United Gas & Electric Corporation, New York, N. Y.—It has been decided to increase the number of directors of the United Gas & Electric Corporation from fifteen to twenty-five, and a meeting of the stockholders of the company has been called for Dec. 17. The new directors will be George W. Bacon, New York; John Q. Gannon, New Orleans; W. P. G. Harding, Birmingham; A. H. Wiggin, New York; A. J. Hemphill, New York; F. M. Kirby, Wilkes-Barre; Frank A. Sayles, Pawtucket; R. Lancaster Williams, Baltimore; Frank V. Hayne, New Orleans, and S. Z. Mitchell, New York.

United Railroads, San Francisco, Cal.—Ladenburg, Thalmann & Company, New York, N. Y., and E. H. Rollins & Sons, Boston, Mass., have contracted with the United Railroads of San Francisco for an extension of the Market Street Cable Company first mortgage 6 per cent bonds for a period of two years, or until Dec. 15, 1915.

Washington Railway & Electric Company, Washington, D. C.—The Washington Railway & Electric Company has leased the Washington, Spa Spring & Gretna Railroad, which runs from Fifteenth and H Streets, N. E., Washington, to Berwyn, Md.

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Dividends Declared

Brooklyn (N. Y.) Rapid Transit Company, quarterly, 1½ per cent.

California Railway & Power Company, San Francisco, Cal., quarterly, 1¾ per cent, prior preferred.

Massachusetts Electric Companies, Boston, Mass., $2, preferred.

Second & Third Streets Passenger Railway, Philadelphia, Pa., quarterly, $3.

West Penn Traction & Water Power Company, Philadelphia, Pa., quarterly, 1½ per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

ATLANTIC SHORE RAILWAY, SANFORD, MAINE

Period			Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m.,	Oct.,	'13	$25,420	$25,002	$417	$654	†$237
1 "	"	'12	29,275	25,286	3,988	464	†3,524

BATON ROUGE (LA.) ELECTRIC COMPANY

1m.,	Sept.,	'13	$14,254	*$9,847	$4,407	$2,127	$2,280
1 "	"	'12	11,432	*7,237	4,195	1,733	2,462
12 "	"	'13	156,427	*96,083	60,343	23,647	36,696
12 "	"	'12	140,942	*84,727	56,215	20,763	35,452

BROCKTON & PLYMOUTH STREET RAILWAY, PLYMOUTH, MASS.

1m.,	Sept.,	'13	$12,091	*$8,340	$3,751	$1,069	$2,682
1 "	"	'12	11,711	*7,648	4,063	1,025	3,038
12 "	"	'13	125,222	*96,400	28,822	13,049	15,773
12 "	"	'12	120,007	*89,783	30,224	12,508	17,716

CAPE BRETON ELECTRIC COMPANY, SYDNEY, N.S.

1m.,	Sept.,	'13	$32,516	*$16,956	$15,560	$6,082	$9,478
1 "	"	'12	34,364	*15,777	18,587	5,703	12,884
12 "	"	'13	373,223	*203,762	169,461	71,449	98,012
12 "	"	'12	354,152	*193,379	160,773	68,080	92,693

COLUMBUS (GA.) ELECTRIC COMPANY

1m.,	Sept.,	'13	$50,685	*$22,186	$28,499	$24,601	$3,898
1 "	"	'12	51,584	*22,539	29,045	18,952	10,093
12 "	"	'13	638,691	*293,129	345,562	255,029	90,533
12 "	"	'12	601,043	*268,762	332,281	224,430	107,851

DALLAS (TEX.) ELECTRIC CORPORATION

1m.,	Sept.,	'13	$180,067	*$102,892	$77,174	$25,393	$51,781
1 "	"	'12	147,473	*86,553	60,921	24,666	36,255
12 "	"	'13	2,105,076	*1,218,562	886,515	297,016	589,499
12 "	"	'12	1,762,242	*1,101,550	660,691	275,430	385,261

EL PASO (TEX.) ELECTRIC COMPANY

1m.,	Sept.,	'13	$73,747	*$39,096	$34,652	$4,233	$30,418
1 "	"	'12	70,434	*36,521	33,914	3,907	30,006
12 "	"	'13	880,335	*470,067	410,268	48,989	361,279
12 "	"	'12	764,240	*419,078	345,162	77,020	268,142

FEDERAL LIGHT & TRACTION COMPANY, NEW YORK, N. Y.

1m.,	Oct.,	'13	$194,206	*$120,441	$73,765	.....	.....
1 "	"	'12	184,087	*104,124	79,963	.....	.....
10 "	"	'13	1,909,848	*1,126,545	783,303	.....	.....
10 "	"	'12	1,745,741	*1,015,099	730,642	.....	.....

GALVESTON-HOUSTON ELECTRIC COMPANY, HOUSTON, TEX.

1m.,	Sept.,	'13	$200,183	*$110,589	$89,594	$34,965	$54,629
1 "	"	'12	184,899	*101,802	83,098	33,722	49,376
12 "	"	'13	2,304,396	*1,317,426	986,970	413,775	573,195
12 "	"	'12	1,889,494	*1,118,956	770,538	362,346	408,192

HOUGHTON COUNTY (MICH.) TRACTION COMPANY

1m.,	Sept.,	'13	$22,596	*$13,863	$8,733	$5,626	$3,107
1 "	"	'12	28,411	*13,719	14,692	5,677	9,015
12 "	"	'13	303,487	*179,788	123,699	67,829	55,870
12 "	"	'12	303,187	*175,254	127,932	65,820	62,112

JACKSONVILLE (FLA.) TRACTION COMPANY

1m.,	Sept.,	'13	$55,357	*$34,496	$20,861	$12,976	$7,885
1 "	"	'12	49,956	*32,609	17,346	10,084	7,261
12 "	"	'13	612,697	*405,337	207,360	136,093	71,267
12 "	"	'12	593,838	*378,977	214,862	115,036	99,826

NORTHERN TEXAS ELECTRIC COMPANY, FORT WORTH, TEXAS

1m.,	Sept.	'13	$172,014	*$96,021	$75,994	$24,166	$51,828
1 "	"	'12	160,275	*80,829	79,446	25,024	54,422
12 "	"	'13	2,089,776	*1,131,746	958,030	288,911	669,119
12 "	"	'12	1,693,982	*909,485	784,497	254,793	529,704

PADUCAH TRACTION & LIGHT COMPANY, PADUCAH, KY.

1m.,	Sept.,	'13	$24,844	*$15,890	$8,954	$7,583	$1,371
1 "	"	'12	23,499	*14,859	8,640	7,201	1,439
12 "	"	'13	292,020	*194,090	97,929	89,115	8,814
12 "	"	'12	280,531	*185,692	94,839	65,819	9,020

PENSACOLA (FLA.) ELECTRIC COMPANY

1m.,	Sept.,	'13	$23,307	*$14,392	$8,915	$7,175	$1,740
1 "	"	'12	23,815	*14,731	9,084	6,377	2,706
12 "	"	'13	284,528	*181,649	102,879	78,617	24,263
12 "	"	'12	286,598	*177,718	108,880	73,821	35,057

PUGET SOUND TRACTION, LIGHT & POWER COMPANY, SEATTLE, WASH.

1m.,	Sept.,	'13	$717,282	*$405,054	$312,228	$174,374	$137,854
1 "	"	'12	684,221	*385,560	298,661	168,046	130,615
12 "	"	'13	8,477,120	*4,929,977	3,547,142	2,051,344	1,495,798

*Includes taxes.
†Deficit.

Traffic and Transportation

Safety Committee Meetings in Seattle

The prominent position taken by the Puget Sound Traction, Light & Power Company in the matter of safety committees and the paper on the working of the safety committee of this company read before the Atlantic City convention by George Carson, claim agent, make the practice in Seattle of special interest. The following is briefly an account of the meeting held on Nov. 12: Those present were the members of the central and division safety committees and also all of the members of the claim department, making a total of eighty-nine men. Mr. Carson presided and first spoke of the appreciation of the management of the good work done by the trainmen during the past year. This appreciation was evidenced by a recent raise in wages. The speaker then explained the history of the organization of the safety committees on the road and presented the following statistics of accidents during September and October:

	September	October
Collisions between cars	5	4
Collisions with automobiles	73	70
Collisions with wagons	43	55
Collisions with pedestrians	17	28
Derailments	2	0
Defective car or apparatus	10	9
Boarding or leaving moving cars with gates	11	16
Boarding or leaving stationary cars with gates	45	47
Boarding or leaving moving cars without gates	33	25
Boarding or leaving stationary cars without gates	4	5
Accidents on cars from motion of cars	33	26
Accidents not caused by motion of cars	17	2
Ejectments, disputes, disturbances	43	31
Miscellaneous	24	31

He then called attention to the increase numerically in accidents to automobiles and said that this condition was prevalent throughout the country on account of the growing number of these machines. He also presented comparative tables showing the number of safety reports turned in from the different carhouses and the number of defects remedied thereby.

A general discussion followed in which Mr. Richardson, assistant superintendent of railways, pointed out that the increase in wages to the men represented the proportion to the men of the saving that the claim department had been able to make during the past year. Several suggestions in regard to reducing accidents were made by the men, calling attention to reckless driving of automobiles in certain parts of the city. It was voted that the general safety committee should take this matter up with the local automobile association as well as with the police department.

New Transfer System Proposed for Brooklyn

At a hearing before the Public Service Commission for the First District of New York on Dec. 1, 1913, A. M. Williams, counsel for the Brooklyn Rapid Transit Company, and William Siebert, superintendent of surface lines, made a proposal to the commission that the company be allowed to issue transfers at each and every intersecting point on its lines. This plan came as a counter-proposal to the recommendation offered by experts of the commission that the company be ordered through two of the operating lines, the Nassau Electric Railroad and the Brooklyn Heights Railroad, to exchange transfers at several local points in the borough of Brooklyn.

Mr. Williams stated that the company was not concerned with the statutory right of the commission to order new transfer points but desired to take up the question only from the view of substantial justice to the public and no harm to the company. On this basis the proposed addition of several transfer points was inadvisable, for the present system, installed in 1910, has proved somewhat inelastic, owing to the steady increase in transfer points. To the 520 original points eighty-eight have been added during the past two years, and each one has necessitated a readjustment of the entire transfer system.

Mr. Siebert testified that he had made a check of earnings and transfers under the present system, and that the number of passengers carried had increased from 41,388,708 in August, 1912, to 42,670,222 in August, 1913, or 3.3 per cent.

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and from 37,734,398 in September, 1912, to 39,307,956 in September, 1913, or 4.2 per cent. On the other hand, the number of transfers had increased from 13,173,417 in August, 1912, to 14,055,921 in August, 1913, or 6.7 per cent, and from 12,461,221 in September, 1912, to 13,278,024 in September, 1913, or 6.6 per cent. Furthermore, the cost per passenger had increased 1.2 per cent and 3 per cent in August, 1913, and September, 1913, over the corresponding months of the previous year, while the earnings per passenger decreased 1 per cent and 1.1 per cent during the same months. The number of surface trips increased 2.6 per cent and 2.9 per cent and the surface mileage 2.3 per cent and 2.8 per cent during August, 1913, and September, 1913, as compared with the results obtained for these months the year before.

Mr. Siebert suggested that the increasing cost of the present system would best be obviated by abolishing it altogether and by establishing free transfers on a cash basis at all intersecting lines of the Brooklyn Rapid Transit Company. An analysis of the present system shows that from 50 per cent to 51 per cent of the passengers request a first transfer on a cash fare, and 3 per cent a second transfer. Mr. Siebert said that by the establishment of any necessary feeder lines and the use of a continuation ticket, and if necessary the re-routing of some lines, this figure of 3 per cent for second transfers would be greatly reduced if not eliminated entirely. The new system would enable a passenger to travel from any part of the city to any other on the payment of one cash fare and a transfer, would give a shorter and more direct routing in many cases, and would establish a permanent system that would not have to be altered at all upon the construction of a new line. One hundred and fifty points at which transfers are not now given would be included in the new plan. Provision would have to be made, of course, against the possibility of a passenger "doubling back."

One of the experts of the commission stated that such a plan could, he believed, be worked out with very few exceptions, and Commissioner Williams assigned two inspectors to examine the entire plan to ascertain whether any hardships would result from the proposed transfer idea. It is expected that the entire reorganization plan of the transfer system will be ready for the postponed hearing in four weeks.

What the Interurban Road Does

The Eastern Texas Traction Company, Dallas, Tex., has published a map, 4½ in. wide by 3¼ in. high, showing the route of its line between Dallas and Bonham. On the back of the map, which is printed on a drab card, appears the following in regard to the value of interurban roads written by Ralph Wade, industrial agent of the company:

"Interburban lines, like good roads and paved streets, make habitation along them most desirable; they enhance the value of farm lands, facilitate transportation and add untold wealth to the producers and consumers of the country; they economize time, give labor a lift and make millions in money; they save wear and tear and worry and waste; they beautify the country and bring it in touch with the city; they aid the social and religious and educational and industrial progress of the people; they make better homes and happier firesides; they are the avenues of trade and the agencies of speedy communication; they give a stimulus to the growing tide of trade and develop commercial advancement and prosperity; they mean the economical transportation of marketable products—the maximum burden at the minimum cost; they convert plantations into farm gardens and make the waste places to 'blossom as the rose'; they are ligaments that bind the country together in thrift and industry and intelligence and patriotism; they open fields of opportunities to thrift and energy and quicken the activity and enterprise of the people; they promote social intercourse, prevent intellectual stagnation and increase the happiness and prosperity of our producing masses; they contribute to the greatness of the city and the glory of the country; give employment to our idle workmen, distribute the necessaries of life—the products of the fields and the forests and the factories—encourage energy and husbandry, inculcate a love for our native land, and make mankind better and happier."

Express Cars and Skip-Stops Discontinued in Denver

J. A. Beeler, vice-president and general manager of the Denver (Col.) City Tramway, has issued the following statement in regard to the plan of the company to discontinue the operation of express cars and skip-stops: "The City Council has repealed the express and skip-stop ordinances and re-enacted an ordinance permitting express service with certain restrictions.

"Our experience has demonstrated, so far as Colfax Avenue is concerned, that these restrictions preclude the possibility of maintaining the express service between local cars making stops at every block.

"This repeal does not become effective until thirty days after its passage. However, as it is apparently the unanimous desire of the Council, and also a considerable minority of our Colfax patrons, the company will immediately comply by discontinuing the express and skip-stop service on Colfax Avenue, including the Aurora and Fairmount lines.

"We regret that action was taken before completion of the postcard canvass of the families within the district served by these lines, for the reason that the returns from this canvass to date indicate that two out of every three favor the express and skip-stop methods, as the following tabulation of preference of patrons indicates:

For	3644
Against	2088
Not heard from to date	3924
Total	9656

"The canvass developed an almost universal sentiment in favor of trailers. On account of the short distance between blocks—there being sixteen blocks to the mile on East Colfax Avenue—the mechanical difficulties incidental to trailer operation are serious. However, it is our desire to please, and we will make every effort possible to continue the trailer operations during periods of heavy traffic."

"Shop Early" Campaign in Kansas City.—The Metropolitan Street Railway, Kansas City, Mo., is co-operating with the Kansas City Consumers' League with the end in view of having residents of that city do their Christmas shopping early. "The company requests its patrons to join the nation-wide movement to make Christmas a happy one by shopping early in the season," reads a placard placed in each of the Metropolitan's cars.

Increase in Wages in Omaha.—Under the increase in the wages of the motormen and conductors of the Omaha & Council Bluffs Street Railway, Omaha, Neb., referred to previously in the ELECTRIC RAILWAY JOURNAL, the men will get 24 cents an hour the first year and this will be increased by 1 cent an hour each year for the first four years, making the wages 28 cents at five years; from the fifth to the ninth year there is no further advance, but at the ninth year the men will get the maximum pay of 29 cents an hour.

Effective Shelters for Patrons.—The methods employed by the Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo., in caring for residents along its route have been commented on favorably. Without spending a great amount of money, the company has attained efficient protection for its patrons. One type of station is particularly effective. It is built in the shape of a cross, storm partitions forming the angles. Seats are built against the storm walls on each side. The chief advantage of this method is that persons are able to avoid the wind, regardless of the quarter from which it is coming.

Prizes for Coaster-Meter Records in Richmond.—The board of directors of the Virginia Railway & Power Company, Richmond, Va., during the past year ordered the cars of the company to be equipped with coaster-meters and offered a series of monthly prizes to motormen showing the best results. The board of directors have also authorized the operating officers to furnish free uniforms twice each year to all crews which do not have accidents costing the company in excess of $10 for the previous six months. This policy has resulted in increased care in operation and in encouragement to older and more careful men.

Change of Title from Claim Agent to Safety Agent.—The title of James Harmon, claim agent of the Louisville & Northern Railway & Lighting Company and the Louisville & Southern Indiana Traction Company, New Albany, Ind.,

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has been changed to safety agent. The change was made at the request of Mr. Harmon. In explaining the reason for the adoption of the new designation, Mr. Harmon said that in dealing with the public it was his desire, as well as that of the companies, to show that the main effort is to make it safe to ride on the electric railways and not to suggest the necessity for handling claims growing out of accidents.

Accident in New York.—Two north-bound trains on the Third Avenue elevated line of the Interborough Rapid Transit Company, New York, N. Y., one coming up from South Ferry and the other from City Hall, collided from the rear at the Chatham Square station on Nov. 28. Five persons were injured. On the same day four persons were slightly injured by a collision between two surface cars on the Manhattan end of the Brooklyn Bridge. A Flatbush Avenue car, one of the new type of side-door steel cars, rammed the rear of a wooden car of the Myrtle Avenue line, demolishing the rear vestibule, smashing the end of the car and most of the windows.

Lower Fares Accepted by Georgia Company.—The Georgia Railway & Power Company has formally notified the State Railroad Commission that it has accepted the schedule of passenger fares on the new Stone Mountain line fixed by the commission. The acceptance was accompanied by a protest, for the company declared the fare too low. The commission notified the railway that the rates are experimental and that if the railway shows after a fair trial that the rate is too low the matter may be reopened. The rate from Atlanta to Stone Mountain as fixed by the commission is 25 cents, to Decatur 5 cents, and each zone between 5 cents.

Quarterly Safety Meetings at New Albany.—The regular quarterly meeting of employees of the Louisville & Northern Railway & Lighting Company and the Louisville & Southern Indiana Traction Company, New Albany, Ind., for the purpose of discussing safety measures, was held in New Albany on Dec. 1. Two addresses were made at the meeting, one by James Harmon, safety agent, and the other by Walter Foreman, trainmaster for the companies. After the addresses, which dealt with practical measures for eliminating accident hazards, the trainmen present took up the discussion, making suggestions and illustrating the points made in the talks by experiences of their own.

New Tariff Issued by Central Electric Traffic Association.—The Central Electric Traffic Association, through its secretary, has issued a joint and local passenger tariff giving joint and local rates, rules and regulations governing the transportation of a corpse. The requirements set forth in this new tariff govern transportation between all stations on the lines of the member companies located in Illinois, Indiana, Kentucky, Michigan and Ohio. In addition to supplying the joint and local rates, rules and regulations of the companies, the tariff also includes the rules of the state boards of health governing the transportation of the dead in baggage cars or baggage compartments in passenger coaches.

Safety Measures Discussed by Union Traction Company Employees.—The semi-annual banquet of the safety committee of the Union Traction Company of Indiana was held at Anderson recently. Methods of preventing accidents were the chief topic of discussion. In opening the addresses H. A. Nicholl, general manager and chairman of the general safety board, reviewed the work of the organization and the accidents of the past year. He pointed out certain places where means might be employed to prevent injury to passengers, and commended the excellent record for the six months just ended. Dr. J. B. Fattic, the company's physician, related incidents of his tour through Europe, Egypt and the Holy Land and told of methods of transportation which he observed in the foreign countries.

Increase in Wages in Seattle.—About 800 motormen and conductors in the employ of the Puget Sound Traction, Light & Power Company were affected by the increase in wages recently announced by Manager A. L. Kempster, to take effect on Dec. 1. The wage increase, which totals about $30,000 annually, was made "as a recognition of the loyal co-operation of the trainmen of the company as evidenced by the material reduction in accidents and the expense connected therewith during the past two years." The announcement also expressed to the trainmen the company's "sincere appreciation of their loyalty and attention to duty, and compliments them on the reputation they have won among the citizens of the community for their unfailing courtesy and accommodating disposition in handling the patronage of our system."

Third Avenue Railway Insurance Plan Soon to Begin.—The Third Avenue Railway, New York, N. Y., is to put into operation on Jan. 1, 1914, the group insurance plan for its men as outlined in the Electric Railway Journal of Aug. 23, 1913. About 2000 of the company's men have taken out $1,000 life and accident policies under the plan. The men pay $7 of the $11 yearly premium, the company paying $4. This company assistance is extended only to the members of the Third Avenue Railway Employees' Association. The company will continue to pay the premiums on policies of employees who become incapacitated. The contract with the Travelers' Insurance Company, Hartford, Conn., is for five years, and the company advances about $25,000, for which it is reimbursed by the payments from the men.

Monthly Tickets to Be Recommended for Massachusetts Road.—A conference was held at the office of the Public Service Commission of Massachusetts in Boston recently on the petition of the daily travelers on the Dartmouth and Westport division of the Union Street Railway, New Bedford, Mass., asking for the issuance of commutation tickets at a reduced fare between Fall River and New Bedford. The petitioners contended that they were entitled to monthly tickets, good for sixty rides. The company had refused to grant these, "because inconsistent with the whole system of street railway fares." After the arguments of both sides had been fully presented, Chairman MacLeod for the commissioners stated that the board would recommend that the company issue to daily travelers a book of tickets for fifty rides, or twenty-five round trips, to be sold for $8, making the cost of a round trip 32 cents.

United Railroads to Insure Employees.—Following a conference between representatives of the retail trade committee of the Chamber of Commerce of San Francisco and Jesse W. Lilienthal, president of the United Railroads, San Francisco, Cal., it was announced that the plan to establish co-operative stores for the benefit of the employees of the company would not be considered further. By Jan. 1, however, Mr. Lilienthal hopes to inaugurate his proposed scheme of insuring every employee of the company. In case of the death of an employee from any cause the families of men who have been in the company's employ for three years will receive $250, for four years $500, for five years or over $1,000. Ultimately Mr. Lilienthal hopes to be able to insure all of the men for $1,000 each. This insurance is to be provided without cost to the men. If the employee leaves the company, the insurance will stop automatically.

Restaurants in Carhouses at Richmond and Norfolk, Va.—It has been found that one of the serious difficulties under which employees of the Virginia Railway & Power Company, Richmond, Va., and especially those engaged in operating the cars, have labored in the past has been their inability to obtain their meals at proper times and at reasonable prices. To meet this condition, the company has arranged during the past year for the establishment and operation of suitable restaurants at its carhouses at Norfolk and Richmond. Under this arrangement the company provides free of charge the building, light and heat, and contracts with experienced caterers to furnish good, wholesome food, subject to inspection by the company, at a scale of prices which represents the minimum cost to the employee. While these restaurants have been in operation only a short while, they have produced most satisfactory results.

Twenty Conductors Arrested for Stealing at Joliet, Ill.—After an investigation extending over more than a year, J. R. Blackhall, general manager of the Chicago & Joliet Electric Railway, caused the arrest recently of twenty conductors charging them with conspiracy, grand larceny and embezzlement of fares aggregating several thousand dollars. Practically all of the conductors who were arrested have confessed their guilt, and it is understood that probably

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fifteen more will be arrested on the same charges. H. A. Fishleigh, the railway's detective, received credit for obtaining the necessary incriminating evidence. Practically all the men arrested were employing the same method in stealing from the company. According to a general understanding they would exchange punched transfers and ring them up on the transfer register when cash fares were collected. In one instance one of the conductors collected $1.30 in this manner on a single round trip requiring one hour.

Relief Association Established in Richmond.—A relief association has been established in Richmond, Petersburg and vicinity, the organization being standardized on the entire system of the Virginia Railway & Power Company, Richmond, Va. Under the constitution of this association as now organized all officers and employees of the company are expected to be members, and the company pays the initiation fee of $1 for all members. The monthly dues of members are 50 cents each, and in case of death there is an assessment of 50 cents on each member, the company contributing the sum of $250 in the event of death of a member. The benefit on account of accident or illness is limited to $200 in any one year, and the death benefit to $500. The beneficial effects of this organization have already become manifest, and the board of directors now has under consideration the question of extending the benefits to a modified or limited pension system for employees who have become incapacitated through old age.

Washington Railway Relief Association Report.—The report of the treasurer of the Washington Railway Relief Association, the membership of which is composed of employees of the Washington Railway & Electric Company, Washington, D. C., shows briefly for the year ended Sept. 30, 1913, as follows: Receipts from initiation fees and dues, $14,754; disbursements, $10,305; surplus, exclusive of miscellaneous income, $4,448; miscellaneous income, $7,815; withdrawals of members, $5,006; surplus for year, $7,257. The receipts of the association from initiation fees and dues for the thirteen years ended Sept. 30, 1913, were $150,637; the disbursements for the same period were $120,602, and the surplus, exclusive of miscellaneous income, was $20,044. The miscellaneous income for the thirteen years was $83,669; the withdrawals of members amounted to $31,278, leaving the surplus as of Sept. 30, 1913, $52,391. The report is concluded with a statement of the amount standing to the credit of members joining in each year from the beginning of the association. This money is payable to members when they leave the service of the company or to the widow, children or other beneficiary of the member upon the death of the latter.

Application for Permission to Increase Fares.—The United Railways, Portland, Ore., has filed an application with the State Railroad Commission for an increase in rates on its line from Portland to Wilkesboro. When the company obtained a franchise to lay its tracks on the Linnton Road from the Multnomah County Court in 1908, it was stipulated that the fare between Portland and Linnton should be not more than 5 cents. After the line was built the company attempted to charge 15 cents from the Portland station at Second and Stark Streets to Linnton. The Circuit Court held that it could not charge a fare of more than 10 cents from the station to Linnton. The company avers that the fare is unremunerative and that when the franchise was granted by the County Court no one had a knowledge of what rates would be reasonable. It says in the application that "the order of the court was made improvidently without proper regard to the public interests or a fair return for the service." The following schedule of rates is asked: Between station in Portland and shops, 5 cents; 10 cents from station to Stockdale and Willbridge, including stations between; 15 cents from Portland station to Webster and Linnton; 30 cents to Burlington instead of 25 cents as at present charged; 60 cents to North Plains and 70 cents to Wilkesboro.

Proposed Increase in Suburban Fare at Ottawa.—The Ottawa (Ont.) Electric Railway gave formal notice some time ago that on and after Dec. 1 an extra fare would be charged to all passengers riding from Holland Avenue, the western limits of the city, to Britannia and intermediate points. As a result of an application filed with the Dominion Railway Board on behalf of the city by Mayor Ellis, asking the commission to investigate the tariffs of the company and its alleged unwillingness to make any further extensions in the city before the expiration of the franchise in 1923, an order has been issued restraining the company from putting the proposed increase in rates in effect before Jan. 1. In the meantime arguments for and against the application will be heard by the Railway Commission on a date to be fixed. The directors of the company contend that since the one fare from any part of Britannia to Ottawa, a distance of about 6 miles, has been in effect the receipts have not been sufficient to pay the fixed charges of $50,000 on the $750,000 invested in the line. When the line was opened in 1900 an extra fare was charged from the city limits. Five years ago the extra fare was abolished and a fare or transfer from any part of the city was honored on the line. The district through which the line runs has become fairly well settled during the last five years, but the increase in traffic which resulted has not been sufficient to meet even the fixed charges of the company.

Jurisdiction of California Railroad Commission.—In a recent decision rendered by the Railroad Commission of California the monthly commutation fare charged by the San Francisco-Oakland Terminal Railways between Oakland and Ashland was reduced from $4.50 to $3.75. The commission held that it was unreasonable to establish a blanket rate of $3 for Ashland and San Leandro, 2.2 miles nearer Oakland, or of $4.50 for Ashland and Hayward, 2.4 miles farther away from Oakland. A rate adjusted between these amounts was therefore adopted. One of the important questions in connection with this case was the right of the commission to decide it. The company claimed that it operated a street railroad upon the public streets of Oakland and San Leandro under local franchises and that neither Oakland nor San Leandro had surrendered to the commission its powers over public utilities. The commission granted that the incorporated cities and towns of the State had the power to establish the rate of fare to be charged by street railways for transportation over routes lying entirely within the city or town limits, but stated that no city or town had the power to establish the fare to be charged by a street railway between a point within the city limits and a point outside of the city limits. Since the towns and cities could not decide this point, the commission held that it came within the jurisdiction of the State Railroad Commission, for by the public utilities act of March 23, 1912, power was given to the commission to regulate the rates of any public utility, street railways included.

Conditions Affecting Traffic on Interurban Lines.—An interesting statement regarding conditions affecting traffic on interurban lines was made recently by R. H. Wyatt, general freight and passenger agent of the Louisville & Interurban Railroad, Louisville, Ky. He said: "We find that our passenger business has not been up to expectations. I am inclined to attribute this to the growing use of the automobile. We have had motor cars with us for a number of years, but their use by people living in the country seems to be increasing and it is affecting the volume of passenger business adversely. On the other hand, a large number of motor trucks are now being used for hauling goods into country districts around Louisville, but apparently this has had little if any effect on our business, which has shown increase right along. We have been watching the development of the parcel post with interest, as it appeared to be possible that providing for this service, especially with the weight limit increased to 20 lb., might interfere with our freight traffic. However, I am glad to say that this has not been the case thus far, and that in our territory, at least, a new class of business has been developed by the parcel post." Mr. Wyatt commented upon the fact that the severe drought of the past summer all over Kentucky, including the district served by the interurban lines of his company, has made it necessary for farmers and live-stock owners to buy feed much earlier than usual. For this reason an unusually heavy traffic on feedstuff has been noticeable this fall, making business better than it might reasonably have been expected to be.

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Personal Mention

Mr. John B. Rawlings has succeeded Mr. W. B. Congdon as claim agent of the Warren-Bisbee Railway, Warren, Ariz.

Mr. C. C. Custer has been appointed electrical engineer of the Hot Springs (Ark.) Street Railway to succeed Mr. A. E. Main.

Mr. R. J. Le Clert has succeeded Mr. W. F. Fuller as superintendent of the Modesto & Empire Traction Company, Modesto, Cal.

Mr. J. L. Mason has succeeded Mr. A. C. Colby as master mechanic of the Birmingham, Ensley & Bessemer Railroad, Birmingham, Ala.

Mr. W. F. Bull has been appointed assistant secretary of the Southern Pacific Company, New York, N. Y., to succeed Mr. Joseph Hellon.

Mr. A. Greet has been appointed auditor of the Gadsden, Bellevue & Lookout Mountain Railway, Gadsden, Ala., to succeed Mr. R. J. Hughes.

Mr. A. E. Carlton has been elected vice-president of the Grand Junction & Grand River Valley Railway, Grand Junction, Col., to succeed Mr. C. M. McNeill.

Mr. Timothy W. Riley has been appointed chief inspector of the Springfield (Mass.) Street Railway. Mr. Riley's service with the company covers a period of about twenty-five years.

Mr. C. N. Ryan, who has been auditor of the Wilmington & Philadelphia Traction Company, Wilmington, Del., has been elected secretary and treasurer of the company to succeed Mr. W. T. Spring, resigned.

Mr. C. E. Yost has been appointed auditor of the Wilmington & Philadelphia Traction Company, Wilmington, Del., to succeed Mr. C. N. Ryan, who has been elected secretary and treasurer of the company.

Mr. James McPherson has been made superintendent, Mr. B. W. Perrin engineer in charge and Mr. W. H. Norton assistant superintendent of the electric lines of the Southern Pacific Company, the change being made by the company in order to maintain its steam and electric lines as separate properties.

Mr. E. L. Putnam has been appointed superintendent of the Springfield division of the Springfield (Mass.) Street Railway. Mr. Putnam has been employed by the Springfield Street Railway for about fifteen years. He began his connection with the company as a motorman. He had been starter for about four years.

Mr. H. M. Flanders, who has been roadmaster of the lines of the Springfield (Mass.) Street Railway, has been appointed engineer of maintenance of way of the Springfield Street Railway, the Worcester Consolidated Street Railway, the Milford, Attleboro & Woonsocket Railway and the Attleboro Branch Railroad. Mr. Flanders, who has served the Springfield Street Railway for five years, is a civil engineer by profession. He was educated at the Massachusetts Institute of Technology. Before he became an official of the Springfield Street Railway Mr. Flanders was engaged in similar work with street railways in Texas. He is a son of Mr. Dana Flanders, who for many years was general passenger agent of the Boston & Maine Railroad.

Mr. E. C. Hurd concluded his duties as chief engineer in charge of valuation for the Nebraska State Railway Commission on Dec. 1, but will continue with the commission in a consulting relation. Mr. Hurd was appointed chief engineer in charge of valuation of the commission on June 1, 1909, at which time the lawmakers of the State had delegated to the commission the important duty of making a state-wide physical appraisal of all railroads, express company's properties, telegraph and telephone lines. This work of appraisal Mr. Hurd has directed continuously up to the present. The entire initial appraisal of all these utilities has thus been accomplished, including the revaluation of the steam railroads. In view of the advanced condition of the work Mr. Hurd requested to be relieved of his regular employment. Engineering of a general type, though more particularly for railroads and public improvements, has engaged Mr. Hurd's attention for more than twenty years. Mr. Hurd will enter private practice and will establish offices at Lincoln, Neb., and at Chicago, Ill.

Mr. Charles C. Dietz has resigned as assistant to the general manager of the United Traction Company, Albany, N. Y., to become assistant in the executive offices of the McGraw Publishing Company, Inc., publisher of the ELECTRIC RAILWAY JOURNAL. Mr. Dietz's first business experience was with the Rochester (N. Y.) Railway. He resigned as ticket and freight auditor of the Rochester Railway in 1906 to become secretary to Mr. T. J. Nicholl, general manager of the Hudson Valley Railway. In 1907 the property of the Hudson Valley Railway was purchased by the United Traction Company and Mr. Dietz was made secretary to Mr. Edgar S. Fassett, general manager of the latter company. On the resignation of Mr. Fassett from the United Traction Company in August, 1912, Mr. Dietz was appointed secretary to Mr. James F. Hamilton, Mr. Fassett's successor. Mr. Dietz was later promoted to the position of assistant to the general manager. He was elected secretary of the New York Electric Railway Association in 1912 and was elected secretary and treasurer of the association in 1913.

Mr. Albert H. Stanley, formerly general manager of the Public Service Railway, Newark, N. J., and now managing director of the London Underground Railway and other traction and omnibus interests in London, is visiting the United States in company with the following officers of the Midland Railway: Sir Guy Granet, general manager; Mr. F. Tatlow, assistant general manager, and Messrs. J. Sayers and J. Dalziel, electrical engineers. The party has planned to make an extensive tour of the United States for the purpose of studying all important steam railroad electrification and other operating practices preliminary to the proposed electrification of the Midland Railway in London and vicinity. This is the first time that these officers of the Midland Railway have visited America. All of the gentlemen named are making their headquarters at the Ritz-Carlton Hotel, New York. The length of their stay in the United States is indefinite, but they expect to be here until the new year at least. The plans of the Midland Railway are referred to at length elsewhere in this issue. Particulars of other British electrifications under way or in prospect were published in the ELECTRIC RAILWAY JOURNAL for May 3, 1913.

Mr. Chester F. Gailor, now way engineer of the Hartford division of the Connecticut Company, will enter the service of the United Railways & Electric Company, Baltimore, Md., on Dec. 15, 1913, as assistant chief engineer. Mr. Gailor was born in 1880 at Saratoga, N. Y., where he completed the high school course. He then attended the Lansingburg Engineering Academy, Lansingburg, N. Y., and upon graduation in June, 1897, became a rodman for the Hudson Valley Railway. At the end of two years he was advanced to engineer in charge of construction. In 1902 he left the company to become chief engineer of the Rutland Railway, Light & Power Company, Rutland, Vt., where he supervised the rebuilding of the horse car system and the construction of 31 miles of extensions. He also had charge of the erection of a large hydroelectric plant, including two reservoirs and 25 miles of transmission lines. In 1904 he had charge of an exploration party for the Grand Trunk Pacific Railway in Manitoba to Lake Nipigon. During the following year he did railway and transmission work for the Raleigh & Durham Passenger & Power Company, Raleigh, N. C., and the Augusta & Aiken Railway & Electric Company, Augusta, Ga. In 1906 he joined the Goldsmith Thermit Company, New York, N. Y., as assistant engineer. He became connected with the Connecticut Company in 1908.

C. F. Gailor

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Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Helena (Ark.) Southwestern Railroad.**—Chartered in Arkansas to build an electric or steam railway southwest from West Helena, a distance of 20 miles. Capital stock, $100,000. Directors: E. C. Nelson, Helena, and R. L. McClell, Chicago, Ill.

***Brooksville (Fla.) Interurban Railway.**—Application for a charter will soon be made by this company to build a 16-mile electric railway from Brooksville to Lake Stafford. Capital stock, $100,000. Officers: H. D. Evans, Brooksville, president; P. H. Saunders, New Orleans, vice-president; W. A. Fulton, Brooksville, secretary, and Charles Monroe Price, Brooksville, treasurer.

***Interurban Transportation Company, St. Louis, Mo.**—Incorporated in Missouri with a capitalization of $4,000. Incorporators: S. McPheeters, O. J. Miller and F. C. Sharp.

***Shefford, Bagot & Missisquoi Railway, Montreal, Que.**—Application for a charter has been made by this company to the Quebec Legislature to build an electric or steam railway through the counties of Missisquoi, Shefford and Bagot from a point on the Quebec and Vermont line in the parish of St. George to a point on the Intercolonial Railway between Bagot and St. Eugène. Capital stock, $1,000,000.

***Nebraska Central Railway, Pierre, S. D.**—Application for a charter has been made by this company to build a 130-mile electric railway from Pierre, S. D., to Ainsworth, Neb., via Tripp and Lyman Counties in South Dakota and Brown and Keyapaha Counties in Nebraska. Power will be obtained from the Ainsworth Light & Power Company, Ainsworth. Incorporators: George W. Adams, Walnut, Ia.; F. W. Sellor, R. H. Osborn, M. V. Finney and Arthur McSweeney, Ainsworth; Charles Henneman, John Scheie and E. G. Kenaston, Springview; F. K. Strother, Omaha; V. B. Hill, Council Bluffs; John A. Holmes, Pierre.

FRANCHISES

Mill Valley, Cal.—W. W. Hicks, Mill Valley, has asked the Council for a fifty-year franchise in Mill Valley. This is part of a plan to build a 10-mile electric railway between Sausalito and Mill Valley. [E. R. J., Nov. 15, '13.]

Lewiston, Idaho.—F. L. Sturm has received a franchise from the City Council in Lewiston which gives him the right to use the line of the Lewiston Terminal Company, the right to operate over that portion of the Lewiston-Clarkston bridge within the city limits of Lewiston, and the right to install overhead equipment. According to the terms of the franchise an electric line must be completed and in operation between Lewiston, Idaho, and Clarkston, Wash., within one year. [E. R. J., Aug. 23, '13.]

Springfield, Mass.—The Springfield Street Railway has asked the Council for a franchise for a double track and a relocation of its track on the Springfield highway.

***Akron, Ohio.**—James Shaw has asked the Council for a franchise for a municipal electric railway in Akron and authority to issue bonds in the sum of $225,000.

Fremont, Ohio.—The Lake Shore Electric Railway has received an eleven-year extension of its franchise in Fremont and in return will rebuild its right-of-way on State Street and improve the street at a cost of $50,000.

Niagara Falls, Ont.—The Niagara, St. Catharines & Toronto Railway, St. Catharines, has asked the Council for a fourteen-year extension of its franchise in Niagara Falls.

Portland, Ore.—The Portland & Oregon City Railway has received a franchise from the Council in Portland.

Portland, Ore.—George F. Heusner, Portland, has received a twenty-five-year franchise from the Council for a line from the Kenton district to the West Side business district in Portland. [E. R. J., Oct. 11, '13.]

Hershey, Pa.—The Hershey Transit Company has received a franchise from the Council for a line between Hershey and Elizabethtown.

Centralia, Wash.—The Washington-Oregon Corporation, Vancouver, has asked the Council for a franchise on Tower Avenue to Third Street in Centralia.

Spokane, Wash.—The City Council recently passed an ordinance repealing a franchise granted to the Moran Prairie Electric Railroad Construction Company on March 4, 1913, for the right to construct and operate an electric railway in Spokane.

TRACK AND ROADWAY

Birmingham Railway, Light & Power Company, Birmingham, Ala.—Several extensions of its lines are being planned by this company. The Owenton-Ensley line will be extended to Wylam and an extension from Ensley to Fairfield will soon be built.

British Columbia Electric Railway, Vancouver, B. C.—The contract for the erection of an interlocking control tower electrically operated at the crossing of this railway and the Esquimalt & Nanaimo Railway on the Esquimalt Road was recently awarded to R. Shields, Vancouver. The city, the Esquimalt & Nanaimo Railway and the British Columbia Electric Railway are sharing the expense of erection.

Fresno, Cal.—Right-of-way has been secured and grading will be begun at once on the line to connect Fresno and Clovis. F. S. Granger, Clovis, is the promoter. [E. R. J., Nov. 22, '13.]

Petaluma & Santa Rosa Railway, Petaluma, Cal.—Plans are being considered by this company for an extension from Forestville to Healdsburg along the Russian River.

San Bernardino, Cal.—The City Commissioners announce that they will shortly call a bond election for the construction of an electric railway in the Northwestern section of San Bernardino. [E. R. J., Oct. 25, '13.]

***San Francisco, Cal.**—Plans involving the construction of an elevated railroad from the ferry and railway lines to outlying districts have been filed with the Supervisors by the Twin Peaks Tunnel Company Property Owners' Association. As the proposition includes the joint use by the city of the tracks of the electric line to be constructed by the Southern Pacific Railroad on its steam railroad right-of-way through the Mission and also of the Ocean Shore Railroad Company's tracks, the association suggested that the board create a commission to consider this scheme, the commission to consist of the engineers of the Southern Pacific Ocean Shore Railroad and United Railroads and the City Engineer.

Geary Street Municipal Railway, San Francisco, Cal.—The Supervisors have authorized the purchase of cars, rails and other equipment for the extension of this company's lines in San Francisco and for an estimated expenditure of $10,000 for paving blocks to be laid alongside the rails.

Tidewater & Southern Railroad, Stockton, Cal.—Work will soon be begun by this company on an extension to Turlock.

St. Petersburg, Fla.—Plans are being made to build a 2-mile electric railway in St. Petersburg. It will be constructed by the holders of certain real estate and later it will probably be operated by the St. Petersburg & Gulf Railway. Thomas E. Lucas, St. Petersburg, is interested. [E. R. J., April 19, '13.]

Idaho Falls (Idaho) Electric Railway.—Work on this railway began Nov. 18, when the contract was signed by William Rogers for 42 miles of grading. Contracts have been let for the ties, poles and all bridge timbers, also for the rails. Franchises throughout the city and right-of-way through Bingham County have been secured. Bonds in the sum of $1,500,000 have been underwritten by a Chicago firm. J. L. Milner, Idaho Falls, president. [E. R. J., Nov. 22, '13.]

***Wardner, Idaho.**—Citizens of Wardner plan to build an electric line between Wardner and Kellogg. No names are yet given of those interested.

Central Illinois Interurban Railway, Bradford, Ill.—Surveys have been completed by this company for its 40-mile line to connect Kewanee and Henry, via Osceola, Bradford and Whitefield. J. R. Fate, 413 Dechman Street, Peoria, president. [E. R. J., March 16, '13.]

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Centralia (Ill.) Traction Company.—This company has completed its 2-mile line from Centralia to Warner and has surveys under way between Warner and Irvington, 4 miles. About 1¼ miles of grading is being done by the company from Warner to the new Illinois Central Railroad yards in Washington County.

Mount Vernon Traction & Power Company, Mount Vernon, Ill.—This company, the incorporation of which was referred to in the ELECTRIC RAILWAY JOURNAL Nov. 29 as the Mount Vernon Traction & Car Company, has changed its name to the Mount Vernon Traction & Power Company. It has placed orders for all the material and will soon begin the construction of its 4-mile line in Mount Vernon. It will obtain power from the Citizens' Light & Gas Company, Mount Vernon. Charles C. Baldwin, Mount Vernon, secretary. [E. R. J., Nov. 29, '13.]

Illinois Traction System, Peoria, Ill.—Plans are being considered by this company to build a line between Joseph, Mo., and Atchison and Topeka, Kan.

Peoria, Canton & Galesburg Railway, Peoria, Ill.—Surveys have been made and construction will be begun in the spring by this company on its 51-mile line between Peoria, Galesburg, Hanna City, Trivoli, Farmington, Maquon, Gibson and Knoxville. Horace Clark, Peoria, president. [E. R. J., Oct. 11, '13.]

Evansville & Indianapolis Light, Power & Electric Railway, Evansville, Ind.—This company, which plans to build a 158-mile railway between Evansville and Indianapolis, via Oakland City, Petersburg, Washington, Bloomfield, Worthington, Spencer and Martinsville, has surveyed the section of its line between Indianapolis and Bloomfield, 60 miles, and surveys are under way between Bloomfield and Evansville, 98 miles. Construction will be begun as soon as the organization of the company is completed. Arthur C. Stone, 113 Upper Fourth Street, Evansville, president. [E. R. J., May 24, '13.]

Indianapolis, Chicago & Meridian Railway, Indianapolis, Ind.—Some engineering work has been begun but no construction is yet under way on this line between Indianapolis, East Chicago, Sheridan, Monticello, Valparaiso, Gary and Hammond. E. J. Binford, Greenfield, is interested. [E. R. J., Aug. 31, '13.]

Indianapolis & Delphi Traction Company, Indianapolis, Ind.—Right-of-way has been obtained and construction will be begun as soon as financial backing has been secured on this line between Indianapolis, Delphi, Sheridan, Kempton and Russiaville. M. E. Bales, Westfield, president. [E. R. J., Sept. 6, '13.]

Southwestern Traction Company, Indianapolis, Ind.—This company states that construction will not be begun until the spring on its 87-mile railway to connect Indianapolis, Mars Hill, Joppa, Mooreville, Monrovia, Prairie City, Cherryvale and Terre Haute. Joseph A. Davidson, Indianapolis, secretary. [E. R. J., July 6, '13.]

Keokuk & Columbus Junction Transit Company, Keokuk, Ia.—This company, which plans to build a 90-mile line to connect Keokuk, Columbus Junction, West Point, Donnellson, Winfield, Lowell and New London, states that the organization and preliminary surveys have been completed and that it is uncertain when construction will be begun. T. A. Craig, 28 West Fifth Street, Keokuk, secretary. [E. R. J., June 14, '13.]

Davenport-Muscatine Railway, Muscatine, Ia.—This company proposes to lay 70-lb. rails on the Mulberry Avenue extension from Sixth Street to Parham.

Salina Street & Interurban Railway, Salina, Kan.—Work will be begun at once by this company on the extension of its Walnut Street line in Salina.

Arkansas Valley Interurban Railway, Wichita, Kan.—Plans are being considered by this company to build an extension from Winfield to Wichita. Another extension will soon be built to Hutchinson and later to Salina and Abilene.

Taylorsville, Louisville & Jeffersontown Railway, Taylorsville, Ky.—This company, which plans to build a 20-mile line between Louisville, Jeffersontown and Taylorsville, has secured all of the right-of-way with the exception of the section between Middletown and Fisherville. Jeffersontown has already created a franchise for the operation of an electric railway through the town and will sell it, at a date to be advertised later, to the new company. I. F. Jewell, Taylorsville, president, and Rowland Cox, Louisville, chief engineer. [E. R. J., Jan. 4, '13.]

Detroit, Almont & Northern Railway, Detroit, Mich.—Grading has been begun by this company on its 9-mile line between Romeo and Almont. F. W. Brooks, 12 Woodward Avenue, Detroit, president. [E. R. J., Nov. 29, '13.]

Duluth (Mich.) Street Railway.—This company is asked to consider plans to extend its line to Itasca.

St. Paul Southern Electric Railway, St. Paul, Minn.—Grading is completed on this company's line between Inver Grove and Hastings.

***Chillicothe, Mo.**—H. L. Gilbert and David Miller, Kansas City, plan to build an electric railway from Chillicothe to Kansas City, 85 miles, via Hamilton and Kinston. Another plan is being considered to build a 50-mile electric railway from Chillicothe to Cainesville, Mo. Frederick Morch, Chillicothe, is interested.

Red Lodge (Mont.) Electric Railway.—Surveys have been completed and a route established for this 10-mile electric railway to connect Red Lodge, Washoe and Bear Creek. C. C. Bowlen is interested. [E. R. J., Nov. 22, '13.]

Lincoln (Neb.) Traction Company.—This company has just completed the work of welding 1000 rail joints upon its trackage system at a cost of approximately $13,000. This work was done by the Littlefield, Frye & McGough Company, Chicago, Ill.

St. John (N. B.) Street Railway.—H. M. Hopper, general manager of this company, states that the line will be extended to Crouchville before July 1, 1914, and that the company is willing to extend to Little River as soon as the highway bridges are strengthened. These extensions are on the Courtenay Bay side of the city and in the vicinity of the extensive dry docks, wharves, etc., being built by the government.

Sapulpa (Okla.) Interurban Railway.—During the next few weeks this company plans to build a 1-mile extension in Sapulpa.

Oregon Electric Railway, Portland, Ore.—It is reported that plans are being considered by this company to extend its line from Eugene to Springfield and well up the McKenzie Valley in the near future.

Pottstown & Phoenixville Railway, Philadelphia, Pa.—This company has placed in operation its line between Sanatoga and Spring City.

***Valleyfield (Que.) Power Company.**—This company is applying for an extension of charter powers to enable it to build an electric railway from Valleyfield southwesterly through Beauharnois and Huntingdon Counties to the provincial boundary; another line from the same place southeasterly through Beauharnois, Chateauguay and Huntingdon Counties to the provincial boundary, and another line from the same place northwesterly across the St. Lawrence River and the counties of Soulanges and Vaudreuil to the Lake of Two Mountains.

Abbeville, S. C.—Plans are being made to apply soon for a charter to build an electric railway from Easley via Abbeville to Anderson, S. C., and thence to Augusta, Ga. Among those interested are James E. Leach and W. C. Smith, Easley; J. H. Anderson and S. J. Farmer, Anderson; S. J. Wakefield and A. M. Erwin, Antreville, and W. N. Graydon and C. C. Gambrell, McCormick. [E. R. J., Oct. 25, '13.]

Jackson Railway & Light Company, Jackson, Tenn.—Estimates and preliminary surveys are being made and construction will be begun in the spring by this company on its new West Jackson line.

Houston (Tex.) Electric Company.—Plans are being made by this company to build a 4-mile extension from Houston to Sunset Heights and Independence Heights, northwest of Houston. Application for a franchise and right-of-way will soon be made.

Port Arthur (Tex.) Traction Company.—This company is extending its line north on Proctor Street to connect with the line on the north city limits of Port Arthur.

***Clarkston, Wash.**—Citizens of Clarkston, headed by former Mayor R. M. Yount, M. Huylete, of the Clarkston State Bank, and others, are back of the movement which

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has for its object the construction of 4 miles of electric railway between Clarkston and Vineland. A company will be organized and incorporated at once with a capitalization of not less than $25,000.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis.—This company is asked to consider plans to build an extension to connect Racine and Burlington.

SHOPS AND BUILDINGS

British Columbia Electric Railway, Vancouver, B. C.—This company has commissioned Westinghouse, Church, Kerr & Company, New York, to prepare new plans to build a two-story carhouse in Vancouver. The structure will be 128 ft. x 350 ft. and of reinforced concrete construction.

Geary Street Municipal Railway, San Francisco, Cal.—Plans are being made by this company to provide for the furnishing of machine shop equipment for its repair shops in San Francisco.

Mesaba Electric Railway, Duluth, Minn.—This company's carhouses and general offices in Virginia were completely destroyed by fire on Nov. 26. The loss will approximate $125,000.

Brooklyn Rapid Transit Company, Brooklyn, N. Y.—Plans are being prepared by this company to build a new passenger station at Flatbush Avenue in Brooklyn.

Portland, Eugene & Eastern Electric Railway, Portland, Ore.—Plans are being made by this company to build soon new trainsheds, waiting room and ticket office on a site south of the Union Station in Portland. The buildings will be of fireproof construction.

Charleston (W. Va.) Interurban Railway.—This company plans to build a new concrete or brick station in Charleston within the next few months.

POWER HOUSES AND SUBSTATIONS

Connecticut Company, New Haven, Conn.—This company has placed an order with the Westinghouse Electric & Manufacturing Company for three 500-kva, 66,000-volt high-tension, 2300-volt low-tension, single-phase, 60-cycle, O.I.S.C. transformers and twelve 1000-kva, 66,000-volt high-tension, 2300-volt low-tension, single-phase, 60-cycle, O.I.W.C. transformers.

Idaho Falls (Idaho) Electric Railway.—This company plans to build soon a new power house in Idaho Falls. The cost is estimated to be about $10,000.

Illinois Traction Company, Peoria, Ill.—Plans are being made by this company to build soon a new power house in Atchison. The cost is estimated to be about $200,000.

New Orleans Railway & Light Company, New Orleans, La.—This company has placed an order with the Westinghouse Electric & Manufacturing Company for one 150-kw, 125-volt, 900 r.p.m., direct-current generator for use with turbine and reduction gear.

New York (N. Y.) Railways.—This company will add to its power house equipment a 242-kw synchronous rotary converter and a 315-kva and six 2000-kva transformers, which will be furnished by the General Electric Company.

Halifax (N. S.) Electric Tramway Company.—This company is installing additions to its railway generating plant and has awarded a contract to the Canadian General Electric Company for one 500-kw synchronous motor-generator set; also for the complete reconstruction of its direct-current switchboard.

Cape Breton Electric Company, Sydney, N. S.—This company is installing a 400-kw motor-generator set in its Sydney power house. The Canadian General Electric Company is supplying the equipment. A duplicate set is being installed in the reserve junction substation.

Toledo Railways & Light Company, Toledo, Ohio.—This company has ordered three 333-kva transformers from the General Electric Company.

Chickasha (Okla.) Street Railway.—This company expects to purchase one 100-hp synchronous motor with a capacity of 2300 volts to 2400 volts, 60-cycle, three-phase, 1200 r.p.m.

Manitowoc & Northern Traction Company, Manitowoc, Wis.—Plans are being made by this company to build soon a new 120-ft. concrete smokestack.

Manufactures and Supplies

ROLLING STOCK

Genesee Light & Power Company, Batavia, N. Y., is in the market for one near-side car.

Birmingham Railway & Light Company, Birmingham, Ala., is building three cars in its own shops.

Bay State Street Railway, Boston, Mass., has ordered seven express cars from the Laconia Car Company.

Citizens' Traction Company, Oil City, Pa., has recently installed one snow plow, one line car, one sand car and one work car.

Washington, Baltimore & Annapolis Electric Railroad, Annapolis, Md., is in the market for five all-steel double-truck interurban cars.

Geary Street Municipal Railway, San Francisco, Cal., proposes to let contracts about Jan. 1, 1914, for cars to cost about $700,000.

Hattiesburg (Miss.) Traction Company has purchased three car bodies from the Meridian Light & Railway Company, mounted on 21-E Brill trucks and with GE-81 two-motor equipments.

Chicago (Ill.) Elevated Railways, in view of increased traffic, has been authorized by its directors to purchase 120 cars instead of 100, as noted in the ELECTRIC RAILWAY JOURNAL of Nov. 22, 1913.

Hull (Que.) Electric Company, noted in the ELECTRIC RAILWAY JOURNAL of Nov. 1, 1913, as being in the market for cars, has ordered four 43-ft. semi-convertible, single-end trailer car bodies from the Ottawa Car Manufacturing Company, Ltd.

Albany Southern Railroad, Albany, N. Y., has placed in service a new 40-ton electric switching locomotive built by the General Electric Company. The locomotive is of standard construction, is provided with type M control, is geared for slow speed and is equipped with four GE-207, 165-hp commutating-pole motors wound for operation on 600 volts.

TRADE NOTES

Canadian H. W. Johns-Manville Company, Ltd., Toronto, Ont., has removed its office to larger quarters at No. 19 Front Street, East.

Gould Storage Battery Company, New York, N. Y., has located its Detroit office in the Boyer Building, 88 East Congress Street, Rooms 402-3.

E. G. Long Company, New York, N. Y., has received an order from the Brisbane Tramways, Ltd., Brisbane, Queensland, Australia, for one Kidder roll feed, bed and platen press for printing tickets. This press has a capacity of 48,000 tickets per hour.

Western Electric Company, New York, N. Y., has appointed A. E. Beling, formerly manager of its Pittsburgh house, as manager at Cleveland to succeed H. A. Speh, resigned. L. M. Dunn has been appointed manager at Pittsburgh, succeeding Mr. Beling. J. R. Ray has been appointed sales manager.

Ottawa Car Manufacturing Company, Ltd., Ottawa, Ont., has appointed W. M. Arnold its assistant manager, succeeding W. K. Jeffrey, who was made general manager some months ago. Mr. Arnold in addition to his new duties will, however, still act as purchasing agent for the company, a position which he has held for the last eighteen months.

Scholey & Company, Ltd., London, England, have received from the British Westinghouse Company an order for special tool steel gears and pinions, manufactured by the Tool Steel Gear & Pinion Company, for the whole of the equipments required in the electrification of the suburban lines of the London & South Western Railway. This constitutes the largest single order ever placed in England for gears and pinions.

General Electric Company, Schenectady, N. Y., has received orders for motor equipment from the Northwestern Pacific Railroad; Twin City Rapid Transit Company; Fitchburg & Leominster Street Railway, Fitchburg, Mass., and the Bay State Street Railway, Boston, Mass. Orders for air-brake equipments and air compressors have been received from the Boston (Mass.) Elevated Railway, Public

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Service Railway, Philadelphia, Pa., and Rockford & Interurban Railway, Rockford, Ill.

New York Switch & Crossing Company, Hoboken, N. J., at a recent meeting of its directors, elected Howard R. Sherman president to fill the vacancy caused by the death of William C. Wood, announcement of which was made in the ELECTRIC RAILWAY JOURNAL of Oct. 11, 1913. Charles L. Wood, a nephew of the former president, was elected secretary and treasurer. Mr. Sherman is thoroughly familiar with the details of the business, having been connected with the company for the past seventeen years.

Edgar S. Fassett, formerly general manager United Traction Company, Albany, has been appointed general sales agent of the New York Switch & Crossing Company, Hoboken, N. J. Mr. Fassett will continue in charge of the railway department of the National Products Company, 43 Exchange Place, New York, a position which he has occupied since he has been in New York City. The National Products Company is the New York representative of the Blair Parke Coal Company and of the William C Robinson Company, refiners of oil.

Davis-Bournonville Company, Jersey City, N. J., gave on Dec. 4 before the members of the American Society of Mechanical Engineers a comprehensive and practical exhibition of the recent development in the oxy-acetylene and oxy-hydric processes of welding and cutting metals. The commercial method of producing oxygen, acetylene and hydrogen gases and the welding of cast-iron, steel, copper, brass and aluminum by hand were shown. Steel barrel welding with an automatic machine was demonstrated. Steel cutting was shown by various machine applications of the torch, including the oxygraph, which cuts steel from 1 in. to 4 in. thick to a drawing, the radiagraph and railograph.

T. H. Symington Company, Baltimore, Md., through C. E. Mitchell & Company, New York, is offering for sale $300,000 of serial mortgage 6 per cent gold notes dated Dec. 1, 1913, payable as follows: Dec. 1, 1914, $75,000; Dec. 1, 1915, $100,000; Dec. 1, 1916, $125,000. These bonds are callable at any interest date as a whole at 102 and accrued interest, and are tax exempt in New York State. The interest is payable without reduction for the federal income tax. These notes are a direct general mortgage obligation, the proceeds of which are to be used in part payment of an issue of $350,000 two-year notes due Dec. 1, 1913. The company is a Maine corporation, owning a plant in Rochester, N. Y., and engaged in the manufacture of malleable iron equipment for railroad use, especially draft gears and journal boxes. There are outstanding $1,500,000 preferred stock and $1,000,000 common stock and the company has a bonded debt of $000,000, which has been reduced as of Nov. 1 by $153,000 through the operation of a sinking fund, leaving the actual bonded indebtedness as of that date $747,000.

ADVERTISING LITERATURE

California Corrugated Culvert Company, Los Angeles, Cal., is distributing a reprint from an article in the *Railway Age Gazette* of July 18, 1913, describing the characteristics and advantages of ingot iron.

Cutter Company, Philadelphia, Pa., has issued a catalog entitled "Who's Who and What's What," commemorating the twenty-fifth year in which it has manufactured its I-T-E circuit-breaker and containing descriptions of the personnel of the company.

Robert W. Hunt & Company, Chicago, Ill., engineers, have issued a sheet showing the specifications for open-hearth steel girder and high T-rails which were adopted as recommended practice by the American Electric Railway Engineering Association.

Drew Electric & Manufacturing Company, Indianapolis, Ind., has issued a catalog entitled "Have You Got Electrolytic Cancer in Your System?" describing the application of its Samson glazed porcelain and bronze pipe insulator to the requirements of electric railways.

Antox Paint Company, Indianapolis, Ind., has issued a folder describing its railway, structural steel, marine and industrial paints. An illustration shows the application of this paint to a large bridge on a line of the Terre Haute, Indianapolis & Eastern Traction Company.

Pyrene Manufacturing Company, New York, N. Y., has issued a folder announcing the start of an extensive advertising campaign and containing colored front-cover reproductions of the various periodicals in which it is conducting this campaign, also reproductions of advertisements which have been used.

Northern Engineering Works, Detroit, Mich., have issued a catalog illustrating their various classes of electric traveling cranes. Among the types illustrated are 50-ton four-motor type E, standard 30-ton type E. 35-ton a.c. type, and 15-ton and 10-ton types. These cranes are adapted to a wide range of locations, for low headroom and close clearance as well as for standard headroom and for special duties. Illustrations are shown of the cranes applied to steel tire, wire and bar mill service, and for lifting and conveying car bodies in shops and carhouses.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has issued a number of pamphlets covering railway line material. Catalog section DS 840 covers suspension, ears and splicers. Different types of trolley suspensions are illustrated and described and also various accessories, such as expansion bolts, insulators, clinch ears, trolley splicers, strain ears and wire chucks. Section DS 841 covers frogs, including the Detroit trolley frog, rigid and adjustable crossings, section insulators, switches and lightning arresters. Section DS 844 covers strain insulators of various types and for different kinds of service. Section DS 850 covers rail bonds and bonding tools. Tables are given showing the net weight in pounds per 100 bonds, and installation views of different types of bonds are shown. Rail-bonding tools, such as ratchet drills, facing tools, bonding punch and bond compressor, are described. An illustrated description of portable grinders, torches and clamps is also given.

General Electric Company, Schenectady, N. Y., has issued Bulletin A4173, which describes the GE-201 ventilated commutating-pole railway motor, and also Bulletin A4171, devoted to a description of that company's ventilated railway motors. Both of these bulletins supersede the company's previous bulletins on the respective subjects. Bulletin No. A4178 describes its three-phase induction motor panels. These panels are for controlling induction motors of voltages of from 110 to 220 and for operation on 25-cycle to 60-cycle circuits. The panels described are single panels only and not intended to be assembled as part of a switchboard. The bulletin contains a long list of standard panels, among which can be found panels suited to practically all conditions of service of this kind. Bulletin A4151 describes engine-driven continuous-current generators of the commutating-pole type. These generators are manufactured in both two-wire and three-wire styles and are either shunt-wound or compound-wound, 115 to 125 volts or 230 to 250 volts. They range in capacity from 25 kw to 400 kw inclusive. Data on larger sizes wound for 250 volts only will be furnished on application.

NEW PUBLICATION

Transformer Practice. By William T. Taylor. Cloth, 278 pages. New York: McGraw-Hill Book Company. Price, $2.50 net.

It is refreshing to read a book upon a highly technical matter, as this one is, which begins with an introduction covering the fundamentals of the subject. In this case the author has broken away from the tradition that a work intended for any use outside of the classroom should start with a leap into the middle of a subject about which the practical engineer has had no time to keep fully informed. Instead, he has presented in clear and concise form a short historical treatment of the matter, followed by a series of comments on the uses, the practical requirements and the basic theories of transformers in general. The book is a practical treatise on transformer selection, design, construction and operation and covers in addition such necessities for the understanding of the problems involved as vector diagrams and the principles of efficiency, regulation, methods of cooling and the like. The book is profusely illustrated with diagrams of connections and outline sketches of different forms of construction, useful tables of information being, of course, included.

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Consolidation of Street Railway Journal and Electric Railway Review

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ENFORCEMENT OF THE LAW

A striking example of two different views of the possibilities of the office of a mayor has occurred during the past few weeks in Indianapolis. We hope that the moral will sink deep into the minds of those city officials who hope to win popular favor and increase their political prestige by failing in their duties in times of emergency. The vigorous action of Mayor Wallace to maintain the supremacy of law in Indianapolis during the present teamsters' strike is in strong contrast to the supineness of ex-Mayor Shank during the street railway strike of a month ago, an attitude which was naturally reflected by his subordinates and undoubtedly led to the refusal on the part of a portion of the police force to protect the property of the railway company against assault. Fortunately the leading citizens of Indianapolis appreciated the seriousness of the situation and demanded the resignation of the Mayor, which was finally secured under threat of impeachment. Under the city comptroller, who automatically succeeded to the office of mayor, a different situation is prevailing, and the city is being spared a repetition of the disgrace which it suffered during the first part of last month. It is unfortunate that under our system of government the most available man for nomination to high office often seems to be the trimmer who has offended no considerable portion of the body politic. But when the test comes it will be found that the real favorite of the American people is the man who has the courage and ability to perform his duty, even if it means unpopularity among a single class or group. This is a lesson which the politicians seem to take a long time to learn. It is not inappropriate to quote here the policy of the new Mayor, as expressed by him when taking office, because it was his readiness to carry out these principles which led to his elevation to the office of chief magistrate. He said: "I shall do my duty impartially and fearlessly. Life and property must be protected at whatever cost and the fair name of our city restored. Every person has a right to conduct his own business in his own way so long as he does it lawfully, and I will not tolerate any interference with it by others."

THE SUBJECT OF PUBLIC RELATIONS

It is undoubtedly more than a coincidence that the subject of public relations of public utility companies occupied almost exclusively the attention of three important conferences this week in New York. One was the meeting on Tuesday of the New York Electric Railway Association, where this was the only topic considered and where the program included addresses by representatives of lighting companies, railway companies and holding companies and the chairman of the Public Service Commission, First District, New York. A full report of this meeting is published elsewhere in this issue. The second meeting which we have in mind was the annual meeting and banquet of the Railway Business Association, where the two speakers of the evening were Howard Elliott, of the New York, New Haven & Hartford Railroad, and Governor Cox of Ohio. The third assemblage was the annual meeting of the National Civic Federation on Thursday and Friday. These meetings, following so closely as they did other important conferences of public utility operators at which the same subjects were discussed, signify, as we have said, more than a coincidence. They show that the public utility operators of the country realize as never before the necessity of meeting the criticisms which have been directed against them in the past and of securing the support of the thinking public in the future. In other words, they feel that they must go more than half way in proving to the public their sincerity in the policy of the mutual consideration of each other's interests.

THE "NEW SPIRIT"

The situation which we have been discussing is not one which is confined exclusively to the electric railway field. It concerns every public utility and every large corporation. But the electric railway companies suffer perhaps more than some other public utilities because of the feeling that in their past history there have been instances of over-capitalization, of valuable franchises secured without adequate compensation and of the subordination in many cases of public interests to private gain. These facts have been and still remain a serious handicap to a better condition of affairs at present. It will be difficult to overcome this record unless the public utilities can convince the public that they are

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animated by a different impulse—by a "new spirit," as Mr. Allen appropriately expressed it this week at the meeting of the New York Electric Railway Association. This does not mean that the electric railways ought not to be allowed to make a profit on the service which they provide. No enterprise which is conducted at a loss will attract new capital, and the community as a whole is practically as much interested as is the company itself in the prosperity of the local railway, because unless it grows and prospers the community cannot prosper. But the "new spirit" means that the company is prepared to give the best service which its means afford; that it welcomes constructive suggestions, criticisms and complaints; that the company will conduct all of its corporate affairs in a manner which will stand the full light of day. This is not the complete code of ethics, but these ideas form an essential part of the new spirit which should animate all public service companies. Then if they will explain the position of the railroads as frankly as did Mr. Elliott at the meeting of the Railway Business Association on Thursday evening, a great deal of the present misunderstanding will disappear.

ACCIDENT PREVENTION MADE A CITIZENS' MOVEMENT

In our editorial columns for Nov. 1 reference was made to the attractive methods which had been adopted by the Brooklyn Rapid Transit System to present accident-prevention material by means of trained lecturers and moving pictures. These methods are described in detail in an article in the present issue. It will be seen from the latter that two other striking features are characteristic of the accident-prevention campaign in Brooklyn, namely, that it has received the title of "Children's Safety Crusade" and that the company has obtained the active co-operation of many citizens who are noted for their connection with public welfare movements.

It was a happy thought that an accident-prevention campaign ought primarily to be directed toward the education of the child who is not experienced enough to realize the dangers of that recklessness all too common to vivacious Young America. The title, however, has the further value of reaching, by indirection, the equally thoughtless adult, on the principle that "Men must be taught as if you taught them not." Similarly, wisdom has been shown by the company in its enlistment of the help of influential persons who are outside of its own ranks. It is not enough for a railway to limit its safety work to the maintenance of the best equipment standards and to the instruction of its employees. It must go still further by demonstrating to the best elements of the public that in this work it is guided by humanitarian motives rather than by the selfish desire to reduce accident expenditures. One way that has been taken to prove this point has been to make the accident talks cover other common forms of dangerous thoughtlessness, such as the improper use of illuminating gas. By this method emphasis is placed upon the general virtue of caution rather than upon the effort to avoid railway accidents alone. The goal of "Safety first" is one which seemingly should be sought by all rather than singly.

GOOD OR BAD PUBLIC RELATIONS

In his talk before the New York Electric Railway Association Mr. Allen drew a distinction between good public relations and bad public relations. He did not define bad public relations at length, but he very properly outlined the ways in which good public relations may be furthered. It is not so important to talk about bad public relations as about good public relations, because the former ought not to exist and the latter should be promoted in every possible way. Where unsatisfactory public relations do exist the problem of changing them is greater than any other problem of the management.

Electric railways would like to have the good will of their communities. They ought not to expect to capitalize that good will, but they ought to have it. If they do have it, it is just as much an asset as if they did capitalize it. It is, in fact, an asset without which they cannot do business satisfactorily for any great length of time. Good public relations are worth all of the trouble it takes to develop them. They cannot be developed without trouble. If they are not an asset worth having, much time, thought and money have been recklessly wasted by managers of public service corporations throughout the country.

Mr. Allen plainly says that relations that are not good are bad. No doubt he would agree that there are good relations which may be made better, and that there are bad relations which might easily become worse. If, however, the relations of the public utility and its public are satisfactory, this fact will be clearly evident to the officials and employees, to public authorities and to visitors in the city. If the relations between the two are bad, evidences of this fact will also leak out continually. They will hurt the corporation and they will hurt the city. The step from bad relations to good relations is a long and hard one to take, but the step from good relations to bad relations is a short one, and it is such an easy way that care is necessary constantly so that it shall not be taken by any slip or misstep.

We should define bad public relations as a state of affairs that, unwholesome as it is, always appears to be much worse that it really is. Faults on both sides are magnified. Differences are allowed to grow. Complaints are unanswered or unsatisfied. Service conditions are not bettered when they could be bettered. Trainmen do not try to please the public. They do not answer inquiries as they should. They are not careful to stop cars when signals are given. They jostle people unnecessarily. Where conductors and motormen give the company a bad name it is either because the management for years has not given the heed to public relations that it should have done or because the management really does not care. In either case, if the company is to make the success that it should make, the policy should be changed.

When we come to the question of good public relations, the remedy proposed by Mr. Allen is, in effect, to put the railway side before the public. The company would say to the newspapers in its community: "We have a great deal of material here that is of real news value to you. We will provide you with all the facts about it. We will be ready to give facts in reference to our business at any time. Not only are we ready to give them but we want to give

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them, because there is a great deal about our business that the public would like to know. For what we have withheld from publication in the past we want to give double now, because we realize now that there is a legitimate public demand for interesting news about our property."

There are other ways in which the company can spread public knowledge of its affairs and show its interest in the community. Its money contributions for such purposes should not be less, if it can afford to make them, than those of other industries of equal importance. More than that, its active officials should have a recognized part in movements looking to the betterment of civic conditions. The name of the railway and its officials should be connected with the progress of the city.

No one act will make public relations satisfactory to both the public and the company. But the adoption of a policy that can be carried out by all departments through both officials and employees will help. As a means toward this end, Mr. Allen suggested the adoption of a platform or a plank in the platform by the association, to be used as a creed by the member companies. The result of this would be good, and we regret that the association adjourned without taking definite steps at this meeting to carry the suggestion into effect. This should be done as a constructive upward step at the next meeting. The good lessons of this week's discussion should not be lost.

MEETING THE COMPLAINTS OF THE PUBLIC

Beyond all the possibility of a doubt, the proper manner of meeting verbal and written complaints from the public is a topic that well deserved the emphasis bestowed upon it by various speakers at the New York Electric Railway Association quarterly meeting. The generic subject of establishing a better public relationship between electric railways and the traveling populace is, of course, important; but the eternal difference between general forensic theorizing and specific practical application makes the discussion of such concrete points as the correct manner of meeting complaints one of absorbing interest and instant value. The gist of the whole matter, as one speaker said, is that, whereas once the public viewed railway construction and operation as an interested but chiefly curious outsider, today it has assumed the position of partner in such affairs. Such being the case, the frankness, consideration, unanimity of thought and concert of action that invariably characterize successful partnerships are necessary requisites for the establishment and maintenance of a more cordial feeling between the public and its common carriers.

The various speakers mentioned several concrete ways of meeting frankly, considerately and rapidly these complaints. From all the discussion, however, two fundamental principles stand out in clear relief—principles that may be applied to all companies, irrespective of their size, geographical location or organizational system. These are: first, that the executive and especially the managerial officials of a company should personally attend to all public complaints, and, second, that they should not only give such matters their direct attention but should settle them by means of personal interviews. The first point does not require an extended discussion. Our attitude thereon is most ably summed up by the forceful statement of Frank Hedley to the effect that the manager or a man who has been imbued with the manager's ideas should personally attend to complaints, and any property with a scope of operations too large to permit the manager to do this is large enough to allow the assignment of a special agent for this purpose.

We fully concur, too, in the second postulate, that an interview in person with complainants offers the best method for adjusting satisfactorily all disputes. The remarks of Ernest Gonzenbach relative to the use of such measures on the property under his direction are fully indicative of their efficacy. Business-letter writing is a cold science, one which rarely allows the winning personality of a manager to be displayed, and frankly spoken words, an open countenance and the intimacy of a personal interview will do more to dispel the clouds of distrust and dissatisfaction than pages of letter paper and columns of newspaper talk. In a large city, of course, it may be practically impossible to answer every trivial complaint, but the manager of the largest electric railway can at least see that any necessary letters are signed by him and not spoiled by expressions such as "dictated but not signed" and other evidences of office haste. In any company, large or small, the general attitude should be a desire to spread the scope of personal interviews as far as possible.

The point is of particular interest in connection with the "chronic kicker." With such a man the only question is one of endurance. As Mr. De Long pointed out, the proper way to treat such a customer is to exercise particular pains to investigate and settle every complaint—the first, the second, the third, or even the ninety-ninth. Then, suddenly, either devoid of ammunition or believing himself flattered by the attention, the "chronic kicker" is won over. The process may be long, but experience has shown it to be both practicable and conducive to highly valuable results, for the "chronic kicker" invariably becomes as loyal as a friend as he was vindictive as an enemy. Patience, in the electric railway world as elsewhere, is sure to have its reward.

Finally, it is always desirable to have a definite rule of conduct. This is supplied in the paper by Mr. Sims. There is nothing revolutionary in this code. Each rule, if analyzed separately, will be found to be similar in import to that which any retail merchant who wishes to be successful would enforce in his relations with those who patronize his store. All may be summed up in the statement that if a person wants to attract customers he must treat them courteously and, so far as he can, give them the service which they desire and for which they pay. If this policy had been appreciated to a greater extent in the past by public utility companies the question of public relations would not be so important with them now as it is. Too often these companies have acted upon the principle that their service was a monopoly which the public was obliged to patronize, and if they didn't like it they could go without. This attitude can no longer be assumed, and such rules as those enunciated by Mr. Sims for the guidance of the officers and trainmen will go a long way toward bringing about a better feeling between a public utility and its patrons.

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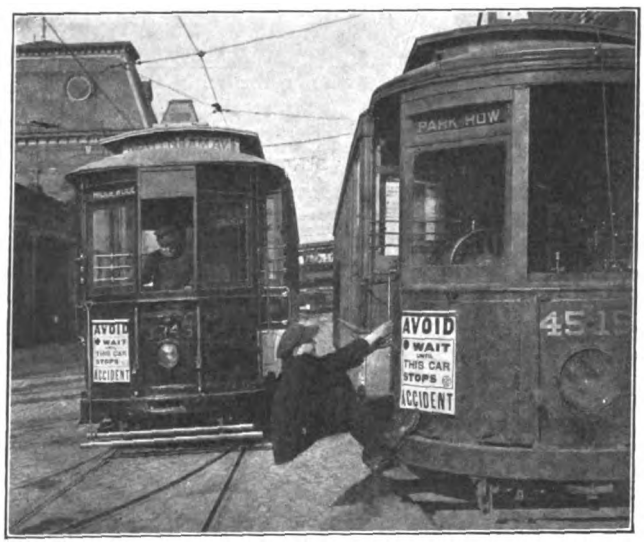
Accident Talks to the Children of Brooklyn

The Brooklyn Rapid Transit Is Conducting a Children's Safety Crusade in Which Effective Use Is Made of Moving Pictures by Lecturers Who Are Specialists in Talking to School Children Along Pedagogical Lines—The Work of the Company Has the Indorsement and Co-operation of Prominent Citizens

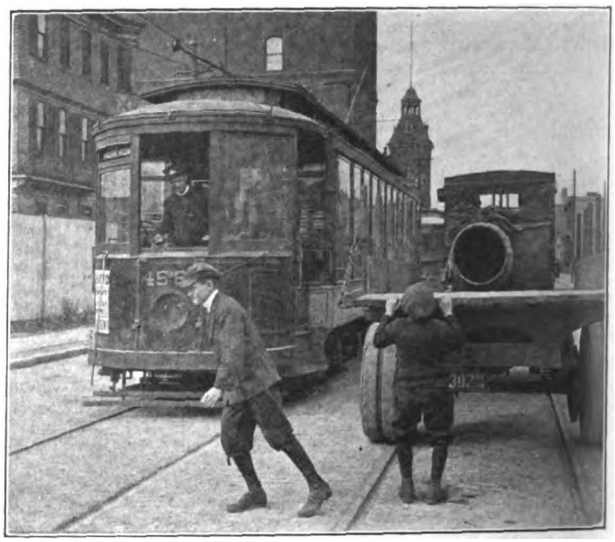
In the spring of 1913 the Brooklyn Rapid Transit System made arrangements for the inauguration of a "Children's Safety Crusade," which, as the name implies, was to be directed toward instructing children how to avoid accidents while on the streets or vehicles. The Board of Education, city of New York, expressed sympathetic approval of the proposed safety campaign and gave the necessary authorization for lecturers to give talks on safety in the public schools.

Objective teaching was decided upon, and the lecturers were provided with a model trolley car, a gas stove, caution signs and a large number of original accident drawings. With this assistance the lecturers found it easy to hold the attention of even the kindergarten children for the thirty-minute period which had been allowed for the presentation of the subject. The objects were taken up in turn for discussion, and the talks were given in conversational form. To broaden the scope of the crusade, the lectures included talks on other dangers—hence the gas stove.

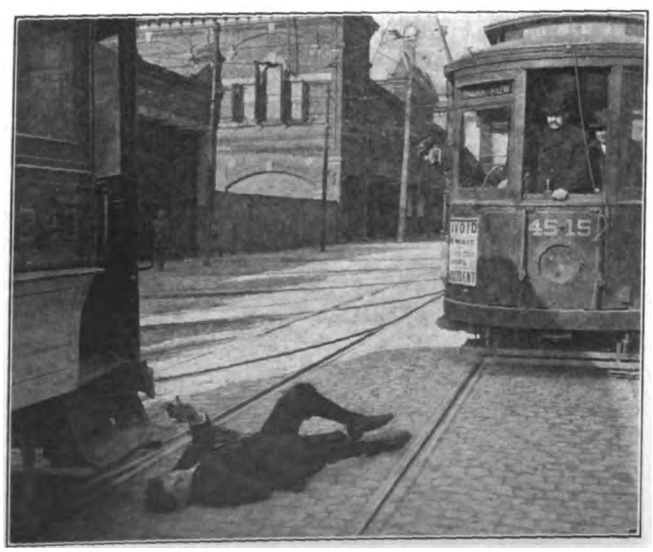
The character of lecture is so different from the usual form of instruction on the subject of accidents and has proved so successful in holding the attention of the children that the following abstracts of two typical talks by Mrs. Jessica P. McCall, supervisor, bureau of public safety, will surely be found of interest. The first talk is usually given to the younger children only, except in districts with a large foreign element. The second talk is for older children and others.



Brooklyn Accident Campaign—Slide Showing Boy Stealing a Ride



Brooklyn Accident Campaign—Slide Showing a Careless Boy Crossing Street and Another Stealing Ride



Brooklyn Accident Campaign—Boy Who Stole Ride Knocked Down by Car Going Other Way

Brooklyn Accident Campaign—Slide Showing How the Wheel Guard Saved the Careless Boy

A TALK TO YOUNGER CHILDREN ON AVOIDING ACCIDENTS

"My dear children, you have a guard for your bodies. Where is he? Your brain or mind. Would you be sur-

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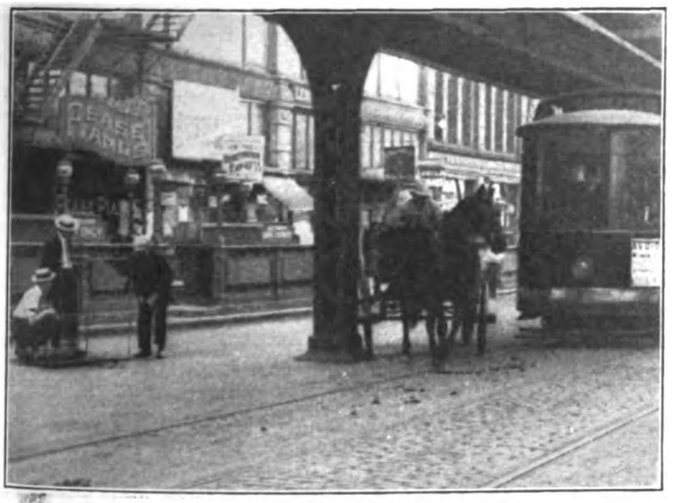
prised if I told you that your bodies are like machines that need engineers or drivers? You cannot see your engineer or driver, as we do one that drives a big locomotive or an automobile, or the motorman that drives this car [pointing to trolley car].

"Your engineer sits silently behind two little windows, your eyes, and looks out, but no one can see him, and if you don't keep him busy he gets very sleepy and lazy and can't think quickly.

"Shall we call your head the cab, or the box, in which the engineer sits and looks out through the window? These windows are more wonderfully made than any other windows in the world, and they are so placed in your cab that your engineer can make them turn in any direction he wishes to look. They have curtains that close over them when your engineer wants to shut out the light and rest or sleep. Let me see you draw those curtains and rest a moment.

"Now these windows are very delicate and need careful protection, need to be guarded, because if they are injured the curtains have to be drawn over them all the time, and your engineer can't do as good work for you as when he had the windows to look out through.

"Did you ever see a blind boy feeling his way across the sidewalk with a cane? He has to find in that way where all



Brooklyn Accident Campaign—The Heedless Driver Gets Between Elevated Pillar and Car

the crossings, sidewalks, posts and trees are, so he goes very slowly. He can't see holes in the sidewalk, runaway horses or other dangers.

"Now if your driver doesn't think quickly, don't you see that your machine is in danger of meeting with an accident, of losing some of its parts and of being smashed up? [Lecturer turning to model trolley car]: Suppose we lost a wheel from this car. What could we do? Yes, we could send to the factory and get another—very easy, isn't it? And we could replace any part of this car with a new part from the factory and make this car as good as it is now, couldn't we? But if you lost a leg or an arm or an eye, where could you send to get another as good? A glass eye would help your appearance, your looks, but you could not see with it. A wooden or cork leg would cost you from $75 to $175, and you wouldn't find it as good as the one of flesh and blood that you have.

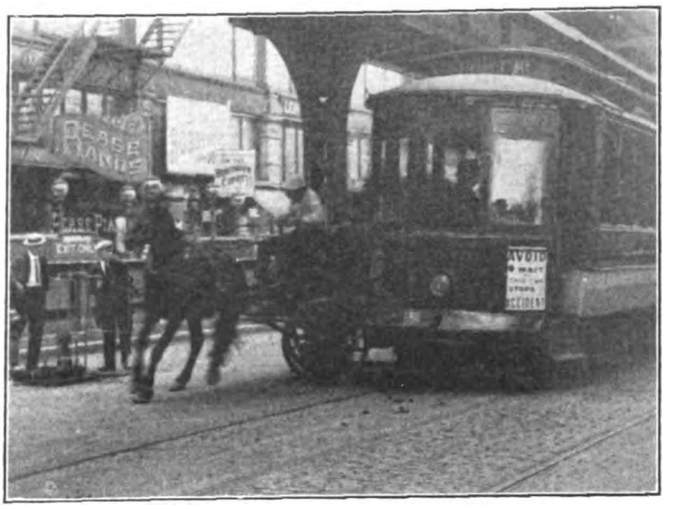
"Is your driver always wide-awake, always on the sharp look-out? Does he think quickly? Is he a safety driver? If he isn't all this, he can't guard your body well, so begin to-day to train him. You don't have to pay him wages to drive your machine as we have to pay a man to drive an automobile or a motorman to drive this street car, so you shouldn't be too lazy to train him.

"A motorman has to be trained to drive this car. [Lecturer turning to some boy]: Suppose after you grow up, you should want to become a motorman on a street car—what would be your duties?"

Child—"I'd have to run the car."

Lecturer—"Yes, and that means control the car, work the brakes, ring the gong, watch the traffic and the traffic policeman's signals, and listen for the signals from the conductor. What are those signals?"

Child—"Bells."



Brooklyn Accident Campaign—The Heedless Driver Is Wedged Between Car and Column

Lecturer—"Yes, but how many times is the bell sounded for the motorman to stop?"

Child—"Once." (Lecturer rings bell.)

Lecturer—"Right. What will two bells tell the motorman?"

Child—"To go ahead."

Lecturer—"Suppose I was a passenger on this car and wanted to leave it, had stepped out on the platform, was ready to get down and suddenly heard two bells [rings bell], what should I do?"

Child—"Stay on."

Lecturer—"You see, children, when we understand signals and obey them, we can safeguard our own lives. [Lecturer turning to a boy]: Suppose when you grow up, you should want to become a conductor, what would be your duties?"

Brooklyn Accident Campaign—The Heedless Driver Has Paid the Penalty of Thoughtlessness

Child—"I'd have to take the money."

Lecturer—"You mean collect the fares, and you would have to do more than that. You would have to see that people got on and off the car in safety, give transfers

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and give the motorman his signals to stop and start the car. What could we call the motorman and conductor? Guards! They are put on the cars to guard the lives of the people inside the cars, and when we stop to think about it we can understand they are pretty busy men. Suppose a boy should 'hitch on' here [pointing to rear of model car] to steal a ride, fall off and get hurt, whose fault would it be?"

"One hundred and twenty-five dollars for a cork leg when he had one of flesh and blood! I don't believe he would be selling papers to-day if he had two good legs. I think he would be doing something with more money in it. Let's get busy, girls and boys, and use our minds as safeguards for our bodies. 'Safety first' is a simple habit —isn't it?—a mighty good habit to cultivate. Every lesson learned for your safety is time and money earned. 'Safety

Brooklyn Accident Campaign—Reproductions of Three Colored Posters of Original Design

Chorus—"The boy's own fault."

A TALK TO OLDER CHILDREN

"Why do you think we are giving you these talks on safety? We want to decrease the ranks of the army of cripples. It's a large army already. We do not want any more of our splendid girls and boys to join it. We need you boys and girls. You are going to take our places in the world and we are trying to help you understand the value of a whole body and a strong, alert mind. A large number of the cripples are beggars or engaged in some sort of work in which there is very little money. I know a boy who sells papers at the Seventy-second Street subway station. I have been buying papers from him three years and can still find him at his old stand receiving pennies for papers with one hand, while with the other arm he leans on a crutch. I asked him one day to tell me the story of his accident, and I am going to read you the note he handed me the next morning with my newspaper." (Reads letter telling how

first' is a subject that is engaging the attention of all thoughtful people and we want to get in that class and stay there, don't we? How many of you ever had an illness in your homes? No doubt every one of you. First, there was the doctor at $1, $2, $3 or $5 a visit. The next item is money for special food, then perhaps the hospital and more money for a stay in the country, if the patient has to have it to get well, or still more money for the funeral, if the patient dies. Is there a boy or girl in this assembly who ever had to give up something he wanted because sister, mother or father was sick?

"It is very much like that with a railroad company. In a city like New York the number of people requiring service is constantly increasing, and as the districts through which trolley and rapid transit lines are operated become more and more congested operation becomes increasingly expensive. These costs run into enormous figures. In a small country town, where trolley service fills the needs of

Brooklyn Accident Campaign—A Wise Boy Knows that a Broken Wire May Be Dangerous

Brooklyn Accident Campaign—The Policeman Keeps the Children Away Before Line Wagon Arrives

boy had his leg crushed because he jumped off a moving car in front of one passing in the opposite direction.)

"To what army does he belong?"

"Cripples." (Chorus.)

"I asked him why he did not buy a cork leg. 'I've got one,' he said, 'cost me $125, but my leg was cut off so near the hip that I have to use two canes when I wear my cork leg.'

the community, construction cost, exclusive of power and equipment, is in the vicinity of $15,000 a mile. In Brooklyn it costs over $50,000 a mile to build a trolley. An elevated railroad built to-day for districts which have outgrown trolley transportation costs more than $500,000 a mile, and a subway costs the enormous sum of from $2,000,000 a mile to $5,000,000 a mile to build and equip ready for the operation of cars. In many other ways the

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ever-increasing demands of city traffic are placing an extra burden of expense upon street railroads.

"Now, what would you do if you were a grocer, or a baker, or a coal dealer, and your expenses increased in any such way? Raise your prices, wouldn't you? But the street railroad cannot do this. In Brooklyn, in the last fifteen years, fares have been reduced from 15, 20 and 25 cents to 5 cents, and from 25, 30 and 35 cents to 10 cents. On the new rapid transit lines, as you know, a 5-cent fare will be practically universal.

"So the only way in which the railroad can meet the increasing demands of the public is by making operation more and more efficient. And this explains the business motive behind all the activities of the railroad in the field of public safety. There is also, of course, the humane motive, the desire to prevent so far as possible, loss of life and injury of those who must use the public streets. But the business motive is worth considering also. And as you go out to earn your living, remember that in proportion as you can help the railroads prevent the awful cost of accidents, to that extent do you provide them funds from which they can meet your own increasing demands for quick and comfortable transportation. We want the girls and boys of Brooklyn to help us make a safer Brooklyn.

"I am going to show you some pictures illustrating accidents from the four general causes I have given you. What are they? Carelessness. Recklessness. Undue haste. Thoughtlessness.

"For instance, here is a boy on a bicycle colliding with a trolley car. You can see that it did not occur to this boy, who has met with a serious accident, that a street car cannot turn out to pass man or child or vehicle or to avoid a collision. It can run only on its tracks.

"Then there is another common-sense thing to observe. If a smaller machine collides with a bigger, which suffers the greater damage? When moving rapidly, a trolley car is under tremendous momentum and cannot be brought to an immediate stop. It is in your interest that the trolley car should have the right-of-way over other vehicles on its own track. The motorman not only has his hands full to control his car, but he must also watch every vehicle he passes and every one coming toward him and every person

Brooklyn Accident Campaign—Motor Tower Truck Off to Repair the Broken Wire

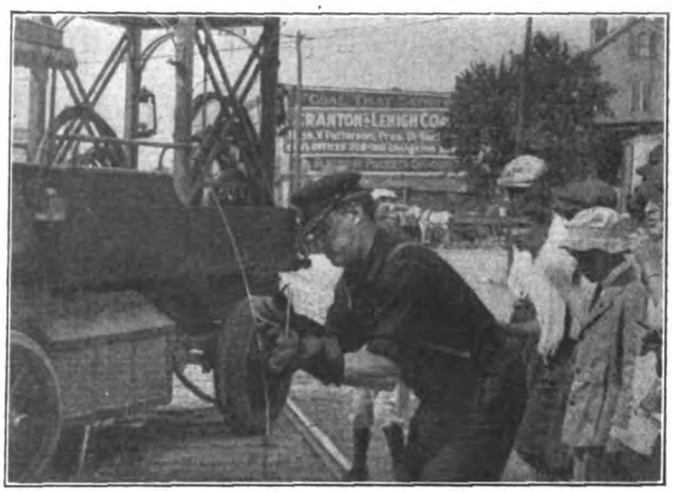
on the street. Your watchfulness will help him as well as safeguard yourself.

"Railway companies at all times do their utmost to avoid accidents of any kind. But the only thing that can prevent accident is co-operation for safety, and we want yours."

SOME RESULTS OF LECTURE WORK

After one of the foregoing conversations a little girl five years old stood up and in a perfectly unconscious way said: "I know a little girl, my size, who told me she was going to throw herself in front of a trolley car so her mother could get a hundred dollars."

The statement was startling, but the lecturer answered: "What good would the hundred dollars do the mother after the child was killed? It would cost her that much to have a funeral, and then she would not have a lovely little daughter to help her about the house."



Brooklyn Accident Campaign—The Lineman Makes the Repair but Is Careful to Use Rubber Gloves

The very small child answered: "No, for she'd be dead."

The greatest encouragement received in response to the talks were hundreds of letters from children in various schools expressing appreciation in the work.

The work aroused interest in other ways. After the safety talk in Public School No. 147, Brooklyn, a safety committee was formed, a "Safety Day" arranged for, and the next issue of *The Leader*, a school publication, was featured as a "Safety" number. Many of the subjects chosen for the pupils' composition therein bear evidence that the children had paid careful attention to the lecture. This paper reaches about 5000 families.

At the close of the safety talks short stories on safety in the form of illustrated leaflets were distributed, and each child received a button as a reminder of the lesson in caution. The principals and teachers gave the movement their hearty co-operation and encouraged it by having the pupils write compositions and letters on safety. By special invitation, talks were given at mothers' meetings and at an evening truant school, proving that in a very short time great interest was created in the work.

As the school campaign progressed safety plays were written and a performance was given in two schools. Safety committees were also formed in many schools.

THE USE OF MOVING PICTURES

The especially interesting new feature of the work is a motion picture, "The Price of Thoughtlessness," prepared by E. C. Clarke, supervisor inspection bureau Brooklyn Rapid Transit System, and Roy F. Hanaford, of the Vitagraph Company of America. The idea of using the motion picture as a supplement to the classroom instruction developed out of the school campaign and the summer playground work of last spring. The picture was produced with the co-operation of the Vitagraph Company of America, and it proved an excellent medium to illustrate how children meet with accidents through carelessness and thoughtlessness. Two views from this picture are shown, and the plot is well described in the following résumé prepared by the producer:

"The Price of Thoughtlessness.—The children are gathered in the schoolroom listening to a lecturer, who, with a pointer and charts, discourses upon the dangers of the city street and shows how to avoid them. When he is through

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he presents each child with a safety button as a reminder of his advice. Howard, Mabel and Bobby remain after the other children to ask a few additional questions. After school Bobby lives up to the button by notifying the police of a live wire he discovers on the car track. He is praised by the crowd on the scene for his thoughtfulness. Through Howard's carelessness little Mabel narrowly escapes death when she falls in front of a street car and is saved by the

Brooklyn Accident Campaign—This Boy Succeeded in Escaping the Car

safety device on the car. She is crossing the track with Howard. Both are on roller skates. Running in front of a northbound car, they suddenly discover that a car coming south is heading them off. Howard jumps to safety, but his sister is not so quick and falls before the car. An automobile coming south on the avenue stalls, forcing a wagon to cut in to the left between the elevated railroad posts onto the car track in order to pass. Just as the wagon is hauled onto the track the car crashes into it, crumbling it to pieces and crushing the driver beneath the wreckage, all due to thoughtlessness. Some boys are playing ball on a side street. Howard, the catcher, misses the ball, which bounds away across the car track on the avenue. He runs after it

Brooklyn Accident Campaign—He Did Not Succeed in Eluding the Unexpected Automobile

blindly and suddenly realizes that he is between two cars. Bewildered, he leaps for safety, jumping in front of a speeding automobile, which runs over him. Howard is crippled for life. After many days of suffering he is taken from his bed in the hospital for a ride in a roller chair. He sees boys and girls playing tag and leapfrog on the hospital lawn, and, with tear-filled eyes, realizes the terrible price of his thoughtlessness."

ORGANIZATION OF BUREAU OF PUBLIC SAFETY

Each lecturer is provided with the services of a man who drives the safety wagon that carries the objects from school to school. The lecturers begin their work in the schools at the 9 o'clock morning assembly and give four lectures each day.

The work in the schools last spring proved so successful that the Brooklyn Rapid Transit System determined to enlarge its scope very materially and to make permanent provision for this systematic study of the question of public safety. To this end a Bureau of Public Safety was organized to take charge of all the work relating to the education of the general public in matters of safety. Through this bureau the company invited a number of Brooklyn citizens occupying leading positions in various phases of the life of the borough to co-operate in forming the Brooklyn Committee of Public Safety. On Oct. 20 the first meeting of this committee was held. Addresses were made by Col. T. S. Williams, president of the Brooklyn Rapid Transit Company, and General George W. Wingate, who presided at the meeting. Steps were taken for the permanent organization of the committee with thirty-three members, the body being divided into sub-committees as follows: Schools and playgrounds, public and sectarian; boy scouts; church and civic organizations; public institutions, other than schools; vehicular and pedestrian traffic; structures, pavements and excavations; street railways; explosives, fireworks and firearms; law and legislation; hazardous occupations; publicity; permanent officers; executive committee.

Great interest has been shown by the press and public generally in this enlargement of the safety campaign, and it is anticipated that the committee named will play an important part in safeguarding the lives of both children and adults in the territory which its activities cover.

ICE MAKING AT DURHAM, N. C.

The Durham Traction Company, which has recently been taken over by H. L. Doherty & Company, operates a combination lighting, railway and ice-making plant at Durham, N. C. The ice-making equipment consists of a 50-ton machine operating non-condensing, but at the present time the company is installing a 50-ton condensing machine and redesigning the ammonia condensers and tank rooms. The Shipley double-tube condensing system of the York Manufacturing Company is being installed with an accumulator for pre-cooling the water. The new unit will enable a great saving to be effected, inasmuch as the old unit required from 30 lb. to 32 lb. of steam per hp-hr. while the new unit is guaranteed to operate on 16 lb. of steam per hp-hr.

The condensation from the ice machine and the main generating unit which is in operation will be sufficient to make 100 tons of ice a day. The water from the reboiler is forced through four coolers and then through a set of three cloth filters. It passes thence through a set of charcoal-brick filters and then through three batteries of charcoal and silica-sand filters, whence it reaches the pre-cooler. The latter is a double-pipe arrangement in a tank, wherein ammonia is expanded directly so that the water on its way to the freezing cans reaches a temperature of 40 deg. Fahr. or lower. There is a 6-ft. x 6-ft. x 14-ft. storage tank which is also piped with coils sufficient to maintain the temperature of the water a few degrees above freezing before it reaches the cans. Storage space is provided for 150 tons of ice without stacking. The storage room is insulated with 4 in. of cork covered with cement.

No data are available on the cost of manufacturing the ice other than that it can be manufactured for less than it can be delivered. The ice is retailed by the company at the rate of 40 cents per 100 lb. in small pieces and 30 cents per 100 lb. in cakes. If two cakes are sold at one delivery, the rate is 25 cents per 100 lb.

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Public Relations Discussed by New York Electric Railway Association

At This Meeting, Which Was Held in New York on Tuesday, There Were Addresses by the Chairman of the Public Service Commission, First District, New York, and by a Number of Prominent Public Utility Operators

The eighteenth quarterly meeting of the New York Electric Railways Association was held on the fifth floor of the United Engineering Societies Building, 29 West Thirty-ninth Street, New York, on the morning of Dec. 9. About 125 were present.

President Frank Hedley called the meeting to order about 10:15 a. m., and after welcoming the delegates introduced as the first speaker Hon. Edward E. McCall, chairman Public Service Commission, First District, New York. An abstract of Judge McCall's remarks follows:

ADDRESS OF JUDGE M'CALL

"My main motive for appearing here is to extend to the New York Electric Railway Association the warm welcome of the Public Service Commission for the First District of New York. The commission realizes that meetings of this character must necessarily tend to bring about results beneficial to it, because where questions of import in the conduct of electric railways are made the subject of discussion by men engaged in the activities of that work the results are bound to make more easy the settlement of questions that come before the commission.

"If there were no other reason or incentive for the existence of your organization, your quarterly or annual meetings would be amply justified through the discussion of such topics as the one to-day, the relations between yourselves as operating companies and the public whom you serve.

"The old order of events in the operation of electric railways has come to an end, and a new and perhaps a wiser method is in vogue. No longer in the operation of railways can officials find any justifiable reason for not playing their game with the cards on the table. There is no need for concealment of any kind and no justification for secretive methods. An open, frank dealing with the traveling public will bring to you in the management of your roads a far greater degree of comfort and a more proper realization of the great work you are doing than was possible in the former days of studied efforts to conceal your reasons for certain actions or keep secret the cause of certain omissions.

"Under the present laws publicity in regard to corporation affairs is practically compulsory. There is not a single act that can for a moment now, in the operation of electric railways, be concealed. The records and acts of your companies are public documents and public acts in the fullest sense, because the supervising boards and the so-called public service commissions, acting either for themselves or in the interest of the public, can find out even your innermost secret and publish every operating act. It is my contention and my belief that the major part of the men engaged in the management of railways in this state agree with me that the good which will follow from this publicity will redound to you as electric railway officials, because it will bring the public to see just what you are doing and why you are doing it.

"When you appear before the Public Service Commission do not walk in like cowering slaves, bending the knee for a favor, metaphorically speaking, but go in as men with capital invested in public service corporations, as citizens of the State demanding your rights. The commission over which I preside will ever be an open place where a man representing a railway or a complaining citizen can come, and in all instances there will be a fair application of judgment to the real facts as they are presented. The question of individual or corporation, of clamor or prejudice, will find no lodgment in the minds of the commissioners, to affect the disposition of the matters brought before them. A fair, upright treatment, the recognition of the rights of all these, will be the guiding rules in the disposition of all cases."

At the conclusion of Judge McCall's remarks the association, upon motion of President Hedley, gave him a rising vote of thanks. The speaker expressed his appreciation of this action. Following Judge McCall, President Hedley requested C. Loomis Allen, president Syracuse & Suburban Railway, to make some remarks. Mr. Allen's address was followed by those of J. H. Pardee, president J. G. White Management Corporation, and C. S. Sims, second vice-president Delaware & Hudson Company. Abstracts of these addresses follow:

ADDRESS BY MR. ALLEN

Mr. Allen first said that it was extraordinary, in the history of the New York Association, to hear a man of the standing of Chairman McCall speak so unqualifiedly of the change in public relations that had taken place and was taking place in the railroad world to-day. Many railroad commissioners and public service commissioners had entertained the association with narratives of their experience, both serious and humorous; from others there had been tirades. But the chairman of the Public Service Commission, First District of New York, had spoken in terms of the new spirit that is in existence to-day, a spirit that is manifested not only in an altered manner of living and new manner of thought but also in a changing attitude in our own industry regarding the question of public relations.

Mr. Allen said that the relations which a railway corporation had with the public were classified sometimes under the caption of good public relations, and when they were not of this order they were called bad public relations. The term "public relations" was a collection of two words which was on a parity with the words "public service." Mr. Allen, for the purpose of the discussion, divided "good public relations" into two parts, as follows:

(1) A fair understanding by the management of a corporation of what the public wants in the shape of service.

(2) A fair understanding by the public of the details that are necessary to be carried out in order that the corporation can provide the service demanded by the public.

If the facts were placed squarely on these two propositions, if the public and the corporation through its management were inclined to deal fairly and equitably, it should not be a very difficult matter for the public and the corporation to establish the relation between them as good public relations. On the other hand, if there was a lack of facts or there was a spirit of unfairness on the part of either party, the roads were divergent and there would be bad public relations.

Historically it was interesting to note, Mr. Allen said, that in the early days of mechanical power the energy, brains, ability and personnel of all of the representatives of the corporation were employed in the consideration of the mechanical steps and apparatus needed. The mind of the public was occupied by the novelty of the new method of rapid transit. Before the novelty had worn off entirely there were new developments in tracks and power and larger cars. Then changes and prepayment equipment

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came, and again the public mind was occupied by the novelty of the new developments in rapid transit. It was fair to say, in passing, that money came easy for the men engaged in developing the properties, as compared with to-day.

The press, for many years the institution used by the public as a method of obtaining information and news, was used freely by individuals, associations and municipal officials. The political demagogues and the ambitious citizens always had their views in the news columns and some pretty rough things were said that all must acknowledge were not far from the truth at the time.

But, Mr. Allen asked, did the corporation put its affairs forward in the news columns as a defence of its service and acts? At a late day the corporations were awakened to the fact that the public throughout the years had been reading—what? Facts? No, but material that the public had accepted as facts had been presented fully. Now those who were engaged in public service as operating men for public service corporations knew that at this late day they must secure the attention of the public and their patrons. They must state fairly the facts in relation to the business. The truths that were old stories and humdrum in the lives of the operating officials could be made news of reading value to the public. This material would be useful to the newspapers if the right road was followed. In this work it was not possible to talk satisfactorily in the language of transportation officials, engineers, accountants or claim agents. The language that the newspaper man talked when he told his readers the story or wrote the news item that attracted attention and interest must be used.

Continuing, Mr. Allen asked if the railways had anything of interest to tell. What about an item showing how many miles of electric railroad were built in New York State from 1901 to 1907 and the number of miles that had been built from 1907 to 1913? Mr. Allen asked his hearers if they knew. Did their patrons know? Did they know the reason why there had been practically no development in electric railroads? Was not that a news item that interested every village, city and township in the State that was desirous of development?

Mr. Allen said that there were plenty of news items if only the operators would devote attention to the details of producing them and then, having produced them, see that they were prepared by men who knew how to place them in news form. This could not be done by a layman. The preparation of items of news was a business just as technical as that of the electric railway, and it involved a knowledge of human nature that most railway men lacked.

In conclusion, Mr. Allen said that bad public relations could be eliminated and good public relations could be established easily. First of all, the company must have the facts in relation to its business. It must be willing to state the facts frankly and all of the facts in terms that the public would understand.

ADDRESS BY MR. PARDEE

In the early days of street railway development the difficulties and problems which confronted the promoters and operators of traction properties were not entirely of a technical nature, Mr. Pardee said. The general public stood on the side lines, always interested in the progress made by those who were struggling with the adaptation of the electric motor to the propulsion of public carriages, but assuming no particular risk excepting perhaps that which they considered involved in the granting of franchises for the distribution and use of the deadly electric current. The public during those years never considered itself as a partner in the development of traction properties, but looked upon the movement as one belonging entirely to a few outsiders and affecting itself only through the required grant for the use of the streets.

To-day the situation is very different, for the public is indeed considered a partner in the management of the affairs of public service properties. Under the new phase of utility regulation, the public has assumed a direct relationship to public utilities. The public has found, after many costly trials of municipal ownership, that the most expedient and practical means of controlling public service corporations lies in their development by private capital, together with proper and fair commission regulation representing the public interest.

With this comparatively new system of utility regulation there have come a great many abuses of the regulatory power. Prompted by an ill-advised public opinion, and in some cases ignorant of actual conditions, commissions have been known to impose upon electric railways very onerous conditions, limitations, etc., which have so seriously burdened the companies as actually to set back their development by inspiring the ever cautious money lender with fear. Unreasonable regulation can, in the long run, harm no one but the public itself, for it automatically increases the rate at which money can be drawn into this field of investment, and hence the rates which the public must pay for service. It was the speaker's confident belief that, in the abuse of regulatory powers, the pendulum has now commenced to swing back and that public service commissions are coming more and more to realize their obligations to security holders as well as to the sovereign partner, the public.

Most of the unfair burdens which have been saddled upon street railway companies with the consent of public opinion have been the result of gross misconceptions concerning the affairs and conditions of operation of such companies. Most people do not know, or at least stop to think, that street railway companies pay taxes, offer and give employment to citizens and often pave streets and assist in the development of communities by offering industries cheaper power than could be generated in isolated plants of small capacity. On these points the general public must be educated if street railway companies are to obtain a cordial, harmonious relationship of co-operation with the public, which is the most valuable of all assets and the most difficult to obtain. It is only through the establishment of better public relations that electric railway men may expect to be relieved of burdensome and unjust regulatory mandates such as those calling for unreasonable extension of fare zones, extension of lines into territory not offering sufficient traffic inducement, and the unwarranted rehabilitation of road and equipment.

The fact that the public is inclined to view public utilities with disfavor is made worse because it is taken advantage of by everybody who desires either to make some private political capital or to stand before the world as a reformer. Another class, which is made up of real socialists, attack public utilities because they are really opposed to them. A ray of hope comes from the fact that these same people are attacking almost every business, and public utilities will soon have the assistance of the business men of the country to protect themselves and the utilities.

The criticism against electric railways comes from avowed enemies, who cannot be convinced of public utility rectitude. The value of publicity in the improving of public relations, therefore, is to get facts and arguments into the hands of the friends of the companies and the people who are inclined to treat everybody fairly. There are no cut and dried rules for establishing good public relations. With every community the situation is different. Things that will serve the purpose in one community will not do at all in others. More depends on the personality of the men who operate the company than on all arguments. The great point is that the officials should study human nature, the community and the conditions therein and give friends the facts so that they will have a sound basis for supporting the company.

ADDRESS OF MR. SIMS

Your relations with the public are many times closer than those of the other public utility companies with the possible

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exception of water and lighting companies, which are comparatively easy to maintain and satisfactorily perform public service. All the public use the trolley. All the public are discommoded by your failures. You take them to work in the morning; you take them home for lunch; you carry them home in the evening; your cars constantly pass their dwelling houses. The slightest disarrangement in your service is noticed almost automatically by all your patrons, and all of them seem to have more or less ability in managing your affairs. Men who have not even thought about the trolley situation are most prolific in their suggestions as to how the line can best be operated. Rarely do these men realize that a broken-down coal wagon, a fire, a stalled truck or a thousand and one things over which you have no possible control may and do greatly inconvenience and disarrange your service.

Comparatively few people use the steam railroads and fewer still see their failures and criticise their service. This is also true of the telegraph companies, of the express companies, of the telephone companies, of all the other public utility companies. None of them have, comparatively, your difficulties. Regardless of this, I am sure that we all admit that a trolley company to be successful must be operated in the interest of the public and must perform a satisfactory service. Its relationships must be close to the people. Its manager must meet their wishes, and, with your permission, I should like to give a few of the reasons why the public criticise us.

On a wet afternoon hundreds of people who usually walk to their homes from business take the trolley cars and, naturally, are angered because the cars are crowded. The cars are damp and uncomfortable and the company and its manager are severely censured. You should make a great effort to increase your service at times when the weather conditions will greatly add to your patronage. It will not cost you anything and will win in the end.

During the evening, the morning and, if you have it, the noon-hour rush periods your cars are crowded. You should increase your service as much as you can. But, more than that, you should get in such close touch with the manufacturers, with your chambers of commerce and your other civic bodies, that your influence and theirs shall, where possible, have the larger factories begin work at slightly different hours in the morning and close at slightly different periods in the evening, thus giving you a better opportunity to handle your traffic properly.

Try to educate your passengers not to get on a crowded car but to wait for the next car. The delay will not be great, and your passengers will be very much more comfortable. Better still, it will enable you to quicken your schedules, make a greater use of your cars and run up your earnings per car hour.

It is important in the case of large interurban companies that they have in each large town a man of authority who is acquainted with all the people, who has their confidence, who when he makes a statement will be believed, and who will see that the service rendered by his company is satisfactory to the people. He should call upon them, talk over their complaints and do away with the writing of letters. Criticism of poor service can best be answered by looking the man in the face, explaining to him frankly the cause of the trouble and what you are going to do to rectify it.

Keep an accurate record of the number of failures and of accidents of each employee every year. You will find that practically all your accidents and failures come from the carelessness of 10 or 15 per cent of your employees. Call these men into the office, talk to them kindly, show them what they have done and what they have cost your company. Show them what the desirable employee has done. Make it clear to them that unless they improve you will have to drop them from the service. Unless they do improve, get rid of them; they are dangerous. You owe this to the public.

Train your motormen so that they will run their cars carefully and will not jerk passengers off their feet. You will save power, avoid accident claims and add greatly to the comfort of your passengers. You owe this to the public.

Keep your cars always in a clean and sanitary condition. Keep them in good repair. See that they are painted and look attractive and that your men are not sloppy or careless in their apparel. It will add a good deal to the standard of your service.

See that your employees do not attempt to flirt or carry on a conversation with passengers. It is dangerous in the case of the motorman and will add to the cost of your accidents in the case of the conductor.

Watch your paving and renew the rough or worn-out spots. It will surprise you how kindly the people will take to a policy of this kind. It costs less in the long run and will please the public.

See that your track rides well. It will save repairs to your motors and cars. It will require less power, will make the riding of your cars more comfortable and will please everyone. The saving in car and motor repairs will at least offset the added track cost.

See that the cars are not bunched. It brings about a great deal of criticism, and, while difficult to avoid, the trouble can always be bettered.

Keep your cars well lighted. Your passengers like good lights, and the increase in expense will not be great.

Employ only new men and make it a point in hiring your motormen and conductors to pick out cheerful, bright, pleasant fellows. Do not hire a man with a grouch, one who is continually disagreeable or one with unpleasant manners or unpleasant voice. They will make a bad impression, while the bright fellow will subdue any existing antagonism. And when you get this cheerful fellow treat him kindly.

In streets where your feeders are cared for by conduits do away with the trolley pole and attach your cross wires to the buildings. It will greatly improve the appearance of the street and will please everybody.

Unfortunately, some few of the new public service commissioners feel that they are retained to defend the public, while actually they should act as arbitrators between you and the public, and as the commissioners are changing almost constantly you usually get just a little worse treatment than you should. It is, therefore, quite important that you make your service so satisfactory that you will not be called before the commissions to defend it.

The advancement of your art has been so rapid that the period between that which is modern in trolley practice and that which is completely obsolete is probably less than ten years. I would judge that this period to-day on the American steam railway is at least thirty years. You will, therefore, until your great advancement stops or slows up, be handicapped with more or less obsolete facilities—facilities which the public will criticise and which, necessarily, you must wear out. It will require the greatest care on your part to meet this situation. The public demands new facilities; your company cannot afford them. It is then that the value of a satisfied public will come to you.

I do not think that you need fear municipal ownership. I greatly doubt the advantage to the public or to the individual from the municipal ownership of your companies. It would be almost impossible to operate them without political influence, and with political influence they would be operated so poorly that all would suffer. The cost of operation would enormously increase and the class of service would deteriorate. One of our great Eastern cities recently started a municipal ferry, and I believe its annual deficit is greater than its gross receipts, while the predecessor of this ferry, owned and operated as a private venture, was quite successful. This same condition to some extent would be followed were municipal ownership applied to the trolley lines.

You are absolutely public companies, owned and directed

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by the people. The people give you their franchises, they own your securities, and even in the case of a trolley company absolutely owned by some other corporation or company, these securities are in the end owned by the public. The great life insurance companies own them, the fire insurance companies own them, the endowed hospitals own them, the great universities own them, and the number of stockholders of these companies is enormously increasing every year, so that in the end it is the public that actually owns them.

It is truly a harm to the public for you to run one more mile of street car service than you should, and a greater harm I think than for you to run one less mile than you should, as you have absolutely wasted the people's money in the former case, they in the end paying all the costs and receiving all the gain.

The strong, rich and profitable trolley companies—and I hope there are some few of them in the State of New York —will always be prevented from paying out in dividends more than they fairly should by the pressure of the public to keep them modern in every way, and in the case of the weaker companies, it will always require the greatest effort on the part of the trolley manager to earn fair dividends. The public, when you truly analyze the situation, is not in any danger of unfair treatment in either case.

DISCUSSION

J. P. Barnes, Syracuse & Suburban Railroad, in opening the discussion, said he came to the meeting to learn all that was possible on what he considered the most important subject before the association. He felt deeply and keenly the importance of satisfactory relations with the public. It was most essential that the public should be taken into the confidence of the companies on matters of routine that developed from day to day and week to week. If this policy was followed it would mean that the public would appreciate that the company was telling the truth in regard to its affairs, and when the company had an important issue to meet the public would still know that it was presenting its side truthfully, just as it had done in the past with other matters.

Before calling on the next speaker, President Hedley said that the accident side of the issue was a very important one. In his mind it was one of the principal matters to be considered. Upon the treatment of claims rested, to a large extent, the feeling of whether the company left behind it a record of satisfaction with the individual affected and also of whether the company was in the habit of doing the fair thing.

William H. Hyland, Fonda, Johnstown & Gloversville Railroad, said that the conditions of railroad management had undergone great changes. The affairs of the company were now open to the public. The claim agent who was a good representative of his company paved the way for satisfactory public relations. He could not only pay money to satisfy legitimate claims but he could pay the respects of his corporation where he went and leave a feeling behind that it wanted to do what was right and fair.

A. K. Baylor, General Electric Company, then said that the speakers had not gone far enough to get to the root of the difficulties in public relations. The necessity for improved operating details was obvious, and managers invariably tried their best to carry out such a policy. On the other hand, the abandonment or serious crippling of any public service utility, no matter how badly it was operated, would be a calamity to the public. The time had come for public service men to emphasize the point to the public that fair treatment must be accorded to public service corporations if their operation was to go on. As a matter of fact, the public did not know what it wanted, and if agitators were not checked, if political leaders were not checked, the public service was bound to suffer. As an example he cited the stunting of public utilities in England by interference on the part of the authorities, stating that there were 50 per cent more cars within a radius of 50 miles of New York City than in the whole of Great Britain. Public service men, therefore, should take an offensive and not a defensive attitude with the public. It seemed to be the present policy of the government to attack the principles of the holding company, but this form of corporate management was a great boon to the smaller communities, and through its means the little towns were enabled to have service corresponding to that given in metropolitan centers. This was possible because holding companies, by means of the "diversity factor" in their investments, were able to finance their undertakings better than could a local enterprise.

Chairman Hedley approved Mr. Baylor's suggestion to get out, figuratively speaking, with guns and to go for the public aggressively when it took an unreasonable attitude. It was, of course, impossible to satisfy all customers, but it was possible to have the things which redounded to the credit of the public utility corporations made public as well as accounts of occurrences which were detrimental to them.

Mr. Sims said that he was much interested in Mr. Baylor's suggestion regarding the possibility of taking an offensive and not defensive position with regard to public complaints, but he asked how the policy of telling the public to "take this service or none" could be carried out, in view of the activities of the public service commissions.

Mr. Baylor answered that in large towns, if too many burdens were placed upon them, the public service corporations would have to go through bankruptcy and eventually would have to be supported by the communities themselves. In small towns, he said, they did go out of service when pressed too hard. In effect, the corporations should explain to the public that if the next generation was to have good service the existing generation would have to respect the fundamental facts of public utility operation and accept conditions necessary to the permanent life of such properties.

Mr. Sims then said that his company always answered every untruthful statement which appeared in the daily newspapers, and that this course had been very successful in establishing better relations with the public.

Chairman Hedley, with reference to Mr. Sims' suggestion, remarked that in small towns it was possible to give close attention to complaints and to keep in touch with the local press. In large cities, however, it was impossible to attack all known untruths which appeared in the daily newspapers.

J. C. De Long, president Syracuse Lighting Company, was then introduced. An abstract of his remarks follows.

ADDRESS BY MR. DE LONG

A great many of the difficulties in the electric railway field, concerning relations with the public arise, Mr. De Long said, from a lack of knowledge on the part of the public of the peculiar conditions under which the electric railway business must be handled. They do not understand why railway companies make certain rules and regulations, which seem to them irksome and arbitrary, but his company has been able to accomplish much by cultivating newspaper men and by explaining various points in the papers and in public service talks.

The "chronic kicker" is an extremely interesting subject, said Mr. De Long. He can be made a very excellent advertisement for the company if properly handled. In his own organization every man is drilled to the idea that chronic kickers are the important people to deal with. All chronic kickers are followed up and every complaint they make is always investigated, with the result that they are finally won over as the best friends of the company.

Every company has neighbors in the public utilities business, and every public utility man should help his neighbor, because sooner or later agitation against one will spread to the other.

One difficulty often encountered is a feeling on the part of employees in handling the public that the company is always right. This is a wrong attitude or frame of mind

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for employees to have. Where public utilities are in the wrong, the best thing is to confess and clear up the situation.

To the heads of a company the question of the employed organization is important. In Mr. De Long's company all the employees, even down to the lowest, come together in monthly meetings, and the officers impress upon them that they are the ones who make or break the reputation of the company in the community. Managers generally accomplish little with the public. The employees are the ones with whom the public comes in contact, and the more they are brought into touch with the management and made to feel that they are a part of the management, the more the handling of the public will be improved and the better will be the public relations established.

Bodies such as chambers of commerce should be cultivated, for through these the company can get in touch with the men of the town or community who are really worth while. They are the ones who in time of trouble can always come to the aid of the company. The whole proposition can best be covered by these axioms, that a public-utility official must study local conditions, study human nature and "watch his step."

CONTINUATION OF DISCUSSION

L. S. Storrs, vice-president Connecticut Company, said that the roads were passing through a period of very rapid change, and the question of satisfactory public relations was the most serious problem to be dealt with at the present time.

E. F. Peck, of Allen & Peck, said that electric railway development could be divided into three periods—namely, the inventive period, the period of development and the period of refinement. During the inventive period public relations were naturally very weak. Jealousy of inventors and the competition of manufacture made this, in fact, a natural condition. During the period of development all of the companies grew at such a rapid rate that the entire time of the management was devoted to the establishment and maintenance of reasonably satisfactory service, so that but little time could be devoted to such questions as the one under consideration. During the existing period, that of refinement, the cordial relations with the public had become a necessity, and during the past five years these had been improving very rapidly.

Chairman Hedley then remarked that there must be some reason why the railroads had, to use a colloquialism, "got in bad." If the principal reasons for this condition was analyzed, a large part of the question of public relations would answer itself. There were several good explanations for this condition in the past, but there was no reason now.

Ernest Gonzenbach, president Sheboygan Railway & Electric Company, Sheboygan, Wis., said that at one time the management of his company had been greatly interested in politics. Later, another policy, that of excessive concessions to the public on every point, was followed. In recent years the company had endeavored to steer a middle course between these, and during the last nine years it had made many friends in the community. Whenever a mistake due to any fault of the company was made the justification of the complaint was directly acknowledged and an effort was made to conciliate the complainant in any reasonable way, sometimes even by the presentation of some minor electrical device. The employees, he said, were instructed not to get into disputes with patrons.

H. W. Blake, editor of the ELECTRIC RAILWAY JOURNAL, referred to the remark made by Mr. Allen in regard to the "new spirit" of public relations, and said that the effect of this new spirit must be felt by the three parties to the situation, the public service commissions, the public and the electric railway companies. As regards the first of these, Mr. Blake stated that if all public service commissions exhibited the attitude shown by Mr. McCall the question was capable of easy settlement so far as they were concerned. When commission regulation was first proposed some hesitancy was manifested by thoughtful people because the move was a new experiment in government and the commission form of organization seemed to connote a czar-like ruler acting under arbitrary rules with no necessary basis in precedents. There was no doubt that public service commissions had made mistakes, but the speaker believed that electric railway men generally recognized the fact that commission regulation was desirable in principle. The ideal public service commissioner possessed a logical and analytical mind and plenty of experience, and it was the duty of electric railways to influence as far as possible not only the selection of such men for office but also their retention in office. Concerning the second party to this question of public relations, the public itself, Mr. Blake stated that it might be reached by direct, concrete means, such as were embodied in the exemplary suggestions of Mr. Sims, through the newspapers as mentioned by Mr. Allen, and in other ways. The news service, mentioned by Mr. Allen, could not properly be handled by an electric railway publicity man only. The manager of the railway himself must also exhibit friendship and cordiality toward the newspapers and, even when assisted by a publicity agent, should give some time to answering the legitimate inquiries of the papers. The electric railway itself is the third party concerned in the establishment of better public relations. The speaker believed that the railways were thoroughly imbued with the "new spirit," but in effecting more friendly conditions they must always act through the public, which, as the body politic, dictated the character of men appointed to the public service commissions and also was ultimately responsible for all reforms.

Mr. Hedley, in commenting on public service regulation, said he believed that commissions had come to stay, and with members of the proper type they were one of the best mediums for the establishment of better public relations, especially through their actions as arbitrators for the official settlement of disputes. Mr. Hedley remarked that in recent cases before the Public Service Commission for the First District of New York decisions had been rendered after public hearings which could never have been obtained unless some body through state or municipal authorization had received power to settle such points once and for all. Furthermore, Mr. Hedley was of the opinion that the publicity given to unreasonable complaints before commissions would also ultimately benefit public utility companies.

H. H. Vreeland, vice-president Interborough-Metropolitan Company, New York, said that the principal reason for an unsatisfactory relation between public utilities and the public was that until recently the subject of public relations had been treated by executives and managers of electric railway properties in much the same way as a man calls in a doctor to treat a physical ailment after it has well started on its course. It was much simpler to stop the course of the disease at its source, and control over it was then easily obtainable. Mr. Vreeland stated that in 1893 one of the best men possible had been secured by his company to study the question of public relations from the standpoint of the public, the laboring classes and the newspapers, and that this man was treated as one of the executive staff of the company. This idea followed out for several years succeeded in establishing good relations between the company and the public. In Mr. Vreeland's judgment, the trouble to-day was that managers and executives were too busily engaged in their daily work to give any time to publicity. A man was needed who could keep in close touch with the organization heads of the company while studying public relations and act in an advisory capacity on this supremely important question. In the case of the small company, the manager had more time; he was more intimately connected with the local people, and his relation to the public had certain ministerial aspects. In large cities, however, a supplementary organiza-

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tion was the best device to foster the proper public relations. In this connection Mr. Vreeland said that the choice of the right kind of men was the kernel of the public service commission question, and he pointed out that terms of short duration make reappointment entirely dependent upon public sentiment. This resulted in a study on the part of the commissioner as to how he could establish such a relationship between himself and the general public that he would be assured a reappointment.

E. S. Fassett, formerly general manager United Traction Company, Albany, took up the question of personal contact between officers of a company and the public. He stated that when a complaint was received a personal visit by an officer of the company in answer thereto was the best practice. Even in the case of a large company, where an officer could not find time for such visits, a representative with his ideas should be sent. The meeting of the complainant face to face and the personal settling of his grievance was far better than long-distance correspondence or newspaper talk.

Mr. Hedley then outlined the system used by the complaint bureau of the Interborough Rapid Transit Company. This bureau was stationed three desks from him, and all complaints in person were adjusted there. Complaints in writing needing investigation were acknowledged by correspondence, and after the investigation was completed another letter was sent showing the disposition of the case. If the matter was important, a man from the department obtained the views of the management and interviewed the complainant a number of times, if necessary, until the latter was satisfied. The personal interview was by far the best means of settling disputes, and if any company was too large for the manager to attend to such work it was large enough to have a special person assigned to it.

Mr. Hedley then discussed the important part played in the establishing of better public relations by the employees of a company. Trouble for motormen and conductors started early in the morning with the passenger who perhaps left home without his breakfast, and it lasted practically the day through. This condition prevailed over all the country, but particularly in large cities. Too much importance, therefore, could not be attached to the necessity of having as employees men of the best class, who were above resenting the insults of disgruntled passengers. Extraordinary care in selecting such men was more than repaid through the effect they produced in the way of a better public opinion toward the company.

S. P. Smith, superintendent of transportation Manhattan Elevated Railway, New York, stated that during the last six or seven years every public service corporation had been trying to win public favor, but that so far the public had quite successfully dissembled its love. His company was doing all in its power to establish a better public opinion, but as yet the public had not responded with affection, to say nothing of admiration, respect and regard. Furthermore, Mr. Smith believed, while the best class of men was desirable for employees, a man cannot be judged by his exterior, and poor men would always be employed to some extent. This necessitated a constant weeding process which could not be entirely eliminated by watching more closely the type of men employed.

J. J. Dempsey, superintendent of elevated lines Brooklyn Rapid Transit Company, told how for several years his company had used every possible publicity method such as advertising, advance publicity concerning developments and anticipated delays and the like. The Brooklyn Rapid Transit Company had been able to utilize advantageously the countless civic bodies of the city, and it endeavored to have complaints brought through these bodies directly to its notice. These local bodies had been found to possess more than a local outlook, too, for often when they had asked for improvements at a certain point which would work out as a detriment to the system as a whole, no great difficulty had been experienced in making them see this point.

In closing the discussion Mr. Allen said that if any one thing was evidence that the subject of public relations was one of very large importance, it must be to sit at the meeting and hear the diverse opinions and ideas that were advanced. Many theories and suggestions had been advanced to show what the companies ought to do. It was surprising that each man who rose had something to suggest that would improve public relations. The younger men of the association should express their ideas freely. The association needed their ideas and the results of their experience.

Continuing, Mr. Allen said that the New York association was a voluntary organization for the free expression of opinions on the part of officials of its member companies. However, it had no direct control over or power to influence the policies of those companies, unless its action was concurred in voluntarily by the members. It occurred to him that better results could be obtained if a platform or a plank in a platform could be drafted and made acceptable to all of the members. This would present the views of the association and the companies on the principles which the companies should follow in their relations with the public. Greater strength would be given to the work of the association and the companies if such a platform could be adopted as part of the motive for the existence of the association. In the management of industrial enterprises it was frequently found that companies adopted creeds or statements of policy, and these were used and quoted by officials and employees as principles they believed in.

Mr. Allen referred to a misleading editorial published in a daily newspaper, which was based on a misunderstanding of some of the figures given by Gen. George H. Harries in his address as president of the American Electric Railway Association at Atlantic City in October. When attention was called by the association to the misleading interpretation placed upon the figures the daily newspaper immediately published a correction, thus showing every willingness to set the facts straight. Mr. Allen said that if the companies had the facts accurately placed before the newspapers it was always possible to get a fair hearing in the public press.

Mr. Allen also mentioned the power that employees in the electric railway industry could exert to create more favorable conditions. He called attention to the welfare work of some of the companies and said that such work was an undeniable force in the creation of better relations. If closer relations with the employees could be developed by the companies they would have a support whose full strength could not be measured.

Mr. Allen spoke of the importance of reducing to practice all of the valuable suggestions that had been presented before the association. He said that any one who did not believe that better public relations could be produced could not expect to produce them. The companies should tell the public what they wanted to have done. Under the laws of New York as they had existed for the last few years it was almost impossible to do pioneer work in the construction of new electric lines.

At the conclusion of the meeting a lunch was served to the delegates in attendance. The next quarterly meeting of the association will be held in March, 1914.

The question of a central authority for London's electricity supply was again revived at a recent meeting of the London City Council. The question at issue is whether, in time, London's electricity supply shall be controlled by the London County Council or by a corporation consisting of the thirteen existing companies. The idea of linking up all these companies is not a new one. It was discussed in 1895, and since then there has been a proposal for the London County Council to build generating stations at Battersea and Barking.

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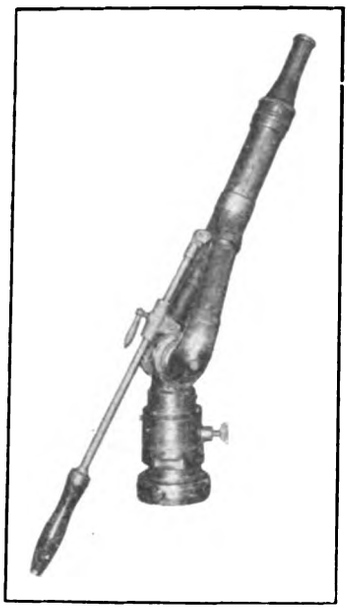
IMPROVED CAR YARD FIRE PROTECTION AT CLEVELAND

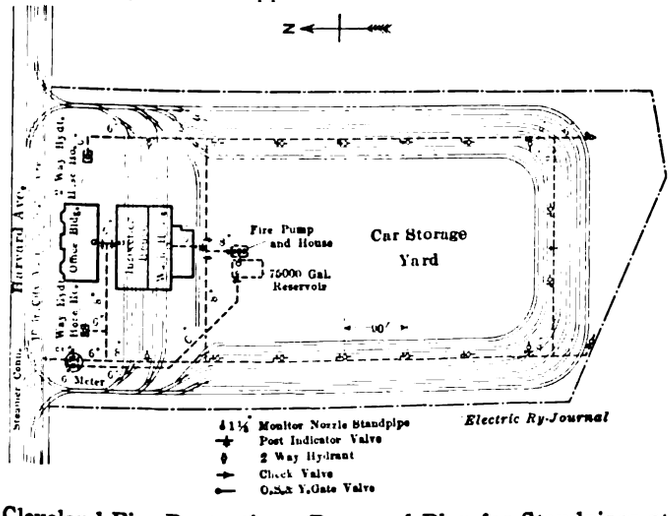
The Cleveland (Ohio) Railway, which was one of the first electric railway companies of the United States to install fire-protection equipment on a large scale, both in carhouses and yards, has recently made a number of improvements in its installations of the latter type. The latest yard to be furnished with standpipe fire protection is that at Harvard Avenue, which has a present capacity of 150 cars, valued at $1,350,000, and an ultimate capacity of 175 cars. This gives the company four car yards with three more under way. The Cleveland Railway will continue the use of the present sprinklered carhouses, but as the number of car yards increases it is probable that eventually some of the buildings will be made over for other purposes.



Standard Nozzle

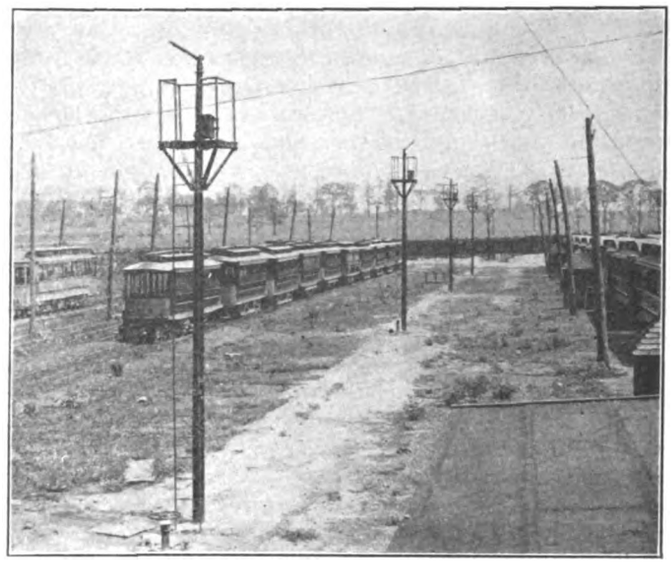
The later standpipe equipments embody some important improvements, one being the substitution of reinforced concrete for steel in the construction of the standpipe platform supports and another being the use of an improved nozzle. As in the original form, the nozzle platform is 20 ft. above ground level and is reached quickly by means of a permanently attached iron ladder. Two set screws in the new nozzle permit the operator to adjust and lock it for the most effective angle, depending upon the location of the fire. One of the accompanying halftones shows how the operator has set the nozzles to obtain streams at the desired angles.

The pump which supplies the monitor nozzles is started by means of a switch placed in a box on the platform at the base of the nozzle, thus insuring the immediate operation of the pump and application of the water.



Cleveland Fire Protection—Proposed Plan for Standpipes at Harvard Avenue Car Yard

The fire-protection equipment of the Harvard Avenue car yard, which may be considered a typical installation, is shown in the accompanying plan. The yard is 750 ft. long x 454 ft. wide, including car inspection structure, offices and utilities buildings. The eighteen standpipes are located around the yard at intervals of 90 ft. The standpipe nozzle tips are 1⅛ in. in diameter and the supply mains are of 8-in. and 6-in. diameter. Two hydrants are also installed to reinforce the interior sprinkler protection of buildings. The water supply is forced through the mains by a 750-gal. electrically driven underwriters' pump of centrifugal type,



Cleveland Fire Protection—General View of Yard, Showing Standpipes

taking suction from a 75,000-gal. reservoir maintained on the premises. Under maximum pressure the fire pump will deliver 1000 gal. of water per minute, which can be concentrated on any one car in the yard. The installation cost of protection for the ultimate capacity of 175 cars will be about $20,000.

This plan of equipment has great advantages over the ordinary plan of yard hydrants and hose, as in case of fire one man can handle the streams to advantage. Under the ordinary plan of hose and hydrants, much difficulty is experienced in carrying the hose underneath the cars or over the platforms to reach a car that might be burning in a distant part of the yard. The plans for the work were made by W. G. Asmus, chief engineer, and Henry N. Staats, insurance expert bureau of insurance American Electric Railway Association.

Cleveland Fire Protection—View Showing Standpipes in Operation

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Correspondence has passed between the Dunfermline Town Council and other local authorities with reference to the construction of a tramway between Dunfermline and Rosyth, the new naval base on the River Forth.

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Standardized Maintenance

A Detailed Statement of the Division of Maintenance Labor, Which Has Been Standardized at Nine Inspection Points in Brooklyn—A Comparison of the Practice of Other Companies

BY J. L. INGOLDSBY, ASSISTANT TO THE SUPERINTENDENT OF EQUIPMENT BROOKLYN RAPID TRANSIT SYSTEM

In connection with the maintenance of electric car equipment the two terms most frequently used are "inspection" and "overhauling." But as yet these terms do not mean the same thing on all properties, although much has been done in this direction through the efforts of the American Electric Railway Association and the ELECTRIC RAILWAY JOURNAL.

The dictionary definition of "inspection" is "a close examination; to look upon; to examine for purpose of determining quality, detecting what is wrong." It is necessary that this examination should be made with such care that it will be possible for a car to operate from one inspection to the next with the least possibility of interrupting scheduled service through any defect in the equipment. With this end in view, the basis selected must allow an ample margin of protection. The mileage basis is, of course, the most efficient and economical. However, the mileage that a car may run between inspections is governed in most instances by the necessity for adjusting brakes. As all other parts of equipment can remain in service longer than the brakes without any attention, it follows that only the installation of automatic slack adjusters could increase the mileage between inspections.

In the following paragraphs the writer will describe the standard arrangement of organizations at the carhouse shops of the Brooklyn Rapid Transit System. The term "carhouse shop" is understood to mean a shop which is devoted to maintenance work but not a large general shop where extensive repairs, rebuilding or painting work is done. The Brooklyn Rapid Transit System has nine such maintenance shops for surface passenger cars. The work done at these shops constitutes an "inspection." The number of cars assigned for service from each carhouse varies from 116 to 346. The organization at each is as follows:

MAINTENANCE CARHOUSE ORGANIZATION

Day foreman	Fendersmith
Assistant foreman	Machinist
Night foreman	Motor repairman
Clerk	Motor repairman helpers
Stockman	Blacksmith helper
General repairman	Oilers
Air brakeman	Trolley repairman
Blacksmith	Electrical repairman
Carpenter	Brakemen
Carpenter helper	Brakemen helpers
Controllerman	Truckman
Circuit-breaker repairman	

The number of men in each classification depends on the number and class of cars assigned for care. All inspection is done in the daytime only and with the cars over the pits.

DIVISION OF LABOR ON CAR FOR INSPECTION

When a car has arrived for inspection it is placed over the pit by the crew of the transportation department. Then the shop foreman or assistant hangs a blue-backed, white-lettered "Out of Service" sign in a conspicuous location on both dashes as evidence that the car is now out of the jurisdiction of the transportation department. After this the several inspectors go to work on the car in accordance with the book of rules and instructions which governs the employees of the mechanical department.

The carpenter and helper inspect steps, platforms, flooring, grab-handles, seats, sash and glass, destination signs, curtains, roofs, trolley boards, headlights, bell and register cords or rods and bars, handstraps, sand boxes, foot gongs, woodwork and car hardware. They also look for all defects, such as loose screws or any protruding parts from seats that would have a tendency to injure the clothing or person of passengers.

The air brakeman inspects the governors, motorman's brake valves, emergency valves, gages, piping, automatic slack adjusters, reservoirs, pressure cylinders and compressors. The work to be done on the compressor consists of blowing accumulations of dust, etc., from the motor with compressed air, wiping with cheesecloth, cleaning brush holders, adjusting brushes and providing proper brush tension, taking armature clearances, looking over valves, oiling and, finally, trying out all parts under pressure. This man also cares for arc headlights on such few cars as carry them, inspects their mechanical and electrical parts and installs and adjusts carbons.

The controllerman inspects all platform controllers, whether of series parallel or master types, and also the unit switch group attached to the underside of the car body. This work consists of blowing out accumulations of copper dust, etc., with compressed air, filing pitted spots from contact plates and wipers and adjusting tension to give the proper contact on main and reverse cylinders or groups of switches and reversers as the case may be. He must see that cylinder segments are tight on the drum shaft, that the connections on connecting board are correct and secure, that shafts are not worn beyond the gage limit at the point where the handles fit them, that motor cut-out switches are in good condition, that cover, cover hinges and thumb screws or latches holding the cover closed are in order, and that the brackets or hangers that hold controller to the dash or to the underside of the car body are tight. This man also rubs contacts with a piece of felt that has been moistened with vaseline and places a few drops of oil on shaft bearings. Such work as the foregoing is part of a regular inspection, but where extensive changes are found necessary, the platform controllers are removed to the main electrical shops and replaced by local spare controllers. Once every two years every platform controller is removed from the cars for complete general overhauling at the main shops. The controller man also inspects incandescent lighting circuits, replacing burnt-out or defective lamps, watching for lamps with loose sockets, etc., and caring for light switches. He co-operates with the circuit-breaker man in the inspection and adjustment of circuit-breakers or line switches.

The circuit-breaker repairman, in addition to seeing that breakers operate properly and making minor replacements and adjustments, removes all breakers from cars sent to the shop for motor and truck overhauling. He cleans the breakers by blowing them out with compressed air and wiping with cheesecloth, removes pits from contacts by filing them and makes adjustments. He then sets and calibrates the breaker to a predetermined voltage by means of a water rheostat.

The electrical repairman inspects motor leads to see that insulation is not chafed beyond a safe point and that connections are secure and correct where the lead end is soldered into knuckle-joint connectors. Two-way connectors are not used under any circumstances in the Brooklyn Rapid Transit shops as it has been found that they cause endless trouble with any kind of car wiring. This repairman also sees that the leads are being properly held apart by wood spreaders and that rubber bushings at the point where leads pass through the motor shell are affording the protection for which they were installed. He also inspects resistance connections and makes such minor repairs as replacing insulating washers, etc. If grids are burned out

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or require replacement, the whole frame is removed and forwarded to the grid specialists at the department of electrical repairs to eliminate the possibility of wrong resistance steps. He also inspects lightning arresters, adjusting to proper gap if necessary, and looks over fuses, fuseholders and bases to see that none are blown, that the proper type and capacity fuse is in use in various circuits and that the connections and contacts are correct.

The trolley repairman inspects all trolley stands, bases, tension springs, poles and wheels, as well as connection leads at the stands, seeing that trolley bases swivel properly and that wheel or any other replacements necessary are made. Wheels are gaged on inspection for excessive or improper wear and pole tension is adjusted in accordance with outstanding instructions by hanging a prescribed weight from the end of the pole and adjusting the springs, if necessary. Lubrication is also cared for at this time. This man also maintains the carbon brushes, brush holders and commutators of the car motors. He replaces brushes if excessively worn, sees that holders are in good condition and maintains proper tension on each brush in accordance with the pounds pressure specified. Tension is measured with a spring balance scale in case of doubt. This inspector keeps commutators clean by wiping them with cheesecloth and reports the need of regrooving mica if copper bars are worn too far.

The brakeman and helper inspect and adjust brakes and rigging. The helper applies brakes from the platform while the brakeman watches the travel of the levers previous to making adjustments from the pit. These men (the brakeman being held responsible for the work of his helper) look over rigging to see that staffs, chains, rods, levers, pins, brakeshoe heads and all other rigging are perfectly safe for service, replacing any parts that may be worn to the limit of safety. They also replace brakeshoes, lubricate the rigging and inspect hand-brake handles and parts, including star wheels and dogs and the whole emergency hand-brake rigging and apparatus on air-brake cars.

The truckmen look over and tighten bolts on trucks and motors. In addition, they inspect motor-axle and armature bearings and gage armature clearances to make sure that the bearing is not worn low enough to allow the armature to strike the fields. These men also replace truck end frames when necessary, renew side bearing pedestal bushings on maximum traction trucks and inspect center and side bearings to see that they are properly lubricated and that specified clearances are provided.

The fendersmith inspects wheel and truck life guards and projecting fenders, making repairs when necessary and adjusting them to specified clearance above the rails. He also conducts pressure tests with a spring balance scale to make sure that the automatic guards will trip at the pressure specified in the company's instructions and sees that each car is provided with an emergency drawbar, which must be hung on hooks provided for the purpose.

Each man at the nine maintenance carhouse shops is provided with a red flag with a brass plate attached, on which the individual's name is plainly stamped. This flag is hung on the controller or dash before the man starts to work on a car and is removed when he leaves the car. This plan serves as protection because no man is permitted to remove other than his own flag; therefore no person is likely to start a car as long as it shows a flag to indicate that an employee is working somewhere on or under it. The removal of red flags by individuals and "out of service" signs by the foreman or his assistant is evidence that the car is O. K. and ready again for service.

OTHER LABOR, SUPERINTENDENCE, RECORDS, ETC.

As the work done by men engaged on inspection has already been detailed, a brief description of work done by the other men in the organization follows:

The shop foreman supervises all maintenance inspection and overhauling work.

The assistant foreman acts as foreman in the absence of the latter. Otherwise he assists the foreman in supervision, particularly in regard to inspection, as it is his duty to check each car pronounced "complete" by the inspectors. The night foreman is in charge of the shop during the night hours to answer any calls which may be received for the wrecking tool car, to care for minor car defects that may be reported during the night hours, to supervise the two night oilers and to see that all cars due for inspection and overhauling on the following day are properly placed and made ready for the day workers to start promptly at 7 a.m.

The shop clerk collects and typewrites detailed records of the work performed each day, writes car inspection reports for the use of the claim department, keeps the office neat and orderly, answers telephone calls, etc. He also cares for the shop foreman's correspondence and other clerical work, thus allowing the latter to devote all of his time to supervision and betterments.

The stockman maintains an ample but not an excessive quantity of supplies. In addition to the usual duties of a storekeeper, he assists in maintaining standards by satisfying himself that the applicant receives exactly the right part no matter what he may call for.

The work of the general repairman, as his name indicates, is of a miscellaneous nature, consisting principally of correcting defects on cars which have been removed from service and in repairing between regular inspections such items as are reported by the motormen on defect reports. During the absence of the foreman he helps the assistant foreman, who is then in charge.

The blacksmith and helper make all welds, replace bushings in holes of brake levers, replace dowel pins in motors and straighten bent trolley poles, wheel guards and fenders. The helper also assists the machinist when necessary.

The machinist turns all armature and motor-axle bearings to fit individual shafts and axles when cars are in for equipment overhaul. He replaces all tape bands on ends of commutators, looks after condition of all shop tools and machinery and does any machine work necessary. The last includes some lathe, bench, drill press and grinding work, but the principal machine jobs are cared for by specialists at the large general repair shops.

The oilers lubricate all armature and motor-axle bearings, adding specified quantities of oil at stated periods in accord with a detailed "lubrication schedule." These men are held accountable for any hot bearings that may be caused by insufficient or improper lubrication, either in respect to the quantity of oil or to the manner in which waste packing has been cared for. No lubrication and packing of truck journal bearings are done at inspections but only when cars are shopped for motor and truck overhaul.

The motor repairmen and helpers work in crews of two and care for work termed "overhauling," i.e., "a close examination with a view to correction or repairs." The wear of armature and motor-axle bearings determines the overhaul mileage basis for motor and truck equipment. The work consists of jacking up or raising the car bodies, running trucks out to a large free space where the motors are removed from the truck frames. The motors are then opened up and the carbon dust accumulations are blown out with compressed air, armatures are taken out and cleaned, brush holders removed and cleaned, fields tested, etc. Motor-axle and armature bearing housings are repacked and bearings renewed. After the interior of the motors has been cleaned, the armatures, fields and inside of motor shells are coated with an insulating paint and final adjustment made before closing and bolting the motors for replacement in the trucks. As to trucks, the wheels are replaced if necessary after having been gaged as to flanges and rims and the distance between gage lines; bolts are examined and tightened, while worn journal bearings,

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pedestal wearing shims, rods, levers, hangers, brakeshoes and the like are replaced and bearings are repacked and oiled.

COMPARISON OF PRACTICES

The foregoing paragraphs give details of what constitutes "inspection" and "overhauling" at maintenance carhouse shops on the Brooklyn Rapid Transit System. The mileage basis between the inspections ranges from 600 miles to 900 miles while that for overhauling ranges between 7000 and 15,000 miles, the variations depending on the type, age and class of equipment.

On some systems cars are placed over pits at stated periods for brake adjustment only and the general inspection is deferred to a greater mileage. Where this arrangement is in effect it is usual to take cars in for the replacement of armatures and motor-axle bearings only in accordance with the wear shown by clearance gages, while the work termed "overhauling" is deferred until a greater mileage has been attained.

On still other systems every car assigned for service is looked over every night or once every twenty-four hours. While this arrangement seems to satisfy its users, it is difficult to see how a proper inspection can be made in the very short time that is available when so many cars must be handled.

In some places the overhauling period is fixed entirely by the pole piece clearance gage or overhauling is done when cars come in for a change of armatures, wheels and the like. Again, some companies do inspection work at terminals where cars have some lay-over time, and the rolling stock comes into shops only when it is necessary to renew bearings, armatures, wheels, etc.

On our property all work is done during the day so that practically all equipment is available for heavy evening rush-hour service. Of the total cars assigned for service from each carhouse the number placed for inspection ranges from one-sixth to one-tenth, based on variations in mileage, and no shop ever has more than four cars to overhaul in one day.

Each inspector makes his own repairs, adjustments or replacements as found necessary on examination. Defects are not found by one set of men and reported for repairs by others, although the latter arrangement is in effect on some properties with excellent results.

It will be observed that many maintenance plans are in effect. While most of them are giving results satisfactory to the executives in charge, it is an open question whether some one plan would not be found more economical than the rest, excepting such variations as might be required by the location and size of the property. In any event, would it not be of great advantage to have the several terms of maintenance practice so clearly defined that accurate comparisons would be more practicable than is now the case?

ESTIMATED VALUE OF PREPAYMENT OPERATION IN ENGLAND

Henry Mozley, general manager Burnley (Eng.) Corporation Tramways, recently prepared for the *Tramway and Railway World* the accompanying table to show what the annual gains of the several systems named would be if they were to install prepayment operation, assuming that the missed fares so recovered were equivalent to 2½ per cent of the annual gross earnings.

Mr. Mozley points out that even if the loss was only half the amount shown the leakage would still be worth the serious consideration of railway managers. Two ways, he says, are open to prevent missed fares: the passenger might pay on entering a car, or the conductor might demand a ticket from each passenger who left the car en route and also from all passengers who were still on the car at the terminus. As the conductor was the only person responsible for seeing that all passengers paid fare, he should be on the rear platform at every stop. Mr. Mozley favors the use of an assistant conductor for extraordinary traffic. His belief was that it was advantageous for the conductor to collect the fare tickets, since this enabled him to know where each passenger desired to get off; that the collection of tickets prevented over-riding; that while ticket collection might involve more work for the conductor, it minimized the loss of fares on crowded cars, and, finally, that collection was desirable because of the great variety of reduced fare tickets in use.

Name of System	£	Name of System	£
Accrington	685	Liverpool	15,770
Ashton-under-Lyne	556	Manchester	22,217
Birkenhead	1,531	Nottingham	4,179
Blackburn	1,586	Oldham	2,700
Blackpool	1,836	Preston	1,074
Bolton	3,378	Rawtenstall	650
Bradford	7,240	Rochdale	1,993
Bury	1,690	Rotherham	1,005
Chester	306	Salford	6,492
Darwen	365	Sheffield	8,964
Doncaster	498	Stockport	1,578
Halifax	2,625	Sunderland	1,712
Huddersfield	2,695	Wallasey	1,450
Hull	3,929	Warrington	572
Lancaster	139	Wigan	1,756
Leeds	10,188	York	549

SCHOOL FOR TRAINMEN AT BUFFALO

Applicants for positions as motormen and conductors on the various lines of the International Railway Company are trained in a school located near the Niagara Street power house in Buffalo. Each applicant reports at the school for preliminary instructions as to his duties before being sent out on the road for a ten-day practice. During the practice period he travels with a regular crew and in spare time studies the rule book. This gives explicit instructions in regard to methods of operating cars, routes, transfers, reporting accidents, records, etc. After the practice period the applicants assemble in small classes for more detailed instruction and for examination of the results of the ten days' study and observation. A full working day is consumed in this way, motormen and conductors being instructed and quizzed separately.

The school occupies the entire ground floor of a brick building, about 40 ft. x 60 ft. in area, located on one of the principal lines of the system. It is admirably arranged for purposes of instruction as is evident from the accompanying diagram. On the north side of the room is a standard 21-ft. car, fully equipped and with its trucks mounted on blocks so that the wheels clear the floor. On the south side is a skeleton double-truck car with all details exposed for convenience of inspection and for tracing out the wiring. About the walls are sample parts of a car equipment, mostly exhibiting defects which develop in service. In one corner is an elevated platform for the instructor with a blackboard on the wall behind. On the platform is a desk where records are kept. Comfortable chairs for the class are provided on the floor below. A small toilet room occupies a convenient position near the front entrance to the building.

The instructor, Mr. Ruberry, is a practical railway man who has served as motorman and conductor in the company's service. He is thoroughly familiar with the streets of the city, with the company's rather complicated system of transfers and with the duties of motormen and conductors. He drills his classes thoroughly on the rules given in the book and puts to them practical questions such as they will meet in their work. For example, if the pupil is a conductor a question like this may be asked: "A man boards your car on Main Street at Seneca, going north. He wishes to go to Caroline Place and Forest Avenue. Where should you tell him to transfer, and how would you punch his transfer?" A typical question to a motorman might be: "If your car is climbing a hill and suddenly the power goes off, and, on trying to apply the brakes, you find you have no air pressure, what would you do?" "Well.

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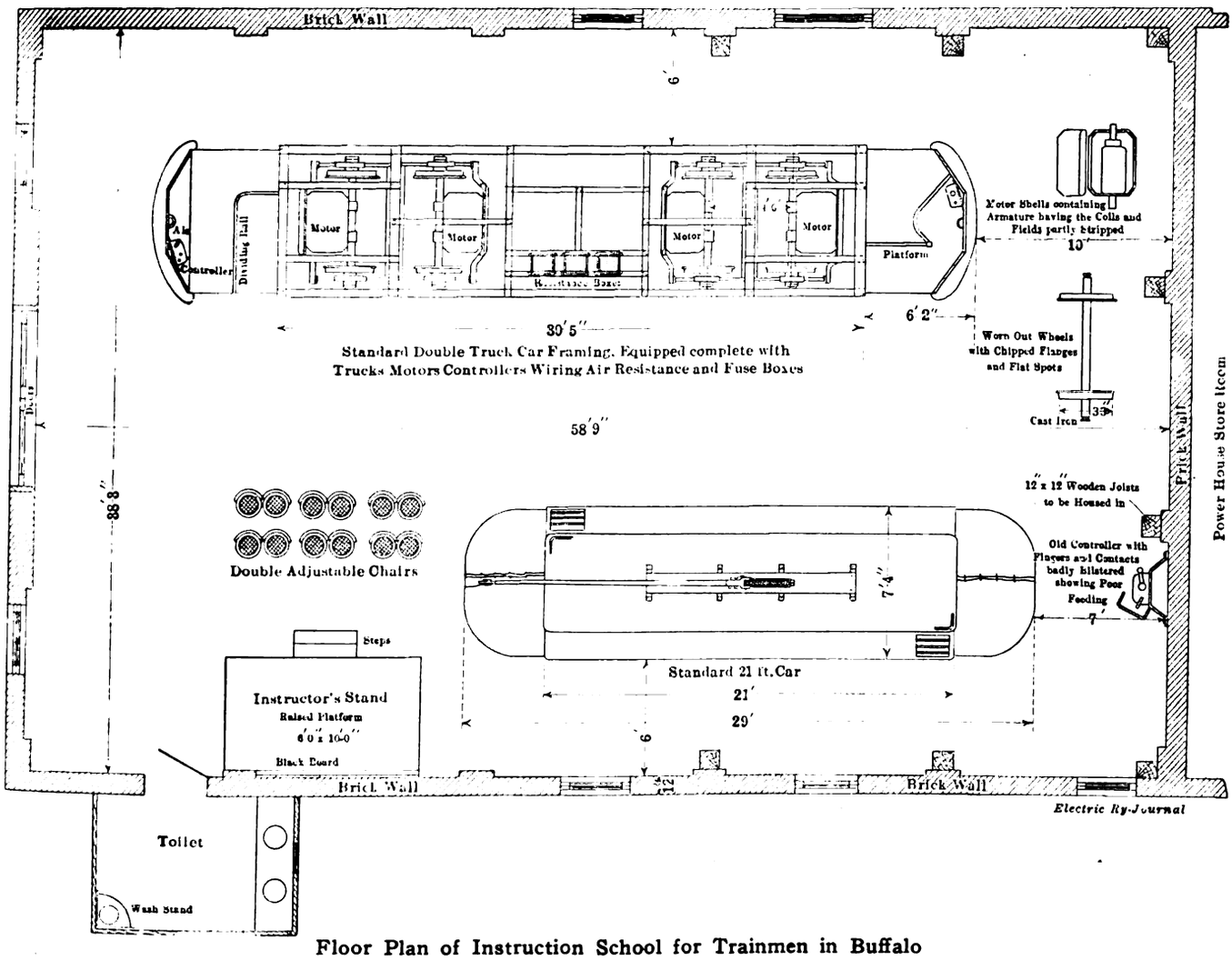
suppose that the hand-brake would not work, either?" Or he might be asked what he would do if the air compressor governor failed to work and he noticed that the pressure was mounting to a dangerous value. On replying that he would cut off the compressor current, he might be asked further: "But suppose that the switch is defective and fails to open the circuit?"

After a long quiz without apparatus before them, the men are taken on one of the school cars and a practical test is made of the results of the study. One exercise consists in sending a man to the controller and telling him that when the instructor gives a bell signal he is to carry out the operations called for by the signal. The instructor pulls the bell twice, the brakes are released and the controller handle is pulled around a notch or two. The motors do not respond. With the aid of the class, if necessary, the pupil finds that the overhead switch is open. He closes it and tries again with no result. After further investigation he learns that the switch at the rear end of the car is open. This is closed, but with no result. He finally recalls that the rule book requires the turning on of the lighting circuit when there is trouble with the power. He does this and finds that there is no power and, on looking outside, notes that the trolley wheel is off. After these and possibly other tribulations on the student's part the motors finally start, but the instructor immediately gives a stop signal, asking the neophyte how long he waited on the first notch. He replies that he forgot that the rule book told him to wait on this notch while he counted eight. After a new start the controller handle refuses to go by the fifth notch. Another search for trouble is made until one of the more careful students remembers that a motor is possibly cut out. Investigation shows this to be the fact.

Finally the car comes to speed and brake applications are made, with the caution that a poor stop may mean a damage suit. A backing signal is then given, and the motorman, if careless, reverses and starts backward without looking toward the rear. He is halted and reminded that the rule book requires him to back slowly, not more than 10 ft., and then only after he has seen the conductor put his head out of the rear window. These illustrations will serve to show the manner in which important rules are brought out and the reasons for them emphasized.

Applicants are rated at all stages of their progress. In addition to the features described, the forms which have to be filled in for various purposes are studied and used. Particular attention is given to the accident report, a sample of which is filled in by each pupil. This written work is an excellent gage of intelligence. After the instruction work has been completed, if the work is reasonably satisfactory, the applicant is returned to the employment division of the transportation department for final examination and assignment to duty. If he gives no promise of attaining proficiency in a reasonable time, he is dismissed. If below standard but promising, he may be returned to the school for further instruction. Otherwise he is put to work.

In the school instruction a great many practical suggestions are given by the instructor to emphasize the underlying principles of success in car platform work. The avoiding of accidents is urged as a first object, and, close to it, courtesy to the public is insisted on as of vital importance. Economy in the use of power, close following of the company's rules and other elements of good service are dwelt upon. The results of all of this are very satisfactory, and the company is securing an increasingly satisfactory and loyal body of men.



Floor Plan of Instruction School for Trainmen in Buffalo

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Meeting of National Civic Federation

Emerson McMillin Presents Report on Model Public Utility Bill—August Belmont Reads Paper on Workmen's Compensation—Government Ownership of Railroads Discussed by Seth Low

The annual meeting of the National Civic Federation was held in the Hotel Astor, New York, on Dec. 11 to 13. The subjects considered included the model public utility bill and workmen's compensation, while government ownership of railroads was discussed in the report of President Seth Low.

The model public utility bill was not made public, but President Low asked that the thanks of the federation be given to the members of the committee who took part in the work incident to its preparation and that it be referred to the executive council with power to act. Upon motion, this was done.

MODEL PUBLIC UTILITY BILL

Emerson McMillin read a report as chairman of the department on regulation of interstate and municipal utilities. An abstract follows:

"That the regulation of public utilities is necessary is no longer a debatable question. The business which they conduct is closely related to the public welfare. The best interests of the public will be conserved ordinarily by the conduct of such business only as a monopoly. Managers of public utilities no less than other members of the public realize that without recognition of the common interest in the conduct of such business conditions might eventually become intolerable; in fact, it has come to be generally believed that regulation of public utilities is the alternative to public ownership and operation. No one of the important public utilities has reached a point where in the interest of the public it can dispense with the initiative, zeal, enterprise and courage which in the past have characterized American business methods.

"Accordingly the bill which we have prepared is an indorsement of the principle of state regulation of public utilities. It stands squarely for the public interest in these matters. Unhesitatingly and without equivocation it gives to a public commission powers of the greatest importance to the well-being and prosperity of the companies. The commission may investigate and fix absolute rates. It may prescribe absolute standards of service and require adherence thereto. It is required to provide uniform accounting and statistical methods, and companies are obliged to make such reports to it as the commission may desire. It is charged with the responsibility of approving issues of stocks and bonds and the transfer of property and franchises from one company to another. These powers and others are conferred on the commission in the firm belief that their exercise is required under a system of adequate regulation, but with the belief that their abuse will be as destructive, ultimately, to the public interest as it may be immediately to the private interests of the companies regulated.

"The bill provides for a single state commission to undertake the regulation of all utilities within the state. This plan is believed to be eminently preferable to any scheme of divided jurisdiction whether on territorial lines or on business lines. Municipal regulation of local utilities must necessarily be expensive and probably inefficient. Utilities no longer are confined to the limits of municipalities. Of even greater concern, however, is the difficulty, if not impossibility, in a majority of cases of obtaining through a municipal regulating body the degree of scientific accuracy and judicial impartiality and fairness which is necessary to a proper solution of public utility problems.

"The bill throws about existing investments the protection from competition offered by the requirement that a certificate of public convenience and necessity issue from the commission before a new enterprise is begun in competition with an old one. This provision summarizes the experience of a number of states. Competition in a field which lends itself naturally to a monopoly is economically and socially wasteful. The rule applies as well whether the proposed competitor is a private company or a municipality. So long as an existing agency is furnishing adequate service at just and reasonable rates in all respects in compliance with the provisions of the public utilities law, there can be no justification for the introduction of competing agencies.

"The bill strikes a blow at another abuse which has cost the people of this country humiliation, political disease and the propagation of graft, which results from the short-term franchise requiring renewals at periodical intervals. A modification of the Massachusetts plan with respect to new franchises granted after the passage of the act, and slightly less extreme than the Wisconsin plan with respect to franchises existing when the act takes effect—the bill takes a long step in the direction of sanity in the adjustment of the important franchise relationship.

"An important feature of the indeterminate franchise principle is the provision made for the termination of franchises by municipal purchase. Full opportunity is afforded municipalities to purchase the property of utilities operating under indeterminate grants for a price and on reasonable terms and conditions determined by the commission. Municipalities are authorized either to operate public utilities so acquired or to contract with private companies for their operation. Every municipality that owns a public utility is required to keep uniform accounts prescribed by the commission and to report to the commission as private companies are required to do.

"The model bill is the result of arduous and long-drawn-out investigation and consideration. It is of necessity a compromise production. Each and every member of the council objects to some feature of the bill, but, as a whole, it has finally received the vote of the entire council, with one single exception."

WORKMEN'S COMPENSATION

August Belmont, chairman of the workmen's compensation department, presented a report on this subject in which he said:

"While there is some difference of opinion as to the form which legislation shall take, the federation has found unanimous agreement upon the following essential points in the interest of both employer and employee:

"(1) That the right to compensation and the amount of it for particular injuries or death should be so definite as to leave as little as possible for controversy or difference of opinion as to the amount of compensation to which the injured workman is entitled;

"(2) That the workman or his family should be so protected in the making of their settlement after injuries that advantage cannot be taken of them or an unjust or delayed settlement be forced upon them;

"(3) That the workman or his dependents should be secured against the insolvency of the employer or other contingency, so that the payment of his compensation will be prompt and certain; and,

"(4) That there should be no question as to fault, as to contributory negligence, the assumption of risk, or the so-called fellow-servant rule.

"Practice, as it has thus far gone, points to the desirability of the employer's making payments direct to his employees or their dependents."

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SETH LOW ON GOVERNMENT OWNERSHIP

In his presidential address Seth Low spoke about railroad conditions, saying in part:

"The actual situation of the railroads at the moment seems to me so serious that if this application for an increase of freight rates is declined I fear the impulse that will be given to the demand for the public ownership and operation of the steam railroads of the country will be inevitably strengthened.

"I wish to point out that in our country, by reason of its vast extent and by reason of its federal government and its historic evolution, the problem of public ownership, and not less the problem of public operation, are surcharged with difficulties that do not exist under different conditions.

"Assuming for a moment that this great economic and social change had been sanctioned and actually put into force, try to imagine, if you can, how the conflicting interests of different parts of the United States could be harmonized when the same government is responsible for railroad operation everywhere. The annual bill for the construction of public buildings for the federal government has acquired the popular name of 'pork barrel,' because it is so universally recognized that appropriations for this purpose are made to gratify local sentiment and to promote the interests of individual Congressmen more than upon the merits of the matters as determined by careful inquiry. What possibility is there that the administration of a system of national railroads would be, or could be, carried on under our democratic government in any other spirit? And in what possible way could the general interest of the people of the United States, in the matter of transportation, be less well served? Furthermore, the political consequences of centering such power in Washington are beyond calculation.

"The argument against the nationalization of the railroads is so strong that it is worth while to try to define to ourselves why any one should think that it is worthy of serious consideration. The arguments in favor of government ownership and operation of railroads I take to be mainly three: First, that government will treat every one alike and will not discriminate between shippers, as the privately owned railroads in the United States in the past have grievously discriminated; second, that government ownership, even if it does result in higher freight rates, is likely to mean lower passenger rates for the masses of the people; third, that government ownership, however costly it may be, at least makes it unnecessary for the public who use the railroads to pay dividends on vast volumes of watered stock.

"Our privately owned railroads are themselves largely responsible for the strength of the popular feeling in the United States under all three of these heads. The feeling in favor of public ownership and operation of railways is strengthened, no doubt, by the large element in our population which comes to us from countries where the railroads are publicly owned and operated. Without public ownership but through public regulation, we have substantially secured equality of treatment at the hands of the railroads for every shipper, large or small, in whatever state he may be.

"I wonder if our railroad managers have ever noticed that where government ownership obtains passenger fares for the multitude are less than the passenger fares in the United States, although in the United States the freight rates are only one-half the rates paid in some countries, while our railroads pay double the wages. First-class passenger rates abroad are apt to be higher than the prevailing rate here. This only emphasizes how much more cheaply the multitude travel, who travel third class, when the average passenger fare in Germany, for instance, is only half what it is in the United States. It is perfectly possible, without reducing the net return to the railroads, to reduce passenger rates importantly, without any division of passengers into classes, if freight rates are correspondingly advanced. Our railroad managers, if they would think for a moment as government officials think, when they are charged with the duty of operating railroads, would realize that passengers vote but freight does not. Any policy, therefore, which reduces the passenger rates is likely to be universally popular, and I take it that is why passenger rates are so low where the State owns the railroads; whereas the policy which reduces freight rates while keeping passenger rates high is popular only with the shipper. I appreciate that the consent and co-operation of the Interstate Commerce Commission must be had for the introduction and successful installation of such a policy. I submit, however, that just because it is a policy that would benefit the great masses of our people, our Interstate Commerce Commission, being a government board, would be as likely to facilitate such a policy as any administrative board in a country which itself owns the railways.

"It is hard to speak with moderation of the financial abuses connected with railroad management which have done so much to create and to strengthen the demand for the public ownership and operation of railroads. The public has seen railroads loaded with charges for the profit of individuals responsible for the conduct of the roads, charges which add permanently to the cost of transportation. Increases of value, largely created by the public, have been absorbed entirely for private benefit, and all of this has gone on upon so great a scale and for so long a time as to have cost railroad management to a great extent, but often unjustly, both the respect and the confidence of the people. It is a case where the innocent suffer with and for the guilty. If government regulation can successfully put an end to these evils, no doubt private ownership and operation of railroads may long continue in the United States; but if government regulation falls short of being as effective in these directions as it has fortunately been in the ending of rebates, the tendency toward government operation, despite all its difficulties and dangers, is not unlikely to grow, unchecked. If the railroads wish to escape public ownership they must consent to the public regulation, for the future, of the issue of stocks and bonds, and it is greatly to be hoped that instead of placing every imaginable difficulty in the way of such legislation, they will cordially cooperate to see that effective and fair legislation to prevent the repetition of the abuses of the past is quickly made a part of the law of the land.

"If not completely, still very largely, the actual management of railroads in this country has passed, and is constantly passing, out of the hands of financiers and into the hands of practical railroad men who are less and less affiliated with the stock market. It is reasonable, therefore, to hope that we are passing out of the old era into a better order of things.

"There is one aspect of public ownership and operation which it seems to me legitimate to point out to the railroad employees who are so largely represented in our membership, and that is its probable effect upon wages. Railroads that are publicly owned have available for wages only such sums as are appropriated by law. In a country of the vast extent of the United States it will always be difficult to secure any change in wages, as established by law, when they have once been fixed. Working conditions will also then be much more difficult to change than when the railroads are under private management. The cost of living is so different in different parts of the United States that this difference is substantially certain to be reflected in an average wage below that which the railroads can pay under private management. The agricultural interests of the country are enormous, and one of their greatest difficulties comes from the fact that agriculture cannot afford to pay as large wages as transportation and many other

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occupations pay now. This is, in fact, one great reason for the high cost of food products, that agriculture cannot command the labor that it needs in order to cultivate as it should and to produce and to harvest larger crops. As long as railroads are privately owned, agriculture must take its chances; but, in this country, if railroads were publicly owned, the granges and other combinations of farmers would certainly be on the job to keep railroad wages as low as possible. They would have to be, or they could not work their farms at all. There is a rigidity about law that makes it difficult to change conditions once established, and it is equally hard, under the provisions of law, to take into consideration local qualifying conditions. Such considerations as these satisfy me that railroad employees are not only better off now, under the private administration of railroads, than they would be likely to be under public administration; but also that, under existing conditions, they can hope for a betterment in pay and rules of service which it would be vastly harder to realize from a federal government constituted like ours."

INDUSTRIAL ARBITRATION*

BY CHARLES MURPHY, MEMBER OF PUBLIC SERVICE COMMISSION OF INDIANA

In the evolution of the relationship of capital and labor, industrial arbitration becomes a necessity. In the beginning, combinations of wealth came first as a great organization. Large properties and interests combined naturally as the resources and means for wealth production of this country came into the hands of a few cool, calculating men, whose motto has ever been "We are masters of our own house," and gave to these groups of men such unlimited influence that the organization of labor unions came from the necessity of forming a combination to fight the combination already in existence. So, in every dispute, on one side is the company, on the other are the workers, one great combination of power making absolutely necessary the opposing combination of force.

Between these two is the public and the public interest is as great as that of either the company or the workers.

Now, let me say that in my judgment any remedy which would try to solve the problem of the conflicting interests by suppressing the union would meet with the same disfavor from the citizenship of the state as would the suppression or destruction of the capital invested in our various industrial institutions.

On the other hand, the conduct of some of the walking delegates or agents is as bad and as much against public policy as one could possibly find any conduct to be, and the unions should eliminate from their payrolls the hot-headed, overfed, overpaid delegates whose only counsel is to "fight to a finish." Yet the employer who can see no solution to the problem except that he shall be the sole judge of whatever questions or differences arise between the workers and the company, and that his solution of the problem is the final one, had better be eliminated from the position of dictator, and his elimination is just as necessary as the elimination of the walking delegate.

When you have a board of arbitration whose judgment shall be final you will eliminate the necessity of the walking delegate. You will also eliminate the man who thinks that he is to be the sole judge of the destiny of any dispute that may arise between the workers and the employers.

I want to call attention to the position that was taken by a group of railway men and railway financiers some few years ago, when the agitation first began as to the regulation of service and rates of the railroads of this country. This group of the greatest builders and financiers in the world took the position that any regulation of their affairs was an encroachment upon property rights and that such encroachment would not be tolerated as it meant ruin to the country. In the earlier stages some of the courts took the same position, but regulation came and the Interstate Commerce Commission was formed. At first it was weak, made so in many instances by the interpretation of the statute by the courts, but the necessity for this regulation increased, and in a short time even the men who loudly denounced the scheme have come to agree that it was exactly the solution of the problem. So it is with industrial companies and organized labor. The necessity for compulsory arbitration is at hand, and instead of fighting the enactment of such legislation, it would be better to assist in its enactment.

Consider the meaning of a general strike to the users of the service of any public service corporation. In but a few days the main question under dispute is always forgotten, and the bitterness and animosity between the workers and the company are uppermost in the minds of the parties interested, resulting in untold suffering among the general public, at least in large communities. Indeed, in this progressive age the time is past for lock-outs or tie-ups. Public opinion will no longer sustain a lock-out nor will it sustain a general tie-up of business.

In Canada in 1900 the first attempt was made toward a law for regulating such differences. It attempted to settle matters only so far as railroads were concerned. In 1906, six years later, an act applying to all public utilities, transportation companies, and also all coal and metal mines, was passed by the Canadian Parliament, making it unlawful in these industries and occupations for employers to lock out their workmen or for employees to strike until an investigation of the dispute had been made by a government board appointed for this case and a report of the result of arbitration had been published. Under this law the proceedings necessary in making changes in wages or conditions affecting either employers or workers must be preceded by thirty days' notice, and application must be made to the Dominion labor department, which shall appoint three members as a board, one member upon recommendation of the workers, one on recommendation of the employer and a third to be appointed by the two members of the board, or if they cannot agree, then by the government. The penalty for instituting a lock-out before bringing the dispute to the board is a fine of from $100 to $1,000 on the company, and a fine of from $10 to $50 is imposed upon each striker if the workmen strike before submitting their dispute in proper form to the board. The act has been amended and changed, but the main features are the same now as they were in the beginning. It is very popular with the citizens of the country and is recommended by a large percentage of unions. It also has the support of most of the industrial companies of Canada. The statistics of the cases brought before the boards of arbitration show that all cases were settled except two in each thirty, which failed in arbitration.

In New Zealand, perhaps, the boards of arbitration have made the greatest number of decisions, and they have the support and friendship of both workers and employers. Neither were wholly satisfied with the early results, as shown in the statistics of the first cases, for out of the first 100 cases arbitrated there were seventy-three appeals taken to higher courts. But in most of these appeals the boards of arbitration have been finally sustained. In all of the statistics the method of forming the boards of arbitration seemed to be the problem that was hardest to solve. In New Zealand there were seven boards, each consisting of five members, of whom two were elected by unions of workmen and two by the union of employers. The four men elected a chairman, who had the deciding vote only. The orders of the board were enforced by a fine of not more than $500 on employers and in case of workmen's unions not more than $10 on each individual.

*Abstract of a paper read before the Central Electric Railway Association at Indianapolis, Ind., Oct. 21, 1913.

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Judge Alfred P. Backhouse, of New South Wales, who, as a commissioner appointed to investigate the law of arbitration in force in New Zealand, spent several months studying the question and the results obtained by its working, said in his report to his government: "The working of the law in the main has rendered great good to the workers, to the employers and to the general public."

MEETING OF RAILWAY BUSINESS ASSOCIATION

The annual meeting of the Railway Business Association was held in New York Dec. 11 and was followed in the evening by the fifth annual banquet, which was held at the Waldorf-Astoria. At the business session George A. Post was re-elected president of the association. In the evening the two addresses at the banquet were made by Howard Elliott, chairman New England lines, and James M. Cox, Governor of Ohio. Mr. Post, president of the association, presided.

The report of the executive committee, presented at the annual meeting in the morning, called attention to various important matters of interest not only to steam railroads but to all public utilities. It expressed an opinion of optimism on the future of the railway industry and approval of the idea of public regulation. Among other favorable signs mentioned by the committee the report cites recent requests to the Interstate Commerce Commission from shippers that a general increase in transportation charges should be permitted. The report deprecates the idea which it says has been advanced that such an increase should be postponed until the railways introduce various specific theories of conduct. It says that railway managers are energetically striving to improve their standards, both of efficiency and propriety. The report urges a longer term and retention in office of public service commissioners to avoid the danger of mistakes by new commissioners and secure greater freedom from politics. Statistics are published showing a constantly decreasing net income on the part of the railways and a consequent decrease in extensions and improvements. The report urges Congress to go slowly in ordering the substitution of steel cars for wooden cars, calls attention to burdens imposed on the railway companies by recent state legislation and suggests a further amendment to the general federal railway labor arbitration law to make it more nearly like the Canadian law on this subject.

ADDRESS OF MR. ELLIOTT

Mr. Elliott's address was a vigorous defense of the demand of the railroads for more favorable consideration. After quoting statistics in regard to the extent of the railroads and the number of the individuals who are engaged in that work directly or through the supply of material, he showed that the interests of a very large proportion of the country were closely associated with those of the railroads. He then quoted some figures showing that, while gross earnings had increased, net earnings had decreased and declared that this was due in part to the great increase in cost of labor and materials and in part to the elaborate and luxurious facilities which the people demanded. The seriousness of the situation, the speaker said, would be admitted by all thoughtful and candid persons. A great many demands were made that the railroads should introduce economies, but somewhat inconsistently objection was made to the economy of combinations of railroads which under suitable management could be made to serve the ends of efficiency by more economical operation and better service.

Mr. Elliott also spoke about the multiplicity of laws and the conflicting statutes of the different states and said that the effect of this heterogeneous regulation was to compel the railroads to serve forty-nine masters, although the possibility of serving only two masters had been crystallized into a proverb. On the question of efficiency, Mr. Elliott compared the efforts of the railroads in this direction with the waste in the government service and said that the number of employees in the executive civil service, excluding the army and navy, had increased 100 per cent in the last fourteen years, although the population of the country had shown no such increase. Yet the regulation of this matter was in the hands of the public which was attempting to criticise the railroads.

Mr. Elliott also referred to the position taken by the government in regard to the payment to railroads for the mails and asked whether the government exemplified in its own dealings the principles of justice and morality which the people, through the government, exacted from others. While paying for the mails on the basis of weight made some time ago, the Post Office Department is continually increasing its parcel post and deliberately taking service worth at least $15,000,000 a year to the railroads. Mr. Elliott quoted an editorial from a daily paper which held that anyone now receiving a postal package was a receiver of stolen goods. He then said that it was claimed that the management of some railroads had not been honest, but while dishonesty should be rooted out, this was no reason for calling a halt on the development of the country. Clergymen, doctors, senators and cashiers sometimes go wrong, but that is no reason for abolishing all these callings. Another claim was that if securities were sold over the counter, the banker's commission would be saved. But railroads must have financial experts as well as engineering experts and must pay a fair price for their services. Not even city, state or federal governments, whose credit is based on taxing power, have always been able to float popular loans without the aid of bankers. In conclusion, he said that the railway managers of the country welcomed just criticism based on real knowledge of all facts and were doing all they could to improve their men, methods and facilities, but many economies can be adopted only by discarding old appliances and buying new ones, and if the roads have no money for the new tools, they must get along with the old ones. He asked the patient good will of the public and its assistance in solving this important problem.

ADDRESS OF GOVERNOR COX

Governor Cox of Ohio, who delivered the only other speech, illustrated the dependence of the community upon adequate railway transportation by referring to the Ohio floods last spring when his State lay helpless until railroad communication was re-established. He spoke of the large gross business done by the railways but said that the service was becoming congested and the rolling stock was becoming inadequate because the needed increased facilities could not be supplied for lack of funds. These could not be secured because railway credit had become impaired. He did not believe this condition had been caused by the present policy of governmental regulation. If any mistake had been made in regard to regulation, it was that it had not come soon enough, but the transactions of yesterday could not and should not be measured with the ethical yardstick of to-day. Many practices were formerly accepted which would be shocking to present ideals, but the existing stockholders should not be punished for the abuses committed by former owners. The government itself and the people who selected the authorities cannot be held blameless. Necessary extensions could not be built unless new securities could be sold on such a basis that the public would be assured of a return on its investments. He believed that ultimate relief would come only when the Interstate Commerce Commission should pass upon the issue of securities. He also suggested the issue of securities of smaller denominations. In conclusion, he said that the roads should be permitted to put living rates into force and should not be held down to rates established years ago. If society insists upon better accommodations and higher prices to labor, society should defray this expense.

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SAMPLING COAL DELIVERIES

BY MORGAN B. SMITH, CHIEF CHEMIST DETROIT UNITED RAILWAY COMPANY

Sampling may easily be said to be the most difficult step and in many ways the most important factor in the final acceptance or rejection of materials purchased and used in commercial practice, and it is a matter which has received very careful attention on the part of all scientific societies in this and other countries. In the United States the Bureau of Mines, the Bureau of Chemistry, the Bureau of Standards and other bodies have devoted much time and thought to this matter of sampling, for the value of the ultimate analysis of the material in question depends absolutely on the integrity of the sample received.

It is comparatively easy to get a fair sample when the conditions are such that considerable time is available and the material readily accessible for sampling. On the other hand, conditions are often such that fair sampling becomes very difficult if not wholly impossible. Such a condition exists in the matter of sampling coal received at power stations in cars, in which case the material is not readily accessible nor can a great deal of time be taken, for the cars must be emptied as rapidly as possible and moved out of the way.

Because of the manner of loading cars it is generally found that the coal varies throughout the car and that this variance is by no means constant. Cars are sometimes loaded at the tipple and again under the spouts of storage hoppers. In the latter case the car may contain as many as six different qualities of coal varying with the number of spouts from which the car was filled. Evidently it will be difficult for such a car to be sampled in a manner to obtain a fair average of the contents. In consequence the following series of tests on coal received in cars at several power stations was carried out to find the best means for rapidly sampling coal in cars.

The coal received was known as Hocking Valley slack. The cars, as received, were sampled in five different ways, of which four are shown diagrammatically in the accompanying illustration. In each case six samples were obtained and in method A these were taken in staggered rows on each side of the car. In method B six samples were taken at equal distances along one side only at a distance of 18 in. from the side. In method C three samples were taken along the center in staggered rows. In method D the six samples were taken along the center line of the car. In method E the six samples were taken at the coal-elevating conveyor during the process of unloading the car. These cars had previously been sampled in one of the specified manners mentioned above.

The sampling was carried out thus: A so-called sampling ram was made from 1½-in. wrought-iron pipe, 5 ft. long, welded at one end with a plug about 6 in. long and ground to a long taper at the opposite end to give a good sharp cutting edge. This ram was then driven down through the coal at the specified points in the car and filled with coal. It was then withdrawn and emptied into a pail. Six such samples gave about 40 lb. of coal per car. This sample was then crushed and quartered down in the usual manner, after which it was tested for ash and for heat value. The ash was determined in a gas-fired muffle furnace at a temperature of 750 deg. C., the heat value being determined in a standard Atwater bomb calorimeter, corrected in the usual manner. In all forty-three cars were sampled and tested.

A summary of the results of these tests showed that the highest heat values and the lowest ashes were found in the coal along the sides of the cars. The next highest heat values were found in samples taken along one side only. The next highest heat values ware found in samples taken along one side and center. The next highest heat values were found in samples taken along the center. The lowest heat values were found in the samples taken at the conveyor buckets, in which case every part of the car was reached, including the dirt and fine coal in the bottom of the cars.

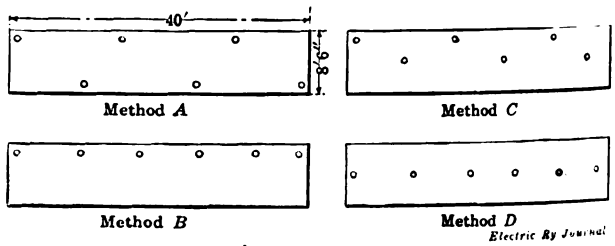
From this the conclusion is evident that a fair sample can only be taken while the car is being unloaded, since that is the only manner in which every part of the carload can be reached, and while ram sampling gives very fair average results it invariably gives figures higher than the actual average heat value of the coal contained in cars because of the fact that the ram does not reach the poorer coal contained in the bottom of the cars.

Method A, as shown in the illustration, was finally adopted as the best method of ram sampling with the proviso that frequent check sampling should be done from the conveyor buckets taking the coal from the crusher to the hoppers. This manner of sampling actually gives the coal companies a shade the better of the testing, but this seems justifiable in view of the extreme difficulty found in taking fair samples in a very short time.

TABLE I—SUMMARY OF COAL-SAMPLING TEST DATA

Method	Number of Cars	Heat Value, B.t.u.	Ash, Per Cent	Averages B.t.u.	Averages Ash, Per Cent
A	10	12,576	11.40	12,540	11.62
	5	12,508	11.77		
	11	12,481	11.95		
B	10	12,510	11.83	12,490	11.90
	5	12,586	11.39		
	11	12,427	11.45		
C	10	12,544	11.61	12,450	12.20
	11	12,234	13.53		
D	10	12,353	12.75	12,345	12.80
	5	12,378	12.71		
	11	12,323	12.85		
E	5	12,125	12.10	12,125	14.10

In the summary given in Table I it is needless to say that the results were obtained from the same cars, making the figures strictly comparable. The ten cars spoken of above are identical cars throughout, likewise the five cars and the eleven cars.



Coal Sampling—Plans of Coal Car, Showing Different Methods of Taking Samples

It is well to point out the fact that much poor coal is generally found in the bottoms of cars as received after transportation for some distance from the mines. The constant jar en route and while switching is being done in the railroad yards tends to shake the finer coal, and the dirt from the tipples and hoppers, down into the bottom of the cars. As cars are now handled, for the most part at least, there is no way to prevent this poorer coal and refuse from going into the crushers and on into the storage bins of the plant. Consequently any method of sampling which does not take into account this poorer coal will give results higher than the average quality of the car's content really warrants. The results given in Table II for five cars, in which sampling by method A above is compared with the resultts of sampling by method E, show at a glance the truth of the above statements.

It is very evident from these figures that the coal as burned in the boiler furnaces will not come up to the

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standard shown by the sample taken by method A. The coal will be poorer in heat values and there will be more ashes to handle as well.

TABLE II—COMPARISON OF RAM SAMPLING WITH CONVEYOR SAMPLING

Car No.	Method A		Method E	
	B.t.u.	Ash, Per Cent	B.t.u.	Ash, Per Cent
1	12,489	11.87	12,056	14.58
2	12,590	11.27	12,375	12.30
3	12,387	12.48	12,136	14.02
4	12,476	12.00	12,350	12.79
5	12,598	11.22	11,708	16.78
Average	12,508	11.77	12,125	14.10

By grouping the tests with regard to the method of sampling and the heat values found, calling the highest heat value 1, the next highest 2, the next highest 3, the next 4 and the lowest heat value 5, the results shown in Table III were obtained.

TABLE III—COMPARATIVE RESULTS GIVEN BY FIVE DIFFERENT METHODS OF SAMPLING

Method	A	B	C	D	E
Highest	3	6	0	2	0
Next highest	7	1	1	2	0
Next highest	1	2	3	5	0
Next highest	0	2	7	2	0
Lowest	0	0	0	0	1

From this it will be seen that in the eleven cars sampled in all four ways method A gave the highest heat value three times out of eleven, the next highest seven times out of eleven, etc., and did not give the lowest value at all. On the other hand, the method of sampling known above as C gave the highest heat value not once, but gave instead the lowest heat value seven times out of the eleven cars sampled. The samples taken from the conveyor buckets in every case showed extremely low results compared with any of the four other methods.

ASSOCIATION COMMITTEE MEETINGS

Several important committee meetings were held in New York this week.

The meeting of the committee in charge of the dinner arrangements of the American Electric Railway Association and the American Electric Railway Manufacturers' Association occurred on the evening of Dec. 9 at the Engineers' Club. The full membership was present. Mr. Stott, Mr. Donecker and Mr. McGraw were also in attendance. Reports were received from the three sub-committees as follows: Mr. McConnaughy, of the committee on announcement, said that a notice of the dinner had been sent to all member companies of the association, and he was instructed to send similar announcements to all individual members. The committee on speakers reported progress. Mr. Conwell, of the committee on arrangements, reported that satisfactory arrangements were being made with the Waldorf-Astoria. It was decided to send a second letter the first week in January, this letter to contain the complete program of the midyear meeting as well as the program for the dinner. Application blanks will accompany that letter.

The committee on compensation for carrying United States mail of the American Electric Railway Transportation & Traffic Association met at the headquarters of the association in New York on Dec. 11. It was decided to send to Congressman John A. Moon, chairman of the House committee on post offices and post roads, which has jurisdiction over appropriations for carrying United States mail, a letter outlining the position of the association on the matter. This letter has already been delivered to Congressman Moon at Washington. A copy of the letter will be forwarded by the association to member companies which operate a railway mail service. It will be accompanied by statements made by the Brooklyn Rapid Transit System and the Boston Elevated Railway in reference to the costs of this service to them.

The executive committee of the Traffic & Transportation Association met on the morning of Friday, Dec. 12. M. C. Brush, vice-president Boston Elevated Railway; H. A. Nicholl, general manager Union Traction Company of Indiana, and J. K. Choate, vice-president J. G. White Management Corporation, of the committee, were present. H. C. Donecker also attended the meeting to act in place of R. E. Danforth, general manager Public Service Railway, who was unable to be present. The subjects committee of the Transportation & Traffic Association met during the afternoon of Thursday, Dec. 11, and made a report to the executive committee of the association on Friday morning, presenting, through Chairman L. H. Palmer, of Harrison Williams, New York, a proposed list of subjects to be taken into consideration by the various standing committees of the Transportation & Traffic Association during the coming year. This paper went to press before the close of the meeting.

COMMISSIONER HALE ON NEW ENGLAND RAILROAD PROBLEMS

Public Utility Commissioner J. H. Hale, of Connecticut, delivered a vigorous pronouncement on behalf of the railroads of New England at a meeting of the Massachusetts State Grange at Boston this week. "I would be remiss in my duty at this time," said the commissioner, "if I failed to call your attention to the great calamity that now confronts the leading railroad interests serving this New England agricultural territory. Crushed between professional agitators, financial pirates, labor unions and threatened prosecutions by the government at Washington, these noble truck horses of ours, with greater burdens to carry than ever before, are to be separated in their work and allowed no extra feed in the way of increased freight rates to make up for the extra strain of an overload of expenses.

"Their side-line feeders, the electric railways that pass our farms and are only just beginning to serve us so cheaply and well, are to be cut off. And all for what? Who is to be benefited? Certainly not the stockholders, or the train employees, or the traveling public, or the receiver or shipper of freight. No one is to be benefited that I can discover, and all are to be injured, except possibly the vultures that pick the remains.

"Probably some of the purchases, mergers and consolidations of the past were technically wrong, too high a price paid for some of them, and those who led in this have paid, or must pay, the penalty. And yet, in spite of all this, the total result was to give all New England better and increased service at no extra cost, and I am clearly of the opinion that a complete separation of all these interests and going back to the old way, as now demanded, will mean turning back the clock of New England's prosperity twenty-five years."

The American officers of the Anglo-American Exposition, to be held in the year 1914 in London, have recently distributed a circular letter urging the hearty and interested support of the people of the United States. The object of this exposition is to celebrate the centenary of peace and progress in the arts, sciences and industries of the United States of America and the British Empire. It will aim to present with definiteness and with comprehensiveness a historic summary of what the two nations have achieved in their relations to education, to art, to science, to industry and to commerce. In the exhibits, large space will be given to the products of inventive genius and to industry, because it is in these fields that the spirit of advance offers the most tangible and visible evidence of its activity. These evidences of manufacturing enterprise will help to strengthen the present bond of commercial union between the United States and the United Kingdom, and will, in so doing, serve to insure the continuance of peace and good will between them.

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MONTREAL APPARATUS FOR TESTING CIRCUIT-BREAKERS

The apparatus shown in the accompanying half-tone illustration has been installed in the Youville shops of the Montreal Tramways to test and set circuit-breakers while in position on cars. Current is used at 600 volts because a circuit-breaker which will successfully break a heavy current at low voltage will not necessarily break it at trolley voltage. The apparatus is mounted on the wall beside the most accessible shop track, and circuit-breakers in any car on this track can be tested with a minimum of labor and without danger to the employees.

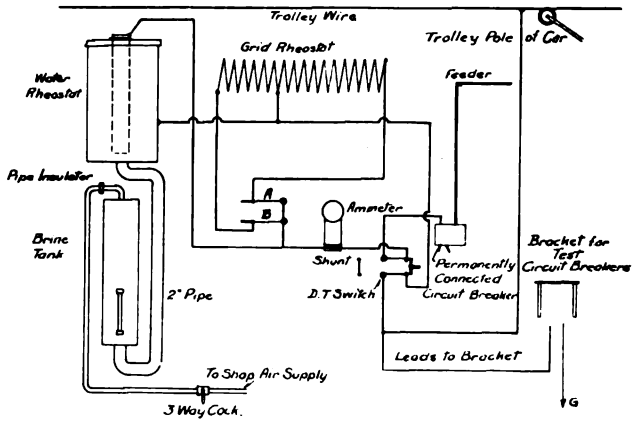
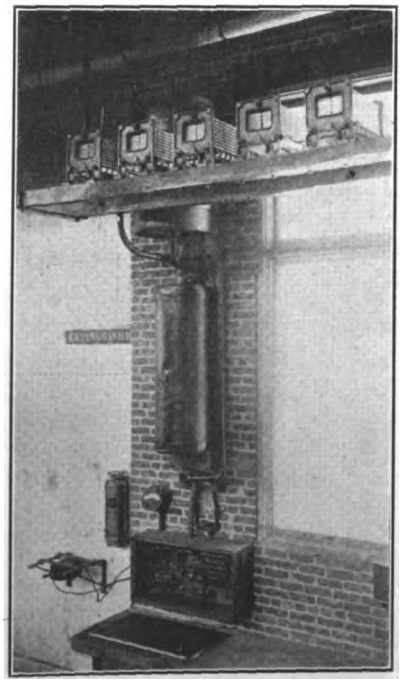


Diagram of Wiring Connections for Circuit-Breaker Testing at Montreal

All circuit-breakers which are sent to the carhouses to be there mounted in cars are first tested by means of this apparatus, as well as all circuit-breakers mounted in the cars before they leave the shops. The unmounted circuit-breakers are clamped to a bracket on the wall. This bracket is so arranged that the circuit-breakers are clamped in the same position as in the cars. This is a necessary precaution because in some types of circuit-breakers the weight of the armature is so great in comparison to the pull exerted by the calibration spring that the position of the circuit-breaker materially affects the calibration. The leads for use in connection with this bracket are shown in the accompanying diagram. The source of current is a shop feeder, and when the apparatus is not in use this feeder is connected direct to the trolley wire by means of a double-throw switch.



Apparatus in Place

Referring to the diagram, it will be seen that when the knife switches *A* and *B* are closed the current after passing through the ammeter shunt follows three parallel paths; that is to say, the two legs of the grid rheostat and the water rheostat. The capacities of the two legs of the grid rheostat are 200 and 100 amp respectively and the water rheostat will carry a maximum of 200 amp, making a total capacity of 600 amp.

The novel feature of this apparatus is the utilization of the shop supply of compressed air to pump brine into the water rheostat. The regulation of the current in this rheostat is found to give ample range of adjustment. This water rheostat is made of an old transformer oil tank in which a 6-in. iron pipe is suspended to form the positive electrode. The lower tank which contains the brine is an old air reservoir with a water gage added. The air is controlled by a three-way cock. It passes into the top of the brine tank, thus forcing the brine up into the rheostat. To empty, the air in the brine tank is exhausted to the atmosphere and the brine runs back by gravitation. The water rheostat and the brine tank are mounted on wooden supports to insulate them from the ground. The air pipe leading into the brine tank is insulated from the tank by a pipe insulation.

In testing circuit-breakers mounted in cars the current after passing through the rheostats goes to the trolley wire and from there to the circuit-breaker in the car. A jumper is placed from the trolley finger to the ground finger of the controller, thus enabling the current to flow directly to the rail. The apparatus is of simple construction and inexpensive. It has been found to give entirely satisfactory service in use.

EXPERIENCES IN OPERATION OF LOETSCHBERG AND SIMPLON TUNNELS

Two recent articles, one by Dr. Breslauer in the *Electrotechnische Zeitschrift* and one by B. Kilchenmann in *Elektrische Kraftbetriebe und Bahnen*, respectively describe electrical experiences in the Loetschberg and Simplon tunnels, the first being operated with single-phase and the second with three-phase line and motor equipment.

LOETSCHBERG SINGLE-PHASE LINE

Dr. Breslauer writes that some trouble has been reported from the excessive static charges on the 15,000-volt, fifteen-cycle contact line of the Loetschberg line owing to differences of altitude. Thus at Spiez, which is 1980 ft. high, the air is moist, while at the southern end of the tunnel, which is at an altitude of 4100 ft., the air is dry. These charges have been eliminated by the use of water-jet static discharges. On two or three occasions the end turns of the locomotive transformers broke down owing to the excess voltages from these static discharges. This trouble and a number of minor mechanical faults have now been remedied, and the regular schedule is being operated with the exception of a few night trains.

In this connection it is reported that a concession has been granted for a new line which will shorten the approach to the Loetschberg tunnel and act as a feeder from the French side. This line is to cross the Jura mountains via a tunnel nearly 5 miles long between Moutiers and Longeau. The Eastern Railway of France will be the most important connection of this line, which will greatly shorten distances from England to Berne and places beyond.

SIMPLON THREE-PHASE LINE

Mr. Kilchenmann discusses the operation of the Simplon tunnel line at 3300 volts, three-phase, sixteen cycles. In seven years' operation no trouble due to expansion and contraction from temperature variations has occurred, although automatic tension devices are not used. The heavy deposit of steam locomotive soot and dust on the insulators, however, makes it necessary to overhaul and clean them twice a year to discover faults. The horizontally placed bell-shaped insulators have been found unsuitable for tunnel work, owing to the presence of moisture. In some instances the hard-rubber insulated bolts for the attachment of the trolley wire had to be replaced every six or eight weeks because the moisture caused a surface sparking on

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the rubber, thus burning the soot and dust until the bolts broke down. Corrugated porcelain insulated bolts gave somewhat better results, but the best results are now being obtained with glass-insulated bolts. The wear on the contact wire has been only 0.012 in. to 0.016 in. after some 80,000 passes of the collector bows. In some places where lime water drops on the wire the wear is about twice as great. No abnormal wear has occurred at the points of suspension, although the wire is suspended without a catenary and with spans of from 90 ft. to 115 ft. At the south entrance of the tunnel, however, the copper wire is subject to so much oxidation that some 1¼ miles of wire had to be renewed after six years' wear. The reduction in weight was only 7 per cent, but it was considered safest to change the wire. No iron or steel was employed in the overhead equipment of the tunnel, as this would not endure two years in the presence of the soot and moisture. Experiments have shown that copper wire will stand the warm moisture only when no soot is present. This trouble will be obviated, however, when steam trains are operated through the tunnel no longer, which change will be made when the electrification is extended to Domodossola. The new section of copper wire has been coated with various kinds of paint over different sections. Icicles formed in winter on the contact wire by dropping water at the north end have also proved troublesome. This difficulty has been partially overcome by drawing the ventilating air through a 1.7-mile auxiliary tunnel to warm it before it enters the main tunnel, but in the construction of the second main tunnel hereinafter noted an attempt will be made to eliminate the dropping water. The metal paste rail bonds have not proved satisfactory, a test showing that more than 60 per cent of the traction current was returning through the earth. The copper bonds which are now being substituted have increased the rail conductance by 50 per cent.

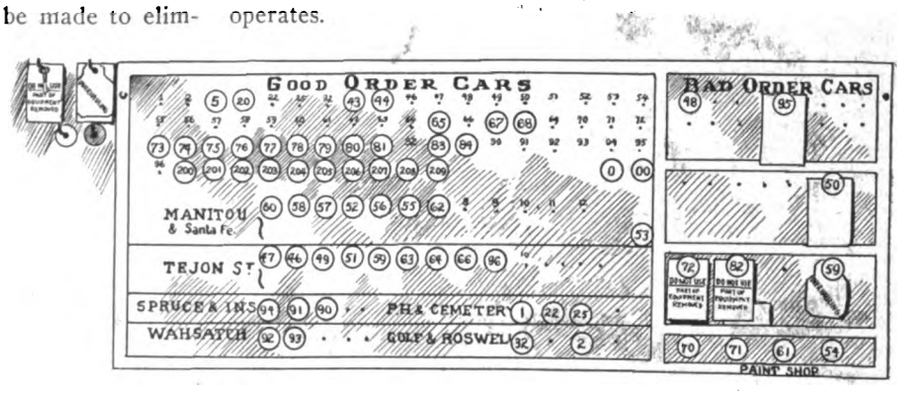
The locomotive equipment has given no trouble in spite of the severe conditions. On account of the rapid changes of temperature and the consequent condensation effects, short-circuits were experienced in the switching apparatus, and had the pressure been much more than 3300 volts these would have been most serious. These difficulties have been partly overcome by painting all live parts except contact surfaces with an insulating varnish. Oil-immersed switches would be employed if there were space on the locomotives. The motors of one locomotive were not overhauled until after some eighteen months, or about 37,000 miles service, but overhauls are now made every nine or ten months, and a complete repair of the locomotive is made every three years. If the contact wire has a double zigzag on either side of the center line alternately, instead of a simple zigzag across the center line, the life of the bows has been increased from 1500 miles to 4500 miles. The use of longer and better-placed locomotive springs is recommended because in the present construction heavy vertical oscillations occur as soon as the journals show the slightest wear. The monthly runs of the four locomotives have averaged 4600 miles, which is good considering the severe conditions. The energy consumption has been 53 watt-hours to 56 watt-hours per ton mile inclusive of the locomotive weight. This high figure is accounted for by the air resistance in the tunnel. When the locomotive is running against the ventilation current the traction resistance, excluding the effect of the grade, amounts to 24.7 lb. per ton at 43.5 m.p.h.

A new line is being built between Frasne, France, and Vallorbe, Switzerland, including a 4-mile tunnel to shorten the approach to the Simplon tunnel by 12 miles. The federal government has also undertaken the completion of the second single-track Simplon tunnel, which hitherto has been used only as an airshaft, and for the drainage of water from the first tunnel during construction.

REPAIR SHOP BOARD IN COLORADO SPRINGS

An ingenious form of board for recording the cars available for use and those in bad condition on an electric railway is used at the entrance to the main carhouse of the Colorado Springs Rapid Transit Company. Although somewhat similar boards are used elsewhere, the plan has proved so convenient on this line that a short account of it may be of interest.

The board, as shown in the accompanying engraving, is divided into various sections, is painted black and contains a number of horizontal rows of holes. Into these holes are inserted plugs, each representing a car and having the number of the car painted on the head of the plug. In the holes in the large section at the left of the board are placed the plugs representing the cars in good order, and in the four upper rows of this section are the plugs for the cars in the carhouse. The lower rows of holes in this section are marked with the names of the different lines operated by the company. When all cars are in the carhouse all of the good-order car plugs are in the four upper rows of holes. When a car is sent out on any line the plug representing this car is taken from the upper rows and is inserted in the row representing the line on which the car operates.



Board for Recording Cars Available for Use in Colorado Springs

The holes for those cars on the street are in double rows so that if a car hauls a trailer the plug for the trailer is inserted directly under the plug for the motor car. The trailer car numbers are 200 or above so that they may easily be identified.

The section of the board at the right represents the "bad-order" cars. This section is divided horizontally into four panels. The two upper panels represent the cars which are simply in bad order but have not been dismantled. The third panel represents the cars from which a portion of the equipment has been moved, and the fourth or lowest panel is for the plugs of the cars which are in the paint shop.

A system of washers or tags is used with the bad-order cars to indicate the trouble with the cars. A white tin washer under the bad-order car plug indicates that while the car needs some slight repair it could be used temporarily in case of emergency. A yellow washer under a plug means a more serious defect and that the car should not be used for temporary service without a careful inspection. In addition to the washers, the company also uses two kinds of tags which can be put under the plugs. Some of these tags are of tin and others are of cardboard. The tin tags are lettered in paint with wording similar to the following: "For inspection—Use if necessary"; "Do not use—Part of equipment removed"; "Overhauling." The cardboard tags are blank and are filled out by the motorman to indicate

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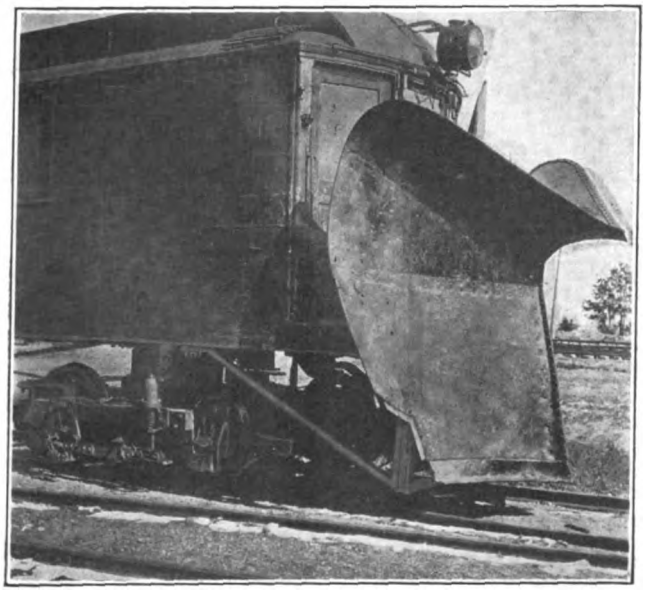
the defect in the car. These tags are hung ready for use on hooks at the side of the board and are plugged in under the car plug when necessary, as shown in the right-hand section of the board. The cardboard tags are numbered and remain with the plug until they are "O. K.'d" by the foreman to indicate that the repair has been made. An exception is made in the case of repairs to air brakes and equipments as the air brakes have to be tested by the motorman before he leaves the carhouse, so these tags must also be "O. K.'d" by the motorman before the car is taken out of the carhouse.

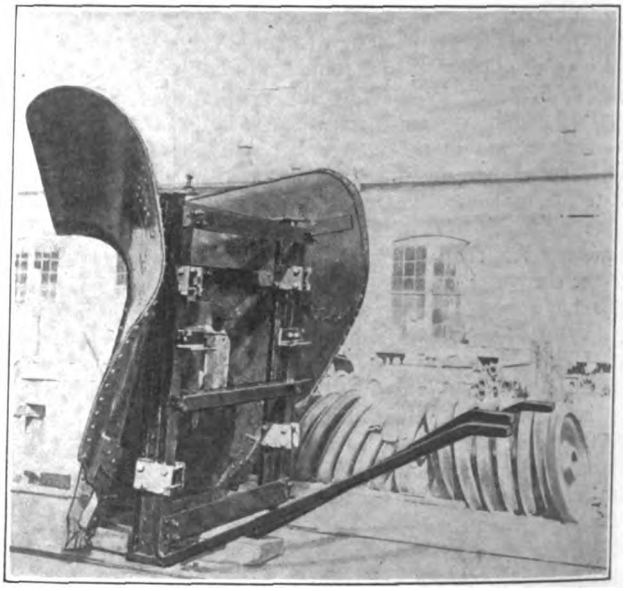
MICHIGAN UNITED TRACTION COMPANY'S SELF-CONTAINED SNOW PLOW.

The mechanical department of the Michigan United Traction Company recently designed and built an ingenious type of snow plow which is permanently applied to all the express cars during the winter months. The framework and mechanism is completely self-contained and may be detached by removing eight bolts.

The plow is 10 ft. wide by 9 ft. 6 in. in height and built



Self-Contained Snow Plow—View Showing Plow in Place on Car



Self-Contained Snow Plow—Rear View Showing Air Cylinder and Guides for Raising Plow on Frame

of 3/16-in. steel plate. It is supported on the bumper beam of the car by two angle lugs bolted to two 2-in. x 4-in. steel bar uprights which compose the supporting frame of the plow. These uprights are bent at the base and extend backward and upward to the bottom framing of the car, taking the thrust from the plow when it is bucking snow. The plow proper is reinforced at the bottom by 6-in. x 3-in. x 5/8-in. angles and the edges are reinforced by a 3/16-in. x 2-in. strap riveted to them. The bottom cross brace is a 2-in. x 4-in. steel bar and the rest of the cross braces in the supporting frame are 1-in. x 1/4-in. steel.

In order to provide for raising and lowering the plow the cross braces are permanently attached to two sections of rail extending the full height of the plow. These two sections of rail are attached to the supporting frame by two sets of guide bearings and this arrangement permits the plow to be raised and lowered within a range of 12 in. A 10-in. x 12-in. standard brake cylinder connected to the car reservoir by way of a three-way valve located in the motorman's cab permits him to raise and lower the plow from his normal position in the car. The plow nose is provided with adjustable stops which regulate the height above the rail. It is also provided with resting stops on which the plow may be supported when it is not in service. The removal of the latter throws the load on the brake cylinder, which is used only for raising the nose. The device is an invention of R. C. Taylor, superintendent of equipment Michigan United Traction Company.

PROGRESS OF LONDON & SOUTHWESTERN RAILWAY SUBURBAN ELECTRIFICATION

Late in October the London & Southwestern Railway began the electrification of its London suburban lines in accordance with the plans and map published on page 799 of the Electric Railway Journal for May 3, 1913, in the article entitled "Electrification of British Railways." H. A. Walker, general manager of the company, announces that the work on the power house at Wimbledon was begun on July 21. The building will be 260 ft. long and 210 ft. wide and will contain twenty-four boilers, each capable of a normal evaporation of 20,000 lb. of water per hour and of supplying steam at a pressure of 200 lb. per square inch and with 200 deg. Fahr. superheat. Coal from the overhead bunkers will descend through chutes into electrically driven mechanical stokers. The condensers will be of the surface type. Economizers will be installed in the main flues. The turbine room will contain six 5000-kw, 11,000-volt, three-phase alternators, running at 1500 r.p.m. Two 400-kw d.c. auxiliary turbines of geared type will be used for power house lighting and auxiliary motors. The high-tension current will be transmitted to nine substations by the use of three-core, paper-insulated, lead-sheathed and wire-armored cables. In most cases they will be carried on poles beside the line and will also be arranged to afford a duplicate supply to every substation. The number and size of the converters to be installed follow: Waterloo, four; Clapham Junction, three; Raynes Park, two; Barnes, two, and Twickenham, three—all of 1874 kw. Hampton Court Junction, two; Kingston, two; Sunbury, two, and Isleworth, two, all of 1250 kw.

Eighty-four train units are being provided for the first section of the electrified lines. Each unit will consist of three compartment type coaches of 190 seating capacity, the forward truck of the first car and the rear truck of the last car carrying two 275-hp motors, the largest size yet placed under passenger cars. The carhouses and repair shops will be built at Wimbledon adjacent to the power house. It is hoped to commence electric operation on the Kingston Roundabout line before the end of 1914.

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Committees for 1914

The Appointment Is Announced of a Number of the Committees of the American Electric Railway Association and of the Affiliated Organizations

The secretary of the American Electric Railway Association made public this week a partial list of the committees which have been appointed by the presidents of the several associations. Other committees as they are appointed will be announced. Those made public this week are:

AMERICAN ASSOCIATION

COMMITTEE ON SUBJECTS

James D. Mortimer, chairman, Milwaukee Electric Railway & Light Company.

Calvert Townley, Lackawanna & Wyoming Valley Rapid Transit Company.

E. C. Foster, Manchester Traction, Light & Power Company.

S. G. McMeen, Columbus Railway & Light Company.

W. F. Web, The Cleveland Railway.

M. W. Glover, Mobile Light & Railroad Company.

J. H. Hanna, Capital Traction Company, Washington, D. C.

D. A. Hegarty, railway and electric departments, New Orleans Railway & Light Company.

COMMITTEE ON INSURANCE

H. J. Davies, chairman, Cleveland Railway.

E. J. Cook, New York State Railways, Rochester, N. Y.

F. A. Healy, Ohio Electric Railway.

Richard McCulloch, United Railways Company of St. Louis.

A. H. Ford, Birmingham Railway, Light & Power Company.

COMMITTEE ON EDUCATION

Prof. H. H. Norris, chairman, ELECTRIC RAILWAY JOURNAL, Ithaca, N. Y.

H. A. Bullock, Brooklyn Rapid Transit System.

Prof. D. C. Jackson, Massachusetts Institute of Technology.

Martin Schreiber, Public Service Railway.

Prof. A. M. Buck, University of Illinois.

COMMITTEE ON FEDERAL RELATIONS

Arthur W. Brady, chairman, Union Traction Company of Indiana.

Gen. George H. Harries, Louisville Gas Company.

Frank R. Ford, Ford, Bacon & Davis, New York.

H. S. Lyons, Boston Elevated Railway.

F. W. Brooks, Detroit United Railway.

L. S. Cass, Waterloo, Cedar Falls & Northern Railway.

L. S. Storrs, Connecticut Company.

J. N. Shannahan, Newport News & Old Point Railway & Electric Company.

COMMITTEE ON COMPENSATION FOR CARRYING UNITED STATES MAIL

M. C. Brush, chairman, Boston Elevated Railway.

H. A. Nicholl, Union Traction Company of Indiana.

Capt. A. R. Piper, Brooklyn Rapid Transit System.

J. K. Choate, J. G. White Management Corporation.

COMMITTEE ON TAXATION MATTERS

C. L. S. Tingley, chairman, American Railways.

Alabama.—J. H. Wilson, Mobile Light & Railroad Company.

Arizona.—F. E. Russell, Tucson Rapid Transit Company.

Arkansas.—C. J. Griffith, Little Rock Railway & Electric Company.

California.—Paul Shoup, Pacific Electric Railway.

Colorado.—John A. Beeler, Denver City Tramway.

Connecticut.—L. S. Storrs, Connecticut Company.

Delaware.—T. W. Wilson, Wilmington & Philadelphia Traction Company.

District of Columbia.—W. F. Ham, Washington Railway & Electric Company.

Florida.—Hardy Croom, Jacksonville Traction Company.

Georgia.—P. S. Arkwright, Georgia Railway & Power Company.

Illinois.—L. C. Haynes, East St. Louis & Suburban Railway.

Indiana.—R. I. Todd, Indianapolis Traction & Terminal Company.

Iowa.—P. P. Crafts, Iowa & Illinois Railway.

Kansas.—R. M. Patten, Topeka Railway.

Kentucky.—F. W. Bacon, Kentucky Traction & Terminal Company.

Louisiana.—D. A. Hegarty, New Orleans Railway & Light Company.

Maine.—Howard Corning, Bangor Railway & Electric Company.

Maryland.—William A. House, United Railways & Electric Company.

Massachusetts.—H. S. Lyons, Boston Elevated Railway.

Michigan.—F. W. Brooks, Detroit United Railway.

Minnesota.—A. M. Robertson, Twin City Rapid Transit Company.

Mississippi.—A. B. Paterson, Meridian Light & Railway Company.

Missouri.—A. H. Rogers, Southwest Missouri Railroad.

Nebraska.—W. A. Smith, Omaha & Council Bluffs Street Railway.

New Hampshire.—E. C. Foster, Manchester Traction, Light & Power Company.

New Jersey.—George H. Barker, Public Service Railway.

New York.—B. E. Tilton, New York State Railways, Utica.

North Carolina.—H. W. Plummer, Asheville Power & Light Company.

North Dakota.—C. P. Brown, Fargo & Moorhead Street Railway.

Ohio.—S. G. McMeen, Columbus Railway & Light Company.

Oklahoma.—George W. Knox, Oklahoma Railway.

Oregon.—C. N. Huggins, Portland Railway, Light & Power Company.

Pennsylvania.—C. L. S. Tingley, American Railways.

Rhode Island.—D. F. Sherman, Rhode Island Company.

South Carolina.—F. H. Knox, South Carolina Light, Power & Railways Company.

South Dakota.—F. M. Mills, Sioux Falls Traction System.

Tennessee.—Percy Warner, Nashville Railway & Light Company.

Texas.—W. J. Jones, Austin Street Railway.

Utah.—Simon Bamberger, Salt Lake & Ogden Railway.

Virginia.—A. B. Guigon, Virginia Railway & Power Company.

Vermont.—I. L. Meloon, Twin State Gas & Electric Company.

Washington.—Guy W. Talbot, Walla Walla Valley Railway.

West Virginia.—H. H. Archer, Parkersburg, Marietta & Interurban Railway.

Wisconsin.—George B. Wheeler, Chippewa Valley Railway, Light & Power Company.

Canada: British Columbia.—George Kidd, British Columbia Electric Railway.

Manitoba.—Wilford Phillips, Winnipeg Electric Railway.

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Nova Scotia.—J. W. Crosby, Halifax Electric Tramway.
Ontario.—J. D. Fraser, Ottawa Electric Railway.
Quebec.—Patrick Dubee, Montreal Tramways.

COMMITTEE ON PUBLIC RELATIONS

Thomas N. McCarter, chairman, Public Service Railway.
Arthur W. Brady, Union Traction Company of Indiana.
C. Loomis Allen, Newport News & Old Point Railway & Electric Company.
T. S. Williams, Brooklyn Rapid Transit System.
James D. Mortimer, Milwaukee Electric Railway & Light Company.
W. E. Dunn, Los Angeles Railway.
James H. McGraw, McGraw Publishing Company.
Guy E. Tripp, Westinghouse Electric & Manufacturing Company.
S. M. Curwen, J. G. Brill Company.
E. W. Rice, General Electric Company.
Col. H. P. Bope, Carnegie Steel Company.
Allan B. Forbes, Harris, Forbes & Company.
F. R. Ford, Ford, Bacon & Davis.
J. H. Pardee, J. G. White Management Corporation.
C. A. Stone, Stone & Webster.
Randal Morgan, United Gas Improvement Company.
William A. House, United Railways & Electric Company.

COMMITTEE ON THE COST OF PASSENGER TRANSPORTATION SERVICE

James D. Mortimer, chairman, Milwaukee Electric Railway & Light Company.
Thomas N. McCarter, Public Service Railway.
Patrick Calhoun, New York.
Paul Shoup, Pacific Electric Railway.
Henry G. Bradlee, Stone & Webster Management Association.
F. W. Hild, Portland Railway, Light & Power Company.

COMMITTEE TO CONSIDER RELATIONS WITH SECTIONAL ASSOCIATIONS

C. L. Henry, chairman, Indianapolis & Cincinnati Traction Company.
R. P. Stevens, Mahoning & Shenango Railway & Light Company.
C. C. Peirce, Providence & Fall River Street Railway.
F. W. Hild, Portland Railway, Light & Power Company.
E. S. Wilde, Union Street Railway, New Bedford, Mass.
S. K. Colby, Allen & Peck, Inc.

"AERA" ADVISORY COMMITTEE

C. Loomis Allen, chairman, Newport News & Old Point Railway & Electric Company.
H. C. Donecker, Public Service Railway.
J. C. Collins, New York State Railways.
H. H. Adams, Chicago Railways.
H. E. Reynolds, Bay State Street Railway.
C. C. Rice, Pittsburgh Railways.
H. A. Bullock, New York Municipal Railway.
Cornell S. Hawley, Laconia Car Company.

COMMITTEE ON COMPANY MEMBERSHIP

Frank Hedley, chairman, Interborough Rapid Transit Company.
W. R. Alberger, San Francisco-Oakland Terminal Railways.
J. E. Gibson, Kansas City Railway & Light Company.
A. H. Ford, Birmingham Railway, Light & Power Company.
E. C. Deal, Augusta-Aiken Railway & Electric Corporation.
T. F. Grover, Terre Haute, Indianapolis & Eastern Traction Company.
L. C. Bradley, Stone & Webster Properties, Texas District.

COMMITTEE ON COMPANY SECTIONS AND INDIVIDUAL MEMBERSHIP

L. S. Storrs, chairman, Connecticut Company.
Martin Schreiber, Public Service Railway.
George G. Whitney, Washington Railway & Electric Company.
W. F. Weh, Cleveland Railway.
E. J. Cook, New York State Railways, Rochester.
J. N. Shannahan, Newport News & Old Point Railway & Electric Company.
W. L. Conwell, Transportation Utilities Company.
W. H. Glenn, Georgia Railway & Power Company.
David Daly, Houston Electric Company.
A. D. B. Van Zandt, Detroit United Railway.

SPECIAL COMMITTEE ON JOINT USE OF POLES

W. J. Harvie, chairman, Hagerstown & Frederick Railway.
Albert S. Richey, Worcester Polytechnic Institute.
Charles L. Henry, Indianapolis & Cincinnati Traction Company.
W. S. Twining, with Ford, Bacon & Davis.
E. G. Allen, Stone & Webster Management Corporation.
(The foregoing represent the American Electric Railway Association.)
Farley Osgood, Public Service Electric Company, Newark, N. J. (Representing American Institute of Electrical Engineers and National Electric Light Association.)
Percy H. Thomas, New York. (Representing American Institute of Electrical Engineers.)
F. B. H. Paine, New York. (Representing American Institute of Electrical Engineers.)
W. T. Oviatt, Narragansett Lighting Company. (Representing the National Electric Light Association.)
F. H. Bethell, New York Telephone Company (Representing the American Telephone & Telegraph Company to confer with committee.)

COMMITTEE TO CONSIDER THE MATTER OF ELECTROLYSIS

Calvert Townley, chairman, Lackawanna & Wyoming Valley Rapid Transit Company.
Frank Hedley, Interborough Rapid Transit Company.
R. P. Stevens, Mahoning & Shenango Railway & Light Company.

COMMITTEE ON ORGANIZATION OF THE INTERNATIONAL ELECTRICAL CONGRESS, SAN FRANCISCO, 1915, ACTING WITH AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS

Frank R. Ford, Ford, Bacon & Davis.
Henry G. Stott, Interborough Rapid Transit Company.
Henry W. Blake, ELECTRIC RAILWAY JOURNAL.
Edwin B. Katté, New York Central & Hudson River Railroad.

CHANGES IN CONSTITUTION AND BY-LAWS

C. L. Henry, chairman, Indianapolis & Cincinnati Traction Company.
W. O. Wood, New York & Queens County Railway.
H. C. Donecker, Public Service Railway.

COMMITTEE ON AWARD OF GOLD MEDAL FOR BEST PAPER READ BEFORE A COMPANY SECTION

E. C. Foster, chairman, Manchester Traction, Light & Power Company.
R. P. Stevens, Mahoning & Shenango Railway & Light Company.
Horace Lowry, Twin City Rapid Transit Company.

ENGINEERING ASSOCIATION

COMMITTEE ON WAY MATTERS

C. S. Kimball, chairman, Washington Railway & Electric Company.
H. F. Merker, East St. Louis & Suburban Railway.
E. H. Berry, Cincinnati Traction Company.
C. H. Clark, Cleveland Railway.
E. P. Roundey, New York State Railways, Syracuse.
W. F. Graves, Montreal Tramways.

SUB-COMMITTEE ON SPECIFICATIONS FOR COPPER TROLLEY WIRE, ACTING WITH THE AMERICAN SOCIETY FOR TESTING MATERIALS

A. S. Richey, Worcester Polytechnic Institute.

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Charles Rufus Harte, Connecticut Company.
C. F. Woods, with A. D. Little & Co.

COMMITTEE ON POWER GENERATION

B. F. Wood, Pennsylvania Railroad.
W. H. Sawyer, with Ford, Bacon & Davis.
L. E. Sinclair, Washington Railway & Electric Company.

COMMITTEE ON EQUIPMENT

F. R. Phillips, chairman, Pittsburgh Railway.
W. G. Gove, vice-chairman, Brooklyn Rapid Transit System.
L. M. Clark, Indianapolis Traction & Terminal Company.
J. P. Barnes, Syracuse & Suburban Railroad.
W. R. McRae, Toronto Railway.
R. N. Hemming, Union Traction Company of Indiana.

COMMITTEE ON POWER DISTRIBUTION

G. W. Palmer, Jr., chairman, Bay State Street Railway.
A. S. Richey, vice-chairman, Worcester Polytechnic Institute.
Gaylord Thompson, New Jersey & Pennsylvania Traction Company.
Charles Rufus Harte, Connecticut Company.
Ralph H. Rice, Board of Supervising Engineers, Chicago, Ill.
C. L. Cadle, New York State Railways, Rochester.
F. B. H. Paine, New York.
A. A. Thurlby, Chicago City Railway.
J. H. Barnard, with J. G. White & Company, Inc.

COMMITTEE ON SUBJECTS

John Lindall, chairman, Boston Elevated Railway Company, Boston, Mass.
B. F. Wood, Pennsylvania Railroad.
Norman Litchfield, Interborough Rapid Transit Company.

CLAIMS ASSOCIATION

COMMITTEE ON SUBJECTS

L. S. Hoffman, chairman, Public Service Railway.
M. P. Spillane, Boston Elevated Railway.
J. H. Handlon, United Railroads of San Francisco.
Wallace Muir, Kentucky Traction & Terminal Company. Lexington, Ky.

COMMITTEE ON WAYS AND MEANS

J. S. Kubu, chairman, New York State Railways, Utica.
F. B. Dixon, Jr., Jackson Light & Traction Company.
J. S. Harrison, Jacksonville Traction Company.

COMMITTEE ON EMPLOYMENT

B. B. Davis, chairman, Columbus Railway & Light Company.
A. D. Brown, New York State Railways, Syracuse.
C. J. McAleer, Schenectady Railway.

TRANSPORTATION & TRAFFIC ASSOCIATION

CONSOLIDATED COMMITTEE ON RULES

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W. R. W. Griffin, vice-chairman, Tri-State Railway & Electric Company.
W. H. Glenn, Georgia Railway & Power Company.
Edward Dana, Boston Elevated Railway.
W. H. Collins, Fonda, Johnstown & Gloversville Railroad.
F. W. Coen, Lake Shore Electric Railway.
C. P. Wilson, Indianapolis, Columbus & Southern Traction Company.

COMMITTEE ON PASSENGER TRAFFIC

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E. E. Soules, Illinois Traction System.
S. W. Greenland, Fort Wayne & Northern Indiana Traction Company.
C. R. Gowen, New York State Railways, Utica.
E. R. Kelsey, Toledo Railways & Light Company.
J. A. Stoll, United Railway & Electric Light Company, Baltimore, Md.

COMMITTEE ON EXPRESS AND FREIGHT TRAFFIC

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G. W. Quackenbush, Illinois Traction System.
C. T. Battey, Union Street Railway, New Bedford, Mass.
George H. Harris, Birmingham Railway, Light & Power Company, Birmingham, Ala.
F. W. Watts, New York State Railways, Utica.
T. C. Cherry, Maryland Electric Railways.

COMMITTEE ON CONSTRUCTION OF SCHEDULES AND TIME-TABLES

J. J. Dempsey, chairman, Brooklyn Rapid Transit System.
Alex. Jackson, Public Service Railway.
J. P. Barnes, Syracuse & Suburban Railroad.
J. W. Howden, Toronto Railway.
Harry Bullen, Detroit United Railway.
W. C. Pearce, Chicago Railways.

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E. E. Strong, New York State Railways, Rochester.
R. L. Rand, Anniston Electric & Gas Company.
Cyrus Ching, Boston Elevated Railway.
L. D. Mathes, Norfolk Southern Railroad.
C. M. Paxton, American Railways.

COMMITTEE TO DEVELOP UNIFORM DEFINITIONS

M. C. Brush, chairman, Boston Elevated Railway.
W. C. Callaghan, New York State Railways, Rochester.
A. Benham, Ohio Electric Railway.
W. M. Weatherwax, Chicago City Railway.
T. C. Cherry, Maryland Electric Railways.
L. C. Bradley, Stone & Webster Companies, Texas District.
Frederick Nicholas, ELECTRIC RAILWAY JOURNAL.

COMMITTEE ON SUBJECTS

L. H. Palmer, chairman, Harrison Williams, New York.
C. E. Learned, Boston Elevated Railway.
C. D. Emmons, Chicago, South Bend & Northern Indiana Traction Company.
H. W. Clapp, Columbus Railway & Light Company.

ACCOUNTANTS' ASSOCIATION JOINT COMMITTEE

The new committees of the American Electric Railway Accountants' Association were published on page 1196 of the issue for last week. In that list the members representing the Accountants' Association on the two joint committees with the Engineering Association and the joint committee with the Transportation & Traffic Association were new members, but the names representing the other associations were those of the members of last year's committees. The members of this year's joint committees of the Engineering and Transportation & Traffic Associations have not yet been announced.

In discussing fire hazards in turbo-alternators at the recent meeting of the American Society of Mechanical Engineers B. F. Lamme reported experiments in which attempts were made to delay combustion by the use of asbestos coverings, but he declared that where the arc was sufficient to gasify the insulation the fire was found to spread about as rapidly with as without the non-burning cover. Asbestos tape, in fact, he said, is now believed to introduce a positive element of danger. He questioned the value of automatic devices to cut off the supply of cooling air, as an interruption would cause a large generator to overheat, possibly, with dangerous results.

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POWER PLANT DEVELOPMENT IN MINNEAPOLIS

The evolution of the steam-power plant of the Twin City Rapid Transit Company in Minneapolis is a good example of the rapid changes which have been taking place generally in the methods of power production. Originally this plant contained triple-expansion Corliss engines, representing the best practice of twenty years ago, and these were connected through jack-shafts to 150-hp generators, large for the time. This equipment produced electrical energy at high cost for fuel, because the nature of the load did not permit the engine to be used under good operating conditions, and for maintenance, on account of the complicated character of the machinery. Ten years ago a modern steam plant was projected. The firm of Sargent & Lundy designed it to contain ultimately five vertical, cross-compound Allis-Chalmers engines of 5000-hp capacity, direct-connected to three-phase, 13,200-volt, thirty-five cycle generators conservatively rated at 3500-kw capacity, or at, say, 4000 kw on the now standard temperature rise. Three of these engines were installed by 1905, giving the plant an actual capacity of 12,000 kw.

The engines were supplied from a boiler room containing eighteen Babcock & Wilcox boilers with 5560 sq. ft. of heating surface each, giving a nominal rating of 556 hp. These were equipped with Roney stokers of a continuous capacity of 825 boiler-hp to produce a 50 per cent overload output of the boilers. The boilers contained superheaters of a capacity to produce 120 deg. superheat at rated load. Draft was furnished by two Custodis radial-brick stacks, 162 ft. high, mounted on masonry 63 ft. above the boiler-room floor. The flue diameter was 16 ft. Two flues, each of 125 sq. ft. cross-section, connected the boiler up-takes with each stack.

Following the original plan, a fourth engine and eight more boilers were added in April, 1906. By this time, however, the steam turbine had been pronounced a success in Chicago and elsewhere, and instead of the fifth engine two 5000-kw Curtis vertical turbines were installed respectively in February and July, 1907, in the place provided for it. The fact that this space accommodated in turbines three times its capacity for engines is significant. No increase in boiler capacity was made at the time. Complete detailed accounts of the plant as it existed in its earlier years are given in a paper presented by the mechanical and electrical engineer of the company, E. H. Scofield, before the Minnesota branch of the A. I. E. E. in December, 1906, and in one printed in the issue of the Street Railway Journal for July 27, 1907. The plant was typical of the best practice of the time.

Hardly had the new turbines been installed when it was found possible to secure larger and more economical ones and the process of replacing the engine units began. In the meantime experiments had been made with chain-grate stokers, and in January, 1909, two, in July four more, and during the fall six more, were installed. By this time the stack capacity was greatly overtaxed and one of the brick stacks was replaced, in November, 1910, by two brick-lined steel stacks mounted on structural-steel frames over the boilers. These were 265 ft. high above the boiler room floor, with internal diameters of 14 ft. A 4000-kw vertical Curtis turbine unit was put into service in February, 1911, and in July six more chain grates were installed. Two more boilers, of 5000 sq. ft. heating surface, were added in the space formerly occupied by masonry stack foundations, and the remaining furnaces were equipped with chain grates. Again the stacks were overtaxed, and the second brick one was replaced with two steel ones in August, 1912. During the following month a 15,000-kw turbine set displaced the second engine. More steam being required, two more boilers were added in January, 1913, in the space created by the second brick stack. The installation of a third large turbine, also of 15,000-kw capacity, has just been completed and but one engine of the original four now remains.

COMMUNICATION

PREDETERMINATION OF TRAIN ENERGY

New York, Dec. 8, 1913.

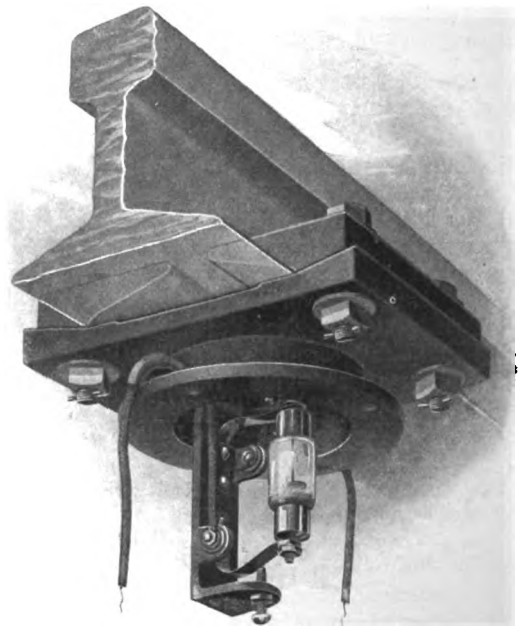
To the Editors:

Our article on the "Approximate Predetermination of Train Energy" in the Nov. 15 issue of the Electric Railway Journal has elicited the question as to whether consideration was given therein to the inertia of rotating parts, such as motor armatures, car wheels, etc. The answer is in the affirmative, an acceleration constant of 100 instead of the theoretical 91.2 having been used in both of the formulas for kinetic energy. This allows about 9.5 per cent for additional inertia due to rotating parts.

W. A. Del Mar and D. C. Woodbury.

NEW TRACK CONTACT FOR ANNUNCIATORS AND INDICATORS

The accompanying illustration shows a new type of mercury contact which is operated by vibration of the rail to which it is attached. It consists of a mercury cup placed between springs and so connected that while it vibrates the mercury is thrown against a platinum wire forming an



Mercury Contact in Place Under Rail but with Casing Removed

electrical circuit. The mercury is held under vacuum so that a uniform and permanent low resistance of the contact can be secured. The entire device is incased in a water-tight jacket and the weight is approximately 20 lb., its installation being the work of but a few minutes, as two adjustable clamps held by four bolts with lock nuts permit the contact to be clamped to the underside of the rail where it is held out of harm's way.

It is stated that there are a number of practical uses to which this contact may be put and that in some cases it may supersede track circuits, as it may be more economically installed. Crossing bells and tower indicators can be so connected as to eliminate the cutting of track circuits, thus effecting a more simple method of handling such signals under these conditions. The L. S. Brach Supply Company, New York, is the manufacturer.

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News of Electric Railways

Formal Hearings on Kansas City Franchise

The committee of the Council of Kansas City, Mo., which is considering the Metropolitan Street Railway franchise has begun to hold formal sessions with a view to getting the ordinance to the Council as early as possible. While the public is not barred from these meetings, it is not believed that anything of importance will be offered in the way of suggestions. Four weeks of public hearings have failed to develop any criticism of the general provisions of the grant. The committee during that time ran advertisements in the newspapers daily asking for advice or suggestions from all quarters. Three extensions of the lines seem likely. The plea of the union supporters for recognition probably will be ignored. The committee expressed the belief that it had no authority to provide for a feature of this kind. A clause, however, will be added, providing for the arbitration of disputes that may arise between the company and its men.

Negotiations for the resumption of traffic on the Intercity viaduct, connecting Kansas City, Mo., with Kansas City, Kan., are to be reopened. This announcement followed the decision to reconstruct the Central Avenue bridge, which is now bearing the street car traffic between the two cities. L. Shaffer will represent the viaduct company in negotiations with the Metropolitan Street Railway. The latter formerly paid an annual rental of $60,000 for the use of the viaduct. The receivership terminated the contract which existed between the two companies.

Subway Construction Contracts in New York

The Public Service Commission for the First District of New York awarded three contracts during the week ended Dec. 6, 1913, for as many different sections of the work on the new subway system, aggregating $4,289,621. These sections were as follows:

Section No. 1-A of Routes Nos. 19 and 22, the Southern Boulevard branch of the Lexington Avenue subway, extending from 147th Street under Southern Boulevard to Whitlock Avenue. The road in this section will be a three-track underground railroad. The contract went to the lowest bidder, Rodgers & Hagerty, for $2,253,159.

Section No. 1 of Route No. 16, the Jerome Avenue branch of the Lexington Avenue subway, extending from 157th Street and River Avenue through River and Jerome Avenues to about 182d Street. The road here will be a three-track elevated railroad. The contract went to the Oscar Daniels Company, the lowest bidder, for $1,077,078.

Section No. 2 of Route No. 18, the White Plains Road extension of the existing subway, extending from Burke Avenue through White Plains Road to East 241st Street. The road here will be a three-track elevated railroad. The contract went to Alfred P. Roth, the lowest bidder, for $958,484.

The commission has opened bids for the construction of Section No. 2 of Routes Nos. 4 and 38, the Seventh Avenue extension of the existing subway. This section lies under Greenwich Street, West Broadway and Varick Street, between Vesey Street and Beach Street, including a two-track branch turning from West Broadway into Park Place. The road here will be a four-track underground railroad. The commission first opened bids for this section on Oct. 1, but rejected all bids and readvertised. The Degnon Contracting Company was the lowest bidder on the second letting, at $3,059,522. Plans for Section No. 6 of Routes Nos. 4 and 38, the Seventh Avenue subway, were approved and the commission has called for bids, to be opened Dec. 29. This section lies in Seventh Avenue between Thirtieth and Forty-third Streets and will include the express stations at Thirty-fourth Street (Pennsylvania Terminal) and at Forty-second Street (Times Square).

The Interborough Rapid Transit Company has notified the Public Service Commission for the First District that it declines to acquiesce in the addition to the dual system of the proposed extension of the Corona rapid transit line in Queens to Flushing, and to operate it as a component part of the main railroad under the dual system contracts. The Corona line, as provided for in the dual system agreement, ends at Sycamore Avenue, Corona. Since the agreements were signed the commission has decided to extend it to Main Street, Flushing. It is, therefore, the first extension of the dual system authorized. Special terms for the operation of such extensions are provided in the dual system agreements, and the operating company has the option of accepting them and operating them on the terms governing the main system or of declining to accept them and operating them under special terms, which make the city responsible for any possible deficit caused by their operation. The Interborough Company in this case chooses the second alternative, and asserts its willingness to operate the Flushing extension under these special terms.

Petition for Compulsory Extensions Refused

The Public Service Commission of the State of Washington has dismissed the application of the city of Seattle for an order to require the Puget Sound Traction, Light & Power Company to accept franchises not applied for or to require it to extend existing lines on streets where it has no franchises.

In its opinion the commission said: "The law is not different from what it was on Aug. 31, 1912, when the former opinion was rendered. Your commission has no more power now than it had then. We are therefore under the necessity of advising you that we adhere to our former opinion and that you have no jurisdiction to compel the extension of street car lines along streets over which the company has no franchise."

The commission, in its findings, states that the complaint is dismissed on the question of jurisdiction, "so that the parties, if they be so advised, may test the jurisdictional question in the courts without having it confused with other matters. If it shall be determined by judicial decree that our action herein is erroneous, we understand the law to be that it is the duty of the court to send the case back to the commission with directions to pass upon the merits of the case as disclosed by the evidence. The hope is expressed that our action herein will be reviewed and this important question of jurisdiction finally determined."

New Akron Franchise Opposed

Opposition on the part of members of the City Council of Akron, Ohio, has developed to the new franchise ordinance for the Northern Ohio Traction Company in Akron, Ohio, the provisions of which were worked out by members of a committee of the Chamber of Commerce of Akron and the officers of the company. Some of the members of the Council object to the following provision on the ground that it is not sufficiently rigid:

"Said company during the life of the grant shall operate cars in such numbers and at such intervals of time as the traffic may from time to time require, and under such further reasonable rules and regulations as the city may from time to time prescribe, and said cars shall be kept in sanitary condition, properly lighted, ventilated and heated when necessary."

In the draft of a franchise prepared by City Solicitor Taylor and A. B. DuPont, the section relating to service control was practically the same as that contained in the Cleveland grant, but the company objected to its terms, on the ground that the city was privileged to fix the fare but did not guarantee a return to the company on its investment.

Some of the features of the ordinance now before the City Council follow:

Extensions of lines, about 6 miles within two years, and double track on some of the existing lines.

Future extension of lines based upon increasing population, possibly 15 miles within the next ten years.

City to approve design of all cars purchased in the future.

Privilege of the city to purchase the property at the end of fifteen years or at the end of any five-year period thereafter.

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Heavy penalty clause in case of violation of any of the conditions.

All poles erected in the future to be of steel or concrete.

Rails to be of type approved by the city and in weight not less than 80 lb. to the yard. Steel ties to be used on concrete foundation.

Forfeiture clause in case of violation of the terms of the ordinance.

In case the company fails to maintain the tracks, pavements and other property, the city may do the work and add 25 per cent to the cost as a penalty.

Railway feeders in certain sections of the city to be placed under ground.

Abandonment of single-truck cars now in use, except in case of emergency.

Reduction of fare.

Arbitration in case of disagreement.

Only the physical value to be considered in case the city purchases the property.

Settlement of all grade crossing questions and other questions at present at issue.

Term of twenty-five years as length of franchise.

Sale of Six-for-Quarter Tickets on Cars Ordered in Seattle

The Public Service Commission of the State of Washington has ordered the Seattle Electric Company to sell six tickets for 25 cents on the cars in all parts of Seattle. The commission in its ruling explains that it is a case of service rather than rate-making, and therefore not a case which required a physical valuation as was contended by the attorneys for the company. The company also claimed that the commission could not overrule the franchise provisions under which was included the right and duty of selling tickets at the rate of 4 cents only at certain designated points in the city. The commission held that to sell tickets only at fixed places was to discriminate against a large percentage of the patrons of the company who were unhandily situated with regard to those places. The commission held that the 4-cent rate was in effect established by franchise as equitable, and that in ordering the company to sell tickets on the cars at the rate of six for 25 cents it was not establishing a new rate but was making the one already effective non-discriminatory.

Subway Offer in Montreal

The text of the Canadian Auto Bus Company's offer through Duncan McDonald to the city of Montreal, Que., in the matter of a subway, has been made public. It says:

"Our offer comprises the building and operating of from 7 to 8 miles of subway to serve the heaviest lines of traffic in Montreal. The estimated cost of this work is to be about $20,000,000. The fundamental conditions of this offer are to be based on the following:

"The city to get half of the profits produced by the operations of the subway.

"The city to own and control the subway proper, the construction to be done by the city or the company, but in either case, to safeguard our mutual interests, the work to be done under the supervision of a joint commission of the company and the city.

"The company to furnish all required capital for plant, tracks, cars and car equipment. The money needed for these will probably amount to 33 per cent of the total expenditure.

"Frequent service and 5-cent fare.

"Service furnished to be as frequent as the traffic justifies. All differences of opinion on this subject between the city and the company to be settled by expert arbitration.

"The fare to be the same as charged on all subways on this continent, that is, a 5-cent fare, subject to revision by expert arbitration every ten years.

"Transfers to be given to and from the subways in terminal zones, transfer privilege to be subject to revision by expert arbitration every five years.

"Franchise to be for a term of thirty years with option to the city of acquiring the whole plant and equipment at the end of this term at their actual value plus 10 per cent.

"Work to be started in 1914 and finished in 1918.

"This is a public enterprise of such great importance and so intimately linked with the personal interests of each and every citizen that in case our proposal is accepted by your Council we should be pleased to have our agreement further ratified by a vote of the people."

The city is already considering an offer by the Montreal Tramways, which wants a fifty-year franchise.

Report on Proposed Cincinnati Loop

Prof. George F. Swain, chairman of the Massachusetts Rapid Transit Commission, acting as consulting engineer for the Cincinnati Rapid Transit Commission, made his first report on the proposed rapid transit loop for that city to Mayor Hunt and other city officials on Dec. 1. The route, chosen from one of the seven suggested by Bion J. Arnold in his report, is considered feasible by Mr. Swain and can be constructed within the estimate of $7,000,000. This amount provides for the construction of the road complete, including terminals, with the exception of the down-town loop. This loop will extend from the canal subway down Plum Street to Fifth Street, thence to Main Street and up Main Street to the canal. It is to have a single track with a capacity of 30,000 passengers an hour. Work on this portion of the line will not be commenced until the inlets for the interurban lines are completed.

It is said that only few unimportant digressions from the Arnold plans are necessary. One feature which differs from the original suggestion is the proposition to carry the road on a trestle along the side of Mount Adams instead of constructing a roadbed on the hillside. A freight depot may be constructed on the site of the old city hospital. In case this is done a municipal market could be established on the second floor. The proposed municipal convention hall could also be contained in this building.

Mayor Hunt has addressed a letter to members of all business and civic organizations suggesting that they unite in an effort to forward the movement for the construction of this rapid transit loop. He reviewed the legislation enacted last winter to enable the city to acquire land for the purpose and issue bonds to pay for its construction and pointed out the many advantages to be gained from having an entrance for the interurban lines. If the Mayor's suggestion is acted upon, the Chamber of Commerce will call a joint meeting of all the organizations in the city and plans will be discussed with the idea of securing the construction of the road at an early date.

Injunction Against Low Fare Ordinance in Portland

Judge R. S. Bean of the United States District Court has granted a temporary injunction restraining the city officials of Portland from enforcing the ordinance requiring the Portland Railway, Light & Power Company, Portland, Ore., to sell six tickets for 25 cents. The company, in applying for the injunction, stated that the conditions of the state public utility act provide for methods of determining the reasonableness of the schedule filed with the State Railroad Commission. It was pointed out that the City Council's right to question such schedule of rates is by representation to the State Railroad Commission and not by means of an ordinance. The company also contended that it was entitled to be allowed to charge such rates as will yield a just and reasonable net return upon the value of all its properties, including its physical property and intangible assets or going cost of business and necessary working capital actually employed in rendering service; that such net return should not be less than 8 per cent a year. The company further contended that, under the provisions of the charter of the city of Portland, "the city did not reserve unto itself or its Council the right thereafter from time to time to change, alter, regulate or fix fares in the franchise granted."

In commenting upon the action of the company, Franklin T. Griffith, president of the company, made the following statement:

"In instituting suit to enjoin the enforcement of the six-fares-for-25-cents ordinance, we are acting on the first law of nature, self-preservation. We feel that the enforcement of this ordinance will be in the nature of confiscation of our

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property in that it would require us to devote the investment in street railways to public service without compensation. The six-ticket ordinance in Portland requires the issuance of transfers. On our present rates of fare, because of the extensive use of transfers, our net receipts per revenue passenger on city railways are only 3.52 cents."

Chicago Elevated Railway Through Routing Reaches Normal

The through routing of elevated trains on the Chicago Elevated Railways, which began on Nov. 3, confused passengers who were unaccustomed to the method of taking advantage of the universal transfer, and the reversing from left-hand to right-hand operation on the Northwestern Elevated Railway delayed trains because the crews were not familiar with the rearranged signal systems. In a public announcement made recently B. I. Budd, president of the Chicago Elevated Railways, stated that the through routing of trains was now normal and that the increase in passengers had more than offset the loss in fares caused by adopting the universal transfers. In view of this increase in traffic the board of directors has authorized the purchase of 120 steel cars instead of 100, as planned at first. In order to increase the capacity of the loop to the limit and at the same time take advantage of any delays to trains, additional elevated tracks will be installed at Eighteenth Street on the South Side and Chicago Avenue on the North Side which will be of sufficient capacity to hold two or three trains for rush-hour emergency service.

One of the most serious difficulties in adopting the system of through routing was the introduction of the universal transfer. The management has made periodical checks at the different loop transfer stations. On one occasion between 5 and 6 o'clock in the evening, and at the busiest transfer point, namely, Adams Street and Wabash Avenue, 4100 passengers were checked going to the Northwestern trains from the West Side lines and 1700 passengers going in the opposite direction. This check represents to a certain extent a portion of the increase in traffic derived from through routing the elevated trains.

The Cleveland Deficit

The Cleveland papers are again discussing the deficits of the Cleveland Railway. It seems that the total deficit, including the value of the power houses that are to be abandoned soon, is about $1,435,000. Peter Witt, street railway commissioner, says that the amount is not more than $1,000,000. He says there are deficits amounting to $200,000 in the operating and maintenance funds inherited from the Baehr administration and approximately $800,000 for the abandoned power houses. According to Mr. Witt no understanding has been reached as to the amount that shall be charged off for the power houses.

Director of Public Safety Springborn of Cleveland has declared that overhead telephone and electric light wires should be eliminated from all streets on which car lines are operated. He is opposed to any yearly limit of the number of miles of wire placed under ground.

The new Denison-Harvard line of the Cleveland Railway was opened on Dec. 1.

At a meeting of the directors of the Cleveland Railway on Dec. 1 the October report was discussed. No action was taken on the subject of charging off the old equipment that will be abandoned shortly, as provided in the arbitration finding some time ago. The November report is expected to be ready about Dec. 20, when this question may come up for consideration.

An agreement has been approved for running the Coventry Road cars of the Cleveland Interurban Railway to the Public Square over the Euclid Avenue route of the Cleveland Railway.

Rules of Pennsylvania Commission

The Pennsylvania Public Service Commission, which succeeds the State Railroad Commission on Jan. 1, 1914, has adopted rules of practice. Complaints must be made by petition, in writing, verified by affidavits. The company complained against must answer or satisfy the complaint within fifteen days or within such other specific time as the commission in its judgment may determine. The burden of proof is on the complainant, unless a violation of a lawful order of the commission is alleged, in which case the burden of proof is on the company complained against. The commission reserves the right to make investigations on its own motion. A form schedule has been prepared for such companies as are required to disclose their financial condition.

In a financial statement the company will be required to show: date and place of said incorporation; amount and kinds of stock authorized and issued, with the nature of all preferences; description of all mortgages; number and amount of bonds authorized and issued; other indebtedness of all kinds; interest paid during preceding year and the rate or rates thereof; dividends paid during the same year; classified statement of earnings and expenditures for the fiscal year showing condition at close of the year; such additional facts as the commission may require.

The commission has begun consideration of rules, which have already been drafted, governing the construction of tariffs or rate schedules which must be posted for the information of shippers.

Street Railway Liable for Damage by Interurban Licensee

In a decision handed down on Nov. 11 by the Ohio Supreme Court Barbara Quigley, guardian of Sylvester Fackelmann, was awarded $8,000 damages against the Toledo Railways & Light Company and some new principles were laid down in regard to the operation of interurban cars over the tracks of city railway companies. The decision holds the local company responsible for accidents occurring as a result of the operation of interurban cars over its track. The boy lost one leg and half of the other foot and Mrs. Quigley asked for $25,000 damages. The Court of Common Pleas found in her favor and the Court of Appeals reversed the decision. The opinion of the Supreme Court contains the following:

"A street railway company receives its franchise subject to certain well-defined duties to the public. It cannot relieve itself from these obligations by a lease or traffic arrangement by which it permits another company to make joint use of its tracks, except by legislative enactment authorizing such lease or arrangement with an express provision exempting it from liability for the acts of its licensee.

"When such owning company makes an agreement with another company under authority granted by law for the joint use of its tracks it is liable for injuries caused by the actionable negligence of its licensee thereon.

"The statute does not provide exemption from such liability, and as against the public it will not be implied."

New Transportation Plan in Toronto

Lionel Clarke, chairman of the Harbor Commissioners of Toronto, Ont., recently submitted to Mayor Hocken a plan recommended by the commission for the solution of the transportation problems of Toronto. This plan includes provisions for the following items: a terminal site for radial lines at the foot of Yonge Street; a rapid-transit route along the waterfront from Woodbine to Humber; a subway from the waterfront station under Bay and Teraulay Streets to North Toronto, and a central station for passenger traffic in front of the city hall. The cost of building the waterfront line from Woodbine to Humber, the Yonge Street subway, the radial entrances and the street railway feeders (25.46 miles long, double track) in the suburbs is estimated at $13,197,533. The cost of the subway and extensions to the north is estimated at $7,703,550.

On Dec. 2 the comptrollers of the city passed a motion asking that the engineer of the Ontario Hydroelectric Power Commission, the engineer of the Toronto Harbor Commission and the City Works Commissioner report jointly on the above transportation plan, and that the corporation counsel of the city and the counsel of the Toronto Harbor Commission report on the legal aspects of the proposal.

Mayor Hocken on Dec. 4, before a meeting of the North Toronto Ratepayers' Association, stated that he had not yet abandoned the idea of the purchase of the property of the

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Toronto Railway and the Toronto Electric Light Company. The introduction of the harbor commissioners' plan had so changed the situation, however, that it would not be possible to present the former plan to the citizens on Jan. 1, 1914. No action, however, can be taken until the experts report on the plan of the harbor board.

The City Council has rejected a motion from Controller Church to take plebiscites of the property owners on the separate questions of buying the Toronto Railway property for $22,000,000 and the Toronto Electric Light property for $8,000,000.

Indianapolis Arbitration Proceedings

The Public Service Commission of Indiana, which is sitting as a board of arbitration in the controversy between the Indianapolis Traction & Terminal Company and its employees, under the terms of the agreement of Nov. 7, opened the hearing Dec. 4. Under the terms of the agreement of Nov. 7, signed by the contending parties, Governor Ralston and Ethelbert Stewart, the latter representing the United States government, the commission has thirty days in which to take evidence and announce its findings in the case, but by agreement between the attorneys representing both sides the commission may take whatever time it desires in the hearing of the case and making its findings. The finding of the commission binds both parties to the agreement for a term of three years.

In their opening statements the attorneys representing the company and the employees said that later on they would argue the questions of the relative increase in wages and in the earnings of the company during a period of years just passed, conditions of street railway service, present living conditions, the question of recognition of the union, etc.

The employees' attorneys seek to show that the present prices of living essentials have outstripped any increase in wages. The company's counsel announced that they would produce tables to show that the wages have increased approximately one-third more than the relative earnings of the company and that foodstuffs and other living essentials have increased only an average of 6 per cent in the last five years in Indianapolis, while during that time the wages of the train service men have been increased between 11 per cent and 20 per cent.

M. L. Clawson, a labor attorney, opened the hearing for the employees. He summarized the events preceding the strike, the disorders during the strike, the settlement agreement and the grievances presented by employees under that agreement. He stated that in the last few years larger cars had been placed in service and that the work and responsibility of the men had therefore been increased. He stated that he would also go into the matter of the physical valuation of the company's property.

W. H. Latta, attorney for the company, in his opening statement told of the various increases in the rate of pay of motormen and conductors, year by year. He read the present wage scale of the company, ranging from 20 to 25 cents an hour, and showed that of the 567 motormen 150 are receiving 25 cents an hour and 169 are drawing 20 cents. Of the 407 conductors seventy-nine are drawing 25 cents an hour and 179 are being paid 20 cents an hour. The gross annual wages of motormen and conductors of the Indianapolis Traction & Terminal Company are now $510,287. He said the question was whether the men had received an advance in wages proportionate with the increased earnings per car mile of the company and that the platform expense of the company per car mile had increased faster than the earnings per car mile, the benefit to the men being greater than the increase in the earnings of the investors who had put their money into the company. He said that he would show that the dissatisfaction of the men had been produced only recently by "outside intermeddlers, within the meaning of the law;" that the morning following the strike sixty-five cars were manned by the early crews alone who desired to continue their work, and that a full schedule would have been put in force by noon when the late men reported for work, but these men were dragged from their cars by force.

Mr. Latta discussed the various car schedules in effect on the lines of the company as approved by the Board of Public Works of Indianapolis, and said he believed that if these schedules were changed by any decision of the arbitration board such changes would have to be ratified by the Board of Public Works, under the charter of the company. It was impracticable to complete the "swing runs" and "straight runs" within the hours demanded. Discussing the question of recognition of the union, he said it related only to the construction to be put on the agreement of Nov. 7.

Several motormen and conductors were examined. Their testimony related to their alleged difficulty in living on their present wages. These, they stated, averaged $18 to $20 per week if they worked seven days and about $84 a month if they worked every day. They went into the details of their household expenses in an effort to prove that their present wages were insufficient to provide the necessary food, clothing, fuel, etc., for themselves and families. In cross-examination it was shown that some of these men owned property which had been paid for out of savings from their wages, and that in the case of extra men, receiving the minimum wage, their present positions were the most remunerative they had ever held.

One man who stated he worked twelve hours a day, seven days each week, to earn about $84 a month, was shown to have been off six days in one month on leave of absence, and during that particular month he still earned in excess of $80.

Chairman Duncan of the commission called the attention of the witness to the fact that many lawyers were not earning any more than the trainmen. During the continuation of this testimony on Dec. 9 Chairman Duncan interrupted Mr. Clawson, attorney for the employees, and discussed his manner of examination of witnesses as follows:

"I think the proper line here is to bring out the cost of certain things at this time and prior to this time. We cannot investigate the question of how these men manage their wages. Some men keep their families well on $10 a week, while others seem to find it difficult to live on $25 a week. It would be helpful to know what things cost in the market; in other words, what could these men have done with their incomes? I should like to see both sides give us a list of table and other necessaries and their prices. I meet men every day who say that they cannot keep their families. Others are saving on even smaller incomes. We cannot enter into the question of the prudence of these men."

The commissioners questioned some of the witnesses for the employees closely as to how a rearrangement of schedules might be effected which would give them shorter hours, but the men stated they did not know just how it could be done. The hearings will be continued Tuesday, Wednesday, Thursday and Friday of each week until the commission shall have obtained all the evidence it deems necessary. It is probable that the company will not present its side of the case for two or three weeks, on account of the detailed examination of witnesses now being conducted.

Boston Elevated Hours of Labor Agreement

J. J. Storrow, chairman of the Boston Elevated board of arbitration, having suggested that the parties ought to reach some agreement upon hours of labor, the Boston carmen's union and the Boston Elevated Railway have agreed upon the hours of labor for conductors, guards, motormen, brakemen and gatemen, which are to remain in force for such period not exceeding three years nor less than one year as may be determined by the board of arbitration. This agreement, so far as it relates to hours of labor, is to be made a part of the main agreement which is to be signed between the parties governing the wages and working conditions, which agreement will express the desire of the members of the carmen's union through their organization that the runs shall be laid out according to the hours of labor hereinafter specified, and the obligation of the members to take the runs so laid out. The hours of labor prescribed follow:

"1. A schedule run is to be any run which provides for a day's work between eight and nine and one-half hours' platform work as hereinafter provided.

"2. Schedule runs to be laid out as follows: Not less than 60 per cent to be performed within an outside limit of not exceeding eleven and one-half hours, and not less than two-

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thirds of such percentage to be completed within eleven outside hours. The platform time of not less than two-thirds of such percentage of schedule runs shall not exceed nine hours and the platform time of the remainder shall not exceed nine and one-half hours. The outside time of not more than 40 per cent of the schedule runs may exceed twelve hours, but shall not exceed sixteen hours, but the actual platform time of not less than one-half of these shall not exceed nine hours and the platform time of the remainder shall not exceed nine and one-half hours.

"3. This arrangement of schedule runs to apply to each rating station, the company having a right, if necessary, to vary the percentages by 10 per cent on each class in any particular rating station, but the percentages for the road as an entirety to be maintained. This means that where the minimum number of runs has been fixed to be performed within certain outside hours or having a certain number of hours' platform work, that minimum may be reduced in any particular rating station by 10 per cent, but it shall not prevent the company from arranging runs in excess of the minimum to any such extent as it may deem expedient.

"4. The company agrees to arrange as many schedule runs as possible with platform time of between eight and one-half and nine and one-half hours, and to arrange the balance of schedule runs with platform time of not less than eight hours, all subject to the limitations in paragraph 2.

"5. The company agrees to recognize the principle that men having runs with an outside limit exceeding twelve hours are entitled to additional compensation because of the fact that their work is not completed within twelve hours, but the amount of such compenastion shall be determined by the board of arbitration, it being understood that no additional compensation is to be paid for excess of actual outside time beyond the schedule time, and that no overtime is to be paid for platform time in excess of nine hours in the case of schedule runs exceeding an outside limit of twelve hours, but in such cases payment for platform time in excess of nine hours is to be at the regular hourly rate.

"6. If any man fails promptly to bid for or choose a schedule run arranged in accordance with the hours herein agreed upon he shall automatically go to the foot of the extra list.

"7. The association claims that men having runs of eight hours' or more platform time but less than eight and one-half hours' platform time should be paid for eight and one-half hours; that men having runs not exceeding twelve hours' outside time with platform time in excess of eight and one-half hours but less than nine hours should be paid for nine hours; that if the platform time exceeds nine hours and does not exceed nine hours and fifteen minutes the men are to be paid at the regular rate for nine and one-half hours; that if the platform time exceeds nine hours and fifteen minutes and does not exceed nine hours and thirty minutes the men are to be paid for ten hours' time at the regular rates, and that conductors and motormen should be allowed twenty minutes a day for making up work and for work at the end of the day for which they should be paid at the regular rates. (This twenty minutes not being figured in determining whether a run exceeds the inside limit of eight and one-half, nine or nine and one-half hours or the outside limit of eleven, eleven and one-half or twelve hours or in computing overtime, nor is it to be paid for if together with the actual platform time it does not exceed in the aggregate eight and one-half or nine hours.)

"All of the matters heretofore described in this section are to be left to the determination of the board of arbitration.

"8. The company agrees to continue the present rate of wages and computation of time for time in excess of nine hours, except as provided in paragraph 5. The board of arbitration is left to determine whether this rate of wage and method of computation of time should be increased in accordance with the demand of the union.

"9. All platform work other than schedule runs shall be known as extra runs, which shall be completed within fourteen outside hours, except that this outside limit may be exceeded on Saturdays or in cases of emergency or unusually heavy traffic, such as holiday service, circus week, opera, etc., and except where extra runs are combined with schedule runs. For all time in excess of said fourteen hours the union asks that extra compensation be allowed, the amount to be fixed by the board of arbitration, and the company agrees to recognize the principle that men having extra runs with an outside limit exceeding fourteen hours are entitled to additional compensation.

"The board will also decide the union's demand for a seven-hour guaranteed workday for extra men. The present practice of requiring men to report and to remain to protect runs or for extra work, together with excusing men for meals and when their presence is unnecessary, is to remain in force, it being understood that the company may reduce the number of men who are required to report.

"The company may assign men or men shall choose extra runs in the order of seniority as provided in Section 16 of the agreement.

"10. Schedules providing for runs in accordance with the hours herein agreed to shall be posted to go into effect not later than Jan. 24, 1914.

"11. Section 16 of the agreement which has already been approved by the association and the company is amended by adding at the end thereof the following:

"'If any man is legitimately absent at the time when runs are chosen, the superintendent shall choose for such man the earliest finishing schedule run remaining unpicked at the time of this man's turn to choose.'"

The effect of the agreement is to release the company from strict compliance with the so-called "nine-hours in eleven" law of 1913.

Urging Appointment of Engineer for Illinois Public Service Commission

Beginning Jan. 1, 1914, the new Public Service Commission of Illinois will assume authority. Governor Dunne has not announced his appointments to the commission, but recently the newspapers printed a slate including W. L. O'Connell, Chicago, chairman; Stephen S. Gregory, Chicago; George W. Fithin, Newton, Ill.; Richard Yates, Springfield, Ill., and Frank H. Funk, Bloomington, Ill. Mr. O'Connell is the county treasurer of Cook County and a business man. Mr. Funk is a wealthy land owner. The rest of the members who are proposed are attorneys. The proposed appointments caused the various engineering societies of the State to urge that an engineer be placed on the commission. The Illinois Society of Engineers and Surveyors, a representative body composed of civil engineers in all parts of the State, has sent a petition to the Governor urging that at least one engineer be appointed. The Chicago Technical League and other engineering organizations have also petitioned the Governor to name Cicero D. Hill as the engineer member of the commission. Mr. Hill is engineer for the Board of Local Improvements of the city of Chicago.

Committee Appointed to Operate London & Port Stanley Railway.—The City Council of London, Ont., on Dec. 1 appointed Adam Beck, Philip Pocock, M. D. Fraser, K.C., Alderman W. Spittal and the Mayor a commission to electrify and operate the London & Port Stanley Railway.

New Line Opened in Idaho.—Service has been established over the line of the Lewiston (Idaho) Terminal Company. For the present cars will be operated only from the Lewiston-Clarkston bridge to the steam railroad passenger terminal, but it is proposed to extend the line to the live stock show grounds in Lewiston.

Appeal from Massillon Order Denied.—The State Utilities Commission of Ohio has refused to rescind its order in favor of the city of Massillon and decided against the Northern Ohio Traction & Light Company in that company's appeal from what it called unnecessary and unreasonable orders for the rebuilding of its tracks in Massillon.

Cancellation of Underground Franchises in Toronto Sought.—The Board of Control of Toronto, Ont., has decided upon motion of Mayor Hocken to instruct the City Solicitor to ascertain what franchises are in existence for underground railways in the city, with a view to applying to the House of Commons for cancellation of those which have not been exercised.

Mr. Baer's Pronunciamento.—George F. Baer, president of the Philadelphia & Reading Railway, was quoted by the Philadelphia *Ledger* on Dec. 5, 1913, as follows in regard

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to the report that the company was to electrify its Chestnut Hill branch: "There will be no electrification of the Reading while I live. I have no faith in electrification. It has been a failure everywhere."

Municipal Operation in Nelson.—At a conference between the members of the City Council and the directors of the Nelson (B. C.) Street Railway, Ltd., municipal operation of the street railway, with the stockholders retaining their interest in it on a proportionate partnership basis, was decided on. The number of shares of stock of the company will be increased from 50,000 to 75,000, and the city will probably take over 40,000 shares, by which it will have control.

Increase in Rates Ordered Discontinued.—The Interstate Commerce Commission has directed the Washington (D. C.) Interurban Railway to discontinue the increase in passenger rates which it put into effect recently on its line running along Blandensburg Road from Fifteenth and H. Streets, Northwest. According to the commission the company failed to follow the procedure prescribed by the commission where changes of the kind which was made are contemplated.

Report by City Solicitor on Pittsburgh Subway Application.—C. K. Robinson, assistant city solicitor, has rendered to the City Council a report unfavorable to the franchise ordinance presented in behalf of the Pittsburgh Subway Company. He recommends that a special committee be appointed to confer with the company and the city law department. Mr. Robinson contends that it would be better to draw a new bill than to attempt to amend the ordinance prepared by Mr. Fording for the company.

Sale of Municipal Street Railway Bonds Authorized.—The Board of Supervisors of San Francisco, Cal., has authorized the sale of $850,000 of the 5 per cent municipal street railway bonds authorized by the voters recently. The plan is to apply part of the proceeds of the issue to the purchase of the property of the Presidio & Ferries Railroad, with the end in view of making it part of the municipal street railway system. It is said that the public utilities committee of the board has arranged to take over the Presidio & Ferries Railroad for $350,000.

Enactment of Radical Compensation Measure Urged in New York.—Governor Glynn of New York sent a special message to the extraordinary session of the Legislature on Dec. 8 in which he embodied a recommendation for enactment of a compulsory workmen's compensation law covering hazardous employments, with a schedule of compensation rates far in excess of the schedules of any other measure proposed in this State or in most other states. Bills prepared under the supervision of Governor Glynn, carrying out the suggestions made by him, have been introduced in both houses.

Arbitration of Grievances in Lexington.—Differences which have arisen between the Kentucky Traction & Terminal Company, Lexington, Ky., and its men are being settled by arbitration. The company has named one man, the carmen's union another, and the two have agreed upon a third. Formal hearings were held for the purpose of discussing the questions involved in the discharge of three trackmen. The principal question is whether the trackmen can be considered "shopmen" in the meaning of the contract between the company and the union, signed on July 15, 1913, and whether the men were discharged for holding membership in the union.

Electric Railway Concession in Pernambuco.—A concession for a new electric tramway and lighting system in Pernambuco was granted eighteen months ago to Dodsworth & Company, Rio de Janeiro. This company has arranged with J. G. White & Company, New York and London, to do the construction work. The foundation for the power house is being built and surveys made for the carhouse and track, a portion of which has already been laid. The gage is 3.28 ft. English cars will be used. The power machinery and rails are all of American manufacture. The power plant will generate 4000 hp. The work is expected to be completed within one year.

Extensions in Detroit.—At a recent meeting of the public utilities committee of the Detroit (Mich.) City Council, Attorney Weadock, representing the Detroit United Railway, stated that the extension of the Fourteenth Street line between Bagg Street and Fort Street will be built soon on the terms of the new franchise, with a fare of eight tickets for 25 cents during the daytime, the city to build the track foundations and paving where the low fare is in effect. It is said that neither the city nor the company is anxious to plan extensions. It is difficult for the company to secure the money needed for the work and the city has no funds to pay for its portion, as provision for such expenditures was not made in the tax rate. The company has arranged to finance the Junction Avenue cross-town line.

Light Railway Act in Alberta.—An act has been passed by the Alberta Legislature to encourage the building of light railways. The government is authorized to give a subsidy of $7,000 a mile in aid of such lines, which are not to exceed 75 miles in length. A section was inserted in the measure in its passage through the Legislature limiting the total mileage which may be aided before the next session to 200 miles. The first line to be built under this act will, it is said, be one from Bassano through the irrigated belt to Richmond, on Red Deer River. It is reported that this line will be built by the Bassano & Bow River Railway. The only company with anything like this title is the Bassano Electric Railway, which was incorporated by the Alberta Legislature on Feb. 12, 1912, with power to build a line from Bassano southerly to Bow River, from Bassano northerly for 40 miles, and also within the town of Bassano.

PROGRAMS OF ASSOCIATION MEETINGS

American Economic Association

The twenty-sixth annual meeting of the American Economic Association will be held at Minneapolis, Minn., Dec. 27 to Dec. 30. The American Sociological Society will hold its annual meeting at the same time and place. At the sessions a number of papers and addresses of interest to electric railway operators will be presented. At the session of the association on Dec. 27 Prof. John H. Gray, of the University of Minnesota, will present a paper on "The Control of Public Service Corporations." This subject will be discussed by E. W. Bemis, Chicago; J. E. Allison, St. Louis, and others. At the session on Dec. 29 B. H. Meyer, of the Interstate Commerce Commission, will read a paper on "Theory of the Making of Railway Rates." On Dec. 30 a paper on "Syndicalism" will be presented by John Graham Brooks, Cambridge, Mass., and a paper, "The Economic Effects of the Supreme Court Trust Dissolutions," will be presented by Willard E. Hotchkiss, of Northwestern University.

American Society for Labor Legislation

The seventh annual meeting of the American Association for Labor Legislation will be held at the Shoreham Hotel, Washington, D. C., on Dec. 30 and 31, 1913. The program of papers for the meeting includes the following:

Paper, "The Federal Industrial Relations Commission," by Frank P. Walsh, chairman of the Federal Industrial Relations Commission.

Paper, "Labor Law Enforcement Through Administrative Orders," by Charles H. Crownhart, chairman of the Wisconsin Industrial Commission.

Paper, "The Philosophy of Labor Legislation," by W. F. Willoughby, Princeton University, president of the American Association for Labor Legislation.

Paper, "The Practicability of Compulsory Sickness Insurance in America," by Joseph P. Chamberlain, of the Legislative Drafting Association.

Paper, "Sickness Benefit Funds Among Factory Employees," by W. L. Chandler, of the Dodge Manufacturing Company.

Paper, "Trade Union Sickness Insurance," by James M. Lynch, New York State Commissioner of Labor.

Paper, "Work Periods in Continuous Day and Night Occupations," by Basil M. Manly, special agent of the United States Bureau of Labor in the investigation of conditions of employment in the iron and steel industry.

Paper, "Long Hours in Railroading," by Austin B. Garretson, president of the Order of Railway Conductors.

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Financial and Corporate

Stock and Money Markets

Dec. 11, 1913.

In the trading on the New York Stock Exchange to-day the standard stocks rallied quickly after declines, and the majority of the issues traded in at the end ranged moderately above Tuesday's final figures. An advance of 1½ points to 73 was made in New Haven, the announcement of the suspension of the dividend not being made until after the close of the exchange. Rates in the money market to-day were: Call, 5 @ 6 per cent; thirty days, 5½ per cent; sixty days, 5¼ @ 5½ per cent; ninety days, 5 @ 5½ per cent; four months, 5 @ 5¼ per cent; five and six months, 4¾ @ 5 per cent.

Changes in the prices of securities dealt in on the Philadelphia exchange to-day were irregular. The total of sales was small.

The market in Chicago to-day was narrow and dull. The sales of bonds totaled only $14,000. par value.

In Boston the market opened quiet with the tone easy. Interest centered in New Haven, which closed at 72¾. The general list was little changed.

Trading in stocks on the Baltimore exchange to-day was exceedingly dull, but the demand for bonds was fair.

Quotations of traction and manufacturing securities as compared with last week follow:

	Dec. 3	Dec. 10
American Brake Shoe & Foundry (common)	87	87
American Brake Shoe & Foundry (preferred)	127	127½
American Cities Company (common)	36	36
American Cities Company (preferred)	64	63
American Light & Traction Company (common)	333	*334
American Light & Traction Company (preferred)	106	*106
American Railways Company	38	38¼
Aurora, Elgin & Chicago Railroad (common)	a42	a42
Aurora, Elgin & Chicago Railroad (preferred)	82	a84
Boston Elevated Railway	85	88½
Boston Suburban Electric Companies (common)	7	7
Boston Suburban Electric Companies (preferred)	60	60
Boston & Worcester Electric Companies (common)	*6½	*6½
Boston & Worcester Electric Companies (preferred)	39	39
Brooklyn Rapid Transit Company	87½	86⅛
Capital Traction Company, Washington	110	111½
Chicago City Railway	160	160
Chicago Elevated Railways (common)	25	25
Chicago Elevated Railways (preferred)	75	75
Chicago Railways, ptcptg., ctf. 1	90	a90
Chicago Railways, ptcptg., ctf. 2	28	a27½
Chicago Railways, ptcptg., ctf. 3	7	6½
Chicago Railways, ptcptg., ctf. 4	2	1½
Cincinnati Street Railway	110	110
Cleveland Railway	104¼	104½
Cleveland, Southwestern & Columbus Ry. (common)	5½	*5½
Cleveland, Southwestern & Columbus Ry. (pre erred)	*30	*30
Columbus Railway & Light Company	18	18
Columbus Railway (common)	59½	59½
Columbus Railway (preferred)	88	88
Denver & Northwestern Railway	*111	a80
Detroit & United Railway	80	80
General Electric Company	139	138⅞
Georgia Railway & Electric Company (common)	118¼	119¼
Georgia Railway & Electric Company (preferred)	85	85
Interborough Metropolitan Company (common)	14¼	14⅛
Interborough Metropolitan Company (preferred)	58¾	59⅜
International Traction Company (common)	*40	a30
International Traction Company (preferred)	*95	90
Kansas City Railway & Light Company (common)	*22	20
Kansas City Railway & Light Company (preferred)	*30	30
Lake Shore Electric Railway (common)	*7	6
Lake Shore Electric Railway (1st preferred)	*92	92
Lake Shore Electric Railway (2d preferred)	*25	24
Manhattan Railway	130	130
Massachusetts Electric Companies (common)	10¼	10½
Massachusetts Electric Companies (preferred)	66½	65½
Milwaukee Electric Railway & Light Co. (preferred)	*100	95
Norfolk Railway & Light Company	*25¼	24¾
North American Company	70	68
Northern Ohio Light & Traction Company (common)	66¼	66¼
Northern Ohio Light & Traction Company (preferred)	97	97
Philadelphia Company, Pittsburgh (common)	39	39
Philadelphia Company, Pittsburgh (preferred)	39	39
Philadelphia Rapid Transit Company	18¼	18¼
Portland Railway, Light & Power Company	56	53
Public Service Corporation	107	106
Third Avenue Railway, New York	40¼	39¼
Toledo Traction, Light & Power Company (common)	30	15
Toledo Traction, Light & Power Company (preferred)	80	60
Twin City Rapid Transit Co., Minneapolis (common)	105	105½
Union Traction Company of Indiana (common)	*13	11½
Union Traction Company of Indiana (1st preferred)	*83	80
Union Traction Company of Indiana (2d pre erred)	*25	14
United Rys. & Electric Company (Baltimore)	25⅛	*25⅛
United Rys. Inv. Company (common)	19	17
United Rys. Inv. Company (preferred)	35½	33½
Virginia Railway & Power Company (common)	56	56
Virginia Railway & Power Company (preferred)	93½	93½
Washington Ry. & Electric Company (common)	86¼	85½
Washington Ry. & Electric Company (preferred)	86	86¼
West End Street Railway, Boston (common)	68½	a67½
West End Street Railway, Boston (preferred)	90	90
Westinghouse Elec. & Mfg. Company	64⅞	64½
Westinghouse Elec. & Mfg. Company (1st preferred)	112	112

*Last sale. aAsked.

ANNUAL REPORT

Aurora, Elgin & Chicago Railroad

The statement of income, profit and loss of the Aurora, Elgin & Chicago Railroad, Wheaton, Ill., for the fiscal year ended June 30, 1913, follows:

Gross earnings and other income:	
Revenue from transportation	$1,674,768
Revenue from operation other than transportation	338,843
Interest	1,150
Miscellaneous	82
Total gross earnings and other income	$2,014,843
Operating expenses and taxes:	
Maintenance of ways and structures	$154,389
Maintenance of equipment	128,272
Traffic	8,938
Conducting transportation	600,393
Other operations	34,996
General and miscellaneous	291,937
Total	$1,218,925
Less undistributed operating credits	24,250
	$1,194,675
Taxes	43,967
Total operating expenses and taxes	$1,238,642
Net earnings	$776,201
Deductions from income	395,223
Net income	$380,978
Profit and loss—surplus at beginning of year	458,186
Profit and loss—Gross surplus	$839,164
Profit and loss charges:	
Dividends	$279,000
Other	2,770
Total profit and loss charges	$281,770
Profit and loss—surplus at end of year	$557,394

During the year the Aurora, Elgin & Chicago Railroad made numerous improvements, such as extensions, new sidings and cross-overs on its Chicago, Aurora & Fox River divisions, and about 3 miles of track was reconstructed.

L. J. Wolf, president of the company, says in part:

"A steel bridge, which carried a highway, recently vacated, over the tracks of the Chicago division at Glen Ellyn, has been used to replace a temporary wooden bridge carrying a highway over the tracks of the Chicago division at Batavia. A number of wooden bridges on the Fox River division have been replaced with concrete structures.

"While the gross earnings of the company for the past fiscal year increased $120,642 over those of the preceding year, operating expenses increased $101,469, leaving an increase in net operating revenues of only $19,172. The abnormally large proportion of the increase in gross revenue which was absorbed in operating expenses is largely due to the fact that the company's expenditures for maintenance of its track, roadway and equipment were $61,426 in excess of the expenditures made for like purposes during the preceding fiscal year, an increase of 25 per cent.

"Rather than sell its bonds under existing market conditions, the company has preferred to carry as accounts and notes payable its current expenditures for new construction and new equipment. On June 30 last the company had in its treasury $450,000 of its bonds available for sale, and since June 30 the amount of treasury bonds has been increased to $823,000 by the certification of $373,000 bonds against last year's expenditures for construction, improvements and betterments.

"To insure the continuity and regularity of the lighting service in Elgin, a second transmission line is being constructed from the Ingalton substation to the Elgin substation. This line represents the very latest and best type of construction and includes steel towers, cross-arms and pins and insulators with a high factor of safety. On existing transmission lines the policy of replacing insulators with larger ones better suited to high voltage has been continued.

"Automatic track circuit signals have been installed on two industrial sidings on the Chicago division. An additional block of trolley contact block signals was installed on the Fox River division. Two crossing alarm bells were replaced with new standard bells, and thirteen additional new standard crossing alarm bells were installed. Fifty-eight crossings are now protected.

"A new intake and new discharge waterways have been completed in the power house and the screen house has been.

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enlarged. The 8300-kw turbo-generator set, with condensers and auxiliaries, ordered last year, has been installed, thus practically doubling the capacity of the plant. The continued increase of the station load has made it necessary to construct an addition to the boiler room large enough to house four 500-hp boilers and to increase the capacity of the pneumatic ash-handling system. Two boilers, together with stokers, bunkers and coal handling apparatus, have already been installed therein, and two additional boilers will probably be installed by the middle of the coming fiscal year.

"The following rolling stock was purchased for the Chicago division: six standard passenger cars, complete with General Electric equipment and Baldwin trucks; one motor express car, similarly equipped. The passenger cars with which this division was originally provided are now being reconstructed at the Wheaton shops and are being strengthened and reinforced by steel plates and angles to such a degree as to bring them up to the present standard.

"The following rolling stock was purchased for the Fox River division: four double-truck, semi-steel city cars, with General Electric electrical equipment and Baldwin maximum traction trucks, and four 45-ft. double-truck interurban passenger cars, with General Electric equipment and trucks. Pursuant to city ordinances, all city cars have been equipped with wheel guards and fenders."

Financing in Los Angeles

Articles of incorporation have been filed for the Los Angeles (Cal.) Railway Company, the purpose being to merge the Los Angeles Railway Corporation and the City Railway. The announcement in regard to the proposed readjustment was made at Los Angeles by W. E. Dunn, second vice-president of the Los Angeles Railway Corporation, who said that the details had not all been definitely decided, but that they would be announced about Jan. 1. From the unofficial statements which have been made it would seem that the plan is to fix the capital stock of the proposed new company at $20,000,000, or $5,000,000 less than the combined outstanding stock of the Los Angeles Railway Corporation and the City Railway. There is to be a limited open-end mortgage to secure an issue of $50,000,000 of bonds, of which $23,500,000 will be used to refund bonded indebtedness of $23,500,000 of the two companies that are to be taken over. The remaining $26,500,000 of bonds will be reserved for issue from time to time in the future to meet the needs of the company. It has also been announced that the Huntington Land Company, an affiliated corporation, has arranged to borrow $14,000,000. Mr. Dunn's statement follows:

"I have just returned from New York, where the final arrangements were made for this flotation, but the details are not yet fully worked out. The new railway will be capitalized for only $20,000,000, while at the present time the City Railway is capitalized for $5,000,000 and the Los Angeles Railway Corporation has $20,000,000 of capital. In the days before the State Railway Commission was created we were forced to increase our capital stock each time we increased our bonded debt, but under the present law we do not have to carry any excess stock on the books. With the opening of the canal and the coming of the people in 1915, this company must be ready to care for a greatly increased population. New cars must be bought and lines extended. New substations must be built to handle the power.

"The Huntington Land Company must erect certain buildings on its properties, while the Pacific Light & Power Corporation, which participates in this $14,000,000, must be in a position to go ahead with the Big Creek development. Already $12,000,000 has been expended in bringing a portion of that power to Los Angeles, but the work is a long way from completion as far as the ultimate capacity of the plants is concerned. The fact that the Big Creek power development is needed at the present time was shown a week or so ago, when the Redondo plant went out and the cars stopped. Had it not been for the Big Creek at that time there would have been no cars running in the city for three days. As it was, the plant carried the load, even though there was forty-eight hours' work still to be done on the plant to make it ready for service. We shall soon be able to shut off the Big Creek power in order to complete this work. Within a day or so this power will be ready again and this portion of the development will go ahead."

Expenses of Southern Pacific Suburban Traffic

The following statement is an abstract of figures presented to the California Railroad Commission by the Southern Pacific Company in regard to the operating expenses of its Oakland, Alameda and Berkeley lines for twelve months, based upon operation during May, 1912. These lines are operated by electricity. Other references to these figures appeared on page 394 of the issue of Sept. 6 and page 1151 of the issue of Nov. 29 of this paper. The first three main headings given below are itemized only in part.

Operating Expenses of Oakland, Alameda and Berkeley Lines of Southern Pacific Company for Twelve Months Based Upon Operation May, 1912

Maintenance of way and structures		$447,418
Maintenance and care of track	$45,804	
Maintenance and care of roadbed	136,811	
Interlocking plants	109,673	
Electric power transmission	48,334	
Station buildings and appurtenances	51,433	
	$392,055	
Maintenance of equipment		135,449
Passenger train car repairs	81,776	
Electric equipment of cars	36,811	
Power plant equipment	9,392	
	$127,879	
Transportation		699,854
Agents, clerks, etc.	38,156	
Motormen	133,590	
Operating power plants	112,713	
Trains—passenger	231,272	
Interlockers—signals	58,291	
Crossing flagmen, etc.	29,399	
	$603,421	
Maintenance and operation, floating equipment		317,703
General and traffic expenses		177,839
Taxes (4 per cent of revenues)		54,172
Total		$1,832,437
Revenue		1,354,303
Deficit		$478,134

Reproduction Estimate

Way and structures		$32,387,138
Two subdivisions of this account were:		
Electric power plants	$1,346,965	
Electric power transmission	1,473,208	
Equipment		2,756,345
Electric locomotives	17,121	
Passenger train cars	2,083,298	
Floating equipment	655,926	
Law, taxes, interest, commissions		6,090,439
Proportional cost, Oakland pier		2,685,305
Proportional cost, boat yard		1,722,936
Proportional cost, float equipment		567,397
		$46,209,560

Brooklyn & North River Railroad, Brooklyn, N. Y.—The Public Service Commission for the First District has granted the Brooklyn & North River Railroad permission to issue capital stock to the amount of $100,000 to refund obligations incurred for construction and improvements to its system. The commission also adopted an order granting the following component companies the right to acquire the percentage of stock respectively subscribed for, namely, the Brooklyn Heights Railroad and the Nassau Electric Railroad, 25 per cent of the $100,000 capital stock; the New York Railways, 25 per cent; the Third Avenue Railway and the Dry Dock, East Broadway & Battery Railroad, 25 per cent; the Coney Island & Brooklyn Railroad, 25 per cent.

Charlottesville & Albemarle Railway, Charlottesville, Va.—The State Corporation Commission of Virginia has approved the consolidation by merger of the Charlottesville & Albemarle Railway and the Redland Power Company as the Charlottesville & Albemarle Railway. The authorized capital stock of the merged company is to be $700,000, of which $200,000 is to be preferred and $500,000 common. A mortgage to secure $750,000 of refunding and improvement bonds has been authorized. The Charlottesville & Albemarle Railway has outstanding $69,350 of capital stock, $25,000 of first mortgage bonds, $67,000 of general mortgage bonds and $100,000 of two-year improvement and extension notes. The Redland Power Company has outstanding $400,000 of stock and $150,000 of first mortgage 6 per cent gold bonds.

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Chicago (Ill.) City Railway.—The Chicago City Railway has declared the regular quarterly dividend of 2½ per cent and an extra dividend of one-half of 1 per cent, payable on Dec. 30.

Chicago (Ill.) Railways.—It is reported that the proxies asked by the management of the Chicago Railways for the meeting of certificate holders which will pass on the unification plan for the surface railways have been granted in sufficient numbers to assure the approval of the proposition.

Cleveland & Youngstown Railroad, Cleveland, Ohio.—Permission has been granted by the Public Utilities Commission of Ohio to the Cleveland & Youngstown Railroad to issue $600,000 of common stock, the proceeds to be used for discharging obligations incurred in construction and improvement work. The company is building an electric railway between Cleveland and Youngstown.

Columbus Railway & Light Company, Columbus, Ohio.—The directors of the Columbus Railway & Light Company have called two assessments of $10 per share each on the $5,000,000 of capital stock of the company. The first assessment is to be paid on or before Dec. 30, 1913, and the second on or before June 30, 1914. The stock is now $20 a share paid up. After the assessments are paid the stock will be exchanged for stock of the Columbus Railway, Light & Power Company, under which the Columbus Railway, the Columbus Railway, Power & Light Company, the Columbus Edison Company and the Columbus Light, Heat & Power Company, which companies are now operated by the Columbus Railway & Light Company, will be consolidated.

Columbus, Urbana & Western Electric Railway, Columbus, Ohio.—On application of L. P. Stephens as receiver, Judge E. B. Kinkead of the Common Pleas Court has set Jan. 20, 1914, as the date for the sale of the property of the Columbus, Urbana & Western Electric Railway. The company has $400,000 of bonds outstanding, of which the Columbus Savings & Trust Company, now in the hands of a receiver, owns $300,000, and Senator J. B. Foraker the remainder. There is also $42,000 due the bank on a loan.

Idaho Railway, Light & Power Company, Boise, Idaho.—The committee representing holders of certificates of deposit for first and refunding bonds, consolidated first and refunding bonds and preferred and common stock of the Idaho-Oregon Light & Power Company announces that it has terminated the deposit agreement of May 1, 1913, and abandoned the plan therein set forth. The protective committee was formed last April as a result of default by the company of its interest due April 1 on the first and refunding bonds. The company is controlled by the Idaho Railway, Light & Power Company, which owns $718,000 of first and refunding bonds, $854,000 of consolidated first and refunding bonds, $250,000 of notes, $2,148,400 of preferred and $6,415,100 of common stock.

International Traction Company, Buffalo, N. Y.—Ten of the second mortgage sinking-fund gold bonds of the Buffalo & Niagara Falls Electric Railway, dated July 1, 1896, have been called for payment at 105 and interest on Jan. 1, 1914, at the office of the Bankers' Trust Company, New York. N. Y. Harris, Forbes & Company, New York, N. Y., and Perry, Coffin & Burr, Boston, Mass., are offering for sale at 92½ and interest $950,000 of refunding and improvement 5 per cent fifty-year bonds of the International Railway, dated 1912 and due Nov. 1, 1962, but callable at 110 and interest on any interest date. These bonds are part of an issue of $2,366,000 recently authorized by the Public Service Commission for the Second District of New York, as noted in the ELECTRIC RAILWAY JOURNAL of Nov. 29, 1913.

Jefferson City Bridge & Transit Company, Jefferson City, Mo.—For the purchase of the Jefferson City Bridge & Transit Company by the Jefferson City Light, Heat & Power Company, noted in the ELECTRIC RAILWAY JOURNAL of Dec. 6, 1913, the Missouri Public Service Commission authorized the latter company to issue $200,000 of preferred stock and $200,000 of bonds. The property of the Jefferson Bridge & Transit Company is valued at more than $250,000. The Jefferson City Light, Heat & Power Company also applied to the commissioner for permission to create $1,000,000 of bonds to provide for taking up the company's outstanding indebtedness and for improvements and additions, only a portion to be issued at present, but the commission has delayed action on this petition for the reason, it is reported, that the total bonds must not exceed the capital stock.

Massachusetts Northeastern Street Railway, Haverhill, Mass.—The Massachusetts Northeastern Street Railway has been authorized by the Massachusetts Public Service Commission to issue $1,000,000 of twenty-year 5 per cent mortgage bonds, $870,000 to be used to refund bonds issued for the purchase of railways lately taken over by the company. The balance of $130,000 is to pay the floating debt of the companies at the time of the consolidation.

Nelson (B. C.) Street Railway, Ltd.—It is stated that the number of shares of stock of the Nelson Street Railway will be increased from 50,000 to 75,000 shares and that 40,000 shares will be sold to the city, giving it control of the property as referred to on page 1256 of this issue.

New York, New Haven & Hartford Railroad, New Haven, Conn.—The board of directors of the New York, New Haven & Hartford Railroad decided unanimously on Dec. 10 that no dividend should be paid on its stock for the current quarter. The passing of the dividend follows forty years of distributions of never less than 7½ per cent. Up to and including September, 1913, the company had paid to its stockholders 130 dividends in all, aggregating $158,477,817. At the meeting on Dec. 10 the directors authorized Howard Elliott, chairman of the board, to arrange for a separate management of the lines of the Connecticut Company. L. S. Storrs, now vice-president of the company, is to be made president. This is another step toward closer detailed supervision of the various properties in which the New York, New Haven & Hartford Railroad is interested.

New York (N. Y.) Railways.—T. De Witt Cuyler, Philadelphia, Pa., and John C. Cobb, Boston, Mass., have been elected directors of the New York Railways, increasing the membership of the board from nine to eleven. Milo Ray Maltbie, of the Public Service Commission for the First District of New York, has adjourned to Dec. 22 the rehearing on the application of the New York Railways for the approval of an issue of bonds originally put at $2,600,000, involving the right of the commission to limit the capitalization of the cost of the new stepless cars to the excess over the original cost of the cars displaced instead of the excess over the scrap value of the old cars, as the company desired.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—The Oakland, Antioch & Eastern Railway has filed for record a mortgage in favor of the Union Trust Company, San Francisco, as trustee, given to secure an issue of $5,000,000 of bonds.

Porto Rico Railways, San Juan, P. R.—The Royal Securities Corporation, Ltd., as financial agent for the Porto Rico Railways, recently offered in London the remaining $250,000 of an issue of $500,000 of 7 per cent cumulative preferred stock, par $100, at a price of 100 per cent Canada, equivalent to £20 11s. per share. The other half of this issue had already been subscribed for by existing shareholders, as noted in the ELECTRIC RAILWAY JOURNAL of Aug. 8, 1913.

Public Service Corporation of New Jersey, Newark, N. J.—The Board of Public Utility Commissioners of New Jersey has refused to approve the application of the Public Service Corporation for permission to sell $620,000 of 5 per cent bonds of the North Hudson County Railway to the Fidelity Trust Company, Newark, at 97 and accrued interest to provide funds to retire a similar amount of 6 per cent bonds of the company due Jan. 1, 1914. At the hearings before the commission in regard to the application a local bond dealer protested that he had not had an opportunity to bid for the issue, intimating that he would have offered a price higher than that at which it was proposed to dispose of the issue to the Fidelity Trust Company. In denying the application the commission said: "The question which arises is this, Was the petitioner's decision to sell the entire block at 97 and accrued interest to the Fidelity Trust Company and its associates, excluding competitive bids and omitting to sound other possible purchasers, a matter fairly within the elastic limits of the company's discretion, or did such financing constitute a departure from a sound and safe rule of action whereby the company would obtain less than the utmost possible or probable return by the sale of its securities? We are of the

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opinion that the sounding of other possible or probable bidders was a necessary part of the proper course to pursue; that departure therefrom in similar circumstances, even admittedly made without consciousness of improper motive, is a policy that may lead to unwarrantable prejudice to shareholders and to customers, and that a sense of special obligation would warrant nothing more than the sale to the preferred bidder at as high a price as offered by another responsible party."

Puget Sound Traction, Light & Power Company, Seattle, Wash.—The stockholders of the Puget Sound Traction, Light & Power Company will vote on Dec. 23 on authorizing an issue of short-term bonds to refund two-year 5 per cent mortgage notes that mature on Feb. 1, 1914.

Sheboygan Railway & Electric Company, Sheboygan, Wis.—The Sheboygan Railway & Electric Company has filed articles with the Secretary of State changing its name to the Sheboygan Public Utilities Company.

Tampa (Fla.) Electric Company.—At the annual meeting of the stockholders of the Tampa Electric Company to be held on Jan. 5, 1914, the question will be voted upon of increasing the stock of the company from $2,244,000 to $2,618,000. The plan is to devote the proceeds of the issue to paying floating debt of $125,000 and to provide for extensions and improvements during 1914. If the increase is authorized the new stock will be offered to stockholders at par in the ratio of one new share for every six now held.

Union Street Railway, New Bedford, Mass.—The Union Street Railway has been authorized by the Massachusetts Public Service Commission to issue $250,000 of twenty-year 4½ per cent bonds, the proceeds to be used to refund a similar amount falling due Jan. 1, 1914. These bonds are part of an issue of $2,000,000 of bonds authorized by the stockholders of the company at the annual meeting on Oct. 17.

Washington Water Power Company, Spokane, Wash.—The stockholders of the Washington Water Power Company have voted to increase the capital stock of the company from $15,000,000 to $20,000,000. Stockholders will have the right to subscribe to shares at par, equal to 10 per cent of their holdings. The present stock will be issued in amounts sufficient to take care of some outstanding notes which were made incident to the construction of the three-million-dollar power house of the company and for future construction work.

J. G. White & Company, Ltd., London, Eng.—One of the important recent financial undertakings of J. G. White & Company, Ltd., is the formation of the International Light & Power Company, Ltd., a holding company owning securities in several electric light and tramway properties throughout South America.

Dividends Declared

Arkansas Valley Railway, Light & Power Company, Pueblo, Col., quarterly, 1¾ per cent, preferred.

Augusta-Aiken Railway & Electric Corporation, Augusta, Ga., quarterly, 1½ per cent, preferred.

Brazilian Traction, Light & Power Company, Ltd., Toronto, Ont., quarterly 1½ per cent, preferred.

Continental Passenger Railway, Philadelphia, Pa., $3.

Eastern Texas Electric Company, Beaumont, Tex., $3, preferred.

El Paso (Tex.) Electric Company, 3 per cent, preferred; quarterly, 2 per cent, common.

Grand Rapids (Mich.) Railway, quarterly, 1 per cent, common.

Indianapolis (Ind.) Street Railway, 3 per cent.

Manila Electric Railroad & Lighting Corporation, New York, N. Y., quarterly, 1¾ per cent.

New York State Railways, Rochester, N. Y., quarterly, 1¼ per cent, preferred; quarterly, 1½ per cent, common.

Philadelphia Company, Pittsburgh, Pa., quarterly, 1¾ per cent, common.

St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., quarterly, 1¼ per cent, preferred.

Twin City Rapid Transit Company, Minneapolis, Minn., quarterly, 1¾ per cent, preferred; quarterly, 1½ per cent, common.

Union Traction Company, Philadelphia, Pa., $1.50.

United Traction & Electric Company, Providence, R. I., quarterly, 1¼ per cent.

Virginia Railway & Power Company, Richmond, Va., 2½ per cent, preferred.

West End Street Railway, Boston, Mass., 2 per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

BERKSHIRE STREET RAILWAY, PITTSFIELD, MASS.

Period			Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1 mo.	Oct.	'13	$82,849	*$78,983	$3,866	$15,283	†$11,417
1 "	"	'12	80,811	*79,932	879	12,749	†11,870
4 "	"	'13	389,592	*306,431	83,161	60,015	23,146
4 "	"	'12	370,433	*313,201	57,233	50,814	6,419

CONNECTICUT COMPANY, NEW HAVEN, CONN.

1 mo.	Oct.	'13	$680,597	*$525,234	$155,363	$89,079	$66,284
1 "	"	'12	640,299	*462,068	178,222	86,500	91,722
4 "	"	'13	3,114,757	*2,090,229	1,024,528	360,408	664,120
4 "	"	'12	2,868,373	*1,844,706	1,023,667	346,405	677,262

CUMBERLAND COUNTY POWER & LIGHT COMPANY, PORTLAND, MAINE.

1m.,	Oct.,	'13	$204,249	*$115,886	$88,363	$63,735	$24,628
1 "	"	'12	176,976	*98,364	78,612	56,510	22,102
12 "	"	'13	2,306,150	*1,286,259	1,019,891	700,142	319,749
12 "	"	'12	2,109,285	*1,225,904	883,381	631,287	252,094

DETROIT (MICH.) UNITED RAILWAY.

1m.,	Oct.,	'13	$1,039,610	$727,635	$311,975	$182,430	$129,545
1 "	"	'12	1,050,143	714,003	335,141	175,308	160,833
12 "	"	'13	10,961,416	7,273,654	3,787,762	1,769,891	1,695,971
12 "	"	'12	9,863,112	6,397,251	3,465,861	1,769,891	1,695,970

EAST ST. LOUIS & SUBURBAN COMPANY, EAST ST. LOUIS, ILL.

1m.,	Oct.,	'13	$248,966	*$156,572	$92,394	$49,547	$42,847
1 "	"	'12	227,088	*122,901	104,187	48,176	56,011
12 "	"	'13	2,668,715	*1,545,041	1,123,674	589,109	534,565
12 "	"	'12	2,400,890	*1,319,750	1,081,140	573,528	507,612

GRAND RAPIDS (MICH.) RAILWAY

1m.,	Oct.,	'13	$104,329	*$68,469	$35,860	$13,306	$22,554
1 "	"	'12	101,569	*58,713	42,856	14,817	28,039
12 "	"	'13	1,279,579	*784,031	495,548	171,038	324,510
12 "	"	'12	1,228,766	*689,050	539,716	175,657	364,059

LEHIGH VALLEY TRANSIT COMPANY, ALLENTOWN, PA.

1m.,	Oct.,	'13	$145,647	$55,348	$90,299	$47,012	$43,287
1 "	"	'12	126,734	49,106	77,538	42,563	34,975
12 "	"	'13	1,758,650	736,822	1,021,828	552,087	469,741
12 "	"	'12	1,479,383	640,401	838,893	498,085	340,808

LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY, LEWISTON, MAINE.

1m.,	Oct.	'13	$51,301	*$36,068	$15,233	$14,456	$777
1 "	"	'12	51,599	*31,686	19,913	14,400	5,513
12 "	"	'13	668,543	*419,260	249,283	177,699	71,584
12 "	"	'12	612,557	*386,141	226,416	173,151	53,265

MONONGAHELA VALLEY TRACTION COMPANY, FAIRMONT, W. VA.

1m.,	Oct.,	'13	$87,394	$33,887	$53,506	$25,799	$27,707
1 "	"	'12	77,837	29,589	48,248	24,738	23,510
12 "	"	'13	788,832	280,152	508,680	246,092	262,588
12 "	"	'12	705,450	280,339	425,111	211,556	213,555

NASHVILLE RAILWAY & LIGHT COMPANY, NASHVILLE, TENN.

1m.,	Sept.,	'13	$187,252	*$119,404	$67,848	$39,828	$28,020
1 "	"	'12	189,100	*102,932	86,168	36,994	49,174
12 "	"	'13	2,166,318	*1,291,318	875,237	455,634	419,603
12 "	"	'12	2,047,795	*1,173,201	874,594	425,572	449,022

NEW YORK & STAMFORD RAILWAY, PORT CHESTER, N. Y.

1 mo.	Oct.	'13	$26,982	*$29,635	$2,654	$7,850	†$10,504
1 "	"	'12	28,635	*25,858	2,777	7,030	†4,253
4 "	"	'13	161,169	*114,909	46,260	30,741	15,519
4 "	"	'12	156,376	*124,963	31,412	27,812	3,600

NEW YORK, WESTCHESTER & BOSTON RAILWAY, NEW YORK, N. Y.

1 mo.	Oct.	'13	$38,749	*$45,320	$6,571	$9,213	†$15,783
1 "	"	'12	29,004	*50,398	21,394	13,992	†35,386
4 "	"	'13	150,261	*193,965	43,704	37,088	†80,792
4 "	"	'12	92,505	*191,472	98,967	45,967	†144,934

PORTLAND (MAINE) RAILROAD

1m.,	Oct.,	'13	$82,620	*$52,081	$30,539	$21,711	$8,828
1 "	"	'12	79,415	*54,283	25,132	10,254	14,878
12 "	"	'13	1,034,100	*705,997	328,103	156,193	171,910
12 "	"	'12	972,501	*691,642	280,859	120,039	160,820

REPUBLIC RAILWAY & LIGHT COMPANY, NEW YORK, N. Y.

1m.,	Oct.,	'13	$257,126	*$156,462	$100,664	$43,804	$56,860
1 "	"	'12	230,773	*137,671	93,103	43,869	49,234
12 "	"	'13	2,962,320	*1,800,391	1,161,929	537,111	624,818
12 "	"	'12	2,606,842	*1,567,406	1,039,436	530 428	509,008

RHODE ISLAND COMPANY, PROVIDENCE, R. I.

1 mo.	Oct.	'13	$462,302	*$343,221	$119,080	$105,739	$13,341
1 "	"	'12	464,302	*298.447	165,856	102,056	63,799
4 "	"	'13	2,056,688	*1,373,605	683,085	421,656	261,429
4 "	"	'12	2,006,136	*1,844,706	1,023,667	346,405	677,262

*Includes taxes.

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Traffic and Transportation

Modification of Running Board Order Refused

The Connecticut Public Utilities Commission has declined to modify its order issued some months ago regarding the custom of passengers riding on the steps or running boards of electric railway cars. The order referred to called upon all electric railways operating side-entrance open cars in the State to adopt and issue a rule forbidding passengers to ride on the steps or running boards of the cars. A petition was filed with the commission later by the New Haven division of the Amalgamated Association asking that the order be amended so that the decree be directed against the public, or that the decree be directed against the companies, calling upon them to refrain from using running boards for the purpose of carrying passengers. The commission has replied that it has no jurisdiction to direct such an order against the public and does not believe the latter drastic action is demanded. It further declares that it believes that a reasonable enforcement of the company's rule can be maintained, if diligent effort is made on the part of the officers and employees of the various companies. The opinion in part follows:

"The previous order, which the petition requests be modified, reads as follows:

"'The Connecticut Company and all other electric street railways operating side-entrance open cars in the State are hereby ordered and directed to adopt and issue a rule, as one of their operating rules and regulations, forbidding and prohibiting passengers from riding on the steps or running boards of all their side-entrance open cars.'

"The commission has no jurisdiction to issue an order directed against or requiring the general public to do or refrain from doing a particular act, as requested in the fore part of said Section 1 of this petition. The commission has jurisdiction, however, after hearing had, on complaint in writing, to issue an order directed against a public service company requiring it to do or refrain from doing certain specified acts pertaining to its plant or equipment or to the manner of operating such plant, if found necessary for the public safety or for the safety of the employees of such company.

"Chapter 15 of the Public Acts of 1913 prescribes a penalty for any person who wilfully resists an employee of a street railway in the enforcement of any such order duly made by the commission. There is no penalty imposed on the traveling public for performing an act which an order of the commission prohibits, but for wilfully resisting an employee of a public service company in the enforcement of such an order, and the company is subject to a penalty of not more than $1,000 for each violation of any such order."

Detroit "Safety First" Plans Being Perfected

The Detroit (Mich.) United Railway is rapidly perfecting plans for its "safety first" campaign, mention of which was made at length in the ELECTRIC RAILWAY JOURNAL of Nov. 22, 1913, page 1122. Within a few weeks the city and the interurban lines will be thoroughly organized through the formation of safety boards in charge of the work. At the head of the movement is the general safety board with W. E. Cann, assistant to the general manager, as chairman. The other members of this board are: General Manager F. W. Brooks, General Superintendent Bullen, Assistant General Superintendent Dohrman, Superintendent of Power Burdick, Superintendent of Tracks Kerwin, Master Mechanic Potter, General Claims Attorney Rankin, General Freight Agent Parker, General Passenger Agent Keys, Supervisor of Dispatching Loughran and Publicity Agent Van Zandt.

There is to be a district safety board representing the Detroit city lines and a division safety board for each of the interurban lines. The first of the division boards organized is that of the Rapid Railway. The Flint, Orchard Lake and Pontiac divisions will be organized next. Each district and division board will meet monthly and go over matters that have come to its attention through contact with other employees, and once a month there will be a meeting of the general board to pass upon the work and recommendations of the district and division boards. At this meeting the chairman of each division board will appear and take up with the general board such matters as have been favorably passed upon by his board. The general board will decide definitely as to what action will be taken upon all such matters presented, and when the decision is adverse specific reasons for such action will be given to the division chairman and he in turn will transmit the reasons to the employee making the suggestion.

Arrests for Stealing Fares in Saskatoon.—Eleven conductors on the Saskatoon (Sask.) Municipal Railway are on trial charged with pilfering from the fare boxes. The cases were remanded.

Reduction in Fare to Be Asked in Tacoma.—The City Commissioners of Tacoma, Wash., have decided to ask the Tacoma Railway & Power Company to sell twenty-five tickets for $1 good on its lines in Tacoma. The company now sells twenty-two tickets for $1 on its cars.

No Excuse for Stepping Off Car Backward.—In a Kansas City Court Judge Bird held in the suit of Alice L. Hulen against the Metropolitan Street Railway for $20,000 that she can collect no damages because she stepped off a street car backward. The court stated that there was no excuse for the woman's act in view of the wide publicity which the correct methods of alighting from cars had received.

Buffalo Conductors Arraigned for Stealing.—Probation and orders to pay $25 each in reparation was the disposition made by the court at Buffalo of the cases of the former conductors of the International Railway who pleaded guilty to cashing used street car tickets. The men bought the canceled tickets from a clerk in the canceling department of the road and then turned the tickets in for cash, keeping the 5-cent fare collected from the passenger.

Inquiry into Fares and Service in Jamestown.—The Council of Jamestown, N. Y., has asked the Public Service Commission of the Second District of New York to enter an order to require the Jamestown Street Railway to carry children to and from school for half fare and to investigate the service furnished by the company during rush hours. The request for half fare for school children was denied recently by A. N. Broadhead, president of the company.

Suggestions Invited.—E. J. Cook, vice-president of the New York State Railways, Rochester lines, issued the following statement previous to an inspection trip which he made recently over the lines in Rochester and the Rochester & Eastern Railway: "All patrons and friends of the company as well as those who have cause to feel other than friendly are invited to board the special train during its stay at the various points and give evidence of their friendliness or the cause of their being otherwise."

Watching the Signals.—The Pennsylvania Railroad has reprinted in leaflet form an article contributed by one of its locomotive engineers to the *Railway Age-Gazette* on how he "keeps a lookout." It describes graphically the work of an engineer on a fast passenger locomotive, the requirements as to signals, etc., and gives an excellent idea of the duties required of an engine man in work of this character. This publication of the Pennsylvania Railroad is one of its series of publicity leaflets designed to inform the public of some of the problems of steam railroading.

Freight Right Granted in Waupaca.—The City Council of Waupaca, Wis., passed an ordinance authorizing the Waupaca Electric Light & Railway Company to haul freight over its line between the Soo Line depot in Waupaca and the Wisconsin Veterans' Home, a distance of 5 miles. The ordinance provides that not more than two cars shall be hauled in any one train and that no car shall exceed 10 tons capacity. The Wisconsin Veterans' Home, with its 1000 inmates, has been obliged heretofore to have its freight hauled from the city of Waupaca by team.

New Transfer in Rochester.—The New York State Railways is using a new transfer on its Rochester lines by which it is hoped that confusion will be decreased and the number of unused transfers lessened. The new transfers are all of one color—yellow—and bear in red across the face the numeral corresponding with the day of the month. The month is punched. Transfers which are left over may

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be used on the same day of any other month. The new transfers also bear on the face opposite each line the transfer point where passengers may change from car to car. This was formerly printed on the back.

Moving Pictures at Lexington.—The Kentucky Traction & Terminal Company, Lexington, Ky., has arranged to exhibit at the Colonial Theater in that city at its own expense a moving picture film called "The Fruits of Thoughtlessness." The film indicates the causes of street railway accidents and the proper way to avoid them and on account of its dramatic interest impresses the lessons of care more deeply than can be done ordinarily. The company is carrying on a definite campaign for accident prevention, of which the exhibition of the film is but a part. M. A. Cassidy, superintendent of public schools, is co-operating with the company and will arrange for school children to see the film at the moving picture theater.

The Stepless Car in Brooklyn.—The Brooklyn (N. Y.) Rapid Transit Company now has in operation all of the 101 center-entrance stepless cars which it ordered some time ago. Fifty of the cars are being operated on the Gates Avenue line, thirty on the Flatbush Avenue line and twenty-one on the St. John's Place line. These are all lines on which traffic is uniformly heavy. J. F. Calderwood, vice-president and general manager of the company, says: "The company is naturally anxious to see how the cars stand up under every possible test of service. We have given them practically every test but that of winter service, and we desire to see how they operate during the stormy winter months before we place another order."

Fare Charge Upheld.—In the complaint by the West Middlesex Borough Council against the Republic Railway & Light Company, Youngstown, Ohio, the Public Service Commission of Pennsylvania finds to be reasonable a fare of 5 cents for a distance of 3.2 miles. The commission in its decision says that as long as 5 cents continues to be the unit of fare the dividing lines of zones cannot always be of uniform distance, nor can exact distances be fixed as the length of ride for one unit of fare. In the consideration of the reasonableness of any rates of fare or the length of ride for one fare unit, the commission finds that the controlling factors are the relative locations of the centers of manufacture, business, shopping and population with reference to the greatest proportion of travel.

Collision in New York Subway.—Traffic in the subway from the Brooklyn Bridge station southward was delayed on Dec. 4 for more than one hour following a collision between a northbound train from the South Ferry and a train coming from Brooklyn at the Bowling Green junction. Frank Hedley, vice-president and general manager of the Interborough Rapid Transit Company, issued the following statement regarding the accident: "The train from South Ferry was coming around the Bowling Green loop and had the right-of-way. The signals and switches were right. The motorman of the train from Brooklyn says the distant signal was at caution and that the home signal turned red just as he appeared in sight of it, and he could not stop before bumping into the other train."

Carrying on Construction Without Interfering with Traffic.—The Brooklyn Rapid Transit Company, Brooklyn, N. Y., inserted in the Brooklyn papers of Dec. 9 an advertisement headed "Miracles and the Brooklyn Rapid Transit Company," in a space 8 in. wide and full newspaper depth. The company referred particularly to the work which is being carried out in connection with the subway and rapid transit contracts and showed the immense amount of readjustment which is necessary in order to facilitate that work. Under the circumstances it is impossible not to interrupt the regular Brooklyn Rapid Transit service occasionally. One particularly difficult piece of work to which the company referred in the advertisement is the proposed connection between the Broadway elevated line and the Myrtle Avenue elevated line at the junction of Myrtle Avenue and Broadway. At this point the Myrtle Avenue and the Broadway lines cross at different levels. It is proposed to build a direct connection between the existing structures, and the work is being carried out and an effort made to maintain regular service. The company concluded the advertisement with the capitalized sentence, "Co-operation, Not Miracles, in This Age of Progress."

Personal Mention

Mr. N. W. Patterson has been appointed chief inspector of the Regina (Sask.) Municipal Railway.

Mr. John G. Sutton has been elected vice-president and general manager of the Ocean Shore Railroad, San Francisco, Cal., to succeed the late Alfred Williams.

Mr. A. W. Foster has resigned as a member of the transportation committee of the Panama Pacific Exposition, because he was recently named as a director of the United Railroads, San Francisco.

Mr. Alfred H. Smith, senior vice-president of the New York Central & Hudson River Railroad and the Lake Shore & Michigan Southern Railway, has been elected president to succeed Mr. William C. Brown, who will retire on Jan. 1.

Mr. C. H. Gerber, who has been principal assistant in the valuation department of the State Railway Commission of Nebraska, will assume charge of the engineering office of the commission, Mr. E. C. Hurd having resigned as chief engineer in charge of the valuation work of the commission.

Mr. Clarence P. Westlake, who has been carhouse foreman of the Columbia Railway, Gas & Electric Company, Columbia, S. C., has been appointed superintendent of the company to succeed Mr. Alfred Wallace, whose appointment as general manager of the company is announced elsewhere in this column.

Mr. Wilfrid K. Barnard, formerly engineer of maintenance of way and structures of the Pacific Electric Railway, Los Angeles, Cal., has formed a partnership with Capt. Charles T. Leeds, U. S. A., retired, under the firm name of Leeds & Barnard, for the general practice of engineering, with offices at Los Angeles.

Mr. C. F. Foley, Lyons, Kan., has been appointed a member of the Kansas State Public Utilities Commission, succeeding Mr. Henderson S. Martin, who has resigned to become vice-governor of the Philippine Islands. Mr. Foley is a lawyer. He is the second new member of the commission, Mr. James A. Cable having been appointed about a month ago.

Mr. Archibald B. Millar has been elected secretary of the Public Service Commission of Pennsylvania. Mr. Millar was private secretary to Governor Stuart during the latter's term. Afterward he was secretary to the State Railroad Commission, the predecessor of the Public Service Commission. He has been acting secretary to the latter body since its formation.

Mr. Flagg F. Grant, who has been station agent at Portsmouth, N. H., for many years for the Boston & Maine Railroad, has been appointed general agent at Portsmouth with jurisdiction over the station and the Portsmouth Electric Railway. Mr. Grant is a native of Berwick and has been in the employ of the Boston & Maine Railroad for twenty-four years.

Mr. Alfred Wallace has been appointed general manager of the Columbia Railway, Gas & Electric Company, Columbia, S. C., to succeed Mr. G. K. Dustin, who resigned early in the fall to accept a position in New York. Mr. Wallace has been connected with the street railway system in Columbia since 1885, with the exception of four years during the administration of President Cleveland, when he was in the postal service.

Mr. Robert M. Searle, vice-president of the Rochester Railway & Light Company, Rochester, N. Y., has been elected vice-president of the New York State Railways. He will still retain his former position and will remain in Rochester to take charge of the public policies of the two corporations, while Mr. E. J. Cook, vice-president of the New York State Railways, will remain in Rochester as general manager of the Rochester lines.

Mr. Charles C. Dietz, whose resignation from the United Traction Company, Albany, N. Y., to become connected with the McGraw Publishing Company, Inc., was noted in the Electric Railway Journal of Dec. 6, was the guest of honor at a dinner of the heads of the departments under the jurisdiction of Mr. James F. Hamilton, general manager of the company, at the Albany Club on Dec. 4. He was presented with a diamond pin and diamond cuff buttons. A theater party followed the dinner.

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Mr. F. W. Murphy has been appointed electrical engineer and master mechanic of the Chicago, Ottawa & Peoria Railway with headquarters at Ottawa, Ill. Prior to accepting this position Mr. Murphy was assistant foreman of the electrical department of the Chicago (Ill.) Railways for three years. He began his electric railway career in 1895 in the mechanical department of the Calumet & South Chicago Railway, advancing to master mechanic of that road. Later he became master mechanic of the Southern Traction Company, now the Chicago & Interurban Traction Company.

Mr. C. L. S. Tingley, who has been elected president of the Pennsylvania Street Railway Association, is second vice-president of the American Railways, Philadelphia, Pa. Mr. Tingley was born in Philadelphia in 1865 and was educated at the Episcopal Academy of that city. He entered business in 1881 with the Girard Point Storage Company, a subsidiary of the Pennsylvania Railroad. This company operated the grain and oil terminals in Philadelphia. He subsequently entered the employ of the banking and shipping firm of Peter Wright & Son, with which he served first in the accounting department, then as assistant cashier and subsequently as cashier. Upon the organization of the American Railways in 1899, Mr. Tingley was elected secretary and assistant treasurer of the company. In 1901 he was elected treasurer and in 1903 he was elected second vice-president. Mr. Tingley's first association connection was with the American Electric Railway Accountants' Association, of which he was first vice-president in 1901-02, a member of the executive committee in 1905-06, president in 1906-07 and a member of the executive committee in 1907-08. From time to time he has served on numerous committees of that body, and in 1905 presented a paper before the convention on the cost of carrying passengers. His activities with the American Electric Railway Association have been of rather recent date and consist of serving for two or three years on the committee on compensation for carrying United States mail and three or four years on the committee on taxation matters, the last two years as chairman and the year before that as vice-chairman. Mr. Tingley presented a paper, "Present Tendency of Public Utility Laws and Regulations," at the convention last fall.

Mr. George F. Reed has been appointed manager of the Springfield (Mass.) Street Railway to succeed Mr. E. J. Dickson, who has been elected vice-president of the International Railway, Buffalo, N. Y. Mr. Reed was born in Cummington, Mass., on May 10, 1867. His parents moved to Springfield when Mr. Reed was an infant, and he has been a resident of Springfield continuously since that time. He attended the public schools there and entered the employ of the Springfield Street Railway in February, 1882, as a clerk. He remained in that position until the spring of 1890, when the motive power of the company was changed from horses to electricity. He was then made electrician in charge of all of the electrical and mechanical work on the cars. In 1892 he was placed in charge of the transportation department, his duties being practically those of superintendent. In 1905 he was appointed superintendent of the Springfield division, and in 1911 he was made superintendent of transportation in charge of the Springfield, Westfield and Palmer divisions. On Dec. 1, 1913, he was promoted to the position of manager of the Springfield Railway to succeed Mr. Dickson.

G. F. Reed

OBITUARY

Robert Christy Totten, who was president of the Nickel-Chrome Chilled Car Wheel Company, Pittsburgh, Pa., is dead. Mr. Totten was born in Pittsburgh eighty-one years ago. His father was one of the early iron manufacturers, having organized the old Fort Pitt foundry. When the elder Mr. Totten died the son entered the concern and conducted the business until 1891.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Los Angeles (Cal.) Railway.**—Incorporated in California in the interests of the Los Angeles Railway Corporation and the City Railway of Los Angeles. Directors: W. E. Dunn, G. C. Ward, C. A. Henderson, S. M. Haskins, J. E. Brown, Frank Griffith and Albert Crutcher.

***Southern Illinois & St. Louis Railway, Harrisburg, Ill.**—Application for a charter has been made by this company to build an electric railway from Marion to Harrisburg. Another line will extend north to Benton. A spur will connect Johnson City and Herrin. Incorporators: William Rothman, William M. Klein, Samuel Kraus, Thomas G. Deering, all of Chicago, and Harold E. Higginson, Elmhurst.

Red Lodge (Mont.) Electric Railway.—Incorporated in Montana to build a 9-mile railway between Red Lodge, Washoe and Bear Creek. Capital stock, $225,000. Officers: C. C. Bowlen, president; J. N. Tolman, vice-president; Walter Alderson, secretary, and E. A. Sell, treasurer. [E. R. J., Dec. 6, '13.]

Three Rivers (Que.) Traction Company.—Application for a charter will be made by this company to the Quebec Legislature to build an electric railway in Three Rivers and the surrounding municipalities. J. Aldred, T. McDougall and W. S. Hart, Montreal, are interested. [E. R. J., Nov. 8, '13.]

Dallas (Tex.) Northwestern Traction Company.—Application for a charter will be made by this company to build a 50-mile electric railway from Dallas to Krum, via Denton. E. P. Turner, president. [E. R. J., Sept. 20, '13.]

***Tacoma (Wash.) Transit Company.**—Application for a charter has been made by this company to build an electric railway in Tacoma. Capital stock, $30,000. Incorporators: J. Grant Hinkle and George Everett.

FRANCHISES

Birmingham, Ala.—The Birmingham & Chattanooga Railroad has asked the Council for a franchise in Birmingham. This is part of a plan to build a 147-mile railway to connect Birmingham and Chattanooga, via Oneonta and Boaz. W. W. Shortridge, secretary. [E. R. J., May 3, '13.]

***Birmingham, Ala.**—William M. Walker, Birmingham, has asked the Council for an electric railway franchise on Avenue F in Birmingham.

St. Petersburg, Fla.—The St. Petersburg Land & Loan Company has asked the Council for a franchise on Ninth Street north, beginning at the city limits and extending north to John's Pass Road. [E. R. J., Dec. 6, '13.]

New Orleans, La.—The City Council of New Orleans is advertising for sale two electric railway franchises, one on Claiborne Street to Clio Street to Magnolia Street, also on Erato Street from Claiborne Street to Magnolia Street, and the other on Broadway from Claiborne Avenue to Maple Street.

St. Louis, Mo.—The East St. Louis & Suburban Railway will ask the Council for a franchise for a line from the Lansdowne division to Natalia Avenue, Twenty-ninth Street, Caseyville Road and Jones Park in St. Louis.

Brooklyn, N. Y.—The Manhattan Bridge Three-Cent Line has received permission from the Board of Estimate to build through several streets in Brooklyn so as to reach the Long Island Railroad station.

Marion, Ohio.—Eli M. West, receiver for the Columbus, Delaware & Marion Railway, has received a twenty-five-year franchise from the County Commissioners.

Henryetta, Okla.—The Henryetta Interurban Railway has received a franchise from the Council in Henryetta. This is part of a plan to build a 100-mile electric railway to connect Henryetta with the various coal mines and oil fields within a radius of 10 miles of Henryetta. C. H. Kellogg, Henryetta. [E. R. J., Oct. 18, '13.]

Ottawa, Ont.—The London & Lake Erie Railway &

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Transportation Company has asked Parliament to extend the time for construction of its authorized lines and for authority to build branches from Sparta and from St. Thomas through Aylmer to Port Burwell.

Centralia, Wash.—The Washington-Oregon Corporation, Vancouver, has received a franchise from the Lewis County Commissioners for a line from the Galvin station near the fair grounds west on South Street to the old Union Pacific grade and thence north to the south city limits of Centralia.

Seattle, Wash.—The Puget Sound Traction, Light & Power Company has received a franchise from the Council along the county roads between Seattle and Lake Forest Park. The company has also asked for a franchise for a line between Kirkland and Redmond.

Ceredo, W. Va.—The Ohio Valley Electric Railway has asked the City Council for a franchise for a double-track line between Ceredo and Kenova.

TRACK AND ROADWAY

Birmingham & Chattanooga Railroad, Birmingham, Ala.—Grading has been begun by this company in Boaz. Construction at other points along the line will be begun next spring. This 145-mile line will connect Chattanooga, Tenn., and Birmingham, Ala., via Oneonta and Boaz. J. M. Spradin, Boaz, president. [E. R. J., May 31, '13.]

British Columbia Electric Railway, Vancouver, B. C.—Plans have been approved by this company to build a line on Forty-third Avenue, South Vancouver, from Bridge Street to Main Street. This is an extension of the new line from Kerrisdale to Point Grey.

Northern Electric Railway, Chico, Cal.—Surveys have been completed by this company for the Colusa extension. This 40-mile line will extend from Woodland to Colusa.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—This company has filed a deed of trust to the Union Trust Company, San Francisco, to secure a bond issue of $5,000,000. The deed covers rights-of-way through Contra Costa and San Joaquin Counties for a line from Oakland to Stockton.

United Railroads, San Francisco, Cal.—This company is asked to extend its line along Richland Avenue from Mission to Andover in San Francisco.

Stockton Terminal & Eastern Railroad, Stockton, Cal.—Work will soon be begun by this company on the completion of its line to Jennie Lind.

Carolina & Georgia Railway, Augusta, Ga.—Financial arrangements have been made and surveys will soon be begun by this company on the line between Greenwood and Johnston to connect with the proposed line from Columbia, S. C., to Augusta, Ga., two lines being run, one via Ninety-Six and the other via Epworth. James U. Jackson, Augusta, president. [E. R. J., Sept 27, '13.]

***Hagerman Valley & Twin Falls Traction Company, Boise, Idaho.**—This company is reported to have been financed to build a 37-mile electric railway from Hagerman to Castleford. D. B. Welty, Oklahoma City, Okla., is interested.

Michigan & Chicago Railway, Chicago, Ill.—This company has asked authority to issue $3,000,000 bonds and $750,000 capital stock for building an electric railway between Owosso and Saginaw.

Union Traction Company, Independence, Kan.—Plans are being considered by this company for an extension south of Nowata.

***Franklin, Ky.**—Citizens of Franklin and Simpson Counties are considering plans to build an electric railway between Franklin and Nashville, via Orlinda, a distance of 43 miles.

Brandon (Man.) Municipal Railway.—A report is being prepared for submission to the City Council of Brandon, Man., respecting extensions to the line which it may be necessary to make in 1914. The principal extension proposed is one of 4 miles to the Experimental Farm, the Industrial School and Lake Percy.

United Railways & Electric Company, Baltimore, Md.—The Public Service Commission has issued a peremptory order for the extension of this company's Belair Road line from the present terminus at Overlea to Jerusalem, a distance of 7 miles, for which a franchise exists.

Detroit, Lansing & Grand Rapids Railway, Detroit, Mich.—This company plans to begin work in the spring on its 135-mile line between Detroit and Grand Rapids, via Lansing. Capital stock authorized, $2,500,000; issued, $25,000. Bonds authorized, $5,000,000; issued, $50,000. The company will furnish power for lighting purposes. Officers: Henry M. Wallace, 704 Union Trust Building, Detroit, vice-president; Raymond G. St. John, secretary; William T. Utley, treasurer, and H. M. Wallace, Detroit, general manager and purchasing agent. [E. R. J., March 2, '12.]

Grand Rapids, Hastings & Battle Creek Interurban Railway, Grand Rapids, Mich.—This company states that no definite plans have yet been made as to when construction will be begun on the 53-mile railway to connect Grand Rapids, Hastings and Battle Creek. A. C. Sekell, Grand Rapids, promoter. [E. R. J., Dec. 7, '13.]

Lansing, Mich.—Grading has nearly been completed for the 11-mile electric railway to connect Lansing and Grand Ledge. George H. Kneal, Lansing, is interested. [E. R. J., July 6, '13.]

Mesaba Electric Railway, Duluth, Minn.—Plans are being considered by this company to extend its line westward as far as Biwabik and eventually to Grand Rapids.

Mankato (Minn.) Electric Traction Company.—Surveys are being made by this company for an extension from Mankato to St. Clair, via Thompson's ravine.

Minneapolis & Central Minnesota Railway, Minneapolis, Minn.—Surveys have been made by this company on the 25-mile section of its line between Minneapolis and Dayton and grading has been completed between Robbinsdale and Champlain, 12 miles. Construction will be begun in the spring on this 66-mile line between Minneapolis and St. Cloud. E. G. Potter, 433 Andrews Building, Minneapolis, president.

Minnesota Union Electric Railway, Minneapolis, Minn.—Right-of-way has been secured and financial backing has been obtained by this company for its line between Minneapolis and St. Cloud, via Hamel, Hanover, St. Michael, Buffalo, Maple Lake, Annandale and South Haven. Theodore A. Chadwick is one of those interested. [E. R. J., Nov 8, '13.]

Missouri Valley Traction Company, St. Joseph, Mo.—This company states that its 68-mile line between Excelsior Springs and St. Joseph, via Lathrop, Lawson, Mirabile and Kingston, is still in the course of promotion. H. G. Krake, St. Joseph, secretary. [E. R. J., Dec. 12, '13.]

United Traction Company, Albany, N. Y.—This company plans to extend its Broadway line in upper Rensselaer next spring.

Cleveland (Ohio) Railway.—Directors of this company have approved a contract with the Cleveland Interurban Railway, making possible a new electric line to Shaker Lakes.

Poland (Ohio) Street Railway, Youngstown, Ohio.—This company has placed in operation its line between Poland and Youngstown. G. J. A. Paul, superintendent. [E. R. J., Sept. 27, '13.]

***Bartlesville, Okla.**—Plans are being made to build an electric railway from Bartlesville to Caney, Kan., via Bolton, Wayside and Havana. Business men of Bartlesville are promoting the project.

Oklahoma (Okla.) Railway.—A 16-mile extension is being planned by this company from Edmond north of Guthrie.

London & Lake Erie Railway & Transportation Company, London, Ont.—The directors of this company have been asked to build an extension through Elgin from Union to Sparta and further, if possible, to Port Bruce.

Toronto, Barrie & Orillia Electric Railway, Toronto, Ont.—At a recent meeting of the Barrie (Ont.) Town Council a committee was appointed to confer with the company with a view to having an agreement for a franchise submitted to a vote of the ratepayers in January. This company was originally incorporated by the Ontario Legislature as the Monarch Radial Railway, having power to build a railway from Toronto to Barrie and Orillia. An extension of time for construction and authority to change its name to the Toronto, Barrie & Orillia Electric Railway was granted in 1912. [E. R. J., Feb. 17, '13.]

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Conestoga Traction Company, Lancaster, Pa.—This company has placed in operation its 2-mile line between Lancaster and Rohrerstown, and hereafter the cars on the Mount Joy and Elizabethtown division of the company's line will follow this route instead of proceeding west on the Columbia turnpike as far as Ridgeway and then 1 mile north to the Marietta pike, as heretofore.

Scranton & Binghamton Traction Company, Scranton, Pa.—This company has completed 6 miles of grading, from Nicholson to Foster, on its 17-mile extension from Nicholson to Montross. R. W. Day, general manager.

Warren (Pa.) Street Railway.—Work will be begun shortly after the first of the year by this company on a 9-mile extension from Warren to Youngsville.

Jackson Railway & Light Company, Jackson, Tenn.—Work will be begun in the spring by this company on its new West Jackson line.

Puget Sound Traction, Light & Power Company, Seattle, Wash.—This company has agreed to build a 1-mile line on Fairview Avenue from Westlake Avenue to Virginia Street to the proposed county dock on the east shore of Lake Union, provided that the King County Commissioners will agree to operate a ferry from the dock through the Lake Washington canal to some point on the eastern shore of the lake.

Tacoma, Wash.—The City Commission at a recent meeting voted to call a special election Jan. 3, 1914, for the voters of Tacoma to pass upon a proposed bond issue of $100,000 to be used in building a municipally owned and operated street car line across the new Lincoln bridge and the tideflats to the manufacturing district of Tacoma. The Tideflats Carline Club, composed of several hundred workingmen, has agreed to stand the expense of the election, provide polling places and pay the election officials.

Charleston, Parkersburg & Northern Railroad, Parkersburg, W. Va.—Right-of-way has been secured, surveys are under way and construction will soon be begun by this company on its 47-mile line to connect Parkersburg, Charleston and Sissonville. K. B. Stephenson, Parkersburg, president. [E. R. J., July 12, '13.]

SHOPS AND BUILDINGS

Birmingham & Chattanooga Railroad, Birmingham, Ala.—Arrangements have been made by this company for terminal facilities in Chattanooga. J. M. Spradin, Boaz, president.

Stockton Terminal & Eastern Railroad, Stockton, Cal.—Plans are being considered by this company to build soon a new terminal on the Stockton waterfront.

Atlantic City & Shore Railroad Company, Atlantic City, N. J.—This company has now under construction new carhouses and shops in Atlantic City.

Ohio Electric Railway, Cincinnati, Ohio.—The A. Bentley & Sons Company has begun work on the foundation of the new freight house to be built for the Ohio Electric Railway in Cincinnati. The new structure will be one story high.

POWER HOUSES AND SUBSTATIONS

Charlotte (N. C.) Electric Railway.—This company has placed an order with the Westinghouse Electric & Manufacturing Company for one 750-kw, 600-volt, direct-current, six-phase, 60-cycle, 900-r.p.m. rotary converter; three 275-kva, single-phase, 60-cycle, 2200-volt, rotary-voltage, O.I.S.C. transformers and one switchboard for the control of the above apparatus.

Pennsylvania Railroad, Philadelphia, Pa.—This company has placed an order with the Westinghouse Electric & Manufacturing Company for one 20,000-kw and two 1000-kw turbines with surface condensers and other power house apparatus for the Long Island electric power station which furnishes electricity for the Long Island Railroad system.

Scranton (Pa.) Railway.—This company plans to build a new substation at Stark's Crossing in Moosic.

Norfolk & Western Railroad, Norfolk, Va.—This company has placed an order with the Westinghouse Electric & Manufacturing Company for three 9000-kw turbines, which the company will need in its plan of electrifying part of its system.

Manufactures and Supplies

ROLLING STOCK

Southern Traction Company of Illinois, East St. Louis, Ill., has ordered six passenger cars from the St. Louis Car Company.

City Railway, Dayton, Ohio, noted in the ELECTRIC RAILWAY JOURNAL of Aug. 30, 1913, as being in the market for cars, has purchased twenty 29-ft. 6-in. single-end double-truck prepayment car bodies from the Cincinnati Car Company.

Montreal & Southern Counties Railway, Quebec, Que., has ordered from the National Steel Car Company six passenger cars, two trail cars and two combination passenger and baggage cars, all 54 ft. 2 in. long over buffers, with straight platforms.

Regina (Sask.) Municipal Railway has purchased from the Preston Car & Coach Company eighteen double-truck cars and one double-truck snow sweeper. A motor haulage car and other rolling stock have been built by the railway in its own shops.

Ohio Electric Railway, Cincinnati, Ohio, has ordered two 60-ft. combination passenger and smoking excursion trail cars from the Cincinnati Car Company. It has increased its order from the same car builders for freight equipment, noted in the ELECTRIC RAILWAY JOURNAL of Sept. 6, 1913, from three to six motor freight cars and from six to fifteen freight trail cars.

Chicago (Ill.) City Railway, which ordered 100 double-end double-truck pay-as-you-enter cars from The J. G. Brill Company, has specified the following details for this equipment:

Seating capacity.....53	Gongs .....Brill
Bolster centers, length..22 ft.	Hand brakes .....Brill
Length of body...32 ft. 8 in.	Heating system.....Gold
Length over vestibule..47 ft.	Headlights.....A. & W.
Width over sills, 8 ft. 2 11/16 in.	Journal boxes .....Brill
	Motors.....G. E. 242-A
Width over posts at belt.....8 ft. 5 in.	Paint .....Chicago
	Push button signal—Consol.
Width, sill to trolley-base.....9 ft. 1⅜ in.	Registers .....International
	Roofs .....plain arch
Height from top of rail to sills.....2 ft. 6½ in.	Sanders.....E. S. S. Co.
	Sash fixtures.....Edwards
Body.....wood and metal	Seats .....H. & K.
Interior trim, bronze oxidized	Seating material.....cane
Underframe .....metal	Side bearings.....Brill
Air brakes.....G. E.	Springs .....Brill
Bolsters .....Brill	Step treads.....Universal
Brakeshoes .....Brill	Trolley retrievers..Keystone
Bumpers .....Brill	Trolley poles.....G. E.
Car trimmings.....Brill	Trolley bases...U. S. No. 14
Center bearings .....Brill	Trolley wheels.....G. E.
Control system.....G. E.	Trucks .....Brill 39-E
Curtain fixtures. Cur. Sup. Co.	Varnish .....Chicago
Curtain material...Pantasote	Ventilators, Mushroom and Cooke system.
Destination signs.....Hunter	
Fenders .....H.B	
Gears and pinions.....G. E.	Wheels .....Carnegie

TRADE NOTES

New York Pole Company (G. M. Gest), New York, N. Y., has removed its general offices from 277 Broadway to the Woolworth Building.

American Brake Shoe & Foundry Company, Mahwah, N. J., at its annual meeting on Dec. 9, elected W. F. Cutler a director to succeed E. H. Fallows, who recently resigned.

Wagner Electric Company, St. Louis, Mo., has appointed T. T. Richards its assistant sales manager. Mr. Richards has been associated for nine years with the sales department of this company, specializing in the marketing of the new devices produced.

Alberger Pump & Condenser Company, New York, N. Y., has elected Theodore S. Fuller its secretary and treasurer in place of W. R. Billings, resigned. Mr. Fuller was formerly connected with the Scranton Bolt & Nut Company and was also treasurer of Milliken Brothers.

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Wilfred K. Barnard, formerly engineer of way and structures Pacific Electric Railway, has formed a partnership with Capt. Charles T. Leeds, under the firm name of Leeds & Barnard, for the general practice of engineering, with offices at 511-515 Central Building, Los Angeles, Cal.

Cleveland Fare Box Company, Cleveland, Ohio, recently shipped fifty of its No. 2 fare boxes to the plant of The J. G. Brill Company, Philadelphia, Pa., for installation on the twenty-five motor cars and twenty-five trail cars that are being built at that plant for the Montreal Tramways Company.

Electric Railway Improvement Company, Cleveland, Ohio, has recently leased its bonding cars to the following railways: Hudson & Manhattan Railroad, International Railway, Maryland Electric Railways, Des Moines City Railway, Ottawa Electric Railway and Southern Traction Company, Dallas, Tex.

High Voltage Insulator Company, Derry, Pa., has appointed J. W. Blankenhorn to a position in connection with its electrical engineering department. Mr. Blankenhorn has been connected for some time past with the engineering department of the Stone & Webster Engineering Corporation, Boston, Mass.

Dossert & Company, New York, N. Y., has received an order for the wiring of the new signal system of the New York, New Haven & Hartford Railroad, which will replace the old banjo signal system. This company has also received orders for connectors from the Toledo Railways & Light Company, Interborough Rapid Transit Company, Wisconsin Railway, Light & Power Company, and Elmira Water, Light & Railroad Company.

Monitor Controller Company, Baltimore, Md., has brought out a new controller for variable speed motors of single-phase, two-phase or three-phase type. The distinctive feature is that in starting a proper amount of resistance is automatically inserted in each phase of the motor, giving absolutely correct starting characteristics. That is to say, the starting effort required of the motor is the same regardless of the position of the regulating handle. After the rotor has attained the proper speed the starting resistance is automatically cut out by the controller, and the regulating resistance which has been previously determined by setting of the handle is automatically thrown in, bringing the motor promptly to the speed desired. This may be any speed between normal speed and the lowest speed specified. A no-voltage release is provided with these controllers, so that on failure of the line voltage and the consequent stoppage of the motor the entire system is automatically cut out and will not again start on the return of the voltage until the operator has once more touched the start button or lever, when the starting cycle is again begun.

ADVERTISING LITERATURE

H. W. Johns-Manville Company, New York, N. Y., has issued a booklet on the subject of fires, in connection with its J-M Fyro fire extinguisher.

Pass & Seymour, Inc., Solvay, N. Y., have issued a catalog describing the use of their Shurlok electric lamp sockets, which prevent the theft of lamps, shades and reflectors.

American Tool Works Company, Cincinnati, Ohio, have issued a folder describing its radial drills, which are designed for high power and which combine the features of simplicity and convenience.

Electric Storage Battery Company, Philadelphia, Pa., has issued a catalog which commemorates the twenty-fifth anniversary of the company by means of a historical sketch of its growth and which contains an illustrated description of its present factory and organization. Its chloride accumulator and "Exide" batteries are for use in electric railway power houses and substations, switch and signal service, car lighting, electrification of railway terminals and in storage battery street cars. For electric railway service 329 large batteries have been built and installed, representing a kilowatt-hour capacity of 206,025 at the three-hour rate.

Automatic Ventilator Company, New York, N. Y., has issued a catalog on the subject of car ventilation, in connection with its self-acting, intake-and-exhaust car ventilators. Illustrations are shown of the instalment of these ventilators on various types of cars of steam and electric railways, among which those of electric railways are as follows: Terre Haute, Indianapolis & Eastern Traction Company, New York Central Lines, Twin Falls Railway, Brooklyn Rapid Transit Company, Salt Lake & Ogden Railway, Great Falls & Dominion Railroad, Public Service Railway, Newark, N. J., and Schenectady Railway.

American Mason Safety Tread Company, Lowell, Mass., has issued a catalog describing the uses to which its safety tread may be applied, such as to brass bases and nosings, wood and iron stairs and sidewalks. This tread is used in the Grand Central and Pennsylvania Railroad terminals in New York City. The catalog also describes the Starwood tread and Karbolith flooring. The latter material is being used by the steel cars of the Interborough Rapid Transit Company, the Hudson & Manhattan Railroad, Long Island Railroad, New York Central & Hudson River Railroad, New York, New Haven & Hartford Railroad, Chicago Railways, New York & Queens County Railway, Philadelphia Rapid Transit Company and the Boston Elevated Railway.

William E. Volz, New York, N. Y., sales agent for the Weldless Chains, Ltd., Gartsherrie, Coatbridge, Scotland, has issued a catalog describing weldless steel chains for cranes, slings, cage bridles, coupling chains, steering gears, mooring, hauling and mining. Each chain is manufactured from a cruciform bar. Special attention is given to the manufacture of car brake chains, now in use on nearly all the principal tramway systems and railways in Great Britain, the Glasgow Corporation Tramways alone having 5000 brake chains in service. These chains are fitted with solid drop-forged steel eye-bolts, and the ends of the links are thickened to compensate for wear, thus at least doubling the life of the chain. Another folder describes universal patent chain adjusters and positive patent lifting clamps.

Dayton Manufacturing Company, Dayton, Ohio, has issued a bound 158-page catalog, No. 166, illustrating its various types of electric, gas, oil and candle car-lighting fixtures. The catalog also contains an illustration showing the application of these fixtures in the electric lighting of street and interurban cars. The light from a single series of five high-efficiency Mazda lamps, mounted on properly designed fixtures, is directed by correctly shaped reflecting shades, giving high illumination where desired, without the injurious effect of bare filaments. This system, in use on the cars of a large street railway, is found to deliver an increase of 80 per cent effective illumination at a reduction of 65 per cent current consumption, as compared with the former system, which used several series of 16-cp bare carbon lamps. The recent interest in modern methods of car illumination makes this catalog of special interest.

NEW PUBLICATION

Regulation, Valuation and Depreciation of Public Utilities. By Samuel S. Wyer. Columbus, Ohio: The Sears & Simpson Company. Size, 6 in. x 9 in.; 313 pages. Price, in leather, $5.

The author states that this book is "an unbiased discussion and concise compilation of the pertinent economic, engineering and legal facts" relating to both public utilities and the public. With the exception of Chapters I and II, which deal with introductory matters and fundamental definitions, the book is devoted mainly to a discussion of the economics of public utilities, describing the service, costs and rates, the principles underlying public utility regulation and the valuation of public utilities for rate-making purposes. The subject matter of the book is supported by tables, references and citations from court and commission decisions. The front of the book contains a convenient list of reference tables and also a list of the half hundred excellent halftones. The last three chapters of the book are devoted to engineering data pertaining to utility regulation, valuation and depreciation, to reference data and to a selected bibliography and indexes. A comprehensive index is given of all the authorities referred to in the book with the citations abstracted, and there is also an exhaustive separate subject index following. The book shows painstaking preparation and is a valuable handbook of information on its subject.

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Consolidation of Street Railway Journal and Electric Railway Review

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ARE DARK CAR CURTAINS NECESSARY?

One of the changes which have been made a part of the finish of the modern car is the use of whitish enamels or compositions in place of dark light-absorbing veneers and finishes. When such interiors are used in a car with a large number of bare tungsten lamps, the effect is often somewhat dazzling because so many bright spots strike the eye, but where semi-indirect and indirect lighting fixtures are used these light interiors are not only very efficient but most agreeable as they permit the illumination to be well diffused. Since this is the case, is it not time that experiments should be made with curtains which have been manufactured with a light color on the inner side? It is possible that in the daytime the reflections from sunlight on lowered curtains might prove disagreeable, but this is problematical. It may also be urged that a light-colored curtain would become soiled too easily. However, this possibility could readily be avoided if a darker strip of material was used along the lower part of the curtain.

PROGRESS IN RAILWAY ELECTRIFICATION

It is with great pleasure that we chronicle this week two more orders for railway electrification and the announcement of the adoption of electricity by two other large railroads. We refer to the orders of the Canadian Pacific Railway for its Rossland division and of the Canadian Northern Railway at Montreal and the announcement that the Pennsylvania Railroad will install single-phase on its suburban division from Philadelphia to Paoli and that the Chicago, Milwaukee & St. Paul Railroad will use 2400-volt direct current on 440 miles of track. It is very interesting, in considering these orders, to find that the Pennsylvania Railroad has adopted single-phase for suburban motor-car service, whereas direct current is the choice for the long stretches of transcontinental service in Montana and in the Canadian Rockies. This, at first thought, seems to be opposed to the generally held opinions of the special field of each system and proves that the deciding factors in each case go beyond merely the car equipment and include also the question of power distribution and power supply. In fact, it is safe to lay down the general rule that unless all of these factors are considered, it is impossible to reach a proper decision. We do not intend to touch here upon the relative merits of the different systems as that is considered in another editorial in this issue, but we wish to congratulate the industry that the smoke arising from the battle of the systems is not able to obscure the fundamental merits of electricity as a motive power.

ESSENTIALS FOR PUBLIC SERVICE ACCOUNTING

Character, capability, confidence—mentioned by A. F. Elkins before the Central Electric Railway Accountants' Association—these might be termed the three "C's" of public service accounting. They are ultra-important assets to the public service accountant, beyond all doubt, and deserve the emphatic position given them in the list of required characteristics. Inasmuch as they are necessary, however, to the successful practice of any profession, they are not so peculiarly indicative of a high-class public service accountant as some other characteristics mentioned by Mr. Elkins, such as the power to observe and analyze, the desire for uniformity and the love of detail. However excellent may be a man's moral character, however broad his capability, however sure his confidence, he is not fitted for accounting work unless he possesses these other essentials. As Mr. Elkins says, the public little values the preliminary work in assembling and collating a mass of data in order to make an annual report, but the accounting department must spend at least a third of its time on such seemingly laborious detail. The power of observation of the officials of a large corporation is limited, and they must have some artificial means of transcending limits, such as that furnished by financial statements and accompanying statistical data. To supply these the accountant must have a knowledge of more than the mere books employed; he must understand their classifications, the philosophy of accounting, the relation of accounting to allied subjects such as economics, law and finance, and the effects of various economic and legal types of organization upon accounting technic. And, last but not least, he must know the requirements of public utility laws and should not only keep his accounts in accordance therewith but also discourage all loose use of accounting terms and principles. In no other way can the ideal system of accounts for which accountants' associations have worked so industrialy ever become realized.

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MAIN-LINE ELECTRIFICATION

It will be strange indeed if Mr. Armstrong's paper on "The Engineering Problems of Electrification" at Montreal this week does not arouse considerable controversy as well as rejoinders other than those presented at the meeting. It early dismisses the single-phase from the possibilities of further consideration for trunk-line service, and in a study of the relative advantages of the split-phase and high-tension direct-current systems the latter is found preferable. It is not surprising that this severe arraignment of the straight single-phase system should have brought forth equally vigorous replies, which would undoubtedly have been larger in number if the meeting had been held in New York. It also elicited the important statement that the Pennsylvania Railroad had adopted the single-phase system with motor-car operation for its suburban lines out of Philadelphia.

We agree with Mr. Gibbs that this decision by the Pennsylvania Railroad is sufficient answer, if any were needed, to the claim that single-phase can no longer be considered a factor in future trunk-line service, and the high regard with which the system is held on the continent of Europe and its service on the New Haven road show that it is able to meet the requirements of the heaviest passenger and freight operation. Undoubtedly the high-tension direct-current system has undergone a notable development within the past few years, and Mr. Armstrong holds out hope that the limit in voltage has not yet been reached. But we do not consider the number of interurban roads changed from single-phase to high-tension direct-current operation, as shown in Mr. Armstrong's Table I, a criterion of the possibilities of single-phase for trunk-line operation. The early interurban single-phase lines were installed before the development of the high-tension direct-current commutating-pole motor, and in most instances had to run for considerable distances over direct-current city lines. This required such a complicated system of control and such a hybrid electrical equipment that it is not surprising that many of them, though not all, should have been converted to high-tension d.c. On the other hand, on lines operated exclusively with the single-phase system the same troubles have not been found, and their records for maintenance have been correspondingly low.

We believe that it would be to the best interests of the industry if a thorough study and report should be made of the present status of each of the principal systems by some railway engineer, or preferably a committee of railway engineers who have not been so closely allied with either camp as to be considered partisans. Such a report should consider the question of first cost for all parts of the equipment and should include a carefully compiled record of maintenance costs obtained from all of the different systems now in operation. It should also include a study of the question of interferences with telephone and telegraph lines, mentioned by Mr. Armstrong, the means which have been adopted for preventing these troubles and the cost and practical value of these remedial measures. We do not suggest this with the idea that any one system as at present developed will be found to be so far superior to the others that it could be adopted as a standard for this country. We do not see any great necessity for a standard system, even for any one road, provided only one system is used on the same locomotive division. But from such a study it should be possible to determine the conditions under which each system would be the most efficient for the work to be accomplished. A more general agreement upon this point among electrical engineers would certainly be followed by a rapid advance in railroad electrification.

FEDERAL INCOME TAX LAW

Elsewhere in this issue are abstracted two papers which were presented before the Central Electric Railway Accountants' Association on the subject of the federal income tax as related to electric railways. In the absence of specific instructions and report forms from the Treasury Department, the papers should not be looked upon as technical digests of the new law, but they do present a broad practical view of the requirements with which electric railway managers should acquaint themselves. One of the interesting points discussed by Mr. Cavanaugh is whether the "gross revenue" return should include accrued earnings as well as cash earnings. It must be admitted that the largest part of the gross receipts of a railway comes from cash sources, but the accrued amounts are not at all negligible. By no means the least advance made by modern accounting is the substitution of the accrued basis for the old cash basis. This has been applied particularly to expenses and is shown by the allocation of expenses to the accounting or fiscal period to which they are properly applicable.

Consistency in the treatment of an accounting period, however, demands that all earnings applicable to that period, whether already paid in cash or of an established future cash value, should be also taken into the accounting of that period. If accrued earnings cannot be included in a corporation's return of gross income, then expenses not paid in cash must be excluded from operating expenses. Such a treatment, however, would be a lamentable retrogression in accounting practice. The gross income should be that shown by the records of the corporation and its reports to the stockholders and not that indicated by a separate record based on antiquated accounting methods. This situation was thoroughly analyzed under the excise tax law of 1909, and there is no ground for any divergence from the opinion of Secretary MacVeagh at that time, to the effect that a cash basis of accounting would result "in inextricable confusion, uncertainty and inaccuracy."

The paper by Mr. Hixson contains an admirable résumé of the points involved in the collection of the tax at the source, and it suggests the procedure to be followed in determining the net taxable income. Undoubtedly some points will be affected by subsequent rulings of the Treasury Department, but the outline presents an advantageous working basis. It will be well for electric railway officials to bear in mind that the initiatory step in obtaining the required forms must be undertaken by them and that in case of the absence or illness of the officials who have power to make the returns a delay of thirty days is granted only when application therefor is made before the date when the

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return is due. It must also be remembered that although the income tax dates only from March 1, 1913, the re-enactment of the old excise tax law makes it cover for all practical purposes the two preceding months.

LOW SUBURBAN PASSENGER FARES IN OAKLAND

The hearing which was conducted recently by the California Railroad Commission into the question of the suburban fares on the Southern Pacific electrical lines in Oakland, Alameda and Berkeley elicited some testimony which, unless thoroughly understood, might be misinterpreted in regard to the satisfaction given by the electrical equipment there. The hearing was held because of a petition for lower fares from certain stations on the system, and the company's defense was that it was losing money on the present service. In support of these figures it presented statistics to show a property investment of some $46,000,000, with annual receipts from operation of $1,354,303 and operating expenses of $1,832,437. In other words, the electric service on this suburban division is not even paying operating expenses.

The railway system under consideration, as many of our readers may know, consists of a series of short electric lines spread out like a fan, serving the prosperous cities on the east side of San Francisco Bay and carrying a very large commuter traffic to San Francisco. At the point where the lines converge they pass on to a pier, at the end of which the passengers are transferred by ferry to San Francisco. The service supplied is excellent, and we doubt if there is anywhere an equal frequency of trains for an equivalent number of passengers. Since the conversion from steam to electricity the number of trains run has about doubled. The average cash fare between San Francisco and a large part of the district served is 10 cents, and the average fare, including commutation tickets, is less than 1 cent a mile. Practically the same fares are charged by the San Francisco-Oakland Terminal Railways, which also operates electric trains in largely the same territory and has a separate ferry between Oakland and San Francisco.

As the lines in question have recently been converted from steam to electricity, the adverse financial figures presented at this hearing naturally created considerable comment and some dismay among electrical engineers. An analysis of the situation, however, shows that it is not unfavorable to electrical operation *per se*. This is made evident by the report of the operating expenses of the Oakland, Alameda & Berkeley lines for twelve months, based upon operation during May, 1912, published on page 1258 of the issue of this paper for Dec. 13.

This table, for instance, shows that, out of a total expense for maintenance of way and structures of $447,000, less than $50,000 was due to the electrical apparatus. Under maintenance of equipment, of $135,000 expense, only approximately $46,000 was due to the electrical equipment. Under transportation, out of $700,000, $246,300 was due to the electrical equipment and the men required to operate the electric cars, and this is the figure which would be compared with the cost of locomotive engineers and firemen. All of the other expenses, it appears, would not be affected by the character of the power used. Thus, out of a total expense of $1,832,000, only about $335,000 is of such a character as to involve a comparison between electric and steam operation. In this connection it should be remembered that a considerable portion of the trackage of the electric system is also used by through trains of the Southern Pacific from and to the East. The division of expenses between the through and the suburban traffic is not apparent from the table, but it is certain that a large part of the maintenance of way and structures and some of the transportation charges, such as for crossing flagging and interlockers, would undoubtedly have to be defrayed to accommodate this steam service, even if there were no electric suburban trains. Finally, of the reproduction cost of $46,209,560 quoted by the company, the entire amount to be charged against electrical equipment, including power plants and transmission systems, is less than $5,000,000. Unfortunately, no data are available on the cost of operation of the suburban lines when the motive power was steam, but to anyone familiar with the cost of steam operation it is apparent that electrification was in no way accountable for the final deficit. We might add that at the time of the change public opinion was very strongly in favor of electric trains, and had this sentiment been ignored traffic undoubtedly would have suffered. The only conclusion to be reached from this consideration of the subject, then, is that the deficit is due to two causes: First, the rates of transportation are too low to afford a profit on the capital invested; second, the cities in and between which the lines operate are overbuilt with rapid transit lines.

So far as the Oakland situation is concerned, we might stop here, but we believe that in the interest of a broad survey of the situation of suburban fares on trunk lines we should go slightly further. Steam railroad companies have nearly always maintained that their passenger suburban traffic was unprofitable. Indeed, one steam railroad manager in the East said some time ago that his road would be better off if it had no commuter traffic at all. We agree to this proposition in general if the suburban business is charged with the same proportional amount per passenger of overhead expenses as the through traffic, but in most cases this would be an improper method of accounting. The usual elaborate station arrangements, with waiting rooms, facilities for handling baggage, etc., are not needed by the average commuter to anything like the extent to which they are required for the through passenger traffic, and with the possibility which electric power presents of reducing the expense and area required for switching at terminals, the overhead expenses properly to be charged against suburban traffic conducted by electricity are still further greatly reduced. This situation does not apply with so great force in Oakland as in most other places because of the necessity there of ferry transportation. But the Brooklyn Rapid Transit Company has shown at the Brooklyn Bridge that it can handle with electric trains a terminal traffic greatly exceeding that on most steam railroad lines without difficulty on two main tracks, four platform tracks and two stub tracks. This fact and many other similar instances which could be cited prove that any greater trackage in a combined through line and suburban terminal must be charged to some other account than the purely suburban business.

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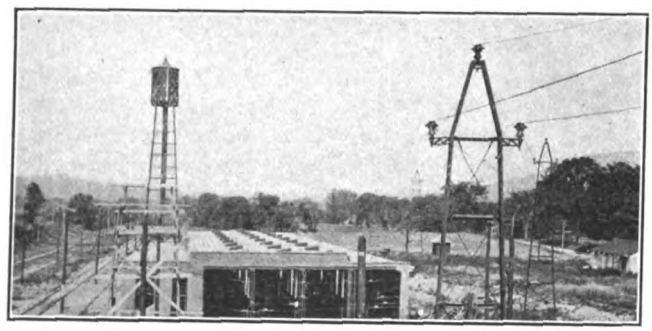
Recent Improvements on Berkshire Street Railway

This Article Concludes the Account of Improvements Made by the Berkshire Street Railway by Descriptions of a New Low-Cost Carhouse at Sheffield, Mass., of a Carhouse Extension at Pittsfield, Mass., and of New Track Work and Bridges

The new inspection carhouse of the Berkshire Street Railway at Sheffield, Mass., was designed to provide storage facilities and pit layouts at a cost not exceeding $600 per car. It has a low roof, which reduces the weight to be carried upon the columns. Part of the rear was built without a floor to save further in cost. The carhouse is adjacent to the Sheffield substation and is 301 ft.



Berkshire Improvements—Sheffield Carhouse and Incoming 33,000-Volt Line

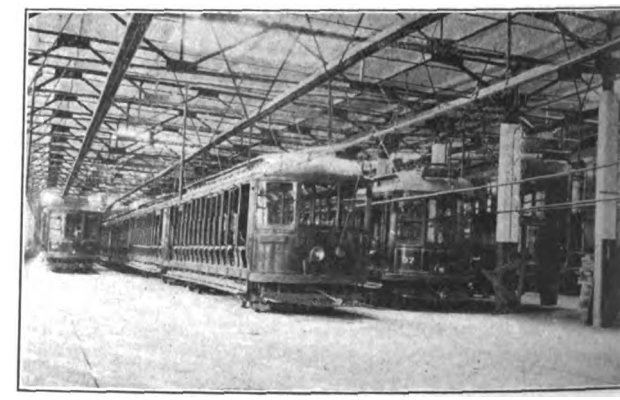
long over all and 75 ft. in extreme width. The storage section, however, is only 57 ft. wide and contains four through tracks located 13 ft. apart on centers. The capacity of the house is twenty-four double-truck cars seating forty-four passengers each. It is of brick construction with concrete flooring throughout 210 ft. of its length. The roof is of five-ply tar and gravel construction, supported on 6-in. x 6-in. yellow pine posts, the foundations being of concrete. The posts divide the storage and inspection area into 10-ft. x 13-ft. bays.

Two tracks have pits 150 ft. long and 4 ft. 3 in. wide, each equipped with sixty 23-watt lamps set in niches which are staggered in the pit walls every 5 ft. The pits have concrete walls, are 4 ft. 6 in. deep and, in each instance, are drained to two points one-fourth of the distance in from the ends. The lamp circuits are carried in 1-in. conduit and are controlled from wall switches along the side

Berkshire Improvements—East Street Carhouse

of the carhouse. The lamp recesses have bottoms inclined about 45 deg. from the horizontal to get good drainage and reflecting conditions. The pit bottoms are of concrete slab and granolithic finish, and the tracks are of 55-lb. T-rail anchored by bolts as illustrated to the pit shoulders. A passageway 3 ft. wide has been left between the pits at their middle point. The carhouse is heated by low-pressure steam supplied to pipe coils installed along the walls from a Smith boiler with a shell 5 ft. 4 in. in diameter and 5 ft. 10 in. long. The latter is housed in a boiler room outside the carhouse proper and with a floor somewhat below the pit level. Ashes are removed by a hand-operated hoist, and a coal pocket of 30 tons capacity is provided with facilities for gravity delivery of fuel from passing cars. At the side of the carhouse proper is a brick and concrete extension 151 ft. long and 18 ft. wide, which contains in addition to the boiler and coal rooms an inspector's office, trainmen's lobby, toilets, sand and oil rooms, machine-shop space and pump room. A small stockroom is also provided.

The interior lighting of the carhouse is cared for by 150 23-watt series lamps hung from the ceiling and controlled in groups of thirty from wall switches. In place of the usual copper trolley wire a 3-in. x ½-in. steel bar supported by insulated clips was attached to the underside of the usual inverted U-trough. The cost of this arrangement was less than with a copper trolley wire over each track. The oil room has a concrete threshold rising 8 in. above the floor at the doorway leading into the carhouse proper, to prevent the flow of oil into the latter in case of leakage. The walls of the oil room are also carried



Berkshire Improvements—East Street Carhouse Interior

upward to a point 42 in. above the roof walls, to insure additional fire protection.

FIRE PROTECTION

The carhouse is equipped with the Rockwood dry-pipe system of sprinklers. Water is taken from the Housatonic River through an 8-in. pipe into a 15-in. Worthington centrifugal pump directly driven by a 50-hp, 600-volt d.c. Allis-Chalmers motor located in a pump well outside the main carhouse, and it is forced from this point through a 6-in. pipe into a tank of 15,000-gal. capacity mounted on a steel tower 90 ft. above the ground. The pump discharge has also a 6-in. connection with a system of underground lines of this size to supply water to six standpipes within the main carhouse and to three hose houses on the property outside, each of which contains a two-way hydrant and 150 ft. of 2½-in. hose. At each interior standpipe 50 ft. of hose are provided, with 1½-in. nozzles. A motor-driven compressor which supplies air at 40 lb. pressure to the sprinkler heads is located in a pump well 7 ft. deep, 13 ft. long and 9 ft. wide.

The carhouse ceiling is carried to a maximum height of 15 ft. above the floor. There are thirty 4-ft. x 5-ft. wired-glass skylights in the roof, installed in ten rows of three each. Most of the skylights are 3½ ft. x 4 ft. in size and are sloped to conform to the incline of the roof. Each skylight has two sprinkler heads. In the intermediate

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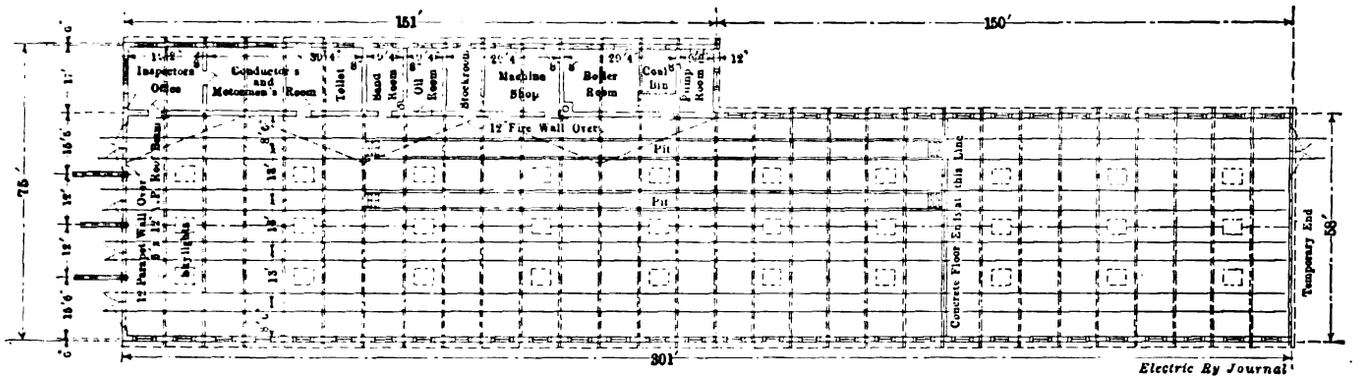
spaces between the skylights and beneath them are groups of ten heads to serve the side wall spaces and the spaces between tracks at the ceiling level. There are 180 heads in the carhouse proper usually installed 10 ft. apart longitudinally and 13 ft. apart laterally, with the exception of the double heads placed at each skylight. No aisle sprinklers are installed. The sprinkler heads are fed from two longitudinal mains running along the wall of the building on each side parallel to the tracks, the heads between tracks being supported alternately in pairs from each main. The mains on the two sides of the house are tied together by a 5-in. cross-connecting pipe run 9 in. below the roof. Four Pyrene extinguishers and six sand pails are also placed within the house. The heads have a height above the floor of from 13 ft. to 15 ft.



Berkshire Improvements—Plan of First Floor of Car Storage and Inspection Shed at Sheffield, Mass.

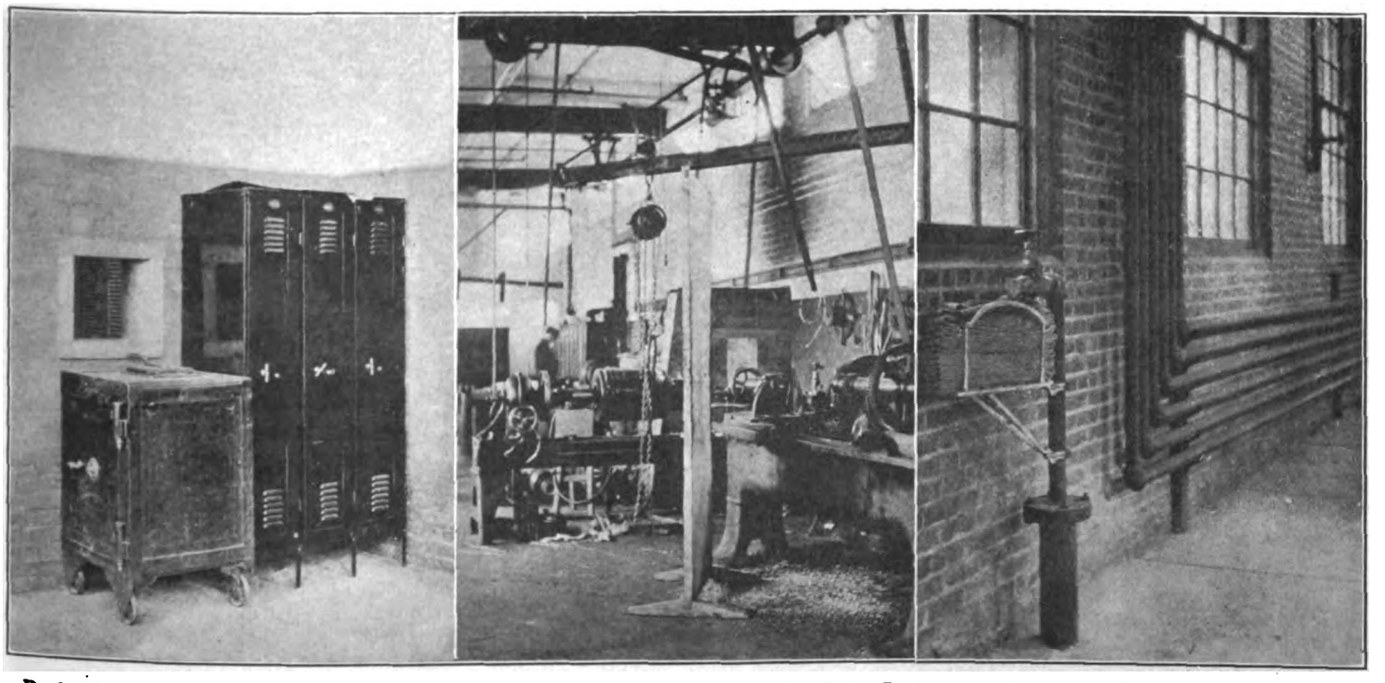
A convenient lamp and headlight rack is used at this carhouse, as illustrated. It consists of a frame 12 ft. long and 4 ft. 8 in. high, of 1-in. x 4-in. wooden stock, the capacity in lanterns being eighteen spaced 8 in. apart on heavy nails driven into the top piece. The lower portion of the frame consists of a shelf of ¾-in. stock, 16 in. wide, carried 6 in. above the ground, and holding eight headlights. The latter are inscribed with the name of each regular user to insure proper care.

EXTENSION OF PITTSFIELD CARHOUSE

The improvements lately effected at the East Street carhouse in Pittsfield are comprised in an extension 286 ft. long and 102 ft. wide, containing eight tracks placed 13 ft. apart on centers. The north side of the building has space for a carpenter shop and a paint shop separated from the storage section of the house by an 18-in. fire wall of brick. The new storage and operating house has an available area of 27,280 sq. ft. and a capacity of forty 45-ft. cars; the carpenter shop has an area of 3550 sq. ft. and houses four cars, and the older portion of the house, which contains the pit and repair shop tracks, houses twenty-four 45-ft. cars in an area of 17,513 sq. ft. A gravel floor section of 4980 sq. ft. at the east end of the house also is in service to hold six cars, so that the total capacity of the plant is now seventy-four cars.

The carhouse extension is a brick structure with tar and gravel roof carried on steel trusses and concrete-sheathed cast-iron columns. Its floor is of concrete. Above the carpenter shop a stockroom for more permanent storage has been provided, and above the present stockroom, machine shop and forge room are an additional stockroom and an armature repair shop of 1720 sq. ft. The shop improvements include the installation of a Wayne oil tank pumping system with storage tanks in a fireproof compartment under the carpenter shop, jib cranes in the old carhouse and in the armature room, a traveling crane over one pit track beside the blacksmith shop, concrete and timber scrap bins outside the carhouse and the Merritt metal unit bins and lockers throughout the stock department. The fire protection of the carhouse and shops also includes a Grinnell sprinkler installation with 810 roof heads and 567 aisle heads for car protection.

In the new portion of the carhouse no pits are provided.



Berkshire Improvements—Receiving Safe for Conductors' Cash at Sheffield Carhouse—Armature Shop at East Street Carhouse—Standpipe at Sheffield Carhouse

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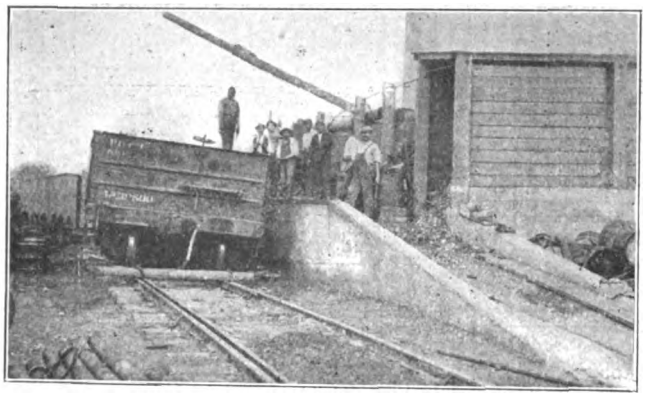
Six tracks are carried entirely through the property, permitting entrance and exit of cars at either end, and these connect with the Pittsfield-North Adams interurban line by ladder tracks. A short track for outdoor wheel storage is provided at the forge shop, and connection with the adjacent main line tracks of the Boston & Albany Railroad is obtained by a trestle track which passes the scrap bins and also serves as a coal-discharging track outside the

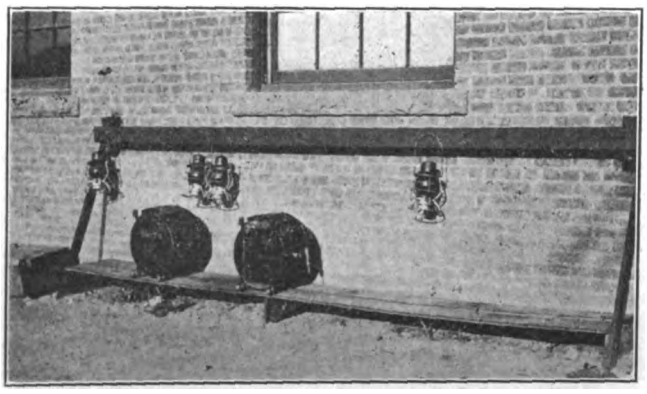


Berkshire Improvements—Scrap Bin, Ramp and Side Track at East Street Carhouse

power house. The offices of the general manager, dispatchers' quarters and superintendent's office are located on the second floor on the front of the old carhouse and by extending outward from that building command an unusual view up and down the line.

CONSTRUCTION AND EQUIPMENT FEATURES

At the front of the extension Kinnear rolling steel doors are provided, with windows above to amplify the lighting of the carhouse interior. There are ten wired-glass skylights over the building, usually 14 ft. x 15 ft. in size. The rolling doors are 15 ft. high. The bar type of trolley used is ⅜-in. x 2½-in. round-edge iron in 12-ft. lengths, which is attached at 6-ft. intervals to wooden trough by means of Anderson hangers and ⅜-in. bolts. Concrete foundations are used for all walls and columns. At intervals of 30 ft. along the side walls Hubbell sockets wired in conduit are brought down to within 4 ft. of the floor to permit the attachment of 110-volt lighting plug circuits to aid inspection work around the cars. The upper portion of the carhouse extension is illuminated at night by seventeen

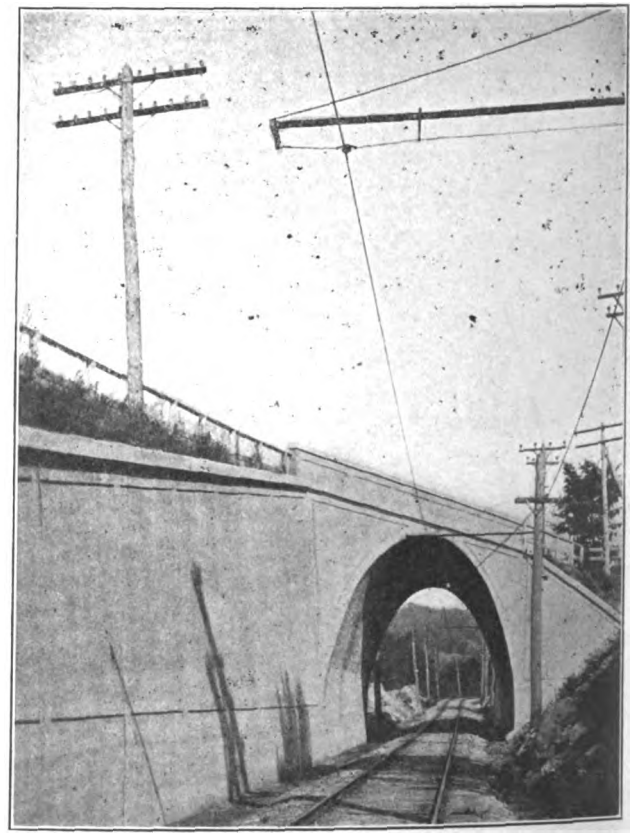


Berkshire Improvements—Lamp and Lantern Rack at Sheffield Carhouse

Westinghouse type B 125-volt, d.c. flame arcs hung from condulets on the roof trusses. Four similar lamps are provided in the paint and carpenter shops, with nineteen drop lamps for work near the floor. Incandescent drop lights are used in the stock and winding rooms on the second floor. In the winding room a 10-ft. jib crane equipped with a 1-ton Triplex hoist is now in service between a banding lathe, banding and armature lathe. This change saves time formerly lost by detaching a hoist from a runway at the east end of the shop and erecting it on an I-beam in the ceiling. To save babbitt turnings and enable them to be used a second time a screen of canvas 3 ft. wide and 7 ft. high, supported by a wooden frame, is used under the lathe. Another useful feature of the shop is a Warsaw electric elevator of 1 ton capacity, with a platform 5 ft. square, which serves the old carhouse, upper and lower stockrooms and armature room by multiple doorways on each floor. A GE commutator slotter lately has been added.

OIL SUPPLY AND SCRAP BIN

The oil supply system is piped to adjustable pump stands at one end of the first floor stockroom, and the company maintains the following storage capacities in separate tanks: linseed oil, 220 gal.; signal oil, 100 gal.; air compressor oil, 400 gal.; engine oil, 500 gal.; power house valve oil, 300 gal.; turbine oil, 300 gal.; kerosene, 400 gal.; electric car oil, 800 gal. Gages attached to floats are lo-



Berkshire Improvements—Skew Arch Bridge at State Highway on Lee-Huntington Extension

cated in one corner of the stockroom to indicate at all times the quantities on hand.

The carpenter shop contains a buzz planer, a speed lathe, a swing saw and two circular saws, group-driven by a 35-hp, 370-volt, three-phase motor of the General Electric induction type.

The scrap bin, 60 ft. long and from 13 ft. to 32 ft. wide, consists of a group of compartments formed by removable 2-in. planking on the top of a concrete floor supported on concrete piers and foundations. The compartments are parallel and front upon a runway 6 ft. wide, which is connected with the ground by a concrete ramp 25 ft. long. Barrows or teams are run up the ramp to the appropriate compartment entrance, and after being discharged the refuse material is kept here until it can be hauled away in a gondola or other car set in front of the bins on the siding shown in the accompanying halftone. A derrick is used to facilitate the handling of heavy material. Below one end of the bin structure is a compartment 10 ft. high

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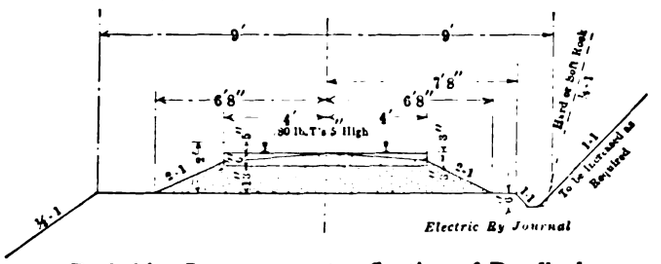
for storing cement and other heavy supplies. The sections provide for seven classifications of scrap material. The concrete flooring is reinforced by I-beams and the compartment sides are attached to 8-in. x 8-in. wooden posts.

SPRINKLERS

The sprinkler system was installed by the General Fire Extinguisher Company, Providence, R. I., and is designed to cover all parts of the old and new carhouse. The dry-pipe system is in service, and the piping features are usual for this class of work. Water is obtained either from the city mains or from the Housatonic River, as described in connection with the condenser installation of the East

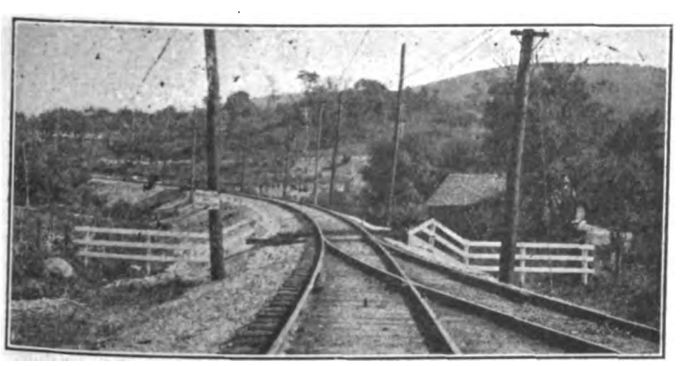


Berkshire Improvements—Section of Roadbed

Street station. There is a 1000-gal.-per-minute fire pump of the steam-driven type in the power house, and this supplies water to the standpipe and sprinkler mains of the carhouse and shops as required. The aisle sprinklers in the new carhouse are installed 8 ft. 8 in. above the floor and 24 in. from the side of the nearest car, being 8 ft. apart horizontally. The feeders for the heads are run from dry valves in pits in the usual manner. The head piping is supported by diagonal inclined rods and adjustable straps attached to the roof trusses. Fifty-six heads are provided in the second-story stock room and armature shop, thirty-nine in the offices on this floor, and there are 335 aisle line sprinklers in the new carhouse. In general, a single line of heads is provided between each pair of tracks.

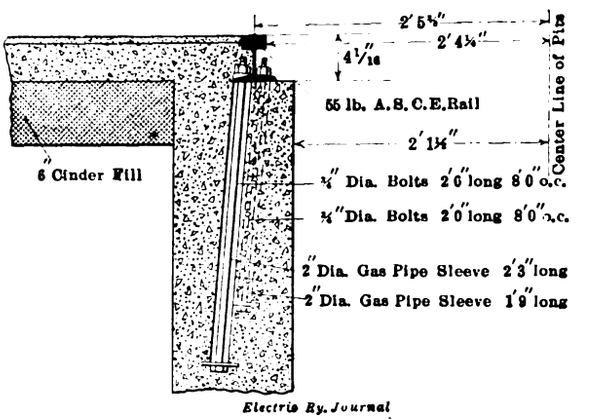
LEE-HUNTINGTON EXTENSION—HEAVY CONSTRUCTION

The so-called Lee-Huntington extension now under construction is one of the best examples of heavy electric railway work in New England. From Lee Junction to Blandford, a distance of 18 miles, the line is built upon a private right-of-way 50 ft. to 200 ft. wide, and conforms to steam railroad standards of construction, the maximum grade being 3.4 per cent and the maximum curvature being



Berkshire Improvements—Beginning of Heavy Track and Roadbed Construction on Lee-Huntington Extension

8 deg. Between Blandford and Huntington, a distance of 5.7 miles, a temporary route will be followed in which the alignment and grade will necessarily be less favorable. As the line crosses the Berkshire Hills in their roughest portions, many heavy cuts and fills were necessary, and much reinforced concrete work has been used in connection with bridge and culvert construction. The largest cut on the line, near Blandford, known as Tiffany cut, is ½ mile long, 60 ft. deep, 30 ft. wide at the bottom and 200 ft. wide at the top. More than 200,000 cu. yd. of earth and stone will be removed at this place. At Mud Pond, west of North Blandford and near Algerie Bridge, the direction of the line was changed owing to the expense of filling the pond. A start was made on both sides of the pond by the

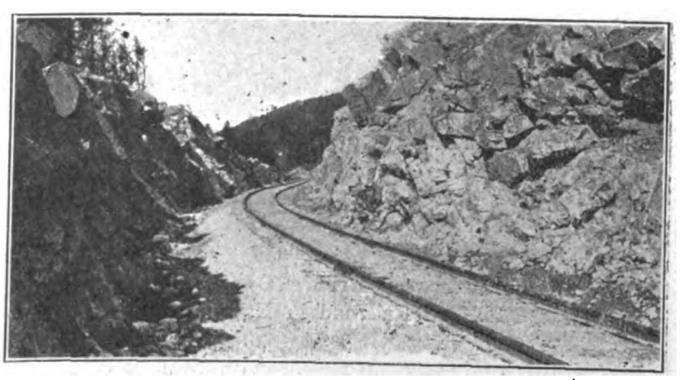


Berkshire Improvements—Detail of Setting of Rails

contractor, but within two rail lengths 60,000 cu. yd. of earth and rock produced no impression upon the bottom.

The line will be single-tracked, using 80-lb. T-rails 33 ft. long, 6-in. x 8-in. x 8-ft. chestnut ties placed fifty-five per 100 ft. and gravel ballast. At each rail joint two copper bonds are used, each of No. 0000 capacity. Reinforced concrete bridge and culvert construction is general throughout the line. Of the several interesting skew arch bridges in place, one is shown in the accompanying halftone taken beneath the state highway leading toward "Jacob's Ladder" hill near Becket. This bridge carries the highway over the track with a 22-deg. angle between center lines, and one side of the bridge ends before the other begins. The width of the bridge at right angles to the center line of the track is 22.5 ft. and its clear height inside is 20 ft. Five similar bridges are used on the line.

As in other new construction, the company uses as its standard a No. 0000 grooved trolley wire. The poles are of chestnut, 48 ft. long and spaced 100 ft. apart on tangent track, the spacing on curves reaching a minimum of 42 ft. Poles are set 7 ft. 6 in. away from the nearest rail. Bracket construction is used throughout, and strain plates are employed in the trolley construction at the beginning



Berkshire Improvements—Carter Cut Near West Becket on Lee-Huntington Extension

and end of every curve and at points 1000 ft. apart on tangent track. The brackets vary in length from 12.5 ft. to 14.5 ft., and the trolley has a minimum clearance of 18 ft. above the rail. The poles are designed to carry a feeder cross-arm with four insulators and two cross-arms for high-tension lines at the top, the lines being carried in 36-in. equilateral triangular spacing. The poles are set from 6.5 ft. deep in rock to 7 ft. in fills and cuts. On the

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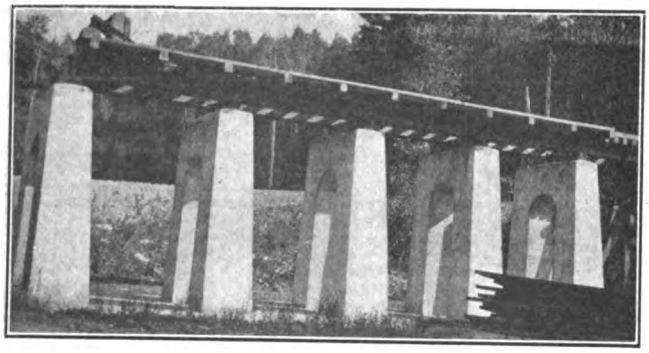
high-tension lines Locke No. 315 insulators and No. 84 pins will be used. The local telephone circuit will be carried on insulators at the side of the pole and transposed every fifth pole.

A noteworthy feature of the line is the permanence of its construction, as indicated, for example, in the view of a siding built over a coal yard for the East Lee plant of the American Writing Paper Company. Here the track

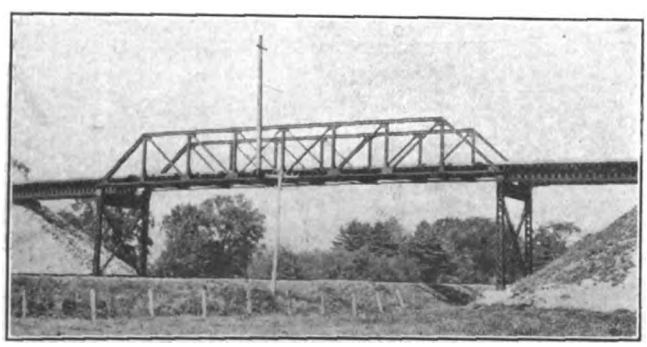


Berkshire Improvements—Reinforced Concrete Trestle Track at East Lee, Mass.

is carried on a wooden trestle supported on reinforced concrete piers 13 ft. apart on centers, 20 ft. high, 3 ft. x 8 ft. at the top and 4 ft. 6 in. x 10 ft. 6 in. at the ground level. A bumping post and plank walk are provided at the track level. The use of reinforced concrete increases the capacity of the yard on account of the reduced space occupied by the piers. The trestle is designed to carry a 100,000-lb. capacity steel coal car at any portion of its length.

OTHER EXTENSIONS

The Canaan and Egremont extensions are not of unusual design, but represent a good standard of trolley line construction. They occupy private right-of-way so far as practicable. The representative bridge illustrated has three spans of 168 ft. total length over the New York, New Haven & Hartford Railroad near Great Barrington, Mass. The central span is a pony riveted Pratt truss 100 ft. long and the approach spans are of the deck plate girder type. The clearance above the track is 22 ft., and the deck



Berkshire Improvements—Bridge Over New York, New Haven & Hartford Railroad in Egremont Extension

is of Southern pine construction, with 8-in. x 8-in. ties spaced 8 in. apart in the clear. Seventy-pound T-rails are used on the line, and two steel trestle bents in the bridge are carried on pile concrete foundations.

SUBWAY IN BUENOS AIRES

The first city passenger subway to be built in South America was officially opened in Buenos Aires on Dec. 2. The line is about 2 miles in length and is double-tracked, making 4 miles of track. It extends between the Plaza Mayo and the Plaza Once, and it was officially opened by the President of the Argentine Republic. Prior to this opening ceremony, the line had been in operation for five days, during which no fares were charged but admission was by complimentary ticket.

The subway is owned by the Anglo-Argentine Tramways Company, whose headquarters are in London. This company also owns a large amount of surface railway mileage in Buenos Aires. Free transfers are not given between the surface lines and the subway, but a transfer ticket is sold from the one to the other for 2 cents.

ANNUAL MEETING OF EXECUTIVE COMMITTEE OF MANUFACTURERS' ASSOCIATION

The annual meeting of the executive committee of the American Electric Railway Manufacturers' Association was held in the offices of the association, 165 Broadway, New York City, on Dec. 11, 1913. William H. Heulings, Jr., president during the past year, was chairman of the meeting, and there were present S. K. Colby, Edwin H. Baker, James H. McGraw, W. L. Conwell, Charles R. Ellicott, Henry C. Evans, Cornell S. Hawley, B. A. Hegeman, Jr., Charles J. Mayer and Daniel W. Smith.

Mr. Colby, vice-president in charge of entertainment during the past year, made his report covering the entertainment at the Atlantic City convention, and in the absence of Mr. Blewett, vice-president in charge of finance, the secretary of the association, H. G. McConnaughy, read a report for him covering the registration at the convention. Mr. Baker, vice-president in charge of exhibits, then read a report covering the exhibit conditions and facilities at Atlantic City. Mr. Heulings then presented a report in which he outlined the general condition of the association as well as the work accomplished during the year and submitted a number of suggestions for the future conduct of the affairs of the association. Mr. McConnaughy then read a summary of the financial report, a detailed statement on finances having been handed to each member of the committee present. A report covering the membership was also presented by Secretary McConnaughy, which showed that the association had a membership roll of 342 members, the largest number of members it has ever had when the conventions were held in Atlantic City. The secretary-treasurer's report covering the *Aera* Publicity Fund showed that the sum of $5,570 had been subscribed and had been turned over to the parent association together with a list of the fund subscribers.

There being no further business before the retiring committee, Mr. Heulings escorted the new president, Cornell S. Hawley, to the chair and requested that he assume it for the unexpired term, or until Jan. 1, 1914. President Hawley accepted the honor with a few appropriate remarks and then asked for a report from the committee on resolutions. B. A. Hegeman, chairman of the committee, reading a resolution which his committee had prepared in recognition of the services of the retiring president.

In this the committee expressed its appreciation of the fact that the advance made by the association during the past year and the increased scope of its work were due to the zeal, executive skill and close attention paid to important detail attendant upon the administration of its affairs by William H. Heulings, Jr., the retiring president, and presented a resolution thanking him for his untiring labor and conscientious devotion to the interests and aims of the association. The resolution was unanimously adopted. A copy from the minutes of the association regarding this action was ordered sent to Mr. Heulings in recognition of his services. A rising vote of thanks from the committee members present was also extended to the retiring president.

President Hawley then appointed Mr. Baker as chairman of a committee on membership and Mr. Colby as chairman of a committee on efficiency, after which the meeting adjourned.

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Meeting of C. E. R. A. Association

Proceedings of Annual Meeting, Held on Dec. 12 and 13 at Cleveland, Ohio—Papers on Essentials of Public Service Accounting and Federal Income Tax Were Presented

The annual meeting of the Central Electric Railway Accountants' Association was called to order at the Hollenden Hotel, Cleveland, Ohio, on Dec. 12. About twenty-five auditors and accounting representatives were present. After the routine business had been disposed of, President Kasemeier reviewed the work done by the association during the year and expressed his appreciation for the co-operation of the individual members.

The report of the executive committee was then read by F. T. Loftus, auditor Indianapolis & Cincinnati Traction Company, Rushville, Ind., and secretary of the association. It recommended that the membership in the association, instead of being restricted to the chief accounting officer, be open to other accounting officials upon the recommendation of the chief accounting officer, only the latter or his designated representative, however, having the right to vote. The executive committee also recommended that in the event of a railway company dropping from the membership of the Central Electric Railway Association the chief accounting officer be continued in the membership of the Accountants' Association, subject to the provisions of the constitution and by-laws. The point was brought out also that the admission of a railway into the membership of the Central Electric Railway Association did not make its chief accounting officer a member of the Accountants' Association, but that such an officer must make application in the regular manner. After a general discussion, the report of the executive committee was adopted.

The report of the standing freight committee was then presented by the chairman, L. T. Hixson, auditor Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind. The report recommended the adoption of certain additions and changes in the agreement now in effect, as well as the adoption of certain rate schedules. After discussion it was decided that the part of the committee's report basing the forms on particular rates for the exchange of equipment be referred back to the committee, and that after taking the matter up with the Central Electric Railway Association the committee include proper basing rates in a further report to be submitted at the next meeting.

The report of the Query Box committee was next read by the chairman, Albert F. Elkins. In the discussion the question of sinking funds came up and Mr. Elkins stated that if the question could be held over until the next day a blackboard demonstration would be given as to the proper entries necessary to handle the sinking fund recommendations in the report.

W. H. Forse, secretary-treasurer Union Traction Company of Indiana, then presented an address on "Proposed Changes in the Classification of Accounts of Electric Railways." T. P. Kilfoyle, auditor Cleveland (Ohio) Railway, stated that the importance of the changes in the present classification made it necessary for the accountants to take some immediate action in order that a careful review of the tentative classification might be made when it was received. Mr. Kilfoyle said that the matter was of added importance because the Interstate Commerce Commission would welcome all suggestions made from every interested source. Mr. Elkins moved that the association, through its president, call a special meeting as soon as possible after the receipt by the auditors of the tentative draft of the new classification, and that invitations be sent to the Interstate Commerce Commission and the American Electric Railway Accountants' Association urging the attendance of their respective accounting officials at this meeting. In the discussion following this motion, H. J. Davies, secretary and treasurer Cleveland Railway, invited the association to meet again in Cleveland, where the first meeting of the Street Railway Accountants' Association was held in 1897. Mr. Elkins' motion was adopted, and Cleveland was selected as the place of the special meeting, subject to the call of the president.

Before adjournment, the president appointed a nominating committee, consisting of the following members: A. F. Elkins, chairman; H. W. Bradtmiller, secretary and auditor Fort Wayne & Northwestern Railway, Kendallville, Ind., and J. N. Tabb, treasurer Parkersburg, Marietta & Interurban Railway, Parkersburg, W. Va.

A letter from M. W. Glover, auditor Mobile Light & Railroad Company, Mobile, Ala., who was first president of the Central Electric Railway Accountants' Association and is now president of the American Accountants' Association, was read by the secretary. Mr. Glover expressed his deep regret at not being permitted to be present and his hope that closer relations between the National and the Central associations might be realized. There being no further business, the convention adjourned to meet again the following morning at 8:30 o'clock.

The first report taken up on Dec. 13 was that of the Query Box committee, accompanied by a blackboard demonstration of sinking fund entries by Mr. Elkins. F. K. Young, auditor Scioto Valley Traction Company, Columbus, Ohio, stated that he did not look with favor upon the plan of treating sinking fund accounts as deductions from income and agreed with Mr. Elkins that entries should be made on the books so as to show the true condition of the company without this deduction. Mr. Hixson thought a plan should be outlined to set up monthly sinking fund accruals and close these at the end of the fiscal year.

After the adoption of the report of the Query Box committee, Mr. Hixson and Mr. Cavanaugh gave their papers on the new federal income tax law, which are abstracted elsewhere. Mr. Davies said it was evident that many of the features of this new law, relating in particular to public service corporations, were not clearly understood, and he suggested that the president appoint a committee of three members whose duty it woold be to draft a letter to the Secretary of the Treasury, to be signed by the association through its secretary, requesting an early construction of the provisions of the income tax law that relate to accruals, collections and payments of expenses, income, taxes and interest. This suggestion was put in the form of a motion by Mr. Hixson and carried. The committee will be named by the incoming president.

Mr. Elkins then presented his paper on "Some Essentials of Public Service Accounting," an abstract of which will be found elsewhere in this issue.

The election of officers was the next order of business, and the nominating committee presented the names of two candidates for each office. The ballot resulted in the election of the following:

President—L. T. Hixson, auditor Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind.

First vice-president—H. B. Cavanaugh, auditor Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio.

Second vice-president—J. B. Hooper, auditor of freight accounts, Detroit United Railway.

Secretary—F. T. Loftus, auditor Indianapolis & Cincinnati Traction Company, Rushville, Ind.

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Executive Committee—T. P. Kilfoyle, auditor Cleveland Railway; F. K. Young, auditor Scioto Valley Traction Company, Columbus, Ohio; J. H. Tabb, treasurer Parkersburgh, Marietta & Interurban Railway, Parkersburg, W. Va.; C. B. Baker, auditor Toledo, Bowling Green & Southern Traction Company, Findlay, Ohio; C. B. Kleinhans, auditor Toledo & Indiana Railway, Toledo, Ohio.

At the conclusion of the election of officers, the new president, Mr. Hixson, assumed the chair and announced that the date of the next meeting of the association would be determined by the executive committee. After a vote of thanks to the hotel management, the Cleveland Railway and the Cleveland, Southwestern & Columbus Railway for courtesies extended, the convention adjourned.

SOME ESSENTIALS OF PUBLIC SERVICE ACCOUNTING

BY A. F. ELKINS, AUDITOR COLUMBUS, DELAWARE & MARION RAILWAY

The most necessary and primary qualifications for public service accounting may be stated in just three words—character, capability and confidence. Character, says Erskine, "is the slow-spreading influence of opinion arising from the deportment of a man in society." The formation of character is our chief asset, and it ranks at the head of the list. To-day we have men of high moral character in every department of the electric railway field, all striving to perfect a complete unit of service to the public in strict conformity with federal and state regulations. The men who are filling the highest accounting positions are those who have carefully prepared themselves and who show character in every test.

I am glad to see independent accounting schools being established in many of our cities in which a very high standard of accounting is set up. These schools increase the capability of men for public service accounting. The demand for trained accountants in this work is ever insistent, and the way is always open for the man who is really capable of doing better work and not merely desirous of a change of employment.

Character and capability are always necessary, but confidence must form the groundwork around them. In our line of work confidence is very important. We must first decide whether a thing is worth doing, and then as to the manner of doing it. Having once decided, we must approach the thing with confidence and complete it, and the responsibility for the manner and effect of its completion will rest upon us alone, for it is entirely obvious that we who complete the record may best interpret it.

Another important essential is the power to observe. We should secure copies of all acts placed upon the statute books, both state and federal, and familiarize ourselves with those which have a direct bearing upon the railroads. All of them directly affect the accounting departments. Our supreme law-making bodies have forced the auditor to the front of the rank. Instead of the old self-centered bookkeeper, we have the trained accountant, the analyst, who must exhaust every means at his command to become thoroughly familiar with every detail of the operation of the property, in order that he may not only record the figures but also know and understand the reasons therefor. For instance, the auditor must be in position to see that no additions are made to capital account, under expenditures for road and equipment, except such as properly and legally belong there and are properly authorized, and only then after such additions are passed upon by a higher official. There is a marked distinction between new works, or betterments, and mere replacements, and for the protection of all concerned it is the auditor's business to show a clear balance sheet in this regard.

Another essential is that of uniformity. It would seem quite impossible to fix a set of hard and fast rules to govern the accounting of public service corporations, but we are well on the way toward an ideal uniform system, and a goodly share of the credit for this may be entered to the account of the Central Electric Railway Accountants' Association. As early as March, 1897, in Cleveland, C. N. Duffy, then secretary and treasurer of the Citizens' Street Railway of St. Louis, read a paper entitled "Suggestions for a Standard System of Accounts, Classification of Operating Expense Accounts and Form of Report That Will Admit of Comparison and Diffuse Information Between Companies." At the next convention, held in Boston in 1898, the revised form was adopted and came into general use. Then when Circular No. 20 was sent out to all railroads by the Interstate Commerce Commission, our accountants assisted the commission with suggestions for a uniform system of accounts. The alphabetical list of items of expense in the operation of electric railways, which is now in general use all over the United States, was prepared by the members of this association.

Another essential in accounting that might be mentioned is a feeling of responsibility. With an almost ideal uniform accounting system in operation, the auditor still must feel a responsibility for local conditions. In particular a watchfulness must be exercised in perfecting the system so as to make it quite impossible for agents and others to become careless in making reports. Carelessness on the part of anyone in the matter of accounting for the company's money or property should be vigorously discouraged. The auditor should feel a responsibility and exercise that carefully without assuming too much authority. I find from experience that better results may be had by a close personal connection with the operating officials, and whenever they are advised of carelessness or inattention on the part of employees my experience is that they will stand firm for the auditing department.

Detail in accounting is another essential worthy of mention. The successful auditor of to-day must be practically wedded to detail. At least one-third of our time is spent in our offices going over and assembling a mass of data, day after day, month after month, until finally we come to the end of the fiscal year. Then we see the net result of our work within the covers of an annual report. None but ourselves may comprehend the labor and worry necessary to bring before the managers of our companies and the public this result.

I would make brief mention of the journal in public service accounting. This book forms one of the most important essentials in our work. Journal entries will always demand complete investigation and verification in an audit by certified public accountants. Auditors spend much time and thought setting up complete facts in vouchers, involving the payment of money, but they are very liable to overlook the importance of writing a complete explanation of extraordinary journal entries. Every journal entry should be supported by all of the facts necessary to make the entry clear to anyone. Complete explanatory detail in support of the mere debit and credit framework of the entry may some time mean personal protection.

The power to analyze should become a fixed asset with all auditors and accountants. A knowledge of the underlying principles involved in a proposition of accounting not only completes the end sought, but is sure to create confidence in us and our work. It is the duty of auditors to study and analyze the conditions, and to be always ready to furnish operating facts to the managers that may help them to solve the problems daily confronting them. It is due to the wisdom and action of these managers as much as to the governing statutes that we are witnessing a new dawn of corporate publicity, and it is within the power of the auditor to be of immeasurable assistance in the furnishing of operating and financial data.

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THE FEDERAL INCOME TAX LAW AS APPLICABLE TO ELECTRIC RAILROAD CORPORATIONS

BY H. B. CAVANAUGH, AUDITOR CLEVELAND SOUTHWESTERN & COLUMBUS RAILWAY

The present income tax law applies to net income accruing after March 1, 1913, but the excise tax law of 1909 was re-enacted to cover the months of January and February, 1913, on the same conditions as the present law, so that corporations in making returns under the present law for the fiscal year ended Dec. 31, 1913, will include the full year, and such report must be filed on or before March 1, 1914. A corporation whose fiscal year ends on the last day of some month other than December may make its report as of its fiscal year but is required to notify the collector of internal reveue of its district within thirty days from the day it designates as the close of its fiscal year of its intention to make returns as of its fiscal year, stating the date on which its year ends. Such a corporation is then required to file its report within sixty days after the date of the closing of its fiscal year.

For 1913 nearly all corporations will be required to make report as of the calendar year for the reason that they have not had sufficient time in which to notify the collector of internal revenue of their intentions. For instance, a corporation whose fiscal year ended June 30, 1913, would have been required to notify the collector of internal revenue before July 1, 1913; but a corporation whose fiscal year ends June 30, 1914, may notify the collector of internal revenue of such fact prior to July 1, 1914. Such a corporation may make its return for the six months of 1914 and can then make its return at the close of the fiscal year as of June 30, 1915.

Each corporation is required to see that the proper forms for making returns are received by application to the collector of internal revenue for its district. It will not be considered the duty of the collector of internal revenue to forward blanks and a corporation cannot plead this as an excuse for not filing a report. In case of sickness or absence on the part of an officer of a corporation, the time limit in which reports are required to be filed may be extended thirty days by application to the collector of internal revenue for its district, but such a request must be made prior to the date upon which the return is made.

PENALTY

For neglecting or refusing to file returns within the time limit a corporation will be liable to an addition of 50 per cent to the amount of the tax and will also be subject to a fine of not more than $10,000. Any officer of a corporation required to make a return under this law who knowingly signs a return which is not correct with the intention of evading the tax will be guilty of a misdemeanor and will be liable to a fine of not more than $2,000 or to imprisonment of not more than one year, or both. Furthermore, the tax due from such corporation will be subject to a fine of 100 per cent.

The failure of a corporation to pay the tax when due as assessed by the collector of internal revenue and ten days after notice and demand by the collector of internal revenue will be subject to an addition of 5 per cent to the amount of tax unpaid and interest at the rate of 1 per cent per month from the time such tax was due until paid.

FORMS OF RETURN

The returns are required to show:

1. The total amount of paid-up capital stock outstanding at the close of the year for which returns are made.
2. The total amount of bonded and interest-bearing indebtedness at the close of the year for which returns are made.
3. The gross amount of income received from all sources during the year.
4. The total amount of operating and maintenance expenses paid within the year, all rentals or other payments required to be made as a condition of operating or holding property being stated separately.
5. The total amount of losses actually sustained during the year not compensated by insurance or otherwise and including depreciation.
6. The amount of interest accrued and paid during the year.
7. Taxes paid.
8. Net income.

The first two requirements are easily understood and will not be discussed.

GROSS AMOUNT OF INCOME RECEIVED FROM ALL SOURCES DURING THE YEAR

In the case of personal returns the law refers to gross income as gains, profits and income derived from salaries, wages, etc., and from any source whatever; while in returns for corporations the law refers to gross income as income arising or accruing from all sources during the preceding calendar year. The gross income of a corporation as shown by the report to its stockholders doubtless includes accrued earnings as well as cash receipts, but the fact that cash or its equivalent will be received in the future for these accruals makes such a gross income a proper return. It seems evident that the gross income to be returned by a corporation should be the same as shown on its books and by its reports. This appears to be borne out by the analysis of the law by L. F. Speer, deputy commissioner of internal revenue, wherein he states that "with responsible corporations the books are supposed to show the facts," and, again, that "the government will not be likely to accept a return of annual net income of a corporation showing a statement of facts at variance with its report to its stockholders or at variance with books of record unless it shall be shown that such reports and records are erroneous." A. H. Walker, attorney of New York City, however, claims that accruals are not intended to be used in connection with gross income and that a corporation cannot be taxed on income not actually received during the year for which return is made.

This question was thoroughly analyzed by accountants for the purpose of making returns under the excise tax law of 1909, and it was generally understood that gross income and net income were to be as shown by a corporation's books and reports. This view of the case is borne out by instructions issued by Secretary MacVeagh regarding the return to be made under the excise tax law of 1909, in which he states in part as follows:

"An impression has obtained in some quarters that no items should be considered in making up the account of the corporation, either as income or a deduction, unless its receipt or disbursement was evidenced by an actual cash transaction. When we contemplate the complications and intricacies of the business affairs of a great corporation, with its many dealings with other corporations and individuals, which are never settled in cash but on somewhat the clearing-house plan, any attempt to follow each of these transactions out into the cash book would result in inextricable confusion, uncertainty and inaccuracy. It will appear, therefore, that the return is to be made from the ledger and not the cash book, and that entry on the ledger from Jan. 1 to Dec. 31 of the year for which return is made is the evidence which will determine whether or not an item is to be considered in making the return."

OPERATING AND MAINTENANCE EXPENSES

Operating expenses would seem to be understood to be the same as shown by the books and records of a corporation. Rentals seem to mean the fixed sum paid for a property taken over from another company and operated, but not charges for offices, buildings or small pieces of land which the company may be renting and using in its operation of property. They are included in operating expenses.

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LOSSES SUSTAINED DURING THE YEAR NOT COMPENSATED BY INSURANCE AND INCLUDING DEPRECIATION

The deductions allowed in this item would seem to be from loss of property or accounts not compensated by insurance and charged off on the books of the corporation. An allowance is also made of a reasonable amount for depreciation, provided that this account is recognized by the corporation, in which case it will, of course, appear in its reports.

INTEREST AND TAXES

It would appear that items of interest and taxes should be treated in the same manner as gross income; that is, the amount to be deducted would be the amount accrued and not the amount actually paid, with the exception that a corporation will not be allowed to deduct interest on an amount of its bonded and other indebtedness in excess of one-half of the amount of its outstanding capital stock and bonded and other indebtedness.

Taxes on real and personal property, on gross earnings and on net income imposed by the state or federal governments are allowed to be deducted, with this exception—that taxes imposed by a municipality for local benefits, such as paving, sewer, etc., cannot be included. The normal tax of 1 per cent paid by a corporation on bond interest, where the provision of the mortgage guarantees the payment of interest free of tax, cannot be included in the deduction of taxes. No provision is made in the foregoing items of deductions for amounts received by a corporation from securities of another corporation held by it, whether in the form of interest or dividends. It would appear to be the intent of the law to compel a corporation receiving such amounts to report them as gross income on which it must pay the normal tax of 1 per cent, although the corporation paying these amounts has included them in its report of net income.

NET INCOME

The law defines net income as the amount derived after deducting from the gross income received from all sources during the year the specific deductions heretofore enumerated.

THE NEW FEDERAL INCOME TAX LAW

BY L. T. HIXSON, AUDITOR TERRE HAUTE, INDIANAPOLIS & EASTERN TRACTION COMPANY

That portion of the tariff act approved Oct. 3, 1913, which provides for an income tax will no doubt be read by a greater number of people than any other section of the act. While it may appear that the exemption of $3,000 or $4,000, as the case may be, will relieve a great many of the necessity of giving this law any consideration, it will be found, on close examination, that a large number of people will be affected in that they will be required to make various reports and certificates, although they will finally be tax-exempt if such reports and certificates are properly prepared.

Officers of corporations will also have to be on the alert and to keep abreast of the rulings promulgated by the Treasury Department not only as to taxes to be assessed against the corporation but as to deductions which such corporation is required to make from certain payments to individuals.

The provisions of the old excise tax law (commonly called the corporation tax law), which is superseded by the income tax law, are considerably changed by the new statute. For example, the specific exemption of $5,000 allowed corporations under the old law is not allowed; neither is it specifically stated that the amount of dividend received from stocks of corporations subject to the tax may be deducted, although the law may be construed as allowing this deduction. There is also a different basis for arriving at the amount of interest which may be deducted.

The law might be subdivided into two parts—that principally affecting individuals and that which affects corporations mainly.

CORPORATIONS

The old corporation tax law was re-enacted and covers the period Jan. 1 to Feb. 28, 1913, at which time the income tax law took effect. The re-enacted corporation tax law provides that the amount of tax to be assessed against a corporation for January and February shall be ascertained in accordance with the provisions of the income tax law, and provides further that a corporation shall be required to make one return only for the full year of 1913. Therefore, to all intents and purposes, the old corporation tax law is a dead letter from Dec. 31, 1912, so far as returns are concerned.

COLLECTION AT THE SOURCE

The most complicated portion of the act seems to be that pertaining to collection of the tax at the source.

The law provides that all persons, firms, corporations, etc., having the control, receipt, disposal or payment of fixed or determinable annual or periodical gains, profits and income of another person subject to tax, shall, in behalf of such person, deduct and withhold from the payment an amount equivalent to the normal income tax upon the same and make and render a separate and distinct return of the income of each person; provided that no portion of such tax shall be withheld prior to Nov. 1, 1913; provided, further, that no return of income as above shall be required, if such income for any taxable year, exclusive of dividends on capital stock of corporations, etc., subject to the tax, is not in excess of $3,000, except that the tax of 1 per cent shall be deducted from interest on bonds, etc., regardless of the fact that the amount of interest may be less than $3,000.

The provisions of the law for collection at the source refer to the normal tax of 1 per cent only.

Owing to difference of opinion as to the interpretation of the law, especially that part pertaining to collection at the source, the Treasury Department has at this writing issued two pamphlets covering regulations regarding the deduction of income at the source—one covering bond interest and similar income, the other covering income other than bond interest, etc. A ruling regarding the tax on bond interest provides that, for the purpose of collecting the tax, the "source" shall be the debtor or its agent in the United States. On the debtor or agent, therefore, falls the duty of withholding the tax, and such tax shall be withheld by no other bank, trust company or individual taking coupons or interest orders for collection; provided that the owner makes a certificate of ownership showing whether exempt or not and delivers said certificate with the coupons. If, however, the coupons are not accompanied by such certificate of ownership, the bank or trust company first receiving the coupons is required to fill out a form of certificate acknowledging responsibility for the collection of the tax. This certificate accompanies the coupons to the debtor or his agent, and the tax is not again withheld, but the certificate is filed by the debtor or his agent with the government.

There are several forms of certificates authorized by the Treasury Department for use in connection with collection of bond interest.

All certificates of ownership of bonds, etc., received by the debtor or agent must be filed by either of them with the collector not later than the twentieth of the following month. While, according to the law, the trustee under a mortgage is authorized to file these certificates, it would probably be more satisfactory for the debtor to make all reports to the collector, thereby retaining all records of transactions as well as saving considerable expense in the way of fees to the trustee. This item of filing reports of bond interest paid, listing certificates, etc., will be found

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to be no small matter. There will also be required changes in, or additions to, ledger accounts to provide a complete record of these transactions, so that they will be clear at all times and that the representative of the Treasury Department may readily audit them if he so desires.

The law provides that the normal tax on individuals to be withheld at the source shall not be construed to require any of such tax to be withheld prior to Nov. 1, 1913. The question then arises as to whether the entire amount of interest which matures Dec. 1 is to be taxed or only that portion accruing after Nov. 1. For example, six months' interest, amounting to $25, might be due Dec. 1. Would the tax be collected on $25, the full amount, or on $4.16, the amount accruing since Nov. 1? One ruling by the Treasury Department provides that "the tax shall not be withheld on coupons or registered interest maturing and payable before March 1, 1913, although presented for payment at a later date." This ruling is probably made for the reason that the proclamation of the Secretary of State stating that the proposed amendment to the constitution had been ratified by the proper number of states was not issued until Feb. 27, 1913.

This brings up the questions: What shall be considered income, the amount actually received or the amount accruing to a certain period? Will the individual include in his returns the amount of interest received between March 1, 1913, and Jan. 1, 1914, regardless of the fact that a portion of this interest accrued prior to March 1, 1913? It would seem that the Treasury officials would have an endless task if they were to apply the "accrual" basis to individuals, and that they will very likely consider the amount as income during the period in which it was actually received. With corporations, however, the reports and collections will probably be made in the same manner as the books of account are kept—usually on the "accrual" basis. Therefore, the ruling mentioned above probably refers to the contract date of payment, and any interest due March 1, 1913, or thereafter would be taxable on the full amount paid and not the proportion accruing after March 1, at least so far as individuals are concerned.

There are a number of mortgages which provide for payment of both principal and interest without deduction for any tax which the company may be required to retain. In such cases the debtor would pay the tax in full. However, when the owner of the bond makes his return he must list as a part of his income the interest received on such guaranteed tax-free bonds, and if he is not exempt from taxation he will pay on such interest. This would make double taxation—the debtor paying tax and also the bond owner. In such cases would the owner not have the right to show such amount on his return as a deduction under item 8—"the amount of income the tax upon which has been paid or withheld for payment at the source"?

The law does not specify that the tax on such bond interest must be finally paid by the bond owner to entitle him to claim the deduction, but it does very clearly state that no credit as a deduction shall be made to a company for taxes paid on bonds issued with a guaranty that they are free from taxation.

In addition to bond interest or similar income, the income arising from other interest, such as ordinary notes and open accounts, rents, salaries, wages, etc., is taxable at the source. Such tax shall not be withheld, however, until such time as the rents, salaries, etc., shall have reached an aggregate amount in excess of $3,000. When such amount has been reached the withholding agent (source) shall withhold the normal tax on the entire amount ($3,000 and excess) unless the person entitled to the income files with such withholding agent a notice, the form of which is prescribed by the Treasury Department, claiming exemption under paragraph C of Section 2 of the act, in which case the withholding agent shall withhold tax on the income in excess of the exemption ($3,000 or $4,000) only.

POINTS AFFECTING INDIVIDUALS NOT CLEARLY SET FORTH, WHICH WILL DOUBTLESS REQUIRE SPECIAL RULING UNTIL DECIDED BY THE COURTS

The law provides very clearly that $3,000 or $4,000 of the net income is exempt from the normal tax, but is very indefinite as to whether this applies to the additional tax.

The law allows as a deduction from income, so far as the normal tax is concerned, under item 7, the amount of dividend received from corporations, etc., subject to the tax, and under item 8, the amount of other income the tax on which has been paid or is to be paid at the source. Does this also apply to the additional tax?

Under the law the additional tax is assessed upon the net income in excess of $20,000. Paragraph C of Section 2 provides "that there shall be deducted from the net income of each of said persons, ascertained as provided herein, the sum of $3,000," etc. If this is to be a deduction from income in computing the additional as well as the normal tax, it would seem that the wording of the law should be "income exemptions," or "deductions from gross income," instead of deductions from net income. Paragraph A, Subdivision 1, reads, "that there shall be levied, assessed, collected and paid annually upon the entire net income arising or accruing from all sources . . . a tax of 1 per cent per annum upon such income, except as hereinafter provided . . ." Paragraph D of Section 2 exempts individuals from the normal tax as far as dividends are concerned, in the following words: "Persons liable for the normal income tax only . . . shall not be required to make return on dividends on the capital stock or from the net earnings of corporations . . . taxable on their net income as hereinafter provided."

Subdivision 2 of paragraph A reads: "All the provisions of this section relating to individuals who are chargeable with the normal income tax, so far as they are applicable and not inconsistent with this subdivision of paragraph A, shall apply to the levy, assessment and collection of the additional tax imposed under this section." Therefore it would appear that it was the intent of the law that neither the $3,000 or $4,000 items, dividends or other income on which the normal tax was paid at the source, should be exempt from the additional tax.

POINTS NOT CLEAR AFFECTING CORPORATIONS

The principal point on which there seems to be doubt is as to whether credit may be taken for the payment of tax at the source on income which a corporation may receive from dividends. While that portion of the law relating especially to corporations (paragraphs G to I inclusive) does not make any mention of this item, it is certainly proper to claim credit for such payment at the source, if it is allowable to individuals, or if it is proper to assume that the individual is to pay the additional tax on such items, and the $3,000 or $4,000 exemption item.

The Treasury Department has not at this writing issued blank forms for making out the reports, but these would be made substantially as shown in the accompanying table.

INDIVIDUALS (ENGAGED IN BUSINESS)

Gross income from all sources		$275,000
Less gross income exempt from taxation (interest on United States bonds, etc)		5,000
		$270,000
Deductions from gross income:		
1. Necessary expenses actually paid in carrying on business (not including personal, living or family expense)	$120,000	
2. Interest paid on indebtedness within the year	2,000	
3. Taxes (not including those assessed against local benefits)	1,000	
4. Losses actually sustained during the year, not compensated for by insurance or otherwise	500	
5. Debts actually found to be worthless and charged off within the year	1,000	
6. Depreciation of property during the year	500	
		125,000
Net income		$145,000
Less net income exempt from normal tax (assumed in this case $4,000)		4,000
Balance net income, on which normal tax is assessed		$141,000

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Normal tax:		
1 per cent on $141,000		$1,410
Additional tax ($20,000 to $145,000)		
1 per cent on $30,000 (20,000 to 50,000)	$300	
2 per cent on 25,000 (50,000 to 75,000)	500	
3 per cent on 25,000 (75,000 to 100,000)	750	
4 per cent on 45,000 (100,0000 to 145,000)	1.800	3,350
Total tax		$4,760
Less normal tax paid at the source:		
7. Dividends from corporation, $20,000 at 1 per cent	$200	
8. Bond interest, salary, etc., $7,000 at 1 per cent	70	270
Balance tax payable by individual		$4,490

INDIVIDUALS (NOT ENGAGED IN BUSINESS)

Gross income, all sources		$4,500
Deductions from gross income:		
2. Interest paid	$200	
3. Taxes paid	100	300
Net income		$4,200
Exempt from normal tax		4,000
Normal tax assessed on balance		$200
1 per cent of $200, which is the amount of tax payable		$2

CORPORATIONS

Gross income from all sources		$1.000,000
(If any portion of this gross income is exempt, such exemption will be deducted as shown on sample for individual engaged in business.)		
Deductions from gross income:		
1. Ordinary and necessary expenses paid within the year in the maintenance and operation of business and properties including rentals and other payments required to be made as a condition to the continued use or possession of property	$500,000	
2. Losses actually sustained within the year and not compensated for by insurance or otherwise, including depreciation	5,000	
3. Interest accrued within the year on indebtedness not exceeding one-half of the sum of interest-bearing indebtedness and paid-up capital stock outstanding at the close of the year	250,000	
4. Taxes paid within the year (not including income tax paid on guaranteed tax-free bonds)	35,000	790,000
Net income on which tax is assessed		$210,000
Tax, 1 per cent on $210,000		$2,100
Less tax paid at source:		
Dividends received, 1 per cent on $5,000		50
Balance tax payable		$2,050

PROBLEMS IN THE LAW

In conclusion, I wish to put the following questions before you:

1. When the interest falls due at a date different from that closing the year for which report is made, what amount shall be reported—the amount accrued during the year, or the amount paid? The wording of the law is "accrued and paid."

2. When taxes are assessed one year and are not due until the following year (in Indiana, first Monday in May and first Monday in November), although they become a liability accruing to the year in which assessed, shall the amount shown on the income tax report be the amount paid during the year (previous year's tax) or the tax assessed during the year and accrued on the books? The law states "paid within the year."

3. Do individuals pay the additional tax on (a) $3,000 or $4,000 exemption? (b) Dividends received? (c) Other income on which the normal tax has been paid at the source?

4. Do corporations pay tax on income derived from dividends that are received from corporations subject to the tax?

5. In withholding tax at the "source" is the withholding agent responsible for the collection of taxes on: (a) Income paid Nov. 1, 1913, and thereafter regardless of the date due? (b) Income paid Nov. 1, 1913, and thereafter if due prior to March 1, 1913? or (c) Income accruing from Nov. 1, 1913, although the payment may include a portion accruing between March 1, 1913, and Nov. 1, 1913? (Treasury ruling states that interest maturing before March 1, 1913, shall not be withheld, although the law is not clear on this point.)

6. Should individuals use the "cash basis" in arriving at their net income?

7. Should corporations use the accrual basis for income reports, provided their books are kept in that manner?

8. May individuals deduce as "paid at the source" the amount of normal tax on bond interest which the debtor is required to pay under terms of mortgage which provides that the principal and interest shall be paid without deduction for any tax which the debtor may be required by any present or future law to make payment of or retain therefrom?

In the final working out of the system, these perplexing points, as well as many others, will be cleared away by the Treasury Department, and all unnecessary reports will, no doubt, be abolished, so that the federal income tax law of 1913 will operate as smoothly as other federal revenue laws have done.

ERRORS IN STATISTICAL ARTICLE

The ELECTRIC RAILWAY JOURNAL greatly regrets that a number of errors have been found in the figures in the article entitled "Statistics of Electric Railway Properties," published in the issue of Oct. 25, page 925. These figures were not prepared by a regular member of the staff but were purchased and published in good faith in the belief that they furnished interesting information for readers. It was stated at the time the article was published that in view of the complexity of the statistics the correctness of the data was not guaranteed. Reference is made again to this statement, in order that the figures may not be put to any use for which they are not intended.

Attention has been called to certain errors in connection with the figures published for the Ohio Electric Railway. The correct figures of this company for the year ended June 30, 1912, are: Gross earnings, $3,692,316; net earnings, $1,744,276; interest and rentals, $1,269,712; surplus before dividends, $314,049; operating ratio, 55.35. The statistics of the Ohio Electric Railway, as published, did not include the earnings and expenses of the light, power and steam heat departments and the miscellaneous earnings of the company. The article showed a deficit of $6,910 without payment of dividends on the company's stock, but the company did pay dividends as rental on the preferred stock of five underlying companies and on the common stock of two underlying companies, and of its surplus $27,518 was invested in bond sinking funds of underlying companies. The article showed the per cent of surplus to gross as zero, although the actual figure was 8.61 per cent. It showed gross revenue per $1 of interest and rentals as $2.19, while the actual figure was $2.90. It showed miles of track operated as 670. The correct figure is 617.42. It included in trackage the sidings and double track, making a gross revenue per mile of track of $5,002. With the figures for the sidings and double track excluded, the figures would be $5,980. A large amount of the capital stock and funded debt of the lessor companies in the system is owned by the Ohio Electric Railway. The article also included the securities of the Columbus Interurban Terminal Company as part of the system. This company is a separate corporation, and while it is controlled by the railway, the funded debt is secured by the terminal property.

The gross receipts quoted for the Winnipeg Electric Railway are from all sources and not from its railway operations only. The miles of track of the Cincinnati Traction Company were published as 442 instead of 227. Errors in mileage have also been pointed out in the case of the International Traction Company, the Puget Sound Electric Railway, the Seattle Electric Company and the Kansas City Railway & Light Company. Changes in these figures would of necessity change the comparative standing of the different roads in the different tables.

Exception has also been taken to the method adopted in determining the extent of the population served, although that method was fully explained in the article and the population assumed was given in every case.

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Chicago City Railway's New Cars

These 100 New Cars Are the First Double-End, Inclosed-Vestibule Motor Cars Purchased for Chicago—Several New Features Are Included in the Steel-Frame Design and General Arrangement

The new cars purchased recently by the Chicago City Railway Company, Chicago, Ill., will be the first inclosed double-end motor cars to be placed in service in Chicago. While the near-side cars purchased by this company more than a year ago were entirely inclosed, they were a radical departure from the standard cars of both the surface railways. The new cars in general conform to the old-type standard cars and to the over-all dimensions laid down by the Board of Supervising Engineers. They have arched roofs, however, and provide a seating space for fifty-four passengers, equivalent to that of the near-side cars.

The general dimensions of these new cars are as follows:

Length of car over body corner posts	32 ft. 8 in.
Length of car over bumper	48 ft. 0 in.
Width of car over all	8 ft. 6 in.
Width of car over posts at belt rail	8 ft. 5 in.
Height of top rail to top of trolley board	11 ft. 7⅞ in.
Truck centers	22 ft. 0 in.
Diameter of driving wheels	34 in.
Diameter of pony wheels	22 in.
Wheel base of truck	4 ft. 10 in.
Height of first step above top rail	13½ in.
Height from first step to platform	12 in.
Height from platform to body floor	10 in.
Total seating capacity, including vestibules	54
Estimated weight complete	40,000 lb.

BODY FRAMING

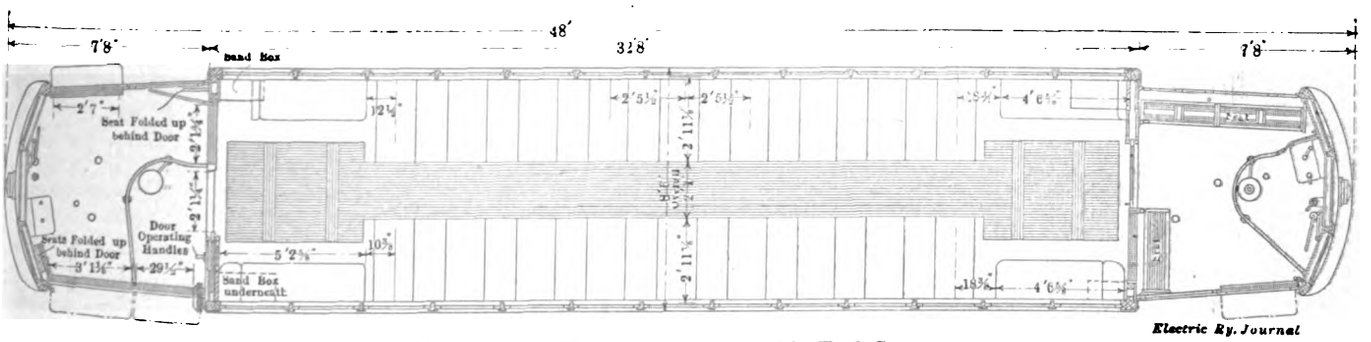
The design of the bottom framing of these semi-steel cars includes departures from the usual designs employed in former Chicago cars. Probably the most marked of these are the side sills, which are inverted fish-belly type girders built of 3/16-in. steel plate and angles and over-trussed. The top is reinforced by a 2-in. x 5/16-in. flat bar and the bottom by a 2-in. x 2-in. x ¼-in. angle. Three openings, 6 in. x 4 in., cut in the three center panels of these side sills, provide for air-duct connections to the cross-seat heaters in the car. In addition to the plate-girder side sills, the sides of the car are over-trussed by 2¼-in. x ⅜-in. steel bars applied on the angle-iron posts 2 ft. 10¾ in. above the base of the side sills and anchored at the girder ends.

Another unusual feature in the design of the bottom framing is in the five cross sills. These are arched trusses formed of two 1¼-in. x 1¾-in. x ¼-in. steel angles, the upper one being horizontal and conforming to the car floor and the bottom one being in an arch from the bottoms of the side sills to the level of the upper member at the center of the car body. These angles are fastened together at the center and the side sills with ¼-in. steel plates. This particular design of cross sill is employed because it gives maximum clearance for electrical conduits and other car equipment underneath the center of the car body, and bending tests demonstrate that they are equal in strength to a cross sill of a uniform section carried between the side sills.

GENERAL ARRANGEMENT

The car body is fitted with thirteen window openings on each side, the upper sashes of which are stationary and arranged in a continuous frame. All lower sashes are arranged to raise vertically to the level of the continuous bottom rail of the upper sash. In addition to these, storm sashes are provided at all side windows of the car for use in extremely low temperatures. The sashes are single, two-light, and conform in shape to the body sashes, being held in place by three brackets and locks mounted on each post.

Each bulkhead of the car contains one swinging door and one sliding door as is now standard for all surface cars in Chicago. The location of these doors, however, is somewhat different from the present standard, in that the stationary portions of the bulkhead are at the sides of the car instead of in the center. By this arrangement it is possible to obtain additional length to the four longitudinal seats in the four corners of the car body. In conformity with the general practice in surface railway car design in Chicago, one side of the vestibule is equipped with a sliding door, fitted with manually operated mechanism, which also raises and lowers the step. The opposite side of the vestibule, however, represents a departure for Chicago in that it is fitted with folding doors and steps divided into two groups. The two exit doors are hinged to the body corner posts and the two entrance doors are hinged to the vestibule corner posts. Each pair of doors is equipped with hand-operating devices, which also raise and lower the steps. In order to make the operation of these folding doors and steps as easy as possible, the operating mechanism is fully equipped with ball bearings.



Chicago City Railway—1913 Double-End Car

Other innovations in the vestibule equipment on the new cars include a light signal system connected with the platform folding doors, which indicates to the motorman that the doors are either in the open or the closed position. In the former designs the motorman's and conductor's seats have been separate from the hand rail dividing the entrance from the exit aisles. The specifications for the new cars provide that these seats are to be fastened to the platform railings by pivotal brackets and made adjustable for height. When the seats are not required they may be folded and swung over to one side clear of both aisles.

Each car is fitted with eighteen cross seats of the "Reversible Walkover" type furnished by Hale & Kilburn. As mentioned earlier in the article, the arrangement of the doors in the bulkhead provides additional length to the four longitudinal corner seats, but in order that the aisles may be clear at the rear end of the car, all four of these longitudinal seats contain collapsible sections adjoining

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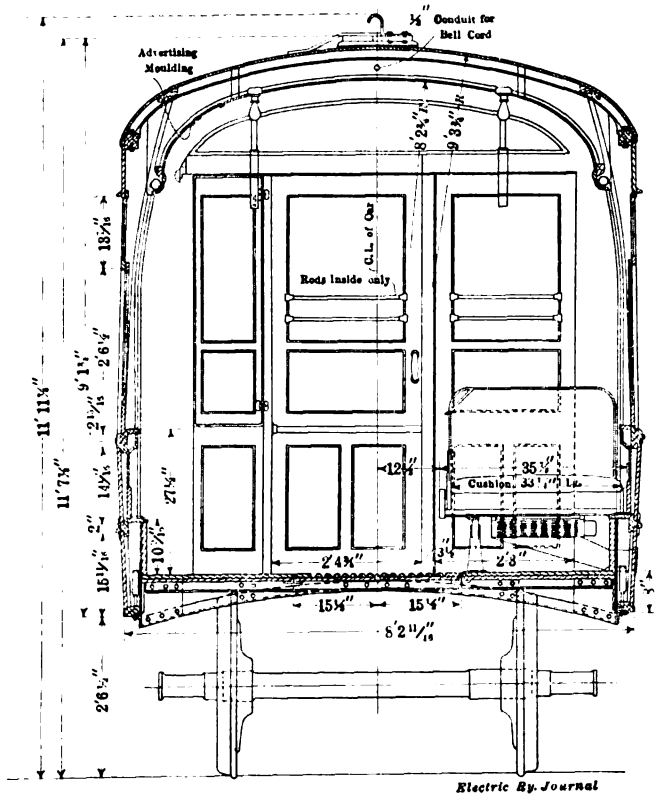
the bulkheads. Two collapsible wooden seats are also installed in each of the vestibules. One of these seats provides for four persons and occupies the space along the closed folding doors in the front end of the car, and the second seat is for two persons and occupies the space made by the closed and locked swing door in the bulkhead.

EQUIPMENT AND FIXTURES

Perhaps no railway company in the country has investigated more thoroughly the question of heating and ventilation than the Chicago City Railway. Practically every known type of ventilator and ventilating system has been tested in order that this company might conform to the ventilating requirements set forth in the Chicago city ordinances and at the same time meet the heating specification also provided by ordinance. The method of ventilation adopted for the new cars appears to conform to the ordinance requirements and embraces a combination of the Cook system, with exhaust ventilators in the vestibules. This system consists of a direct-connected fan motor set in a housing with connection to an exhaust chamber pro-



Chicago City Railway—Section of Body 1913 Closed Car

vided with ceiling registers under the roof. Intake ducts are provided through holes in the side girders and connect to the cross-seat heaters. The fan is arranged for two capacities and is controlled by two three-point indicating snap switches mounted on the bulkhead, one in each vestibule. The fan motors and housing are suspended from the hoods in the car vestibules. A sufficient number of "Utility" exhaust ventilators are installed in each vestibule to meet the requirements of the Board of Health of the city of Chicago.

The heater equipment includes eighteen Gold cross-seat heaters, nine on each side of the car, four panel car heaters, one in each longitudinal corner seat frame, and one heater on each platform, mounted inside the end-sill channels. These electric heaters are equipped with the Railway Utility Company's thermostat control, which provides for automatic regulation of all the heaters in the car body. Other improvements in the design of the cars include sanitary hand straps and additional glass panels in the entrance and exit doors, as well as additional lamps installed over each exit door platform. These lamps are equipped with reflectors and arranged to light only on the operating side of the car.

As a result of the exhaustive tests made on maximum traction trucks more than two years ago, they have been adopted as standard by both the Chicago City Railway and the Chicago Railways Company. These trucks are equipped with fully ventilated, field-tap-controlled GE-242 motors, and the control is the GE type K-51. This type of motor was adopted, aside from its other advantages, because of its special adaptability to Chicago operation. It permits of a change in speed without a change in the gear ratio. Other special equipment includes General Electric air-brake type CP-27 with 60-ft. compressors, consolidated Car Heating Company's signal bells and automatic light signal system, and International fare registers. The new cars are being manufactured by The J. G. Brill Company, Philadelphia, Pa.

THE ILLUMINATION OF STREET RAILWAY CARS

At the regular monthly meeting of the Massachusetts Street Railway Association at Young's Hotel, Boston, on Dec. 10, G. H. Stickney, General Electric Company, Harrison, N. J., presented a paper upon car lighting. President H. H. Crapo, of New Bedford, Mass., occupied the chair, and at the conclusion of the paper a short discussion took place.

The author pointed out that until within the past two or three years no scientific study had been given to street car lighting, although in other fields enormous economies had resulted from the introduction of tungsten lamps and by the more careful placing of such equipment and selection of reflectors. From the first, the 4-watt-per-candle carbon incandescent lamp of 16 cp was employed in street railway service. Metallized-filament and tantalum lamps were later tried in a few cases, but did not prove effective. The appearance of the wire-drawn filament finally opened the way for successful tungsten lighting on electric cars.

The simplest and most direct method of applying tungsten lamps was the replacement, lamp for lamp, of the carbon units already in use. To meet this service there was developed a lamp consuming 23 watts and giving about 17 cp, which meant an increase of 7 per cent in light flux along with the reduction of 64 per cent in power consumption. While this current saving was large, it was often offset by the cost of renewals, especially under rough service conditions.

DESIRABLE FEATURES OF CAR ILLUMINATION

The minimum intensity with which reading may be comfortably carried on under ordinary artificial lighting varies from 2 to 3 ft.-candles, although much lower intensities were used in the past. Lower intensities will suffice for other parts of the car, as long as there is sufficient light to make the car appear bright and comfortable. In distributing the light it is desirable that the lower part of the car be more brightly lighted than the upper portion. Incandescent lamps project their highest intensity in a horizontal plane if run with a vertical axis. By prismatic or translucent glass reflectors properly applied, a large part of the light can be directed downward at such angles as to insure an even distribution. Opaque reflectors above the lamps make the ceilings too dark, and inverted reflectors, while eliminating glare, are less economical and more subject to loss of efficiency through accumulation of dust.

It has been found generally advisable to modify the light from small, brilliant sources by means of reflectors or globes so as to increase the apparent size of the light sources and introduce cross rays of light which tend to minimize contrast and the harshness of shadows. Passengers in electric cars enjoy the dual protection of eyebrows

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and hats, so that brilliant light projected downward at steep angles is not nearly so objectionable as the same light projected in a horizontal direction. High location of lights in cars is therefore desirable. Better lighting of platforms and steps is also a field which has been but little studied. Again, sign and headlight lighting deserves more study.

The author then described the pioneer installation of tungsten lamps on the cars of the Bay State Street Railway which was made in 1912 and which was described in the ELECTRIC RAILWAY JOURNAL for Sept. 28, 1912. The work was done under the joint direction of the author and E. W. Holst, superintendent of equipment, neither of whom favored a lamp-for-lamp replacement on the basis of tungsten for carbon. A new method of lighting was devised by which the illumination of the car body could be effected by a single row of lamps equipped with reflectors and mounted at the middle of the center deck. Calculations indicated that the entire lighting of the 28-ft. and 34-ft. cars used could be obtained, excluding headlight power, with two circuits per car of 60-watt tungsten lamps, or 600 watts total. It was seen that the advantages over the lamp-for-lamp scheme would be: (a) reduced cost of lamp renewals, on account of the greater strength of the filaments and the lower cost of lamps per candle-power; (b) reduction of glare through the shading effect of reflectors; (c) more effective distribution of light by reflectors so as to direct a high intensity on reading matter in the hands of the passengers. The chief objections to this method were that if the reflectors were not firmly secured they might work loose and, falling, possibly injure passengers, and that an initial expense would be required in re-wiring and equipping old cars. Steam railroad experience indicated that a proper and safe holder could be made, and it was believed that in new cars the new method would be reasonable in cost, and in old cars the economies of operation and improved service would warrant the expense.

Three separate sets of installations and tests were made on the Bay State system. The lamps used in the final tests and now standard were clear 56-watt "Mazda" straight-side type units with screw bases, the lamps being 5½ in. long x 2⅝ in. in diameter and having a specific consumption of 1.2 watts per mean horizontal candle-power, the total candle-power being 46.7. The rated voltage of the lamps was selected as one-fifth of the rated voltage of the circuit. The holders were the Safety Car Heating & Lighting Company's 2¼-in. units, and the reflectors were Holophane, XI-40, of clear glass. Adjacent lamps in the car body were placed on alternate circuits to minimize the effects of failure in a lamp on one circuit. Only the holders leave something to be desired with regard to convenience in wiring installation, and some means of making it impossible to insert reflectors without properly securing them would be advantageous. No cases of falling or loose reflectors, however, have occurred in more than eighteen months' operation. A summary of the results obtained is reprinted in the table at the close, which also contains data from other roads at present available.

L. C. Porter, assistant to the author, has co-operated with a number of other street railways for lighting of new equipment. Among these companies are the Massachusetts & Northern, whose Athol and Orange cars are equipped, and the Capital Traction Company, of Washington, D. C. Probably the most extensive test now under way is on the New York Municipal Railway, where indirect lighting with totally concealed lamps and semi-indirect lighting with translucent shades beneath the lamps are being tried along with the reflector method.

To overcome the extinguishment of all light in the car body by the failure of one lamp a so-called selector switch has been provided by which, on turning the dial, an extra lamp is bridged across each of the lamps in turn until the defective lamp is reached, when the circuit is lighted through the bridged lamp. On account of the wider spacing of units, the illumination is not so even as with the 56-watt method and shadows are more pronounced. The wiring is more complicated and there seems no advantage in economy.

To secure the highest benefit from the reflector method, it is necessary to arrange the equipment in accord with the car construction. The spacing of 56-watt lamps in a single row down the center of the car body should not exceed 6 ft. or 7 ft., preferably the former, and the end lamps should not be more than half this distance from the ends of the car body. A 6-ft. spacing represents an energy consumption of 9 watts per foot of car length and, in a car 8 ft. wide, 1.17 watts per sq. ft. of floor area. A wider spacing tends to make the light distribution uneven and the shadows conspicuous. Care should be taken to secure lamps of the right voltage. If the rated voltage is too high the illumination will be low, which may be objectionable during rush hours or on outlying parts of the system. If too low a rated voltage is selected, the burn-outs may be excessive. Railway lamps are rated lower than those for commercial service, both on account of the voltage variation and the low cost of power.

The headlinings of the Bay State cars are dark yellow, those of the Capital Traction Company being green, and those of the Massachusetts & Northern light yellow.

CARBON AND TUNGSTEN LAMP INSTALLATIONS

Company	Length Car Body, ft.	Lamps in Body	Reflector	Watts per Sq. Ft.	Ft.-Candles in Body	Lumens per Watt
Bay State Street Railway	28	14 64-watt carbon	None	4.09	2.1	0.66
Bay State Street Railway	28	4 60-watt tungsten	Holophane I-60	1.29	3.6	2.76
Bay State Street Railway	34	15 64-watt carbon	None	3.52	1.45	0.41
Bay State Street Railway	34	6 56-watt tungsten	XI-40 clear holophane	1.23	2.93	2.37
Capital Traction Company	28	11 54-watt metallized	Flat-steel porcelain enamel	2.65	3.17	1.20
Capital Traction Company	28	11 36-watt tungsten	Flat-steel porcelain enamel	1.77	5.13	2.90
Capital Traction Company	28	8 36-watt tungsten	XI-40 clear holophane	1.28	5.20	4.04
Massachusetts & Northern	24	10 64-watt carbon	None	3.34	4.08	1.22
Massachusetts & Northern	24	5 60-watt tungsten	I-60 clear holophane	1.56	4.08	2.62

DISCUSSION

H. F. Wallace, General Electric Company, Boston, said that forty street railways in New England are now using tungsten lamps, and that more than 100,000 of these are in service in this section alone.

John W. Corning, electrical engineer Boston Elevated Railway, said that his system is changing to tungsten lamps, using 23-watt units in place of the 64-watt carbons. No shades are employed. On the Boston system there are few places where low voltage is a factor in car lighting.

Paul Winsor, chief engineer motive power and rolling stock Boston Elevated Railway, cited the economical service furnished by tungsten lamps on the rapid transit lines and Cambridge subway platforms. In the latter case the demand charge of the Cambridge Electric Light Company for emergency service is reduced by the use of tungstens, which decrease the connected load.

E. W. Holst, superintendent of equipment Bay State Street Railway, Boston, emphasized the importance of designing shades so that they cannot be loosened by car cleaners. Experience on the Bay State lines shows more than 35 per cent longer life in the 56-watt lamp as compared with the 23-watt size. In closing, Mr. Stickney said that constant improvements are being brought forward in lamp design and manufacture and that the lamps now on the market are much stronger than those made a year ago.

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The Engineering Problem of Electrification*

The Author Presents Lists of All American Electrifications of High-Tension A. C. and D. C. Roads, and Offers Comparative Data to Prove the Superiority of High-Voltage D. C. Systems to A. C. Systems of Split-Phase or Other Types

BY A. H. ARMSTRONG, RAILWAY DEPARTMENT, GENERAL ELECTRIC COMPANY

The broad question of whether electrification will show an attractive return upon the large capital investment required can best be determined by a detailed investigation of the local conditions obtaining in any given case. Any estimate of a general character is at best more or less misleading when applied to a specific problem. The electric locomotive possesses many operating characteristics not shared by the steam engine, and its introduction opens up possibilities in operating methods that may make it desirable to effect sweeping changes in train operation as now carried on with steam engines. Until one or more engine divisions are electrically operated, what it means to the railway operator to be relieved of many of the limitations of the steam locomotive perhaps may not be fully appreciated.

For example, given an electric locomotive capable of hauling an 800-ton passenger train at 60 m.p.h. on level track and, without assisting locomotives, able to haul the same train up grades of 2 per cent at a speed of 25 m.p.h., it is possible to make radical improvements in schedule. When it is considered furthermore that such an electric locomotive requires no stops for fuel and water and can operate 1200 miles or more between inspections, it is evident that electrification calls for considerable readjustment of steam railroad traditions.

Failure to grasp fully the possibilities of electrical operation may result in running up the first cost of proposed electrification to an extravagant total upon which no adequate return is possible. So much local color is required to discuss intelligently the question of "Will it pay to electrify?" that no attempt will be made in this paper to discuss the financial aspect of the matter. The several important installations now under construction and the even larger projects upon which favorable decision has been reached all point to the fact that electrification must be attractive in some instances at least. There are, however, certain fundamental data governing the operation of all electric locomotives, and it is the purpose of this paper to discuss some of the engineering questions involved.

At the outset, it is found that the electrical engineer has perfected several types of locomotives and different methods of distributing electric power to them, thus giving rise to what are known as several different "systems of operation." The term "system" is generally applied to the combination of locomotive and trolley or third-rail distribution, as the question of power generation and transmission is common to all. While it is true that the single-phase and split-phase locomotives call for a supply of single-phase, 25-cycle or lower power, it is only in isolated instances that this kind of electric power can be economically generated and used exclusively by the railway company. Large power installations are now so well equipped to give attractive power rates over extended areas, and economical electric power production is so completely an industry in itself, that local conditions must be very favorable to justify the installation of a separate power house devoted exclusively to railway load. Even should such a separate installation be made, it may be considered sound engineering to look to future possibilities and install apparatus similar to that in neighboring systems where the frequency and voltage are standardized. Different frequencies are not as serious as conflicting track gages, but they do involve the burden of expense and loss in efficiency of frequency changing sets which it may some day be found expedient to install in order to tie the two systems together. Hence the statement is again made that the generation and transmission of power offer the same problem without regard to the system of electrification favored.

It is proposed to replace the steam engine with a type of motive power that offers superior advantages in the hauling of heavy trains. In other words, the electric locomotive itself constitutes the main argument in favor of electrification, and no marked excellence of distribution system can offset the failure of the electric motive power. The steam locomotive it is proposed to replace is a highly developed machine of great reliability and the result of the experience born of a great many failures. It cannot be too strongly emphasized, therefore, that the electric motive power is the controlling factor in main-line electrification, a point of view that is sometimes overlooked.

The three electric systems considered for main-line electrification are as follows: Single-phase, alternating; split-phase, alternating, and high-voltage, direct current.

The single-phase commutating motor has been in operation upon interurban electric railways for some years, and a study of the history of these installations reveals some of the fundamental reasons why this type of motive power has not been more generally adopted. It has been found that the initial expense and cost of upkeep of rolling stock equipped with single-phase commutating motors is fully double that of cars having the same seating capacity and equipped with direct-current motors. No new installations have been made for the past two years, and the several single-phase roads are being changed over to direct current as fast as financial conditions will permit. Table I is a list of the single-phase installations, and on those roads starred the single-phase motors have been replaced with the d.c. type.

Table I—Single-Phase Railway Installations in United States and Canada

Name of Railway	Year
Indianapolis & Cincinnati Traction Company	1904
*Atlanta Northern Railway	1905
*Illinois Traction System	1905
Long Island Railroad—Sea Cliff division	1905
San Francisco, Vallejo & Napa Valley, California	1905
*Warren & Jamestown Street Railway	1905
Westmoreland County Traction, Derby to Latrobe, Pa.	1905
Spokane & Inland Empire Railroad	1906
*Toledo & Chicago Railway	1906
*Anderson Traction Company, S. C.	1907
Erie Railroad	1907
Fort Wayne & Springfield Railway	1907
*Milwaukee Electric Railway (interurban division)	1907
New York, New Haven & Hartford Railroad	1907
*Pittsburgh & Butler Street Railway	1907
Richmond & Chesapeake Bay Railway	1907
Windsor, Essex & Lake Shore Electric Railway	1907
*Baltimore & Annapolis, Short Line	1908
Chicago, Lake Shore & South Bend Railway	1908
Colorado & Southern: Denver & Interurban Railroad	1908
Grand Trunk Railway: Sarnia-Port Huron tunnel	1908
Hanover & York Railway, Pa.	1908
Shawinigan Railway, Quebec	1908
Visalia Electric Railway, California	1908
*Washington, Baltimore & Annapolis Electric Railway	1908
Rock Island Southern: Rock Island to Monmouth	1910
New York, Westchester & Boston Railway	1911
Boston & Maine: Hoosac Tunnel	1911

The introduction of the single-phase system was a result of the success of suburban and interurban electric railway operation and the extension of these lines over large areas, thus bringing into prominence the question of economical

*A paper read at Montreal, Que., before the Canadian Society of Civil Engineers, Dec. 18, 1913.

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power distribution. It was recognized that a voltage higher than the commonly accepted standard of 600 volts was desirable upon the trolley in order to minimize the cost of installing feeder copper and substations. While the single-phase motor was being developed and installed upon interurban railways, careful attention was also being given to the question of the possibility of using d.c. motor equipments at higher voltages, and this resulted in the installation of the first 1200-volt road, the Indianapolis & Louisville Traction Railway, operated in 1907. The success attending this operation led to other similar installations at both 1200 volts and 1500 volts until it is now generally recognized that the high-voltage d.c. system is without a competitor for all classes of suburban and interurban electric railways. It is a safe prediction to make that no more single-phase motor equipments will be placed in operation in this country on new roads unless these roads virtually form an extension of existing systems.

Table II is a list of the several high-voltage d.c. installations in the United States and Canada.

TABLE II—HIGH-VOLTAGE DIRECT-CURRENT RAILWAY INSTALLATIONS IN UNITED STATES AND CANADA

Road	Voltage	No. of Equipments	Date
Indianapolis & Louisville Traction Railway Company, Scottsburg, Ind.	1200	13	October, 1907
Central California Traction Company, Stockton, Cal.	1200	22	June, 1908
Pittsburgh, Harmony, Butler & New Castle Railway, Eidenau, Pa.	1200	30	July, 1908
Washington, Baltimore & Annapolis Electric Railway, Baltimore, Md.	1200	47	February, 1910
Milwaukee Electric Railway & Light Company, Milwaukee, Wis.	1200	32	March, 1910
Aroostook Valley Railway Company, Presque Isle, Me.	1200	6	July, 1910
Oakland, Antioch & Eastern Railway, San Francisco, Cal.	1200	25	1910
Southern Cambria Railway Company, Johnstown, Pa.	1200	10	1910
Shore Line Electric Railway Company, Saybrook, Conn.	1200	22	September, 1910
Southern Pacific Railway (Oakland, Alameda & Berkeley division), Cal.	1200	82	April, 1911
Fort Dodge, Des Moines & Southern Railway, Boone, Ia.	1200	29	September, 1911
Southwestern Traction & Power Company, New Iberia, La.	1200	3	May, 1912
Oregon Electric Railway, Portland, Ore.	1200	72	July, 1912
Davenport & Muscatine Railway Company, Davenport, Ia.	1200	7	August, 1912
Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo.	1500	22	June, 1913
Piedmont Traction Company, Charlotte, N. C.	1500	43	1913
Nashville-Gallatin Interurban Railway, Nashville, Tenn.	1200	6	April, 1913
Butte, Anaconda & Pacific Railway, Butte, Mont.	2400	17	June, 1913
United Railways Company, Portland, Ore.	1200	8	June, 1913
Southern Traction Company, Dallas, Tex.	1200	30	October, 1913
Pittsburgh & Butler Railway, Pittsburgh, Pa.	1200	13	1913
Pacific Electric (San Bernardino division), Los Angeles, Cal.	1200	54	Building
Tidewater Southern Railroad, Stockton, Cal.	1200	4	1913
Portland, Eugene & Eastern Railway, Portland, Ore.	1500	38	Building
Southern Illinois Railway & Power Company, Harrisburg, Ill.	1200	5	September, 1913
Jefferson County Traction Company (Eastern Texas Electric Company), Beaumont, Tex.	1200	7	Building
St. Paul Southern Electric Railway, St. Paul, Minn.	1200	5	Building
Michigan United Traction Company, Jackson, Mich.	2400 1200	20 40	Building Building
Canadian Northern Railway, Montreal, Canada	2400	14	Building
Canadian Pacific Railway, Rossland, B. C.	2400	4	Building

All of the foregoing roads are operating with the highest degree of success and no change of type of equipment has been made or any such contemplated.

The history of the battle of the systems and the elimination of the single-phase motor as being unsuitable for the equipment of light electric railways has an important bearing upon the selection of systems for main-line electrification. The limitations of the single-phase motor that lead to its failure in the interurban railway field do not appear to be lessened when considering it for locomotive equipment, with the result that it is in use but on three of the twelve roads that are truly representative of electrified steam roads operating large electric locomotives.

TABLE III—MAIN-LINE ELECTRIFICATION—UNITED STATES AND CANADA

Installation	Year	Type Locomotive	System	Voltage
St. Clair Tunnel	1908	Geared	Single-phase alternating	3,300
N. Y., N. H. & H.	1907	Gearless	Single-phase alternating	11,000
Hoosac Tunnel	1911	Geared	Single-phase alternating	11.000
Cascade Tunnel	1909	Geared	Three-phase alternating	6,600
*Norfolk & Western	1914	Geared side rod	Split-phase alternating	16,500
Baltimore & Ohio Tunnel	1895	Geared	Direct current	600
New York Central	1906	Gearless	Direct current	600
Detroit Tunnel	1910	Geared	Direct current	600
Pennsylvania Terminal	1910	Side rod	Direct current	600
Butte, Anaconda & Pacific	1913	Geared	Direct current	2,400
*Canadian Northern	1914	Geared	Direct current	2,400
*Canadian Pacific	1914	Geared	Direct current	2,400

*Under construction.

There are other electrified steam lines, but the service on them more nearly approaches that of high-class electric interurban railways. Also there are interurban systems where electric locomotives of considerable capacity are operated, but the class of service does not approach the exacting demands of main line passenger and freight operation.

Table III, however, comprises converted steam lines where the service consists of hauling main-line passenger and freight trains behind electric locomotives of large capacity.

It is a noteworthy fact that the use of the single-phase motor has not extended beyond the two original roads installing this type of equipment, the Grand Trunk and the New York, New Haven & Hartford (including the Hoosac Tunnel installation), whereas d.c. motors have been universally adopted in all the more recent electrifications with the single exception of the proposed split-phase installation on the Norfolk & Western Railway.

The so-called "split-phase" system is comparatively a newcomer in the electric traction field and it has not yet been subjected to the test of actual operation. The proposed system offers many attractive features, however, and it is worthy of careful study in order to understand its fitness for heavy electric railway service. From experimental tests made, it seems reasonably certain that the split-phase locomotive can meet the demands of commercial operation with satisfactory reliability.

(A description of the split-phase locomotive appeared in the ELECTRIC RAILWAY JOURNAL for Oct. 11, 1913, page 678.—EDS.)

Confronted with the problem of main-line electrification and the demand for a distributing system which would provide for the economical distribution of large units of power over an extended area, the need of higher d.c. voltage was appreciated and resulted in the first installation of 2400 volts direct current upon the Butte, Anaconda & Pacific Railway, first operated May 28, 1913. This installation marks an epoch in electric railway progress, as its success offers substantial proof that d.c. motor equipments can be constructed at a reasonable cost and operated in an efficient and reliable manner with trolley potentials as high as 2400 volts.

It has been characteristic of the installations operating at 1200 and 1500 volts that the reliability of the d.c. motive power has been in no way impaired by reason of using a higher trolley voltage; in fact, the maintenance of 1200-volt motor equipments shows no increase over that of 600-volt equipments. A brush life of over 150,000 miles gives evidence of good commutator performance with practically no wear and the increased insulation provided has been ample to insure reliability and low cost of maintenance.

The transition from 1200 volts to 2400 volts direct current has also resulted in completely successful operation at this potential. The operating record of the Butte, Anaconda & Pacific 2400-volt d.c. system has been truly remarkable and can best be expressed by the following quotation from a letter published in the ELECTRIC RAILWAY JOURNAL by H. A. Gallwey, general manager:

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"To the Editors:—

"In reply to your inquiry I would say that on Oct. 1, 1913, the Butte, Anaconda & Pacific Railway established regular electric passenger service between Butte and Anaconda. For approximately four months previous to this the freight service between the East Anaconda yards and the smelter had been handled electrically. During this period electric locomotives have made approximately 55,000 miles

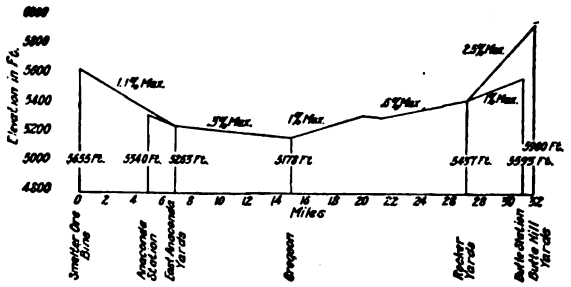

Fig. 1—Profile of Butte, Anaconda & Pacific Railway

and have delivered to the smelter about 1,500,000 tons of ore. Since starting the electric service there has been no failure of any of the electric apparatus and no delay in any way attributable to electric operation.

"The substation at Anaconda has been in continual service twenty-four hours a day with no more than ordinary care and without replacement of any parts. The locomotives have been operated by the steam locomotive enginemen and have been maintained by the regular shop force with the addition of one man experienced in electric operation. They have met every requirement and there has been no failure or replacement of locomotive parts.

"The overhead contact system has been highly successful, and there have been no failures and no accidents. The wear of the contact wire is inappreciable. The original pantograph rollers on the locomotives are still in use and show very slight wear notwithstanding the severe conditions imposed by the smoke and soot deposited on the wire from the steam locomotives during the several months of construction. Our experience up to the present time indicates the complete success of our electrification and justifies the existing optimism and enthusiasm for heavy railroad electrification.

"H. A. GALLWEY, General Manager."

The success of high-voltage d.c. installations has not been marred by a single instance of failure due to fundamental defects in the type of apparatus used, and justifies the conclusion that the 2400-volt, 1200-volt and 600-volt d.c. equipments are all part of the same general d.c. system, and that the only difference is the need of more insulation in one case than in the other. The 2400-volt d.c. installation of the Butte, Anaconda & Pacific Railway cannot be looked upon, therefore, as in any way constituting a new "system" of electrification, but rather as a natural development along the lines of higher voltage of the same well-known d.c. system which has rendered such excellent account of itself in the past on all our city and practically all of our suburban and interurban electric lines. This has an important bearing upon the general electrification of the steam roads, as it places the status of the direct-current system as applied to such service.

Fully appreciating the grave responsibility of selecting a type of motive power for a proposed electrification that holds promise of special fitness for the immediate service contemplated and also is capable of meeting the demands of unlimited future extensions, this paper will briefly touch upon the comparative characteristics of the split-phase and 2400-volt d.c. systems of operation. The choice seems to lie between split-phase and direct current inasmuch as the history of the single-phase motor equipment does not seem to justify its further consideration for heavy electric railroading.

A general scheme of distribution to the split-phase locomotive is shown in Fig. 5 which has special application to Western railways where sixty-cycle energy supply is universally standardized. A corresponding diagram of the 2400-volt d.c. system is shown in Fig. 6, this also being adapted to sixty-cycle supply.

Starting first with a comparison of the two types of locomotives, it is necessary to make some general assumption as regards service conditions in order to draw conclusions as to relative locomotive characteristics. The electric locomotive is capable of being constructed in very large units, but convenience in shopping and simplicity in construction both point to a unit of approximately 100 tons total weight on drivers. These 100-ton units can be coupled together and operated as a single locomotive of any desired capacity, though probably a two-unit locomotive weighing 200 tons and giving a starting tractive effort of 120,000 lb. is as large as the draft gear will stand.

Experience with steam locomotive practice seems to point to a locomotive rating on ruling grade that calls for a tractive effort corresponding to approximately 18 per cent coefficient of adhesion on drivers. Thus the conditions obtaining upon a 2 per cent ruling grade will be as follows:

Tractive effort due to 2 per cent grade	40 lb.
Tractive effort due to train resistance	6 lb.
Tractive effort due to curve resistance	2 lb.
Total per ton	48 lb.
Total weight on drivers	200,000 lb.
Rating at 18 per cent coefficient o adhesion	36,000 lb.
Gross train weight	750 tons
Trailing train weight	650 tons
Speed	15 m.p.h.
Net output at drivers	1,450 hp.

A maximum load of 50,000 lb. per axle has been assumed as being within acceptance of good practice. The question of speed on ruling grade is one subject to local requirements, but in general a speed of 15 m.p.h. on 2 per cent grade is as high as desirable on roads of moderate tonnage.

As ruling grade generally extends unbroken over comparatively short distances, it is possible to take advantage of this fact in electric locomotive design and proportion the motive power for a continuous capacity of say 16 per cent coefficient of adhesion without danger of exceeding safe temperature limits in operation. The continuous capacity of the 100-ton unit would therefore be 32,000 lb. tractive effort at slightly more than 15 m.p.h., based upon 16

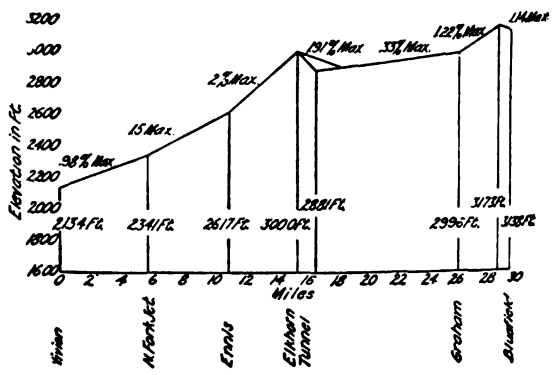

Fig. 2—Profile of Norfolk & Western Railway, Elkhorn Division

per cent coefficient of adhesion of the weight upon the drivers.

Owing to the moderate speeds at which a freight locomotive will operate, it is entirely feasible to consider a construction wherein the motors are geared direct to the driving axles by twin gearing, in this respect following the practice of the Detroit Tunnel, Cascade and Butte locomotive which has proved very successful.

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For the purpose of this comparison, it is assumed that both split-phase and d.c. locomotives will be of similar construction and employ twin-geared motors of equal weight and efficiency. A comparison of weight distribution in the two types of locomotives is presented in Table IV.

TABLE IV—COMPARATIVE WEIGHT OF LOCOMOTIVE—CONTINUOUS CAPACITY 32,000 LB.—15 M.P.H.

	Split-Phase	2400 Volts Direct Current
Four motors	44,000 lb.	44,000 lb.
Control apparatus complete	17,000 lb.	27,000 lb.
Air compressor	4,000 lb.	4,000 lb.
Air brake equipment	3,000 lb.	3,000 lb.
Miscellaneous	2,000 lb.	2,000 lb.
Phase converter	22,000 lb.	....
Transformer	18,000 lb.	....
Cab and running gear	160,000 lb.	120,000 lb.
Total	270,000 lb.	200,000 lb.

As the d.c. locomotive of 100 tons carries no ballast, it is evident that the 40,000 lb. comprising the phase converter and transformer of the split-phase locomotive must be carried on idle wheels together with the additional weight of

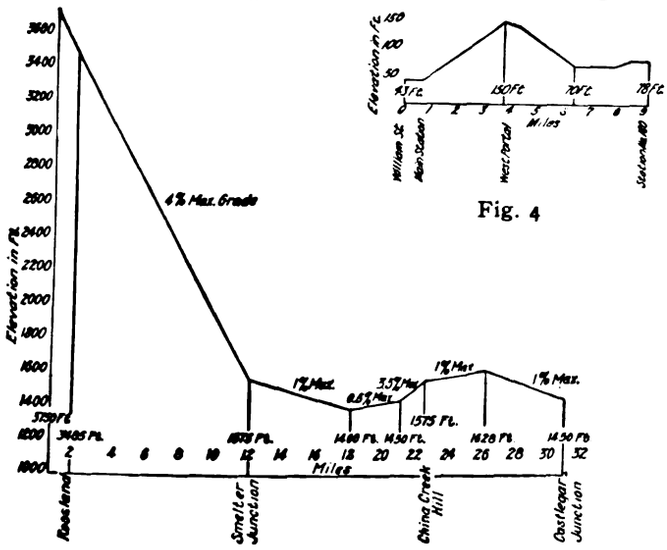

Fig. 4

Figs. 3 and 4—Profiles of Canadian Pacific Railway, Rossland Subdivision, and of Canadian Northern Railway, Montreal Tunnel and Terminal Electrification

cab and running gear required to carry this excess weight. The net result is a split-phase locomotive of fully 35 per cent more weight than a d.c. locomotive of equal capacity and of similar construction. This weight comparison is based upon the assumption that 50,000 lb. per axle constitutes the limit allowable, thus forcing the introduction of guiding axles to carry the excess weight of the split-phase equipment. For locomotive construction of less capacity permitting the split-phase to come within axle weight limits, both types of locomotives would comprise four axles with no guiding wheels and the split-phase locomotive may not total more than 20 per cent more than the direct-current type.

It is evident that the split-phase locomotive is not only considerably heavier for equal capacity but also more complicated and inefficient than the d.c. locomotive. The power from the trolley must in turn pass through transformer, phase converter, control, motors and gears. The efficiency of the complete locomotive in operation will depend upon its output and hence in the following comparison, Table V, efficiency has been computed for operation on both ruling grade and level track. The average efficiency of a day's run will obviously lie somewhere between these values, assuming that portion of the run when the locomotive is taking power.

Motor and gears are assumed to be of equal efficiency for both split-phase and direct current, as the advantage of one type motor over the other will be small at best and will not materially affect the values given.

TABLE V—FREIGHT LOCOMOTIVE EFFICIENCY—DETAILED COMPARISON

	Split-Phase		2400 Volts Direct Current	
	Ruling Grade	Level	Ruling Grade	Level
Motors and gears, per cent	89.3	86.0	89.3	86.0
Blower, per cent	97.8	95.8	97.9	95.9
Starting resistances, per cent	98.6	98.0	99.2	99.4
Phase converter, per cent	96.3	94.7	....	....
Transformer, per cent	98.0	97.0	....	....
Wheel correction, per cent	98.0	98.0	....	....
Weight efficiency, per cent	95.0	97.0	....	....
Combined efficiency, per cent	75.7	70.5	86.6	82.0
Average of grade and level	73.1		84.3	

Blower efficiency is based upon the fan blower required to cool the motors and auxiliaries taking 30 kw split-phase and 25 kw direct current.

Starting resistances consume a portion of the power required to start the train, and the efficiency of the locomotive is based upon the assumption that the train is started from rest once in two hours. This starting resistance loss is greater with the split-phase than with the d.c. locomotive, being twice as large up to speeds of 15 m.p.h. on ruling grade and four times as large up to speeds of 30 m.p.h. on level track.

Phase converter efficiency is determined by assuming that the capacity of the converter will approximate 75 per cent of that of the four motors it controls.

Transformer efficiency values given require no comment.

Wheel correction is determined as follows: Induction motors run at nearly synchronous speed, the slip being proportional to the total secondary non-inductive resistance, hence all wheels upon the same locomotive must be very closely of the same diameter in order to insure equal loading of the several motors. When one pair of wheels is turned, all must be turned equally. This would not be a very serious handicap were it not for the fact that several locomotives will operate in the same train, thus necessitating equal wheel diameters on all such locomotives. It is therefore evident that all locomotives must be interchangeable and any group of two or more be capable of running in the same train or the operating department will be seriously handicapped.

The diameter of new and turned wheels may vary fully 4 per cent, an amount sufficient to cause a prohibitive load distribution between motors. Hence it is proposed to install a variable secondary resistance and so adjust this resistance in the several motor secondaries that all wheel peripheral speeds will conform to the average diameter of new and worn wheels. This will entail an average loss of say 2 per cent when operation has continued long enough to require turning wheels to the minimum diameter allowable. D.c. motors have such a variable speed characteristic as to require no adjustment for varying wheel diameters.

Weight efficiency, as given in Table VI, is a relative value based upon comparison with the d.c. locomotives taken at 100 per cent.

TABLE VI—COMPARATIVE WEIGHT EFFICIENCY—FREIGHT LOCOMOTIVES

	Split-Phase	2400 Volts D.C.
Rated tractive effort on ruling grade	36,000 lb.	36,000 lb.
Gross train weight	750 tons	750 tons
Trailing train weight	615 tons	650 tons
Per cent trailing to gross	82	86.7
Weight efficiency, per cent	94.7	100

On level track it is assumed that pushing locomotives will be dropped and train weight per road locomotive will be double the ruling grade values. On this basis the split-phase locomotive weight efficiency will be 97 per cent for level track runs. Both values of split-phase locomotive weight efficiency are based upon the assumption that locomotives will be loaded to 100 per cent capacity on ruling grades. As such will not always be possible in regular operation, it is evident that the values quoted above will be lower under actual service conditions.

The combined efficiency of the complete locomotive shows

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that the split-phase freight locomotive will demand 15 per cent more power input from the trolley than a d.c. locomotive of equal hauling capacity and similar mechanical drive.

For passenger service it is reasonable to expect the locomotive running gear to be so constructed as to permit maximum speeds approaching 75 m.p.h. without danger of derailment or exceeding safe limits of motor and drive

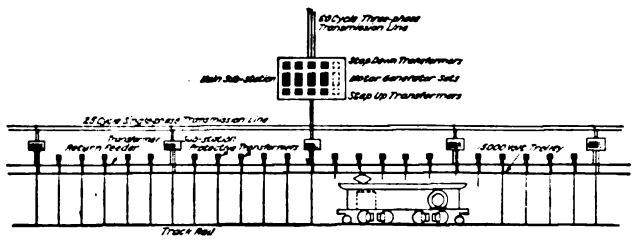

Fig. 5—General Scheme of Split-Phase Alternating-Current System

construction. Neither of the forms of construction in Fig. 7 are well adapted for very high speeds, and to secure good running qualities it is probably necessary to adopt different types of construction for freight and passenger locomotives, however desirable it may be from an operating standpoint to have them interchangeable.

With d.c. motors several forms of construction are available that will all operate successfully at high speeds. Unquestionably the most efficient construction is to mount the motor armatures upon the driving axles and eliminate the losses, weight and complications of any form of mechanical drive. It is assumed in this comparison that gearless construction will be adopted for d.c. high-speed passenger locomotives.

The split-phase locomotive motor is of the multiphase induction type and not adapted to gearless construction except by the introduction of quills and springs. This form of construction has not been so successful in operation as to justify considering its general adoption. It is assumed therefore that in order to get a locomotive of good riding qualities at high speeds, it is necessary to resort to side-rod drive from a jackshaft and house the motors in the cab. In this comparison it is assumed that motors drive the jackshaft through gears rather than by rods as offering a lighter form of construction requiring less space. The same form of drive is equally available with d.c. motors, but gearless construction offers great advantages, such as extreme simplicity, accessibility and high efficiency, so that the comparison in Table VII will be based upon gear side-rod split-phase and gearless d.c. motor locomotives.

TABLE VII—PASSENGER LOCOMOTIVE EFFICIENCY—DETAILED COMPARISON

	Split-Phase		2400 Volts Direct Current	
	Ruling Grade	Level	Ruling Grade	Level
Motors and gears, per cent	89.3	83.0	87.5	94.0
Blower, per cent	97.8	84.8	97.9	95.5
Starting resistance, per cent	98.6	97.8	99.2	99.3
Phase converter, per cent	96.3	94.0	....	....
Transformer, per cent	98.0	96.0	....	....
Wheel correction, per cent	98.0	98.0	....	....
Weight efficiency, per cent	92.5	92.5	....	....
Jackshaft, per cent	97.0	93.0	....	....
Side rods, per cent	97.0	93.0	....	....
Combined efficiency, per cent	69.3	54.5	85.0	89.2
Average of grade and level, per cent	61.9		87.1	

It appears reasonable to expect the efficiency of mixed passenger and freight locomotive operation to approximate 85 per cent for d.c. and not much exceeding 68 per cent to 70 per cent for split-phase locomotives. This efficiency in each case is based upon that portion of the run during which power is delivered to the locomotive. If transformer, phase converter and blower are kept running during coasting periods or when standing, the stand-by losses thus introduced will seriously reduce the all-day efficiency in commercial operation. It is evident that such stand-by losses are much greater in the split-phase than in the d.c. locomotive and the 20 per cent saving in power for mixed freight and passenger service credited to the d.c. motive power may be materially increased in actual service.

Before concluding the general discussion of the locomotive it is necessary to touch upon the question of braking. One of the strongest arguments advanced for the adoption of the induction motor locomotive is that this type of motor offers an ideal electric brake by reversing its function on down grade and return power to the trolley circuit. A regenerative braking method of control has been perfected for use with the d.c. motor which offers even greater advantages in service operation than induction motor braking. Just as the d.c. locomotive is the more efficient in hauling a given trailing tonnage, so also it will return to the system a larger percentage of the mechanical power given the locomotive by the descending train. Hence whatever claims are advanced for regenerative electric braking with the split-phase locomotives are even more applicable to the d.c. type.

Referring again to Figs. 5 and 6, showing the general plan of distribution respectively for the split-phase and d.c. systems, it is of interest to compare the two in order to see how much of the split-phase locomotive loss is recouped by its more efficient distribution system. The following comparison, Table VIII, is therefore submitted.

TABLE VIII—EFFICIENCY OF DISTRIBUTION SYSTEM—DETAILED COMPARISON

	Split-Phase	2400 Volts D.C.
Step-down transformers, per cent	97.5	96.5
Motor generator sets, per cent	87.0	81.0
Step-up transformers, per cent	97.5	....
Railway transmission line, per cent	96.0	96.0
Line transformers, per cent	96.0	....
Protective transformers, per cent	96.0	....
Trolley, track and feeders, per cent	96.0	88.0
Combined efficiency, per cent	70.5	66.0

The protective transformers appearing in Table VIII are for the purpose of neutralizing the inductive disturbance caused by single-phase trolley upon neighboring telephone, telegraph and signal circuits. The total efficiency of the two distribution systems and locomotives is shown in Table IX.

TABLE IX—TOTAL EFFICIENCY—DISTRIBUTION SYSTEM AND LOCOMOTIVE

	Split-Phase	2400 Volts D.C.
Freight Service—		
Distribution, per cent	70.5	66.0
Locomotives, per cent	73.1	84.3
Combined efficiency, per cent	51.5	55.7
Passenger Service—		
Distribution, per cent	70.5	66.0
Locomotives, per cent	61.9	87.1
Combined efficiency, per cent	43.6	57.5

There is every reason to expect that the split-phase system will demand fully 15 per cent or more power input

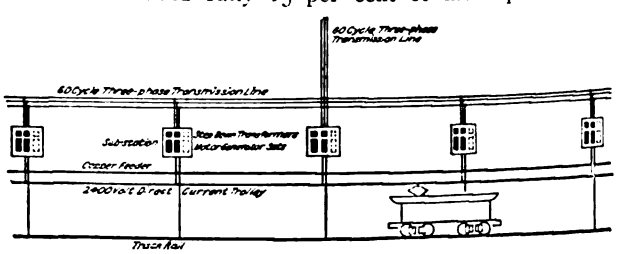

Fig. 6—General Scheme of 2400-Volt Direct-Current System

than the d.c. system of 2400 volts for equal trailing tonnage movement, actual figures depending upon the proportion of freight and passenger tonnage. This figure is based upon sixty-cycle power supply for the reason that many of the immediate electrification projects under construction or contemplated are located in territories where this frequency is firmly established.

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Where twenty-five cycles is available, single-phase power may be taken direct from the three-phase supply provided phase and voltage balance is maintained by suitably located substations containing step-down transformers and phase converters. D.c. supply will be more efficiently obtained through rotary converters in place of motor-generating sets. The efficiency of the distribution system, as given in Table IX, will therefore need correction for twenty-five-cycle power supply but will result in no material change in the relative efficiency figures quoted for the two systems.

The installation of a power house to generate single-phase current at twenty-five cycles or less introduces all the serious handicaps encountered in single-phase generation and also raises questions of general expediency and adequate return on the capital invested in a power plant which is devoted to supplying railway load only. Advocates of single-phase trolley distribution have sometimes failed to consider fully the question of energy supply available as having any bearing upon the broad question of electrification. Not every railway is so situated by reason of character of load, cheap fuel or other favoring local conditions as to justify the large expenditure for a gen-

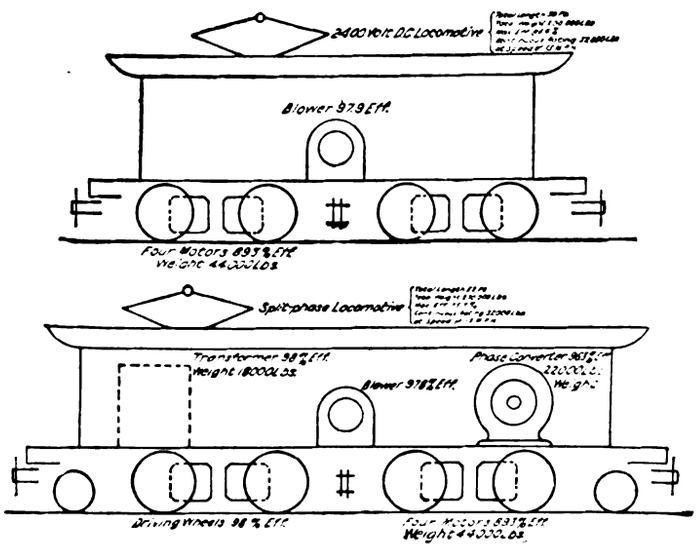

Fig. 7—Comparison of 39-Ft. D. C. and 52-Ft. Split-Phase Locomotive of Equal Capacity

erating station containing ample reserve capacity. The somewhat higher efficiency of the distributing system alone in cases where single-phase power is available is so relatively unimportant that it may be looked upon as a special condition applying only to favored and restricted localities.

A study of the general plan of distribution as given in Figs. 5 and 6 discloses the fact that where sixty-cycle power supply is available at attractive rates the general statement can be safely made that the total amount of electrical apparatus is greater and, therefore, the first cost higher and efficiency lower with the split-phase than with the d.c. locomotive system. Nor is this statement modified to any extent in the event that power supply is obtained from a twenty-five-cycle, three-phase source, as it will be the exception rather than the rule that any power company will be found willing to furnish single-phase power from its balanced three-phase circuit when the pernicious effect upon the general distribution system of a violently fluctuating low-power factor single-phase load is fully understood. Some corrective device like a phase converter must be introduced, and its first cost and efficiency are both comparable to the rotary converters which are permissible with twenty-five-cycle supply to secure direct current. It would seem, therefore, that the complication of the split-phase locomotive system renders it inherently more expensive to install and less efficient to operate. This is due largely to the fact that substations containing moving electrical machinery are required both on the ground and also in the locomotive cab itself.

The single-phase trolley circuit, irrespective of the type of locomotive it may supply, constitutes in itself a most serious handicap to the adoption of any type of d.c. locomotive. Neighboring circuits of all kinds are practically put out of commission by static and inductive disturbances unless adequate protective measures are introduced. No method of complete protection has as yet been perfected, although many schemes have been proposed that are partially successful. The elaborate and expensive apparatus now being installed upon one of our important single-phase railways will soon be in operation and is expected to give relief from the present serious conditions obtaining. As the inductive interference of the single-phase trolley is proportional to the intensity of the current and distance it is transmitted, it is to be expected that a maximum disturbance will result in the case of mountain grade divisions where the current input to trains approaching 3000 tons gross weight is several times that thus far met with in any single-phase trolley installation now operating. No cost estimate of single-phase trolley systems is, therefore, complete without including a liberal allowance for telephone and telegraph protective devices. This cost will probably not be less than $2,500 per mile of route and may even greatly exceed this figure. Despite such an expenditure, no assurance is at hand that hazard to employees and interference with service will be entirely eliminated, and until more exact knowledge of this whole situation is available, single-phase trolley interference constitutes a most serious handicap to the adoption of any d.c. locomotive system of operation.

This paper is largely devoted to a comparison of a.c. and d.c. motor locomotives, as lack of appreciation of the fundamental facts involved has perhaps been the basis of the false hopes raised as to the possible advantages resulting from the installation of the single-phase trolley. It surely does look attractive to install a system employing 15,000 volts on the trolley, no feeder copper and no rotating substation apparatus. But investigation and experience disclose the fact that the single-phase trolley is a decided menace to neighboring circuits, feeder copper is required for return circuit, substations are comparable as to first cost and efficiency with d.c. substations and, finally, the a.c. locomotive of the most promising type, the so-called split-phase combination of induction motors, transformer and phase converter, is heavy, expensive, complicated and inefficient to a degree that would not be tolerated in d.c. construction. Assuming that the favorable results of factory experiments are borne out in the success of later commercial operation, there appear to be no controlling advantages of a.c. locomotive traction which cannot be secured at less expense and with greater reliability in operation with d.c. motive power.

Until the adoption of interpole motor construction made it entirely practicable to build d.c. motors for high potentials, there was some justification for considering a.c. trolley systems as offering the best means of changing from steam to electric motive power at a reasonable first cost. The high-voltage d.c. motor has now been developed, built and proved completely successful under the most exacting service conditions. The trolley potential has been raised to 2400 volts, which seems sufficiently high to insure a distribution system of reasonable first cost and not too high to handicap the locomotive as regards its first cost, reliability and operating efficiency. Experimental results already obtained with d.c. apparatus tested at potentials higher than 2400 volts indicate that no construction difficulties apparently exist and the installation of a higher voltage becomes an economic question rather than an engineering problem.

With 2400 volts direct current both protected third-rail construction and multiple-unit car operation are feasible. The third-rail offers advantages in accessibility and low

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cost of maintenance on single-track roads and multiple-unit car operation is without question the proper way to take care of local traffic. Furthermore, 2400-volt equipments can be successfully operated upon the lower voltage terminal zone that local restrictions may make necessary.

It is popularly supposed among electrical engineers that the cause of electric traction is retarded by any openly expressed divergence of views as to the relative merits of different system of electrification. The opinion is advanced, on the contrary, that a free presentation of the facts available, but not always made public, will do much to clarify the situation. No one contributing cause has done more to hurt the electric railway industry than the failure of the single-phase system to make good the too optimistic claims of its early advocates, and no such open presentation of installation and operating costs has ever been made public on any a.c. installation in operation in this country or abroad, as has been published by B. F. Wood in a paper before the American Institute of Electrical Engineers on the West Jersey & Seashore Railway.*

This paper has been purposely restricted to a discussion of those engineering questions entering into the electrification problem which have a fundamental bearing upon the all-important matter of first cost and cost of operation. Such estimates are readily prepared for any local conditions, provided there is no such serious conflict of engineering opinion regarding engineering details as exist to-day. The d.c. motor is fully able to meet all the requirements of the heaviest passenger and freight train operation, as proved by the entirely successful installations now running and which afford convincing facts upon which statements of costs and operation are based. No such condition exists with any a.c. locomotive system and such operating facts as are obtainable are not of such a nature as to inspire confidence in selecting such a system to meet the exacting requirements of heavy electric railroading. The engineering facts presented herewith are offered with the purpose in view of clearing the engineering atmosphere preparatory to the serious work that seems to lie immediately before us, that is, the problem of where and to what extent it will pay to replace the steam engine by the electric locomotive.

DISCUSSION

The meeting of the Canadian Society of Civil Engineers at which this paper was read was the regular monthly meeting of the society. The chairman was H. H. Vaughan, vice-president of the society and assistant to the vice-president Canadian Pacific Railroad.

In the discussion which followed the presentation of the paper, Mr. Vaughan was the first speaker and referred to the adoption of high-tension direct current for a section of the Canadian Pacific Railroad. This installation involved 30 miles of route and 43 miles of track with a long 4 per cent grade, the operation being carried on by four locomotives. The battle of the systems, he said, had deterred steam railroad men from adopting electricity for motive power; but in the case cited both systems were found to be practically alike in first cost and in maintenance, direct current being chosen because it was considered more advantageous to use a system in which the larger part of the investment was involved in the cost of copper for feeders, rather than in locomotives which might soon become obsolete. In addition the development of the gearless locomotive and the improved methods of collecting large currents had helped toward the decision in favor of direct current.

Mr. Vaughan thought that the train-mileage cost basis was more reliable than the ton-mileage basis except in case of mountain grades where the amount of coal consumed per train mile was fairly steady. He said that in the case stated the cost of steam operation was 40 cents per train mile and that of electric operation was only 25 cents per train mile. Repairs amounted to 5 cents per locomotive mile instead of 7½ cents, and with electric power the cost of coal was cut in half, three electric locomotives doing the work formerly done by four steam locomotives. Reduced to a unit basis there was a saving in operating cost of 15 cents per train-mile and this was balanced against the added investment for electrical equipment. He stated that the operation of at least twenty-two trains per day was required in order to make an electrical installation pay for itself. On the Canadian Pacific electrified line, he said, it had been found desirable to minimize the weight on electric locomotive axles, the pressures being kept down to 50,000 lb.

George Gibbs, of Gibbs & Hill, consulting engineers, New York, contributed the following written discussion in the form of a letter to the secretary of the society:

"Your kind invitation to discuss Mr. Armstrong's paper on 'The Engineering Problem of Electrification' has reached me only to-day, and as your meeting takes place on Thursday of this week it is impossible to prepare anything of a formal nature, but the following general remarks I should like to place on record because I am opposed to the method adopted in this paper of setting forth the railway electrification problem. Practical railway men have been unable until recently to obtain any clear idea of the possibilities of heavy electrification because of the befogging of the whole problem by the controversial attitude of conflicting interests. Each system has been set forth by its promoter as having all the virtues and none of the faults of the other systems, and this has raised doubts in the minds of railway men whether any system is really reliable. During the last year or two, however, there appeared an inclination on all sides to admit that the art is a developing one and that each system had its own particular field of best employment. The present paper, however, appears to have gone back to the old method of special pleading for some particular system, setting forth in an unfavorable light the defects of competing systems while the disadvantages of the system advocated are not even referred to. This, I submit, is not an engineering discussion of the problem of electrification. The engineer should set forth, as completely as his space will permit, the advantages of each system and make his recommendation in accordance with all the facts set forth. The reader, having the balance sheet before him, can then check the conclusions. Unless I am greatly mistaken, the paper in question does not conform to the essentials of its title.

"On pages 1 and 2 reference is made to electric traction in such a way as to lead one to infer that heavy main-line traction is the subject of the discourse. Following this the question of system is taken up, and the single-phase system is promptly dismissed as unsuitable, apparently from unsatisfactory results on a number of interurban traction lines which found it advantageous to change over from single-phase to direct current. Probably these roads never should have used single-phase because their conditions did not suit this form of power, and, in any event, their case is not parallel to that of heavy steam traction.

"On page 4 the following conclusion is advanced: 'It is a safe prediction to make that no more single-phase motor equipments will be placed in operation in this country on new roads unless these roads virtually form an extension of existing systems.' I take it from the context, although the sequence of the argument is not entirely clear, that this means that no more city or suburban roads will be thus operated; otherwise the Pennsylvania Railroad Company's adoption of the single-phase system motor-car operation on its suburban lines out of Philadelphia places the 'safe prediction' above referred to in some jeopardy.

"After thus summarily dismissing the single-phase motor, the writer then proceeds to advocate high-tension direct

*See Electric Railway Journal, July 1, 1911, page 19.

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current, apparently for all classes of work, and appears to think the split-phase locomotive its only serious competitor. Of course, the fact that single-phase contact and split-phase locomotives were adopted on the Norfolk & Western Railway for the heaviest electric traction work yet undertaken anywhere requires some explaining away, because there are presumably reasons to believe that the adoption of this system was made after some study of the local situation and the conclusion arrived at that the system had preponderating advantages for the work in question.

"I do not wish to be understood as condemning direct current, of either high or low voltage, because as a matter of fact I have been intimately connected with a number of heavy direct-current installations which are in successful operation. I merely wish to point out that each system proposed so far has its limitations and best field of application. Furthermore, in working toward the desirable end of a 'standard system,' we should carefully weigh all features of each individual system with the idea always in mind of obtaining the greatest flexibility of application to different conditions."

A letter was then read from Edwin B. Katté, chief engineer of electric traction New York Central & Hudson River Railroad. An abstract follows:

"In glancing over the paper, on the first page I notice that Mr. Armstrong confines his remarks to an electric locomotive capable of hauling an 800-ton passenger train at 60 m.p.h. Such a locomotive is too small to be seriously considered by steam railroad men operating important trunk lines. The modern electric passenger locomotive must have sufficient capacity to haul a train of cars weighing from 1000 to 1200 tons. Please note I say 'train of cars.' Electric companies frequently confuse railroad men by including the locomotives when they refer to a train of a given weight. Further, such a locomotive should be capable of performing the regular service practically continuously and not after a few hours of operation be laid up in the terminal from one to three hours to allow the motors to cool off. Mr. Armstrong also tells you that the electric locomotive requires no stops for fuel or water. This is true in the summer time, but passenger trains have to be heated in the winter, and the locomotive must be taken out of service every few hundred miles for fuel oil or at least water, even though the locomotive does not have to go in for inspection until it has performed something over 1200 miles. Electric operation is a good thing in the proper place, although it does cost considerable money and has some limitations."

W. S. Murray, consulting engineer, New Haven, then presented a series of lantern slides showing work on the New York, New Haven & Hartford Railroad and also a series of curves for a proposed 120-mile electrification to show at what point single-phase became advantageous and also the effect of voltage drop with given wire sections under increasing tonnages. He then referred to Mr. Armstrong's paper, saying that he believed it was the strongest card yet played in favor of single-phase traction. There had been too much play upon the phrase "motive power equipment." It had clouded the real meaning of what might be termed "steam roadbed electrification." He always had been and would remain a strong advocate of direct-current in the interurban and short railroad field, the field where it belonged. Mr. Armstrong's irrelevant deductions, made from the results on lines which never should have been equipped with alternating current, argued him out of court.

On heavy railroad work in the matter of large power installations he said that attractive rates for extended areas should in many cases make separate railway plants needless. However, he cited a case where sixty-cycle power, delivered to the three-phase lines along the right-of-way of the railroad, was offered at a price of 8 mills, electricity being obtained from water power. Yet it was actually found that twenty-five-cycle current which was better for railway work could be produced at a cost of 6 mills from cheap coal located near the railway. Railways must, he said, control their own power in many cases.

The actual power required to move a given tonnage when employing direct current was, he said, 22 per cent more than with single-phase. The question of motive power was an important one but a point not to be overlooked was the system behind that motive power. The locomotive as outlined in the paper might be a gold mine metaphorically speaking, but that was no reason for burning 22 per cent more coal to run it. As to single-phase railway installations, Mr. Armstrong had compared a.c.-d.c. trolley experiments without considering a single locomotive. He called attention to the New Haven Railroad which employed 100 locomotives, moved 65,000 cars each month, and used 65 multiple-unit cars in a 33-mile suburban zone. Yet Mr. Armstrong wanted his comparison to be accepted as proof that the single-phase system was not only passing but had actually passed. The Butte, Anaconda & Pacific Railroad was not an interurban property, but because of the short run, 22 miles, and the consequent impossibility of congestion, it was obvious that this low-speed railway ought to operate satisfactorily with high-tension direct current.

Again, he said, Mr. Armstrong's list of main-line electrifications was composed chiefly of short terminal and tunnel lines. No mention had been made of the great single-phase installations on the Spokane & Inland Empire Railroad nor on the New York, Westchester & Boston Railroad, for which steam would have been used had electricity not been at hand. No reference had been made to the wide adoption of single-phase systems on the continent of Europe, nor to the London & Brighton Railway in England, of which the directors had recently voted $10,000,000 in a recent appropriation to carry the electrification of the line through to Brighton. This was, he said, a good testimonial to the advantages of single-phase current. Mr. Murray referred to the communication from H. A. Gallwey recently published in the ELECTRIC RAILWAY JOURNAL. This had announced a mileage of 55,000 for the locomotives on the Butte, Anaconda & Pacific Railroad during four months of operation, but during the same period the New Haven passenger locomotives alone had traveled 574,000 miles. The seventeen Butte locomotives average 22 miles a day, while some of the New Haven locomotives run ten times that distance daily.

Mr. Murray did not wish to dispute any of the data on the split-phase locomotives because hypothetical tables should not be placed in engineering papers. The figures might be announced as approximate, but there were limitations even to such approximations. Mr. Armstrong had said that the split-phase locomotive was 35 per cent heavier than an equally capable direct-current machine. Yet the New Haven had tested commercially a single-phase locomotive with continuous capacity of 1400 hp, the weight being 110 tons, while Mr. Armstrong had announced that the split-phase locomotive, its assumed successor, weighed 135 tons.

Telephone and telegraph disturbances had been eliminated in England by placing the return wires in concentric cables, but on the New Haven this trouble would be removed about Jan. 1 by the completion of the new 22,000-volt system of distribution between the feeders and the contact wires. In conclusion Mr. Murray said that the paper of the evening had the merit of marking plainly the desirability of application of the single-phase system in the field where all engineers who were free from commercial bias had already placed it.

After several members had submitted questions Mr. Armstrong again took the floor. He admitted that the paper advocated one system as universal in application. Direct-current tests at Schenectady had shown that 5000 volts was possible, but the commercial aspect was still somewhat indefinite owing to the matter of first cost. Mr. Katté's question, he said, showed the need for having the American In-

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stitute of Electrical Engineers decide upon methods of locomotive rating. The use of purchased power from outside corporations should not be ignored in plans for electrification. Single-phase generation or the use of single-phase current from a three-phase supply was less efficient than transformation to direct current, and in any event it was safer to depend upon great networks of power lines than upon a single private plant. The satisfactory service given upon the Butte, Anaconda & Pacific Railroad had, he announced, led the Chicago, Milwaukee & St. Paul Railway to decide finally upon the use of 2400-volt d.c. for operating its proposed 440-mile electrified line in Dakota and Montana.

Mr. Murray then presented maintenance figures upon the cars of the New York, Westchester & Boston Railway, these being given as follows:

		Cents			Cents
1912	July	2.6	1913	February	1.9
	August	3.5		March	2.5
	September	3.5		April	2.0
	October	3.4		May	1.2
	November	2.4		June	1.3
	December	2.7		September	1.3
1913	January	3.0		October	1.1

Since the improved New Haven locomotive repair shops had been built at Van Nest he stated that the running costs obtained for a.c.-d.c. locomotives were very low. After adding the general overhauling charges, the total cost of maintaining the passenger locomotives would be found to be between 5 cents and 6 cents per locomotive mile, and for freight engines of 110 tons, hauling 1500-ton trains and having 40,000 lb. maximum tractive effort, the total cost of maintenance was from 4 to 5 cents. For switching locomotives of equal tractive effort the cost was below 4 cents. Locomotives had given 25,000 miles of service to one detention.

Mr. Armstrong concluded the discussion by the statement that for the last five years the average maintenance cost of forty-seven direct-current locomotives on the New York Central & Hudson River Railroad had been 3.5 cents per locomotive mile. After this the meeting was adjourned.

RAPID TRANSIT SERVICE ON THE QUEENSBORO BRIDGE IN NEW YORK

To secure proper transportation facilities between the boroughs of Manhattan and Queens in New York City it will be necessary in the immediate future to operate elevated railway, subway and trolley cars across the Queensboro Bridge. This service is essential to the full utilization of the rapid transit construction completed or under way. It will greatly benefit a large number of passengers, increase property values in Queens, and give rapid transit to a district which is now without it.

The initial expense of establishing traffic across the bridge and utilizing the latter to its fullest capacity involves the construction and location of new tracks on the bridge, changing the Queens approach for these tracks, and the construction at the Manhattan end of the bridge of a new trolley terminal to replace the present underground terminal, which must be eliminated to provide for the new subway connections. This work involves an estimated expenditure varying from $2,513,000 to $5,510,000 according to the nature of the trolley terminal provided, and exclusive of the subway and elevated railroad connections in Manhattan and the new railway station at the Queens end of the bridge, which are provided for by other contracts now executed.

Reports from Paris state that the council of administration of the Swiss Federal Railways has voted a sum of $7,387,200 for the electrification of the St. Gothard Railway. The work, it is expected will occupy about four years.

OPPORTUNITIES FOR POWER PLANT ECONOMY

BY J. G. SWAIN, SUPERINTENDENT OF POWER AND SHOPS CLEVELAND, PAINESVILLE & EASTERN RAILROAD

In the convention issue of the Electric Railway Journal for Oct. 4, 1913, considerable space was devoted to the operating features of modern electric railway power plants. Along the same general line some observations, based partly upon the experience of the Cleveland, Painesville & Eastern Railroad, may be of interest. This plant was described in the issue of the Journal for July 19, 1913.

In a general way, the generating capacity of a power house determines the extent to which it is profitable to follow the details of power-house operation. In a power plant of, say, 10,000-kw capacity or more, the services of an efficiency engineer will be found of considerable value. His duty should be to analyze fuel, watch the loading and performance of the generating units and of the auxiliaries and give especial attention to the life of those parts of the general equipment which deteriorate rapidly and require frequent renewals and repairs. An efficiency engineer would naturally give most of his time to the performance of the steam equipment because it is here that the greatest savings can be effected. Even when each part of the power-plant equipment has been installed according to the best judgment of the manufacturer of the apparatus and of the supervising engineer in charge of the construction of the station, it is often the case that a slight variation in the adjustment and application of some part of the general equipment will result in a great improvement in the performance of the part so altered. This, in turn, will improve the general operating efficiency of the whole station. For instance, the boilers may be installed as well as the manufacturer knows how, yet it will be found that if the baffling in the boilers is shifted slightly a much higher evaporative efficiency will be produced. The stokers may not be adjusted to yield the proper rate and quality of combustion of the fuel used. The draft in the boilers may not be right, or the feed-water system, including pumps, heaters and regulating valves, may not be maintaining the proper flow of water at the right temperature into the boilers. Where boilers are equipped with arch walls the best method of constructing and maintaining these arches is often quite a problem. The regulation of the cooling water to the condensers, particularly to surface condensers, must also be carefully watched, as considerable power can be wasted if more water is pumped than is absolutely necessary to maintain the proper vacuum on the turbines or engines. All of the above matters and many other details should be followed by an efficiency engineer.

It has been my impression that a technical graduate who is interested in these matters, working directly under the chief engineer of the station, can more than earn his salary by the increased efficiency in the operation of the power station which will result from his efforts. Incidentally, there is no better training for a young engineer than studious attention to a task of this kind.

In smaller power houses the operating force, as a general rule, is so small that it is impracticable to detail a man for this particular work, and the chief engineer must be able to devote considerable of his time to following these details and be capable of intelligently analyzing and removing the sources of inefficiency. To have a cheap man in such a position is poor economy. The chief engineer, also, should personally supervise the general repairs made on the station. There is no doubt that a great many plants are inefficiently operated for no other reason than that the chief engineer is tied down to a regular "turn" and is thus deprived of the opportunity to keep his station in good repair and to watch the details of performance. Obviously, inattention to the condition of a plant, for any reason, will prevent the attainment of the highest efficiency. One of the

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most essential elements in the operation of a power house is to keep the equipment in good operating condition and make repairs promptly. The larger plants usually have maintenance crews which look after the general repairs and renewals of equipment. The smaller plants should also have in their organization one or two men who can be taken from the regular operating force to look after this maintenance work under the personal supervision of the chief engineer. This does not work any hardship on the operating force if the repairs are made promptly as required.

All stations, whether large or small, should be equipped for weighing coal and ashes, for metering the water evaporated by the boilers, and for keeping records of the draft on boilers, temperature of flue gases and temperature of feed water. If these observations are made and studied and the changes in adjustment indicated by them are carried out, there will be a decided improvement in the operation of hundreds of power stations in this country. There are many indications, as stated in the convention issue of the ELECTRIC RAILWAY JOURNAL, which show that this fact is being increasingly appreciated by power-plant operators. I understand that some of the larger steel plants in this country have installed recording CO_2 meters in their boiler rooms and that they offer a daily bonus to the crew in the boiler room which produces the best CO_2 curve. This is certainly the right principle. There is little use in spending from $1,000 to $2,000 in meters, recording thermometers and vacuum, pressure and draft gages if no attention is paid to the records obtained from them. Discrimination must also be used in the expense incurred for instruments, as the expense depends upon the operating conditions of the plant and upon its size.

Where exhaust steam is continuously used for heating or evaporative purposes great refinement of engine economy is not justified and general elaborate measurements are not needed, but the boiler room should have the same careful supervision and measurements of its operation as in any other plant. The same is true also in small stand-by plants. From the standpoint of size no argument is needed to prove that larger stations can and should go into the details of operation more closely than smaller ones as there is greater opportunity for saving and corresponding opportunity for enormous losses. For instance, a small station which has a meter and scales for determining the pounds of water evaporated per pound of coal is not justified in maintaining a recording CO_2 meter. However, in a larger station a CO_2 meter is almost indispensable in obtaining the highest efficiency.

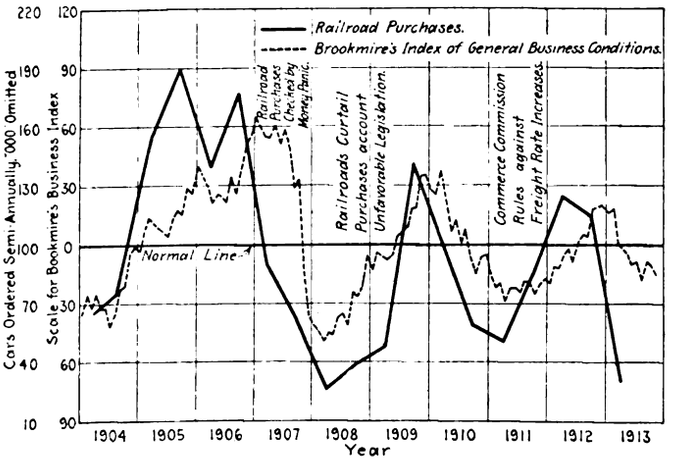
The plant of the Cleveland, Painesville & Eastern Railroad is a small one, of less than 5000-kw capacity, and it contains some equipment which is not of the latest type. It is, however, provided with all measuring apparatus needed for intelligent operation. The interest taken in the operating force in the records of the instruments is very gratifying. The data are assembled daily on a large and comprehensive log sheet, which shows clearly the hourly output of the plant and all component details. The records show not only the performance of boilers, engines, turbines and auxiliaries, hour by hour, but also the names of the men responsible for the human element of the plant operation. Hence it is easy to allot praise and blame for results achieved. Special attention is paid also to the matter of coal receipts, consumption and stock, because in this plant the storage capacity is small and all contingencies require careful watching.

An example of the value of the station records is furnished by an incident which occurred shortly after the starting of the Painesville power plant. We had then the first and to date the only serious interruption to service. This was due to the loss of vacuum. The operating force in the power house attributed the trouble to certain conditions which were not substantiated by the charts. As a matter of fact, the vacuum was lost by the failure of the engineer in charge to allow enough cooling water to flow through the condenser. According to the charts the temperature of the cooling water discharged from the condensers showed a gradual increase covering a period of three-quarters of an hour previous to the time of shutdown, and the position of the valves admitting the cooling water to the condensers was not altered during this period to overcome this condition. When the engineer's attention was called to the story told by the charts he lost no time in admitting that this was no doubt the cause of the trouble, and he then and there appreciated, as he never had before, that when his instruments were in good operating condition they were something more than ornaments in the power house.

The largest light and power central stations have in their power-plant organizations a man who watches the details of the operation with a view to obtaining a high operating efficiency. This practice, however, is not generally followed even in a modified form by many of the larger as well as the smaller railway companies. If the chief engineer is not interested in the good maintenance and efficient performance of the power plant to the extent of making some effort along the lines suggested above, it is a waste of time and money to endeavor to improve the operating conditions with such a man in charge.

RAILWAY PURCHASES AND GENERAL BUSINESS PROSPERITY

E. B. Leigh, president Chicago Railway Equipment Company, read a paper at the annual meeting of the Railway Business Association in New York on Dec. 11, in which he discussed the subject of railway purchases as a measure of general business prosperity. Close study of the effect of railway purchases of new equipment upon general business convinced Mr. Leigh long ago that there was no one more important factor in the development of general business activity than that of the active purchasing of new equipment by the railways. In urging that the advance in rates desired by the railways be granted, Mr. Leigh said that every business man, large and small, and all dependent upon them, are affected by the relation existing between railway purchases and general business prosperity. Mr. Leigh presented the accompanying chart to illustrate his remarks.



Railroad Purchases and General Business Conditions

The London County Council has under consideration the matter of co-ordinating, as far as possible, the various electric systems in the city and extending them on economical lines. The committee which has this matter in hand was granted $14,550 for obtaining expert opinion, and though the experts' report is not expected for some time, it is rumored that the proposals will be of a drastic character.

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MEETING OF EXECUTIVE COMMITTEE OF TRANSPORTATION & TRAFFIC ASSOCIATION

A meeting of the executive committee of the American Electric Railway Transportation & Traffic Association was held at the association headquarters, New York, Dec. 12, 1913. In the absence of President Hegarty, First Vice-president M. C. Brush acted as chairman. Those present were: M. C. Brush, H. A. Nicholl, J. K. Choate, E. B. Burritt, J. V. Sullivan, L. H. Palmer, C. E. Learned and W. O. Wood.

It was stated by the secretary that the association had exceeded its appropriation during the past year by $600, and it was voted that an appropriation of $2,750 be asked for the ensuing year.

A letter from President Hegarty suggesting certain subjects to be taken up was acted upon as follows: The secretary was instructed to see that the chairmen of committees have their reports in the hands of the association not later than July 15, 1914. A suggestion regarding "get-together" luncheons for city and interurban men for the development of a stronger association spirit was accepted. The executive committee adopted a suggestion that all committeemen be required to discuss the subjects assigned to their committees, giving the experience of their companies and all others known about concerning the practices under discussion; and it was further decided that all subjects assigned the various committees should be in the hands of members in time for them to take up these subjects with other transportation men in their respective companies and report the attitude of their company at the meeting of the committee. President Hegarty's next suggestion was that each man entering the convention room should send up his card to the chair in order that more officials might be called upon for short talks regarding experience and practices on certain points. The committee agreed that President Hegarty's suggestion would tend to bring about more discussion.

It was the attitude of the executive committee that at the convention the reading of committee reports and papers should be abolished and the time used for discussion in cases where the reports had been issued early enough for general advance reading. It was suggested that in printing the committee reports and papers approximately one-half of the left side of the page should be left blank and headed "Space for Comment and Memoranda."

At the afternoon meeting of the executive committee the report of the committee on subjects was presented. Recommendations for committee work for the ensuing year were approved as follows:

Rules: (1) Harmonize diction and construction of interurban code along lines approved by the 1913 convention for the city code; (2) arrange to obtain for the association office a file of rule books of member companies with provision for keeping it up to date; (3) investigate objections against substantial adoption of the two codes; (4) investigate markers and classification signals with reference to use on one-car trains; (5) consider minor revisions in rules following rulings of 1913 convention.

Passenger Traffic: (1) Comprehensive investigation of motor bus and trackless trolley; (2) presentation of paper on functions of passenger agent or traffic manager, regarding (a) development of new business; (b) distribution of traffic, especially peak loads, and (c) improvement of public relations.

Express and Freight Traffic: (1) Compilation and digest of franchise and ordinance requirements; (2) study of systematic promotion of this business; (3) further consideration of Question No. 18 in the committee's report; (4) study of types of organization of freight departments on representative roads.

Construction of Schedules and Timetables: (1) Improvement of running time in city operation through skip-stops and limited car service; (2) comprehensive investigation of train dispatching in city operation; (3) consideration of recommendations of last year's committee on uncompleted subjects; (4) study of question of "set-backs"; (5) compilation of list of fundamental factors in time-table construction on representative city and interurban companies, using standard terminology.

Fares and Transfers: (1) Investigation of fare boxes, especially regarding maintenance and increased receipts; (2) study of transfer issuing and collection devices on all types of cars; (3) desirability of bodily transfer of passengers in controlled areas; (4) metal versus paper tickets; (5) accounting for transportation of free passengers.

Training of Transportation Employees: (1) Investigation of "safety-first" movement; (2) up-to-date digest of state and municipal regulations affecting employment; (3) recommended practices for handling bulletin boards; (4) methods of disbursing wages to employees; (5) standardization of training schools, instruction cars and apparatus for different-sized properties.

Uniform Definitions: Work of last year continued.

Block Signals for Electric Railways: (1) Up-to-date revision of: (a) digest of signal laws and rulings on block signals and safety devices; (b) signal installations since the 1913 report, and (c) bibliography since the 1913 report; (2) further consideration of the remaining subjects of 1913 report, including "Signal Rules." (Note: At the meeting of the executive committee of the Engineering Association the subject of "Design of Standard Signal Apparatus" was suggested.)

The committee on train operation (interurban) is to be consolidated with the city committee into a joint committee with the Engineering Association, to be known as the Transportation-Engineering committee, to consider all joint matters except block signals. This new committee is to study car designs from a traffic standpoint.

The executive committee adopted a recommendation that in the future all members of standing committees be chosen for a term of years with rotation so that one member may go out each year. The suggestion was also approved that a syllabus of the subjects that have been investigated and the conclusions arrived at be compiled by the association in loose-leaf form and distributed to the member companies and that each year the work of the convention be thus summarized.

A. E. R. A. COMMITTEE MEETING

The committee of the American Electric Railway Association on company sections and individual membership met on Friday, Dec. 19, at the association headquarters in New York City. There were present L. S. Storrs, chairman, vice-president Connecticut Company; Martin Schreiber, engineer maintenance of way Public Service Railway; George G. Whitney, chief clerk Washington Railway & Electric Company; W. F. Weh, superintendent claim department Cleveland Railway; R. E. McDougall, claim agent New York State Railways; J. N. Shannahan, vice-president Newport News & Old Point Railway; W. L. Conwell, president Transportation Utilities Company, New York. E. B. Burritt, secretary of the association, was also in attendance at the meeting at which ways and means for increasing the membership of the association was discussed in detail.

The construction of an electric railroad is contemplated between Liebenau and Bomisch Aicha, Bohemia, Austria. The entire proposed construction is only 4½ miles in length, and will be built mainly for the purpose of freight traffic, but will also carry passengers. Correspondence should be directed in the German language to the Bürgermeisteramt, Liebenau, Bohemia, Austria.

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COMMUNICATION

PREDETERMINATION OF TRAIN ENERGY

To the Editors:

NEW YORK, Dec. 15, 1913.

I notice the editorial statement in your issue of Dec. 6 that:

"C. T. Hutchinson . . . attempted to do this by substituting for an indefinite number of motor curves a single set of motor curves representing an average for all motors, although it may be noted that recent motors do not all conform with these curves."

Although I cannot say that *all* do conform to my average curve, yet I have not found one that does not conform substantially to it. Moreover, I am told by Dr. Harold Pender, of the Massachusetts Institute of Technology, who has recently investigated this matter elaborately, that he finds substantial agreement between this average curve and all the modern motors which he has investigated. He has, in consequence, used this average curve as the basis of his work.

As an example of the agreement between this average curve and a modern railway motor I give herewith a table comparing the average motor curve sheet given by me (Vol. XXII, *Transactions A. I. E. E.*, 1903, page 660) and a modern motor, taken entirely at random, the General Electric 203, a ventilated commutating-pole railway motor, as given in *Bulletin* No. A4172, October, 1913. The values for the General Electric motor have been reduced to percentages, as shown in Table I.

The table shows an agreement as close as the nature of the data warrants between this General Electric motor of 1913 and the average motor estimated by me in 1903. This is as it should be, since there is no reason to expect any material change in the speed-torque curves of railway motors following the same general lines of design in the magnetic circuit. It is well known to those most familiar with work of this kind that generalized motor curves can be used with sufficient accuracy for all practical purposes.

The method outlined by Messrs. Del Mar and Woodbury seems simple, but it involves three guesses—first, the value of K; second, the value of Q, and, third, the value of the efficiency. All three of these values are dependent upon initial acceleration, train friction and braking force—as well as the average running speed; they cannot be stated with accuracy in terms of length of run alone.

I gave, in the paper you referred to above, a similar approximation, but, I think, a better one, in that it involves only two guesses. It can be simply restated as follows:

Let

r = total resistance, in pounds per ton, except that due to acceleration, including allowance for grades and curves,

V = the average running speed, in miles per hour,

V_b = the speed at braking, in miles per hour,

T = time from start to stop in seconds,

n = the number of runs per mile,

L = the length of run in feet,

l = the fraction of the total length of run that is traversed after the application of brakes, and

A = the "through acceleration."

Then

$$A = V/T = V^2/\frac{60}{88}L = \frac{60}{88}L/T^2 = nV^2/3600 \qquad (1)$$

This A is the most important quantity in the calculation. All runs with the same value of A require the same energy per ton mile, regardless of speed and length of run, for the same accelerations, and require motor capacity proportional to the square root of the length of the run. Further, all values of A that are of practical consequence are included between 0.1 and 0.3, and 0.3 is very high.

The watt-hours per ton mile will then be

$$W = 2r(1-l) + \frac{nV^2_b}{36} \qquad (2)$$

$$= 2r(1-l) + 100A(V_b/V)^2 \qquad (3)$$

Equation (2) is simply a statement of the work done in overcoming friction plus the kinetic energy at braking, allowing about 10 per cent for inertia of rotating parts.

TABLE I—COMPARISON OF MOTOR CURVES OF GE-203 AND C. T. H. AVERAGE CURVE

Input	Tractive Effort		Speed	
	G. E.	C. T. H	G. E.	C. T. H.
27	12	13	200	200
40	27	27	152	149
53	41	41	130	130
67	58	58	119	116
80	75	74	110	109
100	100	100	100	100
120	128	126	94	93
133	147	145	89	89
160	182	178	84	83

G. E. motor, No. 203, *Bulletin* No. A4172.

C. T. H. motor, *Trans. A. I. E. E.*, Vol. XXII, 1903, page 660, curve sheet No. 2.

By substituting A, the length of run and the speed are introduced. Ordinarily it is sufficiently accurate to omit l, as the distance run under brakes is relatively small, and this entire term is small.

If, however, greater accuracy is desired, the value of l can be calculated by this equation:

$$l = \frac{V^2_b}{2c}\Big/\frac{V^2}{A} = \frac{A}{2c}\left(\frac{V_b}{V}\right)^2 \qquad (4)$$

where c is the retardation after braking, in miles per hour per second, 1 mile per hour per second being equal to 91 lb. per ton.

The application of this equation then depends on two guesses only—first, the ratio V_b/V, and, second, the efficiency—one fewer than that of Messrs. Del Mar and Woodbury.

This ratio V_b/V depends on the several accelerations and upon A; it can be tabulated approximately, as is done in Table II.

The values given in Table II are substantially correct for an initial acceleration of 1.25 m.p.h.p.s. and a braking effort

TABLE II—SHOWING RATIO OF SPEED AT BRAKING TO AVERAGE RUNNING SPEED, FOR DIFFERENT SCHEDULES

Through Acceleration (A)	Ratio (V_b/V)
0.10	0.40
0.12	0.51
0.14	0.62
0.15	0.66
0.16	0.71
0.18	0.79
0.20	0.87
0.22	0.95
0.24	1.02
0.25	1.06
0.26	1.10
0.28	1.17
0.30	1.23

of from 140 lb. to 180 lb. per ton. The variation of these values with different braking efforts is not very great, and these values will serve as a sufficient approximation, probably with the same accuracy as those given by Messrs. Del Mar and Woodbury for their ratios K and Q.

The efficiency of the run may be taken at 70 per cent as an average. In the paper quoted I gave a curve of efficiencies ranging from 55 per cent, with no run on the "motor curve," up to 75 per cent. Hobart ("Electric Trains," page 75) gives the range from 65 per cent to 79 per cent. This, of course, depends on the relative run of the "motor curve."

The run given by Messrs. Del Mar and Woodbury would then be calculated as follows:

$r = 7 \times 15/12 = 8.7$ lb. (to allow for grades and curves).

$n = 0.5$.

$V = 30$ m.p.h.

Then

$A = 0.5 \times (30)^2/3600 = 0.125$

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and

$V_b/V = 0.53$ (from table).

Taking

$$c = 2.$$

$$l = \frac{0.125}{2 \times 2}(0.53)^2 = 0.009$$

and

$$\text{watt-hours per ton mile} = 17.4\ (1 - 0.009) + 100 \times 0.125\ (0.53)^2$$
$$= 17.4\ (1 - 0.009) + 35$$
$$= 52.2.$$

Calling $l = 0$ would in this case make no appreciable difference.

Messrs. Del Mar and Woodbury get 48.3 watt-hours.

Neither of these methods, however, is of much value, inasmuch as neither leads to a determination of the motor capacity or the best initial acceleration. They are merely rough approximations, little better than educated guesses.

CARY T. HUTCHINSON.

INVESTIGATION OF STREET RAILWAY SERVICE AT BOSTON

The Massachusetts Public Service Commission and the Boston Transit Commission, sitting as a joint board under Chapter 108 of the Resolves of 1913, gave a series of hearings to the Boston Elevated Railway and the Bay State Street Railway beginning Dec. 11, at which the testimony of these companies was presented in reply to persons desiring modifications in the street railway service of the Boston metropolitan district. Arthur A. Ballantine, of Gaston, Snow & Saltonstall, Boston, appeared as counsel for the Boston Elevated Railway and presented the company's opening statement. He pointed out the limitations existing to further extension of the Boston rapid transit system, which now represents a permanent investment of about $105,000,000. The company carries 894,000 revenue passengers per day and contends that new and increasing burdens must for the time cease if its capital needs are to be financed. The questions presented to the board at previous hearings are of two general types: first, the proposal to extend the service of the Boston Elevated company into territory not occupied by it at present, and, second, changes and improvements of existing service.

By the terms of its charter the company is required to ask and receive a 5-cent fare for a single continuous ride in the same general direction upon its system as a whole. This agreement between the company and the State does not expire until 1922 and has been construed by Massachusetts attorney-generals as a contract. The territorial limits of the city of Boston have never been the basis upon which the 5-cent fare has been established, there being twelve municipalities in the district served by the company. The Hyde Park district is the only one which has joined the city of Boston since the company received its charter, and the company feels that if a 5-cent fare is granted to residents of this ward of Boston, a disastrous precedent will be established, as other districts equally distant from the down-town section will demand the same rate. Three additional subways are now under construction in Boston which will cost $15,000,000 in addition to the present investment, and the fixed charges of these must be carried by the company. On account of equipment for these subways, additional power and surface equipment, the total increased fixed charges from these sources will soon amount to over $1,000,000 a year. About half the company's patrons during the twenty-four-hour period desire to ride inside of a three-hour limit. Through the use of "Car Full" signs the company is endeavoring to improve rush-hour service, and the prospects of reducing overcrowding are attractive.

C. S. Sergeant, vice-president of the Boston Elevated Railway, gave statistics as to the cost of certain proposed extensions, from most of which little or no additional revenue could be expected. The accompanying interesting analysis of the cost of taking over the Hyde Park service of the Bay State Street Railway by the Boston Elevated Railway was presented by Mr. Sergeant. The lines from this latest suburban addition to the city limits touch the elevated system at two points. If the lines were leased by the company, trips from the Summer Street station in the heart of Boston to points about 9 miles distant would be added to the company's 5-cent fare burdens.

ESTIMATED COST OF OPERATING ALL HYDE PARK LINES FOR ONE YEAR

Investment	
Estimated valuation of existing track and overhead construction, based on 35,872 ft. of track, at $5.376 per ft., or $28,385.28 per mile	$192,863
Estimated cost of installing five additional turnouts	15,500
Estimated valuation of additional equipment required to extend present service, based on seventy-one trips per day to Readville track and seventy trips to Cleary Square; also to operate a fifteen-minute service between Mattapan Square and Dedham line (seventy trips per day); thirteen 25-ft. box cars, at $3,400; carhouse storage, $673.75 per car; power capacity, $3,300; transmission lines, $495, or an investment charge of $7,868.75 per car	102,293
Thirteen ten-bench open cars at $1,700 per car and $577.50 for carhouse storage, or $2,277.50 per car	29,607
Total estimated additional investment to operate all lines	$340,264
Operating Expenses and Yearly Charges	
Car mileage per annum, 386,284, at 18.78 cents	$72,544
Rental and taxes	16,168
Interest on equipment not leased at 5.14 per cent, the average return on money paid security holders in the Boston system	6,779
Taxes on equipment not leased at one-half State rate of $17.93 per $1,000, or $8.965 per $1,000 on $131,901.25	1,182
Total	$96,675

Mr. Sergeant said that there would be no revenue to offset the extension of the 5-cent fare to these lines other than that arising from local travel, which would be without question far below the cost of rendering the service. A suitable service is now rendered in Hyde Park by the Bay State Street Railway. In closing his direct examination, Mr. Sergeant called attention to the point that the figures submitted take no account of the cost of transporting passengers on the present system between the Hyde Park lines and the center of the city.

On cross-examination, Mr. Sergeant stated that, although cars of foreign companies are handled by the Boston Elevated without direct compensation to their owners, the use of such rolling stock is often an extra expense on account of their schedule irregularities. The average distance from the heart of Boston to the terminal points of the company's surface lines is 6.87 miles, the maximum distance being 9.095 miles from the Summer Street station to the Charles River, in West Roxbury. A general understanding exists between the Boston Elevated and Bay State companies as to the territory which each will serve. The shortest line from the center of Boston to an outlying point is 3.18 miles in length. A fare of 1 cent per mile is inadequate compensation for city service. The company hopes to be able to operate at least 150 train units per hour through the East Boston tunnel when the Bowdoin Square loop is completed. The witness stated that in his opinion a rate of 5 cents for a 3-mile ride is equitable.

Robert S. Goff, vice-president Bay State Street Railway, testified that car delays on the company's Boston-Chelsea line are largely due to drawbridge openings over the Charles and Mystic Rivers. Forthcoming improvements will tend to reduce congestion. The company has installed automatic block signals in place of the hand-operated type and the movement of cars has been materially expedited.

The Bay State company believes that the handling of Revere Beach traffic should be by a single operating organization. In Sunday rush service the company sometimes handles sixty-nine cars an hour between Scollay Square and Revere Beach. If a 5-cent fare should be placed in effect between all parts of Boston and Revere Beach, there would be a demand for such a fare from all parts of Revere to Boston.

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THE AMERICAN LOCOMOBILE*

BY GEORGE S. COOPER, BUCKEYE ENGINE COMPANY

The locomobile, as it is known in Germany and as its name indicates, had its lowly origin in a small portable unit, consisting of a single-cylinder engine mounted on an internal fire-box boiler. The first machines used low-pressure steam in a non-condensing slide valve engine with but indifferent steam and coal economy. In fact, the only trace that we can discover of an attempt to conserve heat is found in the fact that the engine cylinder was built into the steam dome of the boiler. These machines were built in Germany about the year 1862, and as late as 1880 required 4.6 lb. of coal per horse-power. During the sixties and seventies we find but slight improvements in these machines, their average capacity being 11 hp, but in 1883 a locomobile having compound cylinders and operating condensing was built with a resultant improvement in economy to 2.94 lb. of coal. The next ten or twelve years are marked by an increase in the average capacity of these units to about 38 hp. Higher steam pressures were used with still further gains in fuel economy.

About 1895 an attempt was made to adapt the locomobile for the use of superheated steam, and evidently the results were encouraging, since about five years later we find a complete, compound, condensing, superheated steam locomobile operating with a steam pressure of about 175 lb. and producing a horse-power-hour on 1.36 lb. of coal. In this design the engine was carried entirely on the boiler, the compound cylinders being side by side in the steam dome. The boiler-feed pump and vacuum pump were driven from the low-pressure eccentric. A superheater consisting of a single coil of steel tubing was installed in the casing at the end of the internal corrugated furnace boiler where it was continually swept by the hot gases as they emerged from the boiler tubes on their way to the stack. This achievement was quickly followed by the development of the tandem compound machine with both cylinders jacketed by the hot flue gases. The steam was reheated as it passed from the high-pressure to the low-pressure cylinder, and machines of this type in sizes as small as 100 hp used but 1.04 lb. of coal per net delivered horse-power, while machines of a similar type with a very high degree of superheat further reduced the coal consumption to 0.79 lb.

From the foregoing facts it is evident that the locomobile, far from being an experiment, has reached its present high state of mechanical perfection and thermal efficiency through the adoption one at a time of the principles set forth in a preceding paragraph. It is more a design than an invention. It represents the evolution of the complex conventional power plant into its natural and simplest form. This type of power unit has become an accepted standard in most parts of Europe and its dependencies. In fact, it is well known the world over, except in the United States, where the comparatively low cost of fuel has not made the insistent demand for its conservation which we find abroad. Nevertheless, the trend of our fuel costs has been steadily upward, the past few years being marked by sharp advances. American engineers have not been altogether blind to the desirability of power plants with low fuel costs. In the majority of cases, however, this phase of the matter has been completely overshadowed by the imperative necessity for absolute reliability of operation and comparative simplicity in the matters of attendance and maintenance.

About three years ago the Buckeye Engine Company of Salem, Ohio, began to consider the feasibility of placing on the market a locomobile of American construction. A careful investigation followed, and the facts stood out most plainly that here was a steam power plant which was of comparatively simple construction, which equaled the producer-gas plant in fuel economy, could be operated by American steam engineers, showed low upkeep costs and, owing to the very small number of moving parts, had demonstrated a reliability fully equal to that of any prime mover manufactured. A further advantage was the fact that it operated on any available fuel—coal, lignite, oil or refuse. The economies shown by the small German machines were so startling in view of accepted American practice that before building a machine of our own it was thought best to make some preliminary experiments on standard Buckeye engines to determine the effects of superheat on steam consumption. A series of some sixty tests was at once instituted wherein a simple engine and later a tandem compound engine, each of about 100 hp capacity and of the high-speed type, were operated under superheats varying from 0 deg. up to 225 deg. Fahr. The reduction in steam consumption shown by these tests with increased degrees of superheat was so marked that all doubts of our being able to make record economy with a machine of the locomobile type were dispelled. The first Buckeye locomobile was constructed during the summer of 1912 and put into operation for the first time on Sept. 13 of that year. Its rated capacity was 175 ihp. Since last January it has been in daily operation handling a shop load consisting of cranes, machine tool motors and lights, the load varying from 60 kw to 160 kw. Carefully conducted tests have been run from time to time to determine the efficiency with various grades of coal and with modifications of the furnace and grates. The table presents the average results of seven tests run with Pocahontas coal. Column A is the average of three tests run at about 95 per cent of the rated load. Column B is the average of two tests at 14 per cent overload, and Column C that of two tests at 36 per cent overload, demonstrating the ability of the locomobile to handle large overloads with a scarcely perceptible loss of efficiency. While not shown in this series, other tests show that the same valuable characteristic is possessed at underloads. The three-quarters load fuel consumption is within 5 per cent of that at full rating.

TEST RESULTS OF AMERICAN LOCOMOBILE

	A	B	C
Load, per cent	95	114	136
Indicated horse-power	166	199	237
Kilowatts	99.4	121.5	146.8
Revolutions per minute	206	209	208
Steam pressure, lb.	209	208	207
Saturation temperature, deg. Fahr.	391	391	390
Steam temperature at throttle, deg. Fahr.	638	673	668
Initial superheat, deg. Fahr.	247	282	278
High-pressure exhaust temperature, deg. Fahr.	313	353	387
Receiver pressure, lb.	13	18	27
Low-pressure inlet temperature, deg. Fahr.	413	432	457
Low-pressure superheat, deg. Fahr.	169	178	188
Low-pressure exhaust temperature, deg. Fahr.	146	150	162
Feed-water temperature, deg. Fahr.	131	132	138
Vacuum (referred to 30 deg. barom.), in. Hg.	25.6	24.3	24.3
Temperature gases base of stack, deg. Fahr.	501	558	578
Total steam per hour, lb.	1,626	1,970	2,420
Steam per ihp-hr., lb.	9.8	9.9	10.2
Steam per kw-hr., lb.	16.35	16.3	16.5
Total coal fired per hour, lb.	192	238	283
Coal per ihp-hr., lb.	1.16	1.195	1.195
Coal per kw-hr., lb.	1.94	1.96	1.93
Boiler and superheater efficiency, per cent	76.9	76.6	77.0
Thermal efficiency of engine, per cent	19.8	19.7	19.5
Thermal efficiency of unit, per cent	15.6	15.1	15.0
Heat value of coal, b.t.u.	14,136	14,099	14,215

In comparing the above results with other power plant data, it should be remembered that the locomobile is essentially a small or moderate-sized plant. Small steam plants are usually quite wasteful of fuel for several reasons. In the first place small engines are almost always of the high-speed, non-condensing type, using 30 lb. to 40 lb. of steam per hp-hr. Radiation losses are relatively greater in small plants than in large ones, owing to the fact that small boilers, cylinders and pipes expose more surface per pound of steam carried than large ones. To equip a small plant with economizers, condensers, superheaters, etc., is not often commercially feasible since small apparatus of this class is usually much more costly per horse-power than that used in large plants.

*Abstract of a paper read before the Ohio Society of Mechanical, Electrical & Steam Engineers, Nov. 20-22, 1913.

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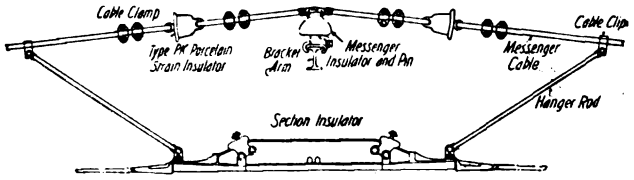
NEW PORCELAIN STRAIN INSULATORS

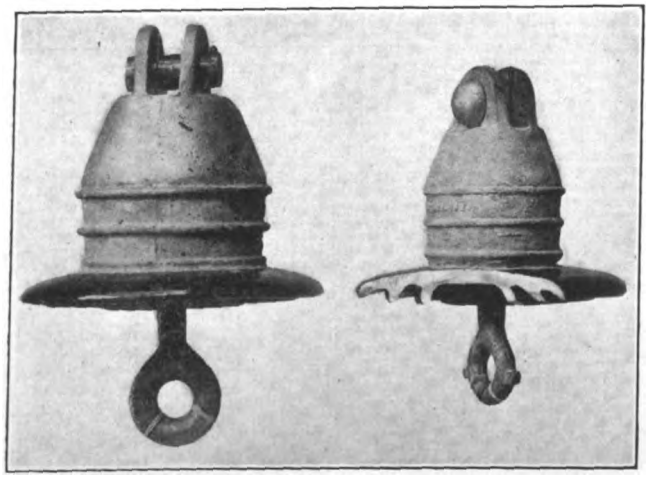
To meet the severe requirements due to the increasing weight of overhead construction two new types of porcelain strain insulators have been developed by the Westinghouse Electric & Manufacturing Company. These are a combination of a metal cap to give the necessary strength and a porcelain skirt to furnish the required dielectric strength. The metal parts of these insulators consist of a malleable-iron cap, a drop-forged steel eye bolt, and a malleable-



Application of Porcelain Strain Insulators to Section Insulator

iron sleeve by which the eye bolt is securely fastened. The metal and porcelain parts are cemented together with a high-grade Portland cement. The cemented surfaces are provided with carefully determined corrugations which prevent failure, except by the actual shearing of the cement. The skirt of the porcelain is provided with corrugations on the under side to give additional creepage surface.

Two types of these insulators are made, the PK and the PK-1. The metal parts of the type PK insulator are sherardized and those of the larger size, types PK-1, are hot galvanized. The type PK insulator is especially used for insulating cables when the working load does not exceed 1600 lb. As they are tested at 5000 lb., both types are generally used for heavy service, such as dead-ending high-strength steel mes-



New Types of Porcelain Strain Insulators

senger cables, with a working load of 4000 lb. and 8000 lb. respectively. The drop-forged eye bolt of the type PK-1 has side projections so that if two or more insulators are used in series they cannot swing more than a few degrees, thus avoiding the danger of breaking the porcelain skirt because of striking the cap of the adjacent insulator.

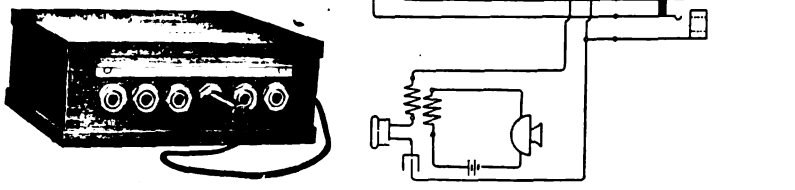
The Board of Public Utility Commissioners of the State of New Jersey recently issued Volume I of its reports for the period from May 1, 1911, to June 2, 1913, in accordance with the provisions of the public utility law. This volume should not be confused with the report which the board is required to make to the Governor annually.

CORDLESS JACK BOXES FOR WAY-STATION SERVICE

A simple switching device for connecting the operator's set in a railroad way station to one or more lines passing through the station is found in the cordless jack box recently perfected by the Western Electric Company's railway engineers. This does away with the unsatisfactory knife-switch method of cutting in the operator's telephone or telegraph set on the train-dispatching lines. The connection is effected by means of a single conductor plug which is inserted in the hole corresponding to the line over which it is desired to talk or telegraph.

The cordless jack boxes are of two kinds, one for telephone dispatching circuits and the other for telegraph lines, a different style of jack being necessary in the latter case on account of the different nature of the telegraph circuit and apparatus. One distinctive feature of the telephone jack boxes is that they may be used to connect two or more lines together and have the operator's set bridged in on all of them merely by using one or more extra switching plugs.

Solid oak is used for the construction of the boxes and the cover is made of three layers to keep it from warping. This cover is hinged so that it may be opened for inspection. The jacks are made with heavy insulation to prevent trou-



Cordless Jack Box—Circuit Diagram for Telephone Lines

ble from sudden voltage surges or accidental crosses with power or lighting circuits, with all jack springs widely separated to prevent arcing and burning of insulation. Screw terminals are used for connecting in outside lines and no soldering is necessary. A tie cord is furnished with the switching plug to keep the latter from being mislaid when not in use.

The cordless jack boxes are manufactured to take three lines, six lines or twelve lines, as desired. Any of the jack boxes can be ordered partially equipped with dummy wood plugs in the unequipped spaces. Jacks can be added at any time by knocking out the wood plugs and screwing in the jacks. Wiring is always furnished for the full equipment.

STANDARD ARRANGEMENT FOR ELECTRIC LOCOMOTIVE EQUIPMENT

Since the electric locomotive is becoming more and more each day a profitable revenue producer for electric railways, it is important that its equipment should be laid out to the best advantage for providing reliable operation and continuity of service. In the arrangement of a locomotive equipment three essential points should be kept in mind, namely, to mount the apparatus on the locomotive in such a way that each part will operate to the best advantage and with the least chance of trouble, that easy access shall be given to all parts and especially to those parts which are most likely to require attention, and that no unnecessary expense will be required for equipping and maintaining the locomotive.

To accomplish these results the following general principles have been adopted in the standard Baldwin-Westing-

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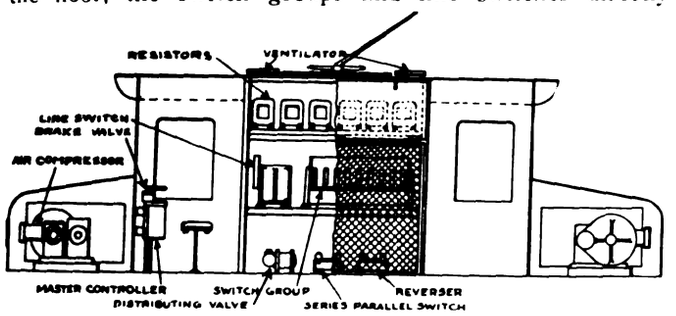
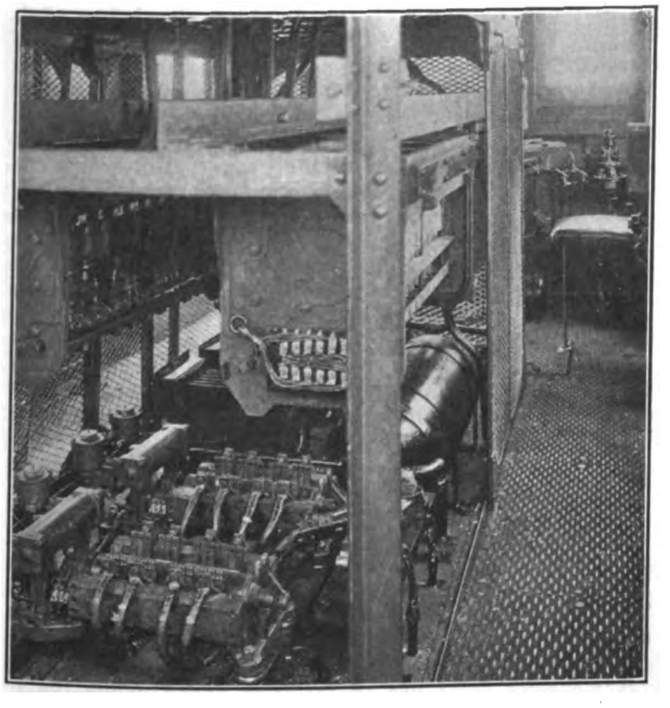
house locomotives. All of the main circuit-control apparatus and the resistors are mounted in the center of the locomotive and surrounded with suitable expanded metal screens as a protection against accidental contact. In the right-hand corners of the cab are mounted the master controllers, engineer's brake valves and the sander valves. The reversers and series-parallel switches are placed next to the floor, the switch groups and line switches directly



Standard Arrangement for Electric Locomotive Equipment

over them, and the resistors directly over the switch groups under the roof. The grid resistors are mounted in the main cab over the switch groups, partly on account of simplified wiring and partly because there is not sufficient room underneath the locomotive between the trucks to accommodate them when considerable capacity is required. The resistors are inclosed in a steel cabinet open at the bottom and provided with hinged doors on each side so as to provide easy access. Ventilators are provided in the roof over the resistance cabinet to give free egress to the heated air.

The space occupied by the apparatus under the resistance is inclosed by grounded, expanded metal screens which are made up in sufficiently small sections so that they can readily be removed for the inspection of apparatus. When forced ventilation is required centrifugal motor-driven



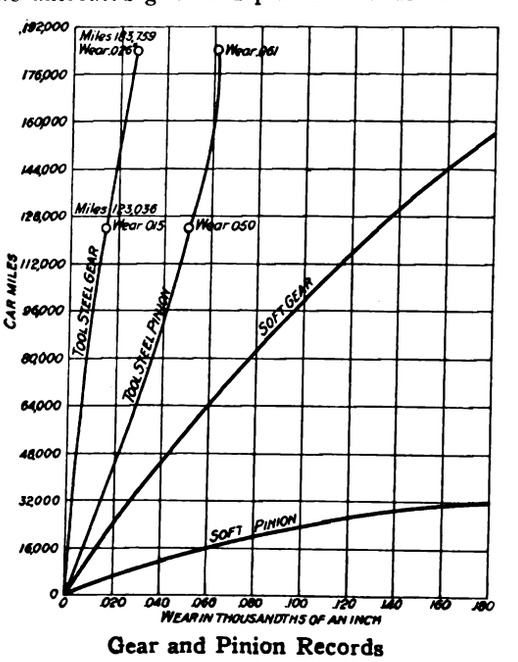
Interior of Standard Locomotive

blowers are installed in one or both of the hoods with the air compressor. These blowers force air through a conduit built into the locomotive frame between the center sills, whence it passes to the main motors through flexible canvas connections.

The advantages claimed for this centralized arrangement are numerous. All of the control apparatus is assembled compactly in one part of the locomotive. The switch groups are located in such a position that they are readily accessible from all sides and they are at such a height that a man can get at them freely without working in a cramped position or inside the hood. As the resistors are located under the roof, just above the switch group, the lengths of the connections between the two pieces of apparatus are reduced to a minimum. At the same time the heat rising from the resistors passes directly out through ventilators in the locomotive roof and very little of it reaches the switch group. The reversers are mounted in a position where they can be readily reached and they are centrally placed relative to the motors and near enough to them so that the amount of cable required is reasonable. The air-brake distributing valve is placed inside the cab, where it will be kept sufficiently warm to prevent freezing and where at the same time it is easily accessible. Finally the location of the compressor and blower motor in the hoods removes the feature of objectionable noise inside of the cab and at the same time puts both pieces of apparatus in a position where they can be easily lifted out.

EFFECT OF FOUR YEARS' SERVICE ON A GEAR AND PINION

In 1909 the Memphis (Tenn.) Street Railway Company began a test of tool steel gears and pinions. Recently it took measurements on one set which had been installed in that year and found that the gear had hardly become more than polished and that the pinion showed about one-third as much wear as could ultimately be obtained. At the time they were measured the gear and pinion had made 183,759 miles, which virtually doubled the pinion gauarantee of 100,000 miles. As the set was one of the first of its kind manufactured, the test was watched with great interest by the company. Prior to this test untreated gears and pinions were used as standard. The pinions gave an average wear life of approximately 32,675 miles and the untreated gears gave 156,000 miles. The Tool Steel Gear & Pinion Company, which furnished this gear and pinion for the test, used the untreated gear and pinion records as a basis and



Gear and Pinion Records

guaranteed the tool steel pinions for 100,000 miles and the gears for 500,000 miles.

The accompanying curves showing wear in one-thousandths of an inch plotted as abscissas and the car miles as ordinates indicate that the guaranteed pinion mileage will be exceeded by more than 300 per cent, and undoubtedly the guaranteed gear mileage will be reached if not exceeded before it is necessary to remove the set.

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News of Electric Railways

Final Arguments Before Boston Arbitration Board

Before the board of arbitration sitting in the Boston Elevated wage investigation at Ford Hall, Boston, on Dec. 11, Frederic E. Snow, counsel for the company, delivered a final argument against granting the demands of the employees' organization for increased compensation. Prior to the presentation of the argument, the terms of the agreement between the union and the company regarding the hours of labor as published in the ELECTRIC RAILWAY JOURNAL of Dec. 13, 1913, page 1254, were read into the record. Chairman Storrow congratulated the parties in appearance upon coming to an agreement upon this important matter during the present proceedings.

Mr. Snow reviewed the main points brought out in the company's testimony, and contended that the company should not be expected to pay more than the market cost for its operating labor. The company is paying the going rate of wages for similar work under similar conditions; it can secure all the help it desires at the present rate of wages and working conditions; it cannot by the terms of its charter increase the price of transportation to meet increases in wages, and its financial condition is such as to jeopardize the present 6 per cent dividend in case any substantial increase in wages is made. A general increase of 5 per cent in wages would add over $372,500 a year to the company's payroll, which would wipe out the surplus for the twelve months ended Sept. 30, 1913, and the surplus for the last fiscal year before the strike, ended June 30, 1911.

The company feels that the rights of its 9000 employees are not paramount to the rights of the 12,000 stockholders and the 1,500,000 residents of the Greater Boston district. Mr. Snow reiterated the point that the company's employees are receiving an average wage of more than $760 a year, compared with $532 for all the industries of Massachusetts, $594 for the boot and shoe industry of the State and $700 a year for employees of the New York, New Haven & Hartford Railroad. There is therefore no question of a living wage before the board. The increased cost of living might be made up to the employees of the road by more hearty co-operation on their part with the company in securing the safety of the public and the employees themselves, in the collection of revenue to which the company is entitled, and by creating a friendly attitude on the part of the public toward the company.

Damage Claims and Other Questions in Cleveland

Councilman Newell, of Cleveland, Ohio, has prepared a resolution to be introduced in the City Council asking that Peter Witt, street railway commissioner, furnish the Council a statement showing the amount of damage claims paid by the Cleveland Railway during the last two months as compared with a similar period a year ago. Mr. Newell contends that the number of accidents has increased since the new schedules, which require greater speed, have been in force.

The East Cleveland Council has under consideration an ordinance giving the Cleveland Railway the right to build a double-track extension of its Superior Avenue line through that village. In case the company's cars make the trip from East Cleveland to the Public Square in the city in twenty-five minutes, the fare is to be 5 cents, but if not it is to be 3 cents. The franchise covers a period of twenty years, ending May 1, 1934. This action was taken to make possible the fulfilment of Mr. Witt's plans to establish an express service on Superior Avenue for East Cleveland and thus lighten the burden of the regular cars, carrying people shorter distances. Objections have been raised to his plan to put four tracks on Superior Avenue for this purpose.

Mr. Witt has suggested that there is sufficient car seating capacity now to limit the number of passengers who should be permitted to ride on each car. He feels that no car should carry passengers in excess of 50 per cent over the seating capacity of the car, and is of the opinion that the conductors and motormen will be able to estimate the number of passengers on their cars and refuse to stop for passengers when in their opinion the limit of capacity as prescribed has been reached.

In order to ascertain the cost of building underground terminals at the Public Square, city engineers are making borings in the northwest and southwest sections of the square. Mr. Witt has proposed that two loops be constructed under each quarter of the square to care for all the surface cars that reach the down-town district. This would also include the west end of Superior Avenue to West Ninth Street, where the cars would emerge and pass onto the bridge that will be built across the Cuyahoga River at that point.

Contract for Brooklyn Elevated Extension

The form of contract for the first extension of the Brooklyn elevated railroads under the dual system agreements has been approved by the Public Service Commission for the First District of New York. This is the Liberty Avenue extension of the Fulton Street elevated railroad, which now terminates at the borough line between Brooklyn and Queens. The Fulton Street road is to be third-tracked and an extension built from the present terminus along Liberty Avenue to Lefferts Avenue, Queens Borough. The extension also will be a three-track line. It will be built and owned by the New York Municipal Railway Corporation, but the commission has directed that the company submit the contract to competitive public bidding and advertise for bids in the usual way. The bids are to be opened in public and later submitted for the consideration of the commission. The extension will be a little more than 2 miles long, and the contractor will be required to complete it within twelve months from the delivery of the contract.

Consents of property owners sufficient to legalize the Flatbush Avenue-St. Felix Street-Fulton Street rapid transit route have been obtained by the Public Service Commission for the First District. This is the route which connects the Fourth Avenue subway through St. Felix Street and Flatbush Avenue with the Brighton Beach line of the Brooklyn Rapid Transit system at Malbone Street. Legalization of this route was delayed for some time by failure to get the consents of the Brooklyn Academy of Music and the Long Island Railroad. These two consents have now been obtained. The assessed valuation of the abutting property is $5,724,900, and the value of the property for which consents have been obtained is $4,942,300.

Changes in the plans of the DeKalb Avenue station on the Fourth Avenue subway, in Brooklyn, have been ordered by the Public Service Commission for the First District, so that this station will become practically an express station. The changes involve the construction of two cross-overs west of the station at a cost of about $130,000. These cross-overs will permit trains from the Fourth Avenue subway, as well as those from the St. Felix Street-Flatbush Avenue connection with the Brighton Beach line, to make stops at DeKalb Avenue.

Decisions Fixing Terms of Joint Use in Milwaukee

On April 14, 1913, the city of Milwaukee passed an ordinance directing The Milwaukee Electric Railway & Light Company to extend its tracks on Wells Street from West Water Street to Fifth Street and from Sixth Street to Eleventh Street, and the company entered into negotiations with the Milwaukee Northern Railway looking toward an agreement for joint use of facilities under which the requirements of the ordinance of April 14 could be fulfilled. The companies failed to agree upon such use and upon the terms and conditions of compensation, and the matter was referred to the Railroad Commission of Wisconsin for adjustment. The commission has decided that The Milwaukee Electric Railway & Light Company may operate cars over the tracks of the Milwaukee Northern Railway between Fifth and Sixth Streets, on Wells. The decision is lengthy, and the subject of liability appeared to be considered of first importance by the commission. The Milwaukee Northern Railway proposed that The Milwaukee Electric Railway

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& Light Company indemnify any liability growing directly or indirectly out of the operation of cars or equipment by The Milwaukee Electric Railway & Light Company over its tracks. The commission decides that the Milwaukee Northern Railway is entitled to adequate compensation for the use of its property, but that it cannot be relieved from its "proper responsibilities."

In a somewhat similar case involving the Chicago & Milwaukee Electric Railway and The Milwaukee Electric Railway & Light Company the commission has decided that The Milwaukee Electric Railway & Light Company may operate cars over the tracks of the Chicago & Milwaukee Electric Railway between Second and Fifth Streets on Wells Street. As in the Milwaukee Northern Railway case the commission holds that the Chicago & Milwaukee Electric Railway is entitled to a just and adequate compensation for the use of its property, but that it cannot be relieved from its "proper responsibilities." The compensation is the same as decided in the Milwaukee Northern Railway case for the use of tracks and overhead system.

Attitude of Department of Justice Toward New Haven Company

Attorney General McReynolds was quoted in part as follows on Dec. 14 in regard to the probable outcome of the conferences between members of the Department of Justice and officers of the New York, New Haven & Hartford Railroad, held with the end in view of correcting the operations of the company so as to meet the ideas of the Department of Justice with respect to the Sherman anti-trust law:

"The Department of Justice is trying to find a way to correct the troubles with the New York, New Haven & Hartford Railroad so that the people of New England will be most thoroughly protected, and in a manner to inflict as little damage to their interests as possible. We have conducted an investigation of the affairs of the company to determine whether the Sherman anti-trust law has been violated. We have prepared a bill in equity, which is designed to correct the evils resulting from the former management of the railroad. There are two ways of accomplishing this. One is to give the managers of the road a chance to correct these evils themselves by adjusting their affairs so as to comply with the law. The other plan is to compel immediate compliance with the law and compel the company to dispose at once of the interests of the company in trolleys, steamships and other corporations, without regard to what these would bring under forced sale. I believe the management has evidenced its purpose to enforce rigid economy by passing up the dividend on its stock. That is the first step in the right direction. It may be that the management will succeed in its undertaking. There will not be the necessity for a civil suit by the government if the evils are corrected."

Howard Elliott on the Massachusetts Trolley Act

Howard Elliott, chairman of the board of directors of the New York, New Haven & Hartford Railroad, has submitted to the Public Service Commission of Massachusetts an estimate by the company of the cost to it of the Berkshire Street Railway stock to be issued to acquire the various electric railways in Massachusetts proposed for such acquisition by the last Massachusetts Legislature. The estimate is $19,000,000 and would be offset through retirement of securities which the company now guarantees—leaving about $5,000,000 for new construction over a period of years. In his letter to the commission Mr. Elliott says:

"I transmit herewith the estimate of cost which, under the provisions of Section 9 of the western Massachusetts trolley act, so called, is required to be submitted by this company within six months after the passage of the act. This estimate is filed at this time merely because the statute seems explicitly to require such action on the part of the company, leaving no discretion in the matter to the company.

"It is not to be construed as indicating any intention of the company to file a petition under the act or ultimately to accept the act. The future action of the company in this matter must obviously depend in large measure upon future developments. The estimate submitted is based in some respects upon opinions which may be altered hereafter by more accurate knowledge. For example, it has not seemed proper to ask the owners of the common stock of the New England Investment & Security Company to fix a value thereon which they would be willing to accept at some indefinite and perhaps distant future date."

Comment Upon the Boston Hours of Labor Agreement

Since the beginning of the arbitration hearings at Boston several months ago the onerous features of the so-called "nine-hours-in-eleven" law passed at the 1913 session of the Legislature have frequently been emphasized, and the difficulty of carrying out the act on the Boston elevated system has been discussed. Pending the conclusion of arbitration proceedings, the enforcement of the act by the company has not been demanded by its employees, and the reaching of an agreement which appears in many respects to modify the most burdensome features of the act has been heralded with general satisfaction. Commenting upon the situation editorially, the Boston *Transcript* says:

"The carmen's union has shown itself wiser than the Legislature in voting to forego a test of the privileges supposed to attach to the 'nine-hours-in-eleven' law. It has been a more perplexing problem to deal with than almost any other phase of the controversy, and this action by the employees of the elevated system seems virtually to concede that it is not practical and that there are other and more workable ways of securing the benefits for which they contend. This was an instance of hasty legislation put through without knowledge of what the effects would be. It is now practically repudiated by both sides in the controversy. It was widely criticised when it went through, and the present disposition of it indicates that the criticism was warranted and should have been heeded. Were that the only mistake made by the recent Legislature, it might be forgiven, but it was symptomatic rather than exceptional. We are always hoping for better things from the one yet to be tried."

Publicity in Connection with Kansas City Franchises

While it is, of course, still uncertain whether the Metropolitan Street Railway, Kansas City, Mo., will obtain a new franchise, public sentiment has undergone a marked change recently and the prospects for a favorable vote at the special franchise election are considered better than for some time past.

The original franchise ordinance is necessarily a formidable document. Acting on the suggestion of Federal Judge William C. Hook, the company sent a copy of the ordinance to each of the 30,000 voters registered in Kansas City. This in itself was a tremendous task. In addition it was decided by the receivers to digest the ordinance so as to present the salient features and to send the following letter to the voters of Kansas City:

"We will shortly send you a synopsis of the proposed contract now pending in the Council, in order that you may know the general effect thereof. Also the full draft thereof will be attached so that you may read the details. We ask that you study this contract and come to your own conclusion whether the street-car problem should be settled at this time, and, if so, whether the proposed contract is the best that can be devised in justice to both sides. If you think no contract at all should be made, or if you think any part thereof is wrong, or you have any suggestions as to how the situation can be better dealt with, we, as court officers, want to know it. If you think the proposed contract is a fair settlement of the problem we also want to know it. Your opinion is invited."

This circularizing was supplemented by advertising to the public, done, not by the Metropolitan Street Railway, but by the committee appointed by the Kansas City Council to consider the ordinance and report back. The committee held daily sessions and invited expressions of opinion from all sources. All of the three daily papers of Kansas City were utilized for a week's time. The advertisements of the Council committee were small, merely inviting anyone interested to attend the daily hearings at the City Hall. There were many responses to this invitation.

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The receivers of the company have heard from many of the voters as the result of the issuance of the condensed drafts of the franchise ordinance. Letters, friendly and unfriendly, have been written, but the majority commended the receivers for their frank dealing with the situation.

Missouri Commission Rescinds Order Directing Removal of Manager

The Missouri Public Service Commission has rescinded its order directing the Fort Scott & Nevada Heat, Water & Power Company to remove its manager for alleged oppressive conduct. In changing its attitude, the commission did not admit that it has not the power to remove the officials of public utilities. The opinion merely stated that additional evidence had caused the members of the commission to change their decision.

In its original order the commission held that it had power to remove a manager when in its judgment such removal was for the benefit of the public, and that it also had the right to direct the company to secure the services of competent persons. The company was prepared to take the case to the courts. Its attorney contended that the original order of the commission was in direct conflict with previous decisions of the Supreme Court of Missouri.

New Haven Electric Zone Safety Hearing

Before John E. Eustis and J. Sergeant Cram, representing the Public Service Commission for the First District of New York, and James E. Sague, representing the Second District Commission, a rehearing was held on Dec. 11 relative to an application of the New York, New Haven & Hartford Railroad for a change in a recent order directing that road to take certain steps to protect the employees from contact with overhead electric equipment.

Charles M. Sheafe, Jr., counsel for the New Haven, and C. L. Bardo, general manager of the railroad, objected to that part of the order which forbade employees from going on the tops of trains while they were in certain electrical zones. It was absolutely necessary to send men there, they said, in certain emergencies, such as disablement of equipments, accidents to the pantograph, loose car roofings and the like.

John Fitzgibbons, legislative representative of the trainmen, said that there was no objection to a modification of the order to prevent men going on the top of cars to make emergency repairs or to carry word to the engineer when the train was standing still in full clearance on the main line.

Chicago Approves Arnold Subway Plan

The sub-committee of the Chicago City Council has approved the subway plan submitted by Bion J. Arnold and described in the Electric Railway Journal for Nov. 8, 1913. Following its approval corporation counsel was requested to draft an ordinance with the assistance of George Weston, the city's representative on the Board of Supervising Engineers. Since Mr. Arnold presented his original subway plan several slight revisions have been made, and the total cost of the proposed subway, including these additions, is now $27,285,000. In its request to prepare an ordinance covering the Arnold subway plan, the sub-committee outlined the following provisions to be included:

1. That the subways be municipally owned.
2. That the cost of subway system be paid out of the traction fund to the extent it is sufficient, and that the additional capital be furnished by the surface railway companies.
3. The surface line companies occupying the subways shall pay the city a reasonable rental based on the cost of the system.
4. The system of subways shall be operated as a part of the surface lines subject to the provisions of the 1907 and subsequent traction ordinances.
5. The general plans and specifications shall be prepared by, and the subways shall be constructed under, the direction of the Board of Supervising Engineers.
6. The subways shall be constructed under contracts to be let by the city of Chicago.
7. The ordinance shall contain a provision that it shall not become effective unless approved by referendum vote.
8. In case the subway ordinance is accepted by the voters the Board of Supervising Engineers shall immediately complete the preparation of plans and specifications for the subways and advertise for bids. The contract for the subway shall make provision for its completion within a limited period.
9. After the completion of the initial system of subways the companies may be required to join with the city in defraying the cost of extensions and additions made to the system.
10. It shall be provided that the initial system set out in the ordinance shall be placed under operation before any extensions are undertaken.

Proposed Akron Franchise Modified

At a conference on the evening of Dec. 11 attended by members of the City Council of Akron, Ohio, City Solicitor Taylor and A. B. du Pont, a number of changes in the proposed franchise for the Northern Ohio Traction & Light Company were tentatively decided upon. The most important, perhaps, related to control of operation by the city. The franchise will be changed to give the City Council power to regulate the service by ordinance. Such regulation, however, must be reasonable. In case any order which is issued is found to be unreasonable, the company is to be compensated for its loss. The company will be subject to a penalty of $50 a day for failure to carry out any order made by the Council.

Another amendment provides that the company shall maintain a special fund of $2,000 to be used in making street repairs; that the city shall make the repairs and the expenses be paid from this fund. The company is to pay into this fund every three months such an amount as will bring the fund up to its full amount.

A third amendment requires the construction of 1 mile of track for each increase of 2000 in population, instead of 5000, as in the original draft.

Progress of Indianapolis Arbitration

The Public Service Commission of Indiana on Dec. 16 resumed its hearings in the matter of differences between the Indianapolis Traction & Terminal Company and its employees. Witnesses for the employees are still being heard, and their testimony relates in detail to their working conditions, cost of living, their opinions of membership in unions, etc. On Dec. 11 and 12 the wives of some of the employees testified as to the expense of living. The figures submitted showed in most instances that they were buying only the highest priced meats and other table necessaries and that they had not saved anything. Mr. Latta, for the company, exhibited photographs of various markets and stores in the city at which cheap food products were available. Chairman Duncan of the commission took issue with the employees' attorney when he objected to the admission of this evidence, and stated that he was glad to have this information and would look into the matter, as everybody would be better off if prudence was exercised in such matters.

One man's ideas as to union and non-union men working together caused Commissioner Clark to question him. The witness took the position that while union men are without the right to prevent non-union men from taking positions, it was not right for a non-union man to come in and work if a union was established. His plea was for recognition of the union. When questioned by the commissioners as to whether he would treat non-union employees civilly if the commission did not recognize the union, he stated that if his motorman was non-union he "guessed" he would treat him right "if he would tend to his own business."

Attorneys representing the employees attempted to show that the increases in the wages of employees have not been proportionate to the increase in cost of living. They then read from a report of the federal Bureau of Labor to show the percentage of increase in the prices of fifteen articles of food in Indianapolis. The percentages of increase from February, 1912, to February, 1913, were as follows: Sirloin steak, 19.3; round steak, 12.3; rib roast, 18.1; pork chops, 16.4; smoked bacon, 11.7; smoked ham, 10.3; pure lard, 16.7; hams, 11.8; flour, 3.6; cornmeal, 2.4; creamery butter, 9.4;

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granulated sugar, 15. The same report showed a decrease in the price of fresh eggs of 18.5 per cent, and of potatoes, 37.3 per cent, while the price of milk had remained unchanged.

During the hearing, Dec. 16, Chairman Duncan questioned one of the witnesses about drinking among street-car men. Mr. Duncan called the witness's attention to the fact that his testimony showed he had money to buy drinks, and that he had to pay cash for them. The commissioner said: "The instalment business comes when men buy things for their families. Men always have money to pay for their drinks. Do you think a crowd of men can properly ask for an increase in wages when they have money to spend for liquor?"

A prominent labor man testified as an expert in labor unions. His theory of one of the advantages of a union to employers was that it prevented a cessation of work at short notice. The attorney for the company called the attention of the witness to the recent controversy between bricklayers and marble workers in Indianapolis, when 800 men quit work because of differences between their respective unions which did not in any way involve the employers.

The local secretary-treasurer of the Amalgamated Association took the stand on Dec. 17 and read a mass of figures showing the number of fares collected on his car while working as a conductor for the company. His figures showed that his wages in 1906 were $699.57 for the year. In 1912 he earned $762.45 and was off duty sixty-three days. He argued for recognition of the union, changes in working conditions and a rearrangement of schedules so that at least 70 per cent of the runs would be straight "earlies and lates." When asked by the commissioners as to how the latter might be accomplished, he stated he had not been able to figure it out, but that the company had experts for that kind of work. The witness thought that the employees should not be required to work more than nine hours a day, six days a week. Chairman Duncan asked the witness if he would be willing that the company should be permitted to earn a reasonable return on its investment, and whether the increased wage scale asked for would result in any increase in street-car fares charged the public. The witness assented to the first question and said he did not think that the increased wages asked for would make it necessary to increase the rate of fare charged.

Chairman Duncan informed the attorneys for the employees that the Public Service Commission had decided the employees must complete all their evidence this week, so that the company could begin its side of the case the week of Dec. 22. The commission is overloaded with other matters which must be adjusted after the differences between the Indianapolis Traction & Terminal Company and its employees are settled. Included among these are the adjustment of the wage scale of the Indianapolis & Cincinnati Traction Company and the hearing of the grievances of seven men of the Terre Haute division of the Terre Haute, Indianapolis & Eastern lines.

New Road Opened in Ohio.—The Poland Street Railway has placed in operation its line between Poland and Youngstown, Ohio.

New York Compensation Bill Passed.—After enacting the entire programme of legislation recommended by Governor Glynn, the extraordinary session of the New York Legislature adjourned on Dec. 12. The feature of the closing day's work was the passage of the workmen's compensation bill and three companion measures in both houses of the Legislature.

School Transportation System.—Novel service has just been established at Twin Falls, Idaho, with the opening of I. B. Perrine's storage battery electric railway. The service is part of a centralized school system for Twin Falls and its neighborhood. The line is used to transport children from the country to the city schools. Four miles of line are in operation and a total of 5½ miles will have been completed by the end of December.

Tramway and Electric Light System in Jerusalem.—The American consul at Jerusalem advises that companies desiring to compete for the contract for the tramway to be constructed at Jerusalem, and for the establishment of an electric-light system for the same city, in accordance with conditions which have been distributed, will have to present their bids to the Commission of Adjudication, which will be constituted at the Conak of the government at Jerusalem. The concession will be granted for forty years.

Safety Appliance Bill Introduced.—Congressman R. B. Stevens, of New Hampshire, chairman of the House subcommittee in charge of safety appliance legislation, has introduced a bill which vests the Interstate Commerce Commission with drastic plenary powers over the railroads as regards the safety of travelers and employees. The bill authorizes investigations by the commission, empowers the commission to order improvements and repairs and makes carriers liable to a penalty of $500 for each day that violation of the commission's orders continues.

Tallulah Falls Development Completed.—The Tallulah Falls water-power development of the Georgia Railway & Power Company, Atlanta, Ga., now is practically completed. Four of the generators, aggregating 68,000 hp, are in operation and the fifth will be ready for operation soon. These generators have a capacity of more than 17,000 hp each. The plant has been furnishing power to customers since Sept. 24. The Supreme Court of Georgia has handed down a decision affirming the judgment of the lower court in favor of the Georgia Railway & Power Company's title to the Tallulah Falls water-power site.

Injunction Against Junction Avenue Line, Detroit, Refused.—Circuit Judge Mandell, on Dec. 4, refused a temporary injunction to Barton L. Peck to prevent the Detroit United Railway from building a track past his house on Larchmont Avenue, a portion of the route of the proposed Junction Avenue cross-town line, according to the terms of the agreement between the company and the Common Council. The only question now to be decided is whether the property is damaged by the road passing it. This was a test case brought in an attempt made by a number of property owners to prevent the construction of the line on the route selected.

Lexington Arbitrators Decide Against Men.—The arbitrators selected by the Kentucky Traction & Terminal Company, Lexington, Ky., and the representatives of the men decided unanimously in favor of the company and dismissed the complaint recently made by the men. The representatives of the men insisted that an agreement between them and the company covered employees in the track department. The arbitrators decided that, as foremen cannot be members of the union, the men dismissed were not covered by the agreement. D. L. Thornton, the umpire, or third man, on the committee, was selected, at the request of both parties, by Gov. James B. McCreary.

Transportation Commission Recommended for Toronto.—On Dec. 12 the Board of Control of Toronto, Ont., met to consider what further legislation the city shall apply for at the next session of the Ontario Parliament. The board plans to recommend that legislation be sought to enable the city to appoint a commission to take charge of civic transportation. It has been suggested that the commission be composed of three persons, who shall hold office for three years. In the case of the first appointments the period of service of one man would cover four years, one three years and one two years. They are to be eligible for re-election. The members of the commission, it is suggested, should be elected by the City Council and serve without salary. The idea seems to be favored of giving the Council the right to exercise a veto over any recommendation submitted by the commission, while reserving to the commission all initiative power.

Luncheon to Henry G. Pearce.—The members of the 1913 entertainment committee of the American Electric Railway Manufacturers' Association tendered a luncheon on Dec. 15 at the Railroad Club in New York to its chairman, Henry G. Pearce, of the Standard Steel Works, Philadelphia. At the close of the luncheon E. R. Mason, in behalf of the entertainment committee, presented Mr. Pearce with a gold watch, suitably engraved. Those in attendance at the luncheon were Allen E. Goodhue, Midvale Steel Company, Philadelphia; W. G. Kaylor, Westinghouse Traction Brake Company, New York; W. A. Lake, the Pantasote Company, New York; E. R. Mason, E. R. Mason Company, New York; James G. Mowry, Patton Paint Company, New York; Henry N. Ransom, Westinghouse Electric & Manufacturing Com-

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pany, New York; Robert W. Read, Pennsylvania Steel Company, Philadelphia; W. H. Wilkinson, Pressed Steel Car Company, New York; H. G. McConnaughy, Dearborn Chemical Company, New York; Charles R. Ellicott, Westinghouse Traction Brake Company, New York, and L. E. Gould, Electric Railway Journal, New York.

Agreement Reached in Regard to New Line in Tacoma.—After a conference with representatives of the Stone & Webster interests recently, the City Council of Tacoma, Wash., decided to call off the special bond election which was to have been held on Dec. 30, and announced that the Tacoma Railway, Light & Power Company had agreed to build the proposed line across the Eleventh Street bridge and the tideflats to the manufacturing district. The voters were to have passed upon a plan to authorize an issue of $87,000 of bonds to provide funds for the construction of a municipal railway. The Tacoma Railway, Light & Power Company will be granted a twenty-year franchise, and its gross earning tax on all city lines will be reduced from 2 per cent to 1 per cent. The city is to have the right to purchase the line. The terms proposed by John A. Shackleford, president of the company, for the construction of the line were referred to at length in the Electric Railway Journal of Nov. 29, 1913, page 1150. Subsequently the members of the Council reconsidered the matter and decided to put the question of issuing bonds to a vote. If the bond issue is defeated, the offer of the company to build the line will probably be accepted by the city.

PROGRAMS OF ASSOCIATION MEETINGS

Wisconsin Electrical Association

The annual meeting of the Wisconsin Electrical Association will be held at the Hotel Pfister, Milwaukee, on Jan. 15 and 16, 1914. The entire program has not as yet been completed, but several papers of importance have already been decided upon as follows:

Paper, "The Cost of Supplying Current to Small Consumers and the General Subject of Rates," by S. E. Doane, Cleveland, Ohio.

Paper, "Review of New Laws Affecting Public Utilities in Wisconsin," by John B. Sanborn, Madison, Wis.

Paper, "The Proper Handling of Depreciation Accounts and Some Phases of Rate Making," by Halford Erickson, of the Wisconsin Railroad Commission.

Paper, "Electric Railway Traffic Surveys," by R. W. Harris, Madison, Wis.

Paper, "A Practical Accounting System for the Small Central Station," by H. G. D. Nutting, Milwaukee, Wis.

Paper, "Important Developments in Electricity Meters," by F. A. Vaughn, Milwaukee, Wis.

Efficiency Society, Inc.

The first national efficiency exposition and conference will be held under the auspices of the Efficiency Society, Inc., at the New Grand Central Palace, New York, N. Y., April 4 to 11, 1914. The Efficiency Society, Inc., was organized with the prime object of reducing waste through the adoption of right methods, and of acting as a clearing house for the exchange of ideas for improvement. Its work is essentially constructive. Its membership of approximately 1000 is composed of executive and administrative officers of industrial, manufacturing, railroad, public service, municipal, educational and other corporations, engineers, accountants, bankers, lawyers, sales and advertising managers, publishers, clergymen, labor unionists and others. The aim and purpose of the first national efficiency exposition and conference is to give expression to the increasing application of scientific methods to modern conditions and to provide an exchange and meeting place for producer and consumer. The program for the meeting will include an assembly of representative displays of appliances, methods and products in the fields of industrial, mechanical, governmental, educational and household efficiency, a series of mental and manual efficiency contests, conferences and illustrated talks having particular relation to the assembled exhibits and conferences on current phases of the efficiency movement. Walter H. Tallis, 41 Park Row, New York, N. Y., is exposition director for the society.

Financial and Corporate

Stock and Money Markets

Dec. 18, 1913.

The tone of the trading on the New York Stock Exchange improved materially to-day. There was no considerable advance in values, but there was a steady demand for issues on all recessions. New Haven was in good demand, but ranged moderately under yesterday's final price. Moderate gains were made in Brooklyn Rapid Transit, Third Avenue and Interborough-Metropolitan, all of which were quite active. At the close of trading the leading issues were practically unchanged from the closing range of Tuesday. Rates in the money market to-day were: Call, 3½ @ 4 per cent; thirty days, 5½ @ 6 per cent; sixty days, 5¼ @ 5½ per cent; ninety days, 5 @ 5¼ per cent; four, five and six months, 4¾ @ 5 per cent.

In the Philadelphia market the local group reflected slight interest to-day.

Trading was dull in Chicago to-day, but the tone was firm.

The Boston market opened firm to-day, and except for a few specialties remained quiet.

The principal trading in Baltimore to-day was in United Railways. The demand for bonds was good.

Quotations of traction and manufacturing securities as compared with last week follow:

	Dec. 10	Dec. 17
American Brake Shoe & Foundry (common)	87	87
American Brake Shoe & Foundry (preferred)	127½	127
American Cities Company (common)	36	36
American Cities Company (preferred)	63	63⅜
American Light & Traction Company (common)	*334	333
American Light & Traction Company (preferred)	*106	106
American Railways Company	38¼	38¼
Aurora, Elgin & Chicago Railroad (common)	a42	a42
Aurora, Elgin & Chicago Railroad (preferred)	a84	*84
Boston Elevated Railway	88½	85
Boston Suburban Electric Companies (common)	7	7
Boston Suburban Electric Companies (preferred)	60	60
Boston & Worcester Electric Companies (common)	*6½	*6½
Boston & Worcester Electric Companies (preferred)	39	37
Brooklyn Rapid Transit Company	86⅜	86¼
Capital Traction Company, Washington	111½	111
Chicago City Railway	160	160
Chicago Elevatel Railways (common)	25	25
Chicago Elevated Railways (preferred)	75	75
Chicago Railways, ptcptg., ctf. 1	a90	a90
Chicago Railways, ptcptg., ctf. 2	a27½	28½
Chicago Railways, ptcptg., ctf. 3	6½	7
Chicago Railways, ptcptg., ctf. 4	1½	1⅜
Cincinnati Street Railway	110	110
Cleveland Railway	104½	103½
Cleveland, Southwestern & Columbus Ry. (common)	*5½	*5½
Cleveland, Southwestern & Columbus Ry. (preferred)	*30	*30
Columbus Railway & Light Company	18	18
Columbus Railway (common)	59½	59½
Columbus Railway (preferred)	88	88
Denver & Northwestern Railway	a80	*80
Detroit & United Railway	a80	a80
General Electric Company	138⅞	135⅜
Georgia Railway & Electric Company (common)	119¼	119
Georgia Railway & Electric Company (preferred)	85	84½
Interborough Metropolitan Company (common)	14⅜	14⅜
Interborough Metropolitan Company (preferred)	59⅜	59
International Traction Company (common)	a30	*30
International Traction Company (preferred)	90	*90
Kansas City Railway & Light Company (common)	20	*20
Kansas City Railway & Light Company (preferred)	30	*30
Lake Shore Electric Railway (common)	6	6
Lake Shore Electric Railway (1st preferred)	92	92
Lake Shore Electric Railway (2d preferred)	24	24
Manhattan Railway	130	127
Massachusetts Electric Companies (common)	10½	10
Massachusetts Electric Companies (preferred)	65½	64
Milwaukee Electric Railway & Light Co. (preferred)	95	95
Norfolk Railway & Light Company	24¾	24¼
North American Company	68	66
Northern Ohio Light & Traction Company (common)	66¼	70
Northern Ohio Light & Traction Company (preferred)	97	101
Philadelphia Company, Pittsburgh (common)	39	39
Philadelphia Company, Pittsburgh (preferred)	39	39
Philadelphia Rapid Transit Company	18¼	18
Portland Railway, Light & Power Company	53	53
Public Service Corporation	106	105
Third Avenue Railway, New York	39¼	39¼
Toledo Traction, Light & Power Company (common)	15	15
Toledo Traction, Light & Power Company (preferred)	60	75
Twin City Rapid Transit Co., Minneapolis (common)	105½	103
Union Traction Company of Indiana (common)	11½	11⅛
Union Traction Company of Indiana (1st preferred)	80	80
Union Traction Company of Indiana (2d preferred)	14	14
United Rys. & Electric Company (Baltimore)	*25⅛	24⅞
United Rys. Inv. Company (common)	17	16
United Rys. Inv. Company (preferred)	33½	32
Virginia Railway & Power Company (common)	56	56
Virginia Railway & Power Company (preferred)	93½	97½
Washington Ry. & Electric Company (common)	85½	85
Washington Ry. & Electric Company (preferred)	86¼	86½
West End Street Railway, Boston (common)	a67½	67⅝
West End Street Railway, Boston (preferred)	90	90
Westinghouse Elec. & Mfg. Company	64½	63
Westinghouse Elec. & Mfg. Company (1st preferred)	112	112

*Last sale. a Asked.

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ANNUAL REPORTS

Massachusetts Electric Companies

The Massachusetts Electric Companies, Boston, Mass., presents the following statement of income, profit and loss for the year ended Sept. 30, 1913:

Dividends on stocks owned	$1,133,293	
Interest on notes and bank balances	71,433	
Total income		$1,204,726
Expenses:		
Salaries—General officers and executive committee	$10,292	
Printing and stationery	1,324	
Legal and miscellaneous expense	20,651	
City of Boston tax	184	
Total expenses		32,451
Net income		$1,172,275
Interest on coupon notes		171,561
Net divisible income		$1,000,714
Dividends:		
Jan. 1, 1913—2 per cent	$484,128	
July 1, 1913—2 per cent	484,128	
Total dividends		968,256
Surplus for the year		$32,458
Surplus, Sept. 30, 1912		2,761,810
Total		$2,794,268
Credits:		
Federal tax for 1909 refunded	$158	
Profit on sale of stock	19,998	20,156
		$2,814,424
Debits:		
Premium on coupon notes purchased	$2,015	
Discount on coupon notes sold	65,410	67,425
Surplus Sept. 30, 1913		$2,746,999

The statement of income, profit and loss of the Bay State Street Railway, through which by lease the Massachusetts Electric Companies maintains control over its other companies, is as follows for the year ended June 30, 1913:

Gross income		$9,462,251
Operating expenses		6,109,511
Gross income less operating expenses		$3,352,740
Interest, rentals, taxes, etc		1,914,902
Net divisible income		$1,437,838
Dividends:		
First preferred stock	$125,316	
Common stock	1,128,446	
Total dividends		1,253,762
Surplus for the year		$184,076
Surplus, June 30, 1912		212,861
Total		$396,937
Credits:		
Accumulated profit on sales of scrap	$37,330	
Tickets sold and not used	32,000	
Total credits		69,330
		$466,267
Debits:		
Reconstruction	$196,469	
Net losses by fire, etc	23,526	
Preliminary engineering, etc	9,319	
Premium on bonds called for redemption	1,376	
Adjustment of accounts	7,648	
Settlement with Boston Elevated Railway for certain terminal charges covering a number of years	15,078	
Total debits		253,417
Surplus, June 30, 1913		$212,850

Gordon Abbot, president of the Massachusetts Electric Companies, says in part:

"The business of the Bay State Street Railway and its leased lines showed during the fiscal year ended June 30 an increase of $346,048. Of this increase $72,398 was due to additional earnings from the freight and express business.

"In March, 1913, $660,000 par value of first preferred stock of the Bay State Street Railway was, under the authority of the Railroad Commissioners, issued and sold at $115 per share. In April, 1913, $304,000 par value of bonds were issued and sold under the mortgage of the Boston & Northern Street Railway, and $172,000 par value of bonds were issued and sold under the mortgage of the Old Colony Street Railway; while $28,000 bonds were issued under the Boston & Northern mortgage in exchange for underlying bonds retired, and are now held in the treasury.

"On July 1, 1913, $3,700,000 par value 4½ per cent coupon notes of the Massachusetts Electric Companies matured. The funds for the payment of these notes were received in part from the Bay State Street Railway in payment of its notes, and in part from the sale of $3,100,000, out of a total authorized issue of $3,500,000, of two-year 5 per cent coupon notes dated May 1, 1913.

"In the last annual report a statement was made as to the number of preferred shares of the Massachusetts Electric Companies deposited up to Nov. 26, 1912, under the terms of the offer of the trustees in respect to the purchase of arrears of dividends. Between that date and Sept. 30, 1913, 6403 additional shares of stock were deposited, leaving 4872 shares on which arrears of dividends still remain to be adjusted.

"During the past fiscal year the following amounts have been expended on new property and reconstruction: Track construction, $151,971; track reconstruction, $782,830; cars and electrical equipment, $195,519; electric lines and feeders, $97,356; power stations, $60,636; land and buildings, $58,401; sundry equipment, $37,559, or a total of $1,384,272. Fifty semi-convertible cars with four-motor equipments have been purchased, but no part of the cost of these is included in the figures given.

"Eight express cars, each with four-motor equipments, were purchased, three of which are now in service, while the remaining five are expected for delivery before the end of the present calendar year. Air-brake equipment was purchased for sixty-one cars, and its installation was completed on twenty-four. New track to the extent of 4.1 miles was built during the fiscal year, and 30.1 miles were reconstructed, while 28.3 miles in addition were electrically welded; 55.28 miles of new overhead feeder and 8.18 miles of underground feeder or transmission cable were installed, together with 28.35 miles of underground duct.

"A new brick carhouse was built on Middlesex Street, Lowell, which will provide additional storage for seventy large cars. A new 600-hp boiler, with the necessary auxiliaries, was installed in an addition made to the power station in Lowell, while a 100-kw turbine unit was purchased for use in the Portsmouth station and is now being there installed."

Commonwealth Power, Railway & Light Company

The Commonwealth Power, Railway & Light Company, Grand Rapids, Mich., reports for the twelve months ended June 30, 1913, after all charges, $1,436,234 surplus for its common and preferred stocks. The condensed earnings statement of the company for the fiscal year follows:

	1913	1912
Earnings on stocks owned in subsidiary companies	$1,499,958	$1,098,930
Miscellaneous earnings	155,556	82,238
Gross earnings	$1,655,514	$1,181,168
Expenses and taxes	$90,186	$64,865
Interest paid	129,094	14,198
Total deductions	$219,280	$79,063
Net income available for dividends, replacements and depreciation	$1,436.234	$1,102,105
Dividends on preferred stock	*460,000	360,191
Balance	$976,234	$741,914

*Includes $100,000 to cover dividend requirement for the months of May and June, 1913, on the $10,000,000 of additional preferred stock issued as of May 1, 1913.

The above statement does not include the entire year's earnings from the properties of the Union Railway, Gas & Electric Company, Springfield Light Company and Michigan Railways Company, companies acquired by the Commonwealth Power, Railway & Light Company as noted in the ELECTRIC RAILWAY JOURNAL of May 10, 1913. A. G. Hodenpyl, president of the company, says in part in referring to the operations of the company:

"In accordance with authority conferred by the stockholders at a meeting held May 15, 1913, the company has acquired over 99 per cent of the preferred and common capital stocks of these companies. Earnings for only the months of May and June on the additional stocks acquired, however, are included in the statement, it being considered that such stocks were taken over as of May 1, from which date the dividends began to accrue on the increased amounts of stock of this company issued to acquire the additional securities of the companies mentioned."

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Cities Service Company Takes Over Two Public Utilities

At special meetings of the directors of the Cities Service Company, the Consolidated Cities Light, Power & Traction Company and Utilities Improvement Company, held on Dec. 11, a plan providing for the absorption of the last two mentioned companies by the Cities Service Company was adopted. It provides that stockholders of the Utilities Improvement Company may surrender their preferred stock and receive Cities Service Company preferred stock share for share. They may also surrender their common stock and receive one share of common stock of the Cities Service Company for each two shares of the Utilities Improvement Company common. As the Consolidated Cities Light, Power & Traction Company has no preferred stock, the basis of exchange will be one share of Cities Service Company common for two shares of its stock. The 5 per cent bonds, of which there are $4,000,000 outstanding of the Consolidated Cities Light, Power & Traction Company, are to remain outstanding.

The Cities Service Company was organized in September, 1910, with an authorized capital of $30,000,000 of 6 per cent cumulative preferred and $20,000,000 of common stock. When the exchange of its preferred and common is made for stocks of the other two companies its outstanding stocks will be $27,368,423 preferred and $15,718,389 common. The three companies are under the management of H. L. Doherty & Company.

Massachusetts Street Railways Paying 5 Per Cent

The Public Service Commission of Massachusetts has sent to the Bank Commissioners of that State a list of the street railways that have earned and paid dividends of 5 per cent during the past five years. The list follows: Bay State Railway, Boston & Revere Electric Railway, Fitchburg & Leominster Street Railway, Holyoke Street Railway, Nahant & Lynn Street Railway, Springfield Street Railway, Union Street Railway, West End Street Railway, Worcester Consolidated Street Railway. The Bay State Railway and the Worcester Consolidated Street Railway were added to the list this year.

Albany (Ga.) Transit Company.—An increase from $52,000 to $80,000 in the capital stock of the Albany Transit Company was recently authorized at a meeting of stockholders of that company. The increase will be used in purchasing additional equipment. Directors were re-elected as follows: F. F. Putney, J. R. Wetherbee, S. B. Brown, A. P. Vason, J. C. Fulford, W. B. Haley, W. J. Peed and J. Rosenberg.

American Public Utilities Company, Grand Rapids, Mich.—The directors of the American Public Utilities Company have increased the quarterly dividend on the common stock from one-half of 1 per cent to three-quarters of 1 per cent, placing the issue on a 3 per cent per annum basis. The usual quarterly dividend of 1½ per cent also has been declared on the preferred stock.

American Water Works & Guarantee Company, Pittsburgh, Pa.—The stockholders' protective committee of the American Water Works & Guarantee Company has just issued a circular to preferred and common stockholders of the company which suggests that they should deposit their stock at once with the Bankers' Trust Company, depositary for the committee, in order to receive the benefit of any plan of reorganization. The committee expects to submit at an early date a plan of reorganization, but the details are not yet entirely determined. It is the intention to raise such new money as may be needed by the issuance of new securities which will be offered for subscription to the stockholders who have deposited with the committee. The circular says: "The committee will promptly advise its depositors as soon as a definite plan has been agreed upon; in the meantime stockholders will probably find it to their advantage to consult the secretary of the committee before accepting offers that may be made for the purchase of their stock."

Babylon (N. Y.) Railroad.—On a motion of Attorney Ralph J. Hawkins Judge Chatfield, of the United States District Court in Brooklyn, has modified the order of Feb. 15, 1913, which appointed Mr. Hawkins as receiver of the Babylon Railroad, and has restored the operation of the road to its officials.

Boston (Mass.) Elevated Railway.—The Massachusetts Public Service Commission has been asked to sanction the issuance of $600,000 of thirty-year bonds and $350,000 of capital stock of the West End Street Railway to provide for floating debt due to the Boston Elevated Railway on account of additions and betterments. The capital stock as thus increased would be $13,080,150.

California Railway & Power Company, San Francisco, Cal.—The directors of the California Railway & Power Company will redeem 1000 shares of the prior preference stock of the company on Jan. 2. The shares to be called for redemption are to be determined by lot and a drawing will be made by the Bankers' Trust Company from the list of the holders of record Dec. 31.

Chippewa Valley Railway, Light & Power Company, Eau Claire, Wis.—The Chippewa Valley Railway, Light & Power Company has acquired the property of the Eau Claire Gas Light Company. The company is making surveys for the construction of a new dam and hydroelectric plant on the Chippewa River, at Paint Creek, Wis.

Ephrata & Lebanon Street Railway, Ephrata, Pa.—H. P. Taylor & Company, New York, N. Y., and Pittsburgh, Pa., are offering at 95 and interest $200,000 of first mortgage 5 per cent bonds of the Ephrata & Lebanon Street Railway. The bonds are dated Oct. 1, 1912, and are due Oct. 1, 1942, but are callable after Oct. 1, 1917, at 105 and interest.

Federal Light & Traction Company, New York, N. Y.—At a special meeting of the stockholders of the Federal Light & Traction Company, called for Dec. 12, as noted in the Electric Railway Journal of Dec. 6, 1913, an issue of $10,000,000 of 7 per cent ten-year notes previously authorized by the board of directors was approved. Of this amount $725,000 will be offered to stockholders at par and interest. The stockholders also approved an underwriting agreement between the directors and firms with which the directors are identified to take up such notes as are not subscribed for by the stockholders.

Grand Valley Railway, Brantford, Ont.—The Appellate Division at Osgoode Hall heard on Dec. 11 the appeals of the Grand Valley Railway against the order for the cancellation of its franchise in Brantford, Ont., and against a judgment authorizing the municipality to seize the property of the company to recover $7,500 for taxes said to be in arrears. The hearing will be resumed.

Idaho Railway, Light & Power Company, Boise, Idaho.—The committee of bondholders of the Idaho-Oregon Light & Power Company at Chicago has sent notices to the bondholders of the appointment of W. J. Ferris as receiver and also that the New York committee has abandoned its plan as noted in the Electric Railway Journal of Dec. 13, 1913, page 1259. The Chicago committee says: "The way is clear for you to take over and reorganize your property. We already hold a substantial majority of the bona fide bonds. Our depositaries have been directed to resume acceptance of deposits and those who hold New York certificates may send them to our depositaries. We will make necessary payments to the New York committee for account of bondholders and recover the bonds." The sale of the property has been postponed until March 16, 1914, subject to further postponement if necessary. The Idaho-Oregon Light & Power Company is controlled by the Idaho Railway, Light & Power Company.

International Railway, Buffalo, N. Y.—An order has been issued by the Public Service Commission of the Second District of New York authorizing the International Railway to execute a supplemental mortgage amending the one approved in the latter part of 1912 so as to require it to expend for maintenance or to reserve in a fund for that purpose not less than 16½ per cent of its gross operating revenue. It is also provided in this amendment that no bonds shall be issued in the future except when the earnings available for bond interest are one and one-half times the amount of interest on the bonds then outstanding and those which it is proposed to issue.

Joliet & Southern Traction Company, Joliet, Ill.—Judge Slusser, of the Kane County Circuit Court at Geneva, Ill.,

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has fixed Jan. 28, 1914, as the date for the sale of the property of the Joliet & Southern Traction Company and the Joliet, Plainfield & Aurora Railroad. The court refused previously to pass on the values of certain property of one of the companies as determined by the master in chancery, and the sale set originally for Nov. 17 was postponed.

Los Angeles (Cal.) Railway.—The Los Angeles Railway, which has been incorporated to consolidate the Los Angeles Railway Corporation and the City Railway by amalgamation, has organized temporarily as follows: W. E. Dunn, president; S. M. Haskins, vice-president; C. A. Henderson, secretary and treasurer. The officers and G. C. Ward, Albert Crutcher, Frank Griffith and J. E. Brown are the directors. It is said that when the company organizes permanently H. E. Huntington and Howard Huntington will be elected directors and that H. E. Huntington will be made president, W. E. Dunn vice-president, and Howard Huntington vice-president and general manager. The company has applied to the Railroad Commission of California for authority to issue $20,000,000 of stock to take over $25,000,000 of stock of the Los Angeles Railway Corporation and to issue $23,544,000 of bonds to refund a like amount of bonds of the Los Angeles Railway Corporation.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis.—Harris, Forbes & Company, New York, N. Y.; N. W. Halsey & Company, Boston, Mass.; Harris Trust & Savings Bank, Chicago, Ill.; Spencer Trask & Company, New York, N. Y., and Perry, Coffin & Burr, Boston, Mass., are offering for sale at 90 and interest a block of $807,000 of Milwaukee Electric Railway & Light Company general and refunding mortgage 5 per cent gold bonds of 1911. These bankers have previously placed the remainder of the now outstanding issue of $5,305,000. Bonds to the extent of $13,228,000 are reserved to retire underlying bonds.

National Properties Company, Pittsburgh, Pa.—The National Properties Company has purchased for cash the entire capital stock, mortgages and floating indebtedness of the Chester County Light Company, which was capitalized for $50,000 stock, $25,000 first mortgage bonds and $50,000 second mortgage bonds. In addition the company has outstanding accounts amounting to several thousand dollars.

New Orleans Railway & Light Company, New Orleans, La.—A dividend of one-half of 1 per cent has been declared on the $20,000,000 of common stock of the New Orleans Railway & Light Company. This compares with 1 per cent on June 30, 1913, one-half of 1 per cent on Dec. 31, 1912, and an initial payment of 1 per cent on July 1, 1912.

New York (N. Y.) Railways.—The New York Railways, which took over the old Metropolitan Street Railway, has petitioned the Public Service Commission for the First District of New York for a modification of the order of November, 1912, permitting the company to issue bonds for the purchase of new stepless cars only to the extent of $2,800 per car—the difference between the cost of the old cars and the cost of the new cars at $6,000 apiece to replace the old ones. On Dec. 12 before the commission Robert Reid Rogers, attorney for the company, contended that the New York Railways is a new company, and that it cannot be required to make up the depreciation on the old cars which accrued under the old Metropolitan management, but that it is willing to make up the depreciation from the time the new company took hold, namely, Jan. 1, 1912, to the present time. Mr. Rogers urged that the amount to be deducted from the cost of each new car should be only the scrap value of an old car, $300, or, at the very most, the value which the commission's own engineers placed on the old cars when they were taken over by the New York Railways, $800 a car. He laid stress on the fact that the New York Railways is an entirely separate concern from the old Metropolitan Street Railway. The contention of the commission was that the new company had capitalized on a basis of $3,200 per car when it took hold.

Northern Ohio Traction & Light Company, Akron, Ohio.—The State Public Utilities Commission has been notified by the Northern Ohio Traction & Light Company that it is unable to sell its issue of $360,000 of preferred stock at par and the company has asked the commission to be allowed to dispose of the securities at 95.

Pacific Gas & Electric Company, San Francisco, Cal.—Harris, Forbes & Company and N. W. Halsey & Company, New York, have sold at 99½ and interest $500,000 of additional 6 per cent gold notes of the Pacific Gas & Electric Company, dated 1913 and due June 25, 1914, but callable at 100½ and interest. These bonds are part of an authorized issue of $7,000,000, noted in the ELECTRIC RAILWAY JOURNAL of Sept. 20, 1913. Bonds to the extent of $4,500,000 from this issue have previously been sold.

Public Service Investment Company, Boston, Mass.—Stone & Webster, Boston, Mass., are placing at 97, yielding 6.2 per cent, $500,000 of the authorized issue of $30,000,000 of 6 per cent cumulative preferred stock of the Public Service Investment Company, which owns the securities of eleven Stone & Webster properties. This issue makes an amount of $2,500,000 outstanding. The proceeds of the sale of $500,000 of preferred stock and the proceeds of the sale of a like amount of common stock at par for cash will be invested in dividend-paying securities of companies managed by the Stone & Webster Management Association. It is expected that the income from these securities will be more than twice the dividend requirements on the preferred stock now offered.

Puget Sound Traction, Light & Power Company, Seattle, Wash.—The shareholders of the Puget Sound Traction, Light & Power Company have subscribed for a substantial amount of the new issue of $2,686,200 of 6 per cent cumulative preferred stock, mention of which was made in the ELECTRIC RAILWAY JOURNAL of Nov. 15, 1913. A syndicate headed by Stone & Webster, Boston, Mass., is offering the remainder of the issue at par. The amount of preferred stock now outstanding is $13,676,900.

Quebec Railway, Light & Power Company, Quebec, Que.—The coupons on the bonds of the Quebec Railway, Light & Power Company due Dec. 1 have not been paid, but it is expected that the interest will be met within the ninety days of grace mentioned in the mortgage, as was done with the interest due last June.

Scranton & Wilkes-Barre Traction Corporation, Scranton, Pa.—Brooks & Company, Scranton, Pa., are offering at 99 and interest Lackawanna & Wyoming Valley Rapid Transit Company collateral trust 5 per cent bonds of 1901, due Aug. 1, 1951. These bonds are now equivalent to the closed underlying first mortgage through collateral deposited. The reorganization of the Lackawanna & Wyoming Valley Rapid Transit Company, which was consummated under the title of the Scranton & Wilkes-Barre Traction Corporation, was outlined in the ELECTRIC RAILWAY JOURNAL of June 21, 1913.

Springfield & Xenia Railway, Xenia, Ohio.—The Springfield & Xenia Railway has declared an initial dividend of 2 per cent on its common stock, in addition to the regular payment of 3¼ per cent on its preferred shares. All of the back dividends on the preferred shares are now paid up.

Sunbury & Susquehanna Railway, Sunbury, Pa.—Judge Cummings has appointed Frederick Byrod, Harry Davis and Charles Grant receivers for the Sunbury & Susquehanna Railway, which on May 15, 1912, took over the property of the North Cumberland County Traction Company and the Sunbury & Selinsgrove Electric Railway.

Twin City Rapid Transit Company, Minneapolis, Minn.—William A. Read & Company are offering at par and interest $350,000 of the Minneapolis Street Railway and the St. Paul City Railway joint consolidated mortgage 5 per cent gold bonds, due Oct. 1, 1928, guaranteed principal and interest by indorsement by the Twin City Rapid Transit Company. The total issue authorized and outstanding is $10,000,000.

United Railways & Electric Company, Baltimore, Md.—The United Railways & Electric Company has sold to Baltimore banking interests $348,000 of first consolidated mortgage 4 per cent bonds, the proceeds of which will be used to pay for sixty cars costing $300,000.

Washington Water Power Company, Spokane, Wash.—Walter C. Sivyer, president of the Big Bend Light & Power Company, has announced the sale of the franchises and distributing systems of the company to the Washington Water Power Company.

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Dividends Declared

Asheville Power & Light Company, Asheville, N. C., quarterly, 1¾ per cent, preferred.

Bangor Railway & Electric Company, Bangor, Me., quarterly, 1¾ per cent, preferred.

Boston & Worcester Electric Companies, Boston, Mass., $1, preferred.

Capital Traction Company, Washington, D. C., quarterly, 1½ per cent.

Carolina Power & Light Company, Raleigh, N. C., quarterly, 1¾ per cent, preferred.

Chicago (Ill.), City Railway, quarterly, 2½ per cent, extra one-half of 1 per cent.

Cincinnati (Ohio) Street Railway, quarterly, 1½ per cent.

Cleveland (Ohio) Railway, quarterly, 1½ per cent.

Duluth-Superior Traction Company, Duluth, Minn., quarterly, 1 per cent, preferred; quarterly, 1 per cent, common.

Mohawk Valley Company, New York, N. Y., quarterly, 1½ per cent.

New Orleans Railway & Light Company, New Orleans, La., quarterly, 1¼ per cent; 50 cents common.

Toronto (Ont.) Railway, quarterly, 2 per cent.

United Light & Railways, Grand Rapids, Mich., quarterly, 1½ per cent, first preferred; quarterly, three-quarters of 1 per cent, second preferred; quarterly, 1 per cent, common.

Washington, Baltimore & Annapolis Electric Railroad, Baltimore, Md., quarterly, 1½ per cent, preferred.

Washington Water Power Company, Spokane, Wash., quarterly, 2 per cent.

West India Electric Company, Ltd., Kingston, Jamaica, quarterly, 1¼ per cent.

ELECTRIC RAILWAY MONTHLY EARNINGS

AMERICAN RAILWAYS, PHILADELPHIA, PA.

Period			Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m.,	Nov.,	'13	$436,509	.....	.....	.....	.....
1 "	"	'12	404,223	.....	.....	.....	.....
5 "	"	'12	2,196,393	.....	.....	.....	.....
5 "	"	'13	2,391,243	.....	.....	.....	.....

AURORA, ELGIN & CHICAGO RAILROAD, WHEATON, ILL.

1m.,	Oct.,	'13	$170,290	*$113,834	$56,456	$33,974	$22,482
1 "	"	'12	166,069	*96,615	69,455	32,083	37,372
4 "	"	'13	772,564	*458,336	314,227	135,042	179,186
4 "	"	'12	739,819	*400,938	338,881	128,345	210,535

CLEVELAND, PAINESVILLE & EASTERN RAILROAD, WILLOUGHBY, OHIO

1m.,	Oct.,	'13	$35,498	*$19,042	$16,450	$10,448	$6,002
1 "	"	'12	34,061	*18,535	15,526	9,964	5,562
10 "	"	'13	362,210	*194,233	167,977	104,200	63,777
10 "	"	'12	339,663	*190,681	148,982	99,228	49,754

CLEVELAND, SOUTHWESTERN & COLUMBUS RAILWAY, CLEVELAND, OHIO

1m.,	Oct.,	'13	$111,955	$65,988	$45,967	$32,341	$13,626
1 "	"	'12	107,767	61,539	46,227	31,892	14,335
10 "	"	'13	1,051,382	627,872	423,509	316,785	106,724
10 "	"	'12	986,010	574,348	411,662	309,301	102,361

COMMONWEALTH POWER, RAILWAY & LIGHT COMPANY, SAGINAW, MICH.

1m.,	Oct.,	'13	$249,887	*$66,230	$183,657	$80,000	$103,657
1 "	"	'12	128,362	*19,908	108,454	30,000	78,454
12 "	"	'13	2,070,706	*391,134	1,679,572	660,000	1,019,572
12 "	"	'12	1,266,762	*126,227	1,440,535	360,000	780,535

KENTUCKY TRACTION & TERMINAL COMPANY, LEXINGTON, KY.

1m.,	Oct.,	'13	$65,729	$33,650	$28,681	$16,415	$12,266
1 "	"	'12	63,037	34,348	26,054	16,632	9,422
4 "	"	'13	285,579	144,253	126,184	66,210	59,974
4 "	"	'12	273,447	153,912	109,857	61,448	48,409

LAKE SHORE ELECTRIC RAILWAY, CLEVELAND, OHIO

1m.,	Oct.,	'13	$117,721	*$72,689	$45,031	$35,119	$9,912
1 "	"	'12	110,505	*63,777	46,728	35,083	11,645
10 "	"	'13	1,193,593	*700,986	492,606	351,325	141,281
10 "	"	'12	1,109,025	*630,370	478,656	349,501	129,155

NORTHERN OHIO TRACTION & LIGHT COMPANY, AKRON, OHIO

1m.	Oct.,	'13	$279,361	*$174,321	$105,039	$48,964	$56,075
1 "	"	'12	249,148	*149,092	100,056	43,813	56,244
10 "	"	'13	2,724,059	*1,645,357	1,078,702	462,161	616,541
10 "	"	'12	2,497,015	*1,406,663	1,090,351	438,175	652,176

PHILADELPHIA (PA.) RAPID TRANSIT COMPANY

1m.,	Nov.	'13	$2,018,497	*$1,173,980	$844,517	$792,251	$52,266
1 "	"	'12	2,008,401	*1,196,259	812,142	761,838	50,304
5 "	"	'13	10,098,016	*5,887,174	4,210,841	3,987,498	223,343
5 "	"	'12	9,860,294	*5,865,245	3,995,049	3,798,281	196,768

*Includes taxes.

Traffic and Transportation

Resuming Service After Colorado Storm

Four more lines of the Denver (Col.) City Tramway, blockaded by the snowstorm of the previous week, recommenced operations on Dec. 9, and J. A. Beeler, general manager, announced that 110 miles of track were in operation—approximately one-half of the company's system. The lines which resumed service were the East Nineteenth-West Twenty-third Avenue line, the Larimer Street line from Fifteenth to Fortieth Street, the Eleventh Avenue line from the Central loop to the Capitol Hill terminal, and the West Twenty-ninth Avenue line from the Central loop to Sheridan Boulevard. On Dec. 10 the work of reclaiming the right-of-way was carried further with the opening of Larimer Street from Fifteenth west to the county line, with the opening of the West Lawrence Street tracks and by the opening of a double track to Englewood. Mr. Beeler said that the company would place extra conductors on all its cars on Dec. 10 because passengers found it difficult to climb over some of the larger snow piles in getting aboard. Volunteer workers rendered the company valued assistance in clearing a considerable length of track.

The *Rocky Mountain News*, Denver, commenting editorially on the storm, said: "The value of organization, intelligently and systematically applied, was never more strikingly exemplified than in the recent snowstorm. The excellent and unselfish work of the officials of tramway, telephone and gas and electric companies proved that Denver is fortunate in the possession of its utility companies. The hardest task fell to the tramway with its hundreds of miles of track buried under the clinging snows. The company lost no time in mobilizing an army of workers, and in a comparatively short period service was resumed on the main lines. Denver has had a splendid object lesson in the strength and capacity of business organization, as well as patriotic self-sacrifice, it is not likely to forget in many a day. In the last few days the public utility companies have done work to merit the cordial appreciation of Denver's citizens. That is one point upon which there will be unanimous agreement."

While it was impossible for the Arkansas Valley Railway, Light & Power Company, Pueblo, Col., to operate cars on exact schedule time, the service maintained during the storm was sufficient to prevent any considerable inconvenience to the public. Commenting editorially on the work of the company, the Pueblo *Star-Journal* of Dec. 5, 1913, said in part:

"The fact that the street cars have operated in Pueblo has been of untold advantage to the people, as it enabled them to get to the markets and supply themselves with provisions which could not be delivered. Except for the operation of street cars there might have been suffering in the city. Hundreds of people used the street car tracks for sidewalks and tramped to their work over the frozen crust between the rails. Teamsters also used the car tracks for roadways and in this way were able to drive from the wholesale houses to the retail stores. The successful fight which the company has made against the storm has been a benefit to the entire city in more ways than one."

Coney Island Fare Case to Be Reopened

On the petition of the Van Sicklen Taxpayers' Association, of Coney Island, the Public Service Commission of the First District of New York has decided to reopen Case No. 1375, which was dismissed without prejudice in February, 1912. This proceeding involved the question of fares between Manhattan and Coney Island, and it was discontinued upon the promise of certain Brooklyn Rapid Transit companies to put into effect a commutation plan under which a fare of 5 cents would be available between Sept. 15 and May 15 from Coney Island between 6 a.m. and 9 a.m. and to Coney Island between 4 p.m. and 7 p.m. This plan involved the purchase of a commutation book containing twelve round-trip tickets at $1.20. These books were placed on sale only at stations south of the second fare points.

The petitioners state this plan has been in operation since March, 1912, and that it is objectionable to the travel-

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ing public for several reasons. School children whose parents purchase the commutation books lose the use of the tickets for Saturdays, and as the unused tickets are not redeemable, this entails a loss of one-sixth of the price paid for the books. Persons unable to travel every day lose the value of the tickets for each day they do not make the ride, as do also those whose business compels them to journey between Manhattan and Coney Island outside of the commutation hours. The books can be bought only at stipulated times, thus compelling a family to make a large outlay of money for the number of books required.

The petitioners, therefore, ask that the proceeding be reopened and the plan modified, so that the companies will be required to issue a daily round-trip ticket for 10 cents, good for the day stamped, at any time of the year and during all hours of the day, such tickets to be sold only at stations south of the second fare point.

The proceedings will be started on Dec. 29 before Commissioner George V. S. Williams.

Faithful Service of New York Employees Rewarded

The management of the Interborough Rapid Transit Company and the New York (N. Y.) Railways expressed in formal notices dated Dec. 17, 1913, its appreciation of the faithful service of its employees during the year and announced the proposed distribution of five-dollar gold pieces among them. The notices issued by both companies are signed by Theodore P. Shonts, president, and Frank Hedley, vice-president and general manager. The notice of the Interborough Rapid Transit Company follows:

"During the past year unprecedented numbers of passengers have been safely transported on the lines of this company on the subway and elevated divisions. The management wishes to express to its employees its recognition of the services rendered by them and its desire to maintain at all times the highest degree of comfort and convenience to the patrons of this company, realizing that these results have been attained by efficient and intelligent co-operation rendered under exceptional and severe traffic conditions.

"This appreciation of the employees' efforts is heartily concurred in by the directors of this company, and as a further expression of their thanks they have appropriated a sum, and authorized the payment from same, of $5 in gold to each employee in the service receiving $115 per month or less who entered this company's employ prior to Jan. 1, 1913."

The notice of the New York Railways, worded somewhat differently, follows:

"The management desires to express to the employees of this company its high appreciation of their faithful and efficient service during the past year, which has resulted in the safe transportation of large numbers of people with comfort and convenience. It is realized that this has been achieved only by untiring, intelligent and co-operative effort with a view at all times to rendering the traveling public the best possible facilities and accommodation.

"The directors of this company are heartily in accord with the management's expression of its thanks to the employees, and as a further expression of their appreciation they have authorized an appropriation, from which sum $5 in gold will be paid to each employee in the service receiving $115 per month or less who entered the company's employ prior to Jan. 1, 1913."

It is estimated that 14,000 employees of the companies will receive five-dollar gold pieces as Christmas presents.

Ordinance Against Smoking Introduced in Minneapolis.—An ordinance is before the City Council of Minneapolis to prohibit smoking on the cars of electric railways operated in that city.

Increase in Wages in West Chester.—The West Chester (Pa.) Street Railway has increased the wages of its employees 10 per cent. This is the third increase in less than a year and a half which the company has made in the pay of its men.

"Far-Side" Stop in Rock Island.—The Tri-City Railway has announced that the practice of stopping cars on the "far side" of the street will be resumed in Rock Island, Ill. Labor men in Davenport, Ia., have asked the company to restore the "far-side" stop in that city.

Cars for the Opera.—In addition to the regular service the Boston (Mass.) Elevated Railway will run special cars marked "Boston Opera House" to the opera house each Monday, Wednesday, Friday and Saturday night on which performances are given during the winter season.

New Offices in Lexington.—The Kentucky Traction & Terminal Company, Lexington, Ky., has removed its offices from the City National Bank Building to the Hughes Building, which is more centrally located. The new building will also be used as a transfer station for city and interurban lines.

Mirrors on Cars of New Albany Lines.—After having tested mirrors as an aid to motormen in determining whether passengers are alighting or entering at the back platform, the Louisville & Northern Railway & Lighting Company and the Louisville & Southern Indiana Traction Company, New Albany, Ind., have installed mirrors on all of their cars running between Louisville, New Albany and Jeffersonville.

Tickets Sold at Factory to Employees.—By an arrangement which has been made by the Detroit (Mich.) United Railway with the Ford Motor Company, employees of that company are enabled to buy street car tickets before boarding the cars. The tickets are sold at the Ford plant from an office which has been established there. The purpose is to facilitate the handling of the employees on the cars and also add to their comfort and convenience in that they will have no bother about getting tickets and making change on the cars.

Motormen and Conductors Want Stools in Cars.—Because the City Council of Cleveland has refused to consider their request for seats or stools, the conductors and motormen of the Cleveland Railway are threatening to bring the matter before the next Legislature and have a law enacted requiring all companies to furnish such conveniences for the men. The Cleveland Railway has accepted the amended ordinance granting it permission to operate freight cars over its tracks. The words "in bulk" were eliminated from the original ordinance.

South Boston Service Order.—The Massachusetts Public Service Commission has issued an order requiring the Boston Elevated Railway to re-establish a belt-line service between Dorchester Street transfer station in South Boston and Field's Corner, Dorchester, operating upon the routes two lines of cars upon a fifteen-minute headway during hours of normal travel, with additional cars in the rush hours. The company is also ordered to maintain as a separate line the service now existing between the Dorchester Street transfer station and the East Boston ferry.

Annual Entertainment for Washington Employees.—The thirteenth annual entertainment and presentation of gifts to all the children of employees of the Washington Railway & Electric Company, Washington, D. C., will be held on Dec. 30 at the New National Theater. Fully 2500 children will be entertained by a varied program, and gifts at a cost of $1,500 presented. The entire cost will be borne by the company. A new feature this year will be a prize baby show, suggested and handled by President Clarence P. King personally. For this feature there were sixty-eight entries on Dec. 17, and it is expected that before closing the number will have increased to a total of eighty.

Revision of Express Rates in New York.—George V. S. Williams of the Public Service Commission of the First District of New York has announced that in all probability a zone system of calculating express rates much like that now used for the parcel post will be adopted in New York State and that it may be drawn up in time to be put in operation by Feb. 1, the date set by the Interstate Commerce Commission for the enforcement of the new interstate rates. The Interstate Commerce Commission has rendered a decision reducing the rates in interstate express service on packages weighing less than 50 lb. so as to make them slightly lower than the postal charges, and the companies represented that unless they were permitted to raise the rates on packages above 50 lb. in weight they could not carry on their business.

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Personal Mention

Mr. Frank B. Lasher has been elected treasurer of the Republic Railway & Light Company, New York, N. Y.

Hon. Adam Beck, chairman of the Hydro-Electric Power Commission of Ontario, has been appointed chairman of the newly formed railway commission which will electrify and operate the London & Port Stanley Railway, owned by the city of London, Ont.

Mr. Warren H. Snow, formerly treasurer of the American Public Utilities Company, Grand Rapids, Mich., has been admitted to partnership in the firm of Howe, Corrigan & Company, Grand Rapids, Mich., which will hereafter be known as Howe, Snow, Corrigan & Berteles.

Mr. J. H. Libbey, of the electrical engineering department of the Stone & Webster Engineering Corporation, Boston, Mass., has joined the staff of the Bay State Street Railway, Boston, Mass. Mr. Libbey will be assistant to Mr. George W. Palmer, Jr., the electrical engineer of the company.

Mr. Samuel Riddle, superintendent of transportation for the Louisville (Ky.) Railway, was the subject of a complimentary sketch in a recent issue of *Sparks,* published by the Louisville Rotary Club. The club is composed of one representative of each line of business in Louisville, Ky. Mr. Riddle represents the traction interests in the club.

Mr. Leighton Calkins has resigned as secretary, general counsel and director of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, effective on Jan. 1, 1914, and Mr. William M. Coleman has been elected as his successor. Mr. Calkins retains his connection with the company under special retainer. The Mahoning & Shenango Railway & Light Company is the principal subsidiary of the Republic Railway & Light Company, New York, N. Y.

Mr. J. B. Foraker, Jr., who has been vice-president of the Cincinnati (Ohio) Traction Company since 1901, has resigned and moved his residence to Montana, where he is largely interested in mining enterprises. Mr. Walter A. Draper, the secretary of the company, has been elected to succeed Mr. Foraker. Mr. Dana Stevens is vice-president of the company as well, and will continue as such, Mr. Draper merely succeeding Mr. Foraker, and also retaining his position as secretary.

Mr. E. B. Neiswanger, superintendent of construction of the Texas Power & Light Company, Dallas, Tex., has been appointed construction engineer of the company in charge of all construction to succeed Mr. G. E. Moffat, chief engineer, who has accepted a similar position with the Phoenix Construction Company. For ten years prior to entering the service of the Texas Power & Light Company in January, 1913, as superintendent of construction, Mr. Neiswanger was engaged in plant installation and efficiency work with mining and milling interests in Colorado and with beet-sugar and irrigation projects in Kansas.

Mr. Walter A. Draper, secretary of the Cincinnati (Ohio) Traction Company and vice-president of the Ohio Electric Railway, has in addition been elected vice-president of the Cincinnati Traction Company to succeed Mr. J. B. Foraker, Jr. Mr. Draper began his career as a reporter, covering the financial and business districts in Cincinnati. He left newspaper work to become secretary of the Zoological Gardens, in which capacity he came in close contact with Mr. W. Kesley Schoepf and other officials of the Cincinnati Traction Company. Some half dozen years ago Mr. Draper was elected secretary of that corporation. He has been honored by election as president of the Cincinnati Chamber of Commerce. It is understood that Mr. Draper will also be elected to succeed Mr. Foraker as vice-president of both the Ohio Traction Company and the Cincinnati Car Company.

Mr. W. L. Davis has recently been elected assistant secretary and assistant treasurer of Texas Power & Light Company, Dallas, Tex., and affiliated companies, including the Paris Transit Company, to succeed Mr. E. E. Reber, resigned. Mr. Davis entered railway service in 1906 with the Indiana, Columbus & Eastern Traction Company, later merged into the Ohio Electric Railway. After holding various positions in the accounting department of this company, he was appointed statistician in 1909. In August, 1912, he accepted the position of traveling auditor of the Texas Power & Light Company, of which, with its affiliated companies, he now becomes assistant secretary and assistant treasurer.

Mr. Philip Dawson, consulting engineer of the London, Brighton & South Coast Railway, London, Eng., who had been in this country for about two months, sailed for England on Dec. 11. While here Mr. Dawson visited all of the prominent examples of steam railroad electrification in the country, including those on the Pacific Coast. Before leaving he said that he had been much impressed with the extent of the electrified systems here, their great interest from an engineering standpoint and the kindly hospitality with which he was everywhere received. The officials of the roads visited were most sympathetic and courteous and of great assistance through the manner in which they allowed him to examine their records and thus obtain a correct idea of their technical and operating results.

Mr. V. W. Berry, formerly superintendent of the Galveston-Houston Electric Railway, has been appointed general superintendent of the Northern Texas Traction Company and the Fort Worth Southern Traction Company, Fort Worth, Tex. On his departure from Houston Mr. Berry was presented with a handsome diamond stud by the shop employees of the Galveston-Houston Electric Railway, the Galveston Electric Company and the Houston Electric Company. His co-workers in the general offices at Houston gave him a mahogany "chifforobe." Mr. Berry has had eighteen years' experience in handling city and interurban railways. Before he was appointed superintendent of the Galveston-Houston Electric Railway in 1911 Mr. Berry was master mechanic of the Houston (Tex.) Electric Company. He was also district master mechanic for all the Stone & Webster properties in Texas.

Mr. C. M. Paxton has resigned from the American Railways, Philadelphia, Pa., effective on Jan. 1, with the intention of retiring from electric railway work. Mr. Paxton began his career in 1895 as a call boy. He served in various capacities on steam railways until January, 1904, when he became auditor of the Dayton & Troy Electric Railway, Dayton, Ohio. After a year as auditor he was made secretary of the company and traffic manager. Two years later he was made general manager, retaining that position for five years. He resigned from the Dayton & Troy Electric Railway to become connected with the American Railways as assistant to Mr. H. J. Crowley, general manager. Mr. Paxton was an early exponent of limited service on electric railways, of the adoption of standard steam road rules and practices and of electric railways doing freight business at steam freight rates. He was a charter member of the Ohio Electric Railway Association, which was succeeded by the Central Electric Railway Association.

C. M. Paxton

Mr. Robert M. Searle, whose election as vice-president of the New York State Railways in charge of public relations was noted in the Electric Railway Journal of Dec. 13, 1913, was born on March 3, 1869, at Peekskill, N. Y. He received a common-school education in the public schools of the city of New York and in 1884 began in the lighting business as office boy with Mr. Thomas A. Edison. Mr. Searle acquired his engineering knowledge by night study, and he has had twenty-six years of experience in the lighting business in all of its varied branches—from office boy to vice-president. He was in 1907 the recipient of the honor medal awarded by the English Institute of Gas Engineers. Mr. Searle is vice-president and a director of the Rochester Railway & Light Company, a director of the New York State Railways, and early in 1913 was elected to the presidency of the Rochester Chamber of Commerce.

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Mr. John B. Gorman, superintendent of divisions 1 and 2 of the Worcester (Mass.) Consolidated Street Railway, was the subject of an illustrated biographical sketch which appeared in the Worcester *Telegram* recently. Mr. Gorman is rounding out twenty-five years of service in street railway work, and the *Telegram* took occasion to point out the qualifications which have made for his advancement and endeared Mr. Gorman to the public and the men who are under him. Mr. Gorman began his street railway career in Attleboro, Mass. In 1890 he became connected with the Leicester & Spencer Street Railway as assistant superintendent. After being instrumental in building up the road, a position as superintendent of the Worcester & Millbury Railway was offered to him. Two years later he took charge of the Leicester & Spencer and the Worcester & Millbury roads. In 1895 the Blackstone Valley line came under his supervision, it having been added to the Millbury line. When the Worcester Consolidated Street Railway took over the lines mentioned in 1900 Mr. Gorman became superintendent of transportation for the Worcester Consolidated Company. Mr. Gorman now has jurisdiction over all of the lines in Worcester proper, and the Bramanville & Jefferson, the Grafton, Westboro & Marlboro, the Worcester & Marlboro and the Spencer lines. In addition to this, he has charge of the Fitchburg & Leominster, the Southbridge & Springfield, the Boston & Worcester and the Blackstone Valley lines within the city limits. He also has charge of the operation of the trolley freight cars.

OBITUARY

Daniel M. Barton, general purchasing agent of the General Electric Company, died at his home in Schenectady on Dec. 5. Mr. Barton was born in Moriah, N. Y., in 1843. He became a dry goods merchant in Meriden, Conn., following which he removed to Lynn, Mass. In 1886 Mr. Barton entered the employ of the Thomson-Houston Electric Company and became its first production manager.. In 1893 he became assistant purchasing agent of the General Electric Company, which had been formed the previous year. With the removal of the department to Schenectady in 1894 Mr. Barton was appointed purchasing agent, this title being changed to general purchasing agent some years later.

E. Lowndes Rhett, who since December, 1912, had been second vice-president and a director of the Federal Utilities, Inc., New York, N. Y., is dead. Mr. Rhett entered the banking house of Brown Brothers & Company in April, 1891, as a clerk and remained with that firm for more than ten years, latterly as manager of the stock and bond department. He then engaged in the bond business with his brother, after which he entered the Stock Exchange firm of Dominick & Williams, where he remained for about three years. Mr. Rhett then became manager of the New York office of E. H. Rollins & Sons, and later was elected vice-president and a director of the Smith-Tevis-Hanford Company.

Mr. Frederick W. Cook, president of the Evansville Suburban & Newburgh Railway, Evansville, Ind., died after a few days' illness on Dec. 11, 1913. Mr. Cook was one of the original stockholders of the company, having become interested in February, 1888. He was elected a director on April 16, 1889, and on Sept. 9 of the same year was elected president, which position he held continuously until his death. Mr. Cook was born in Washington, D. C., on Feb. 1, 1832, and moved to Evansville with his family at the age of four years. He was identified with several large industries and was considered to be Evansville's foremost citizen. He was president of the F. W. Cook Brewing Company and the Cook Realty Company and a director in the Citizens' National Bank. He was also a large stockholder in a number of steam railroads and was the principal owner of the Evansville Suburban & Newburgh Railway.

In the Common Pleas Court Judge Rathmell, on Dec. 9, sustained the contention of the stockholders of the Columbus Light, Heat & Power Company who oppose consolidation with the other public utility companies in one of five points set forth in their amended petition. This point questions the authority of the Public Utilities Commission to grant authority for the consolidation of all the public utilities companies under the name of the Columbus Railway, Power & Light Company.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Barclay & Riverton Railroad, Barclay, Ill.**—Incorporated in Illinois to build an electric railway from the Barclay Coal Company's mine east of Barclay to a connection with the Illinois Traction System east of Riverton. Capital stock, $10,000.

***Tazewell County Traction Company, Pekin, Ill.**—Incorporated in Illinois to build an electric railway from East Peoria south through Pekin to the south boundary line of the county and from the Illinois River east to the county line. Capital stock, $2,500. Incorporators: John E. Melick, Springfield; A. C. Sprague, Normal; W. Elliot, Chicago; C. C. Melick and J. Y. Melick, Hampton, N. Y.

***Interurban Railroad, New Orleans, La.**—Application for a charter has been made by this company to build a 20-mile electric line between New Orleans and Kenner. Capital stock, $1,000,000. Directors: H. Generes Dufour, T. Garland Tinsley, Charles Janvier, Crawford H. Ellis, Stonewall Jackson and W. C. Dufour.

***Morgantown & Fairmont Railway, Morgantown, W. Va.**—Chartered in West Virginia to build an electric railway from Morgantown to Fairmont. Capital stock, $25,000. Incorporators: William E. Glasscock, S. Fuller Glasscock, William H. Brank, Simon L. Wildman, John L. Hatfield, Edward G. Douley, R. E. Arnett and Henry E. Brookover.

***Gauley & Greenbrier Railroad, Sutton, W. Va.**—Chartered in West Virginia to build an electric or steam railway from a point near the mouth of the Cherry River to Ronceverte, 40 miles. Capital stock, $50,000. Incorporators: W E. Haymond, Frederick L. Fox, Lee Raider, E. L. Bland and C. C. Hines, all of Sutton.

FRANCHISES

Birmingham, Ala.—The Birmingham Railway, Light & Power Company has asked the Council for a franchise on Avenue F, in Birmingham.

Dixon, Cal.—The Sacramento Valley West Side Electric Railway has asked the Council for a franchise in Dixon. This 160-mile railway will extend through the west side of the Sacramento Valley. C. L. Donohoe, Willows, president. [E. R. J., Nov. 29, '13.]

Dixon, Cal.—The Northern Electric Railway, Chico, has asked the Council for a franchise in Dixon.

Marion, Ill.—The St. Louis & Southern Illinois Railway has received a franchise from the Council in Marion.

Crawfordsville, Ind.—The Terre Haute, Indianapolis & Eastern Traction Company has received a new franchise from the Council in Crawfordsville.

Boston, Mass.—The Boston & Eastern Railroad has asked the Council for an extension of time required for filing its penal bonds for the construction of its tunnel and opening of its line between Post Office Square and Beverly, with branch lines to Peabody, East Boston, Chelsea, Revere, Saugus, Lynn, Salem, Beverly and Peabody. [E. R. J., Feb. 15, '13.]

Holyoke, Mass.—The Holyoke Street Railway has received a franchise from the Council for track entrances to its proposed new carhouses from Bridge Street in Holyoke.

Lynn, Mass.—The Bay State Street Railway has asked the Council for a franchise for an extension from Lynn to Lynnfield.

East St. Louis, Mo.—Louis C. Haynes, representing the East St. Louis Railway, has asked the Council for a franchise on Main Street and on Broadway in East St. Louis.

Kingston, Mo.—H. L. Gilbert and David Miller, Kansas City, have received a franchise in Kingston. They have also received a franchise in Hamilton. This is part of a plan to build a 9-mile electric railway between Hamilton and Kingston. [E. R. J., Nov. 29, '13.]

New York, N. Y.—The New York, Westchester & Boston Railway has received permission from the Public Service

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Commission, Second District, to abandon the proposed Throg's Neck route, which was proposed to extend from a point of connection with the company's main line near East 180th Street, New York, to Throg's Neck.

Rome, N. Y.—The New York State Railways, Rochester, has received the approval of the Public Service Commission to extend and double-track some of its lines in Albany.

***Elizabeth City, N. C.**—J. K. Wilson, C. W. Stevens and N. S. Leary, Elizabeth City, have asked the Council for a franchise for an electric railway through Elizabeth City.

East Cleveland, Ohio.—The Cleveland Railway has asked the Council for a franchise from Superior Avenue and Euclid Avenue to the northwesterly limits of East Cleveland.

Fremont, Ohio.—The Lake Shore Electric Railway has received from the Council an extension of eleven years to its franchise in Fremont in return for an agreement to lay double tracks and operate at a reduced fare, together with the payment of $6,500 back paving assessments. It is said that a referendum vote may be demanded.

Toledo, Ohio.—The Toledo Traction, Light & Power Company has received a franchise from the Council on Buckeye Street, between Michigan Street and Ontario Street, in Toledo.

Barrie, Ont.—At a special meeting of the Town Council a provisional agreement with the Toronto, Barrie & Orillia Electric Railway was adopted, and a by-law prepared for submission to the qualified ratepayers on Jan. 5. The company gets a twenty-five-year franchise and a fixed assessment of $15,000 for general taxation.

Hillsboro, Ore.—The Portland, Eugene & Eastern Railway has received a two months' extension of time on its franchise from the Council in Hillsboro in which to complete its line in Hillsboro.

Centralia, Wash.—The Lewis County Commissioners recently granted two franchises to the Washington-Oregon Corporation to operate electric lines along county roads. One of the lines will leave the present line of the company one mile south of Centralia and extend west, connecting with a line down Washington Avenue, for which a franchise is being sought from the city. The other line will leave the present line at the same point and run north on Grand Avenue, connecting with a proposed line up Gold Street, for which a franchise is being sought by the company in Centralia.

Wenatchee, Wash.—Hyman Harris, Wenatchee, has received a fifty-year franchise from the Chelan County Commissioners to build a 35-mile electric railway from Malaga to Leavenworth on the condition that the line be completed and in operation within five years' time. Mr. Harris has asked the City Council for a franchise in Wenatchee. [E. R. J., Nov. 1, '13.]

TRACK AND ROADWAY

Gadsden, Bellevue & Lookout Mountain Railway, Gadsden, Ala.—An extension from Sixth Street to Randall Street in Gadsden will soon be built by this company.

***Ferndale, Cal.**—Plans are being considered to build an electric line from Ferndale to Fernbridge to connect with the Northwestern Pacific Railroad at Fernbridge. W. B. Alford and G. M. Brice, Ferndale, are interested.

Fresno (Cal.) Traction Company.—Plans are being made by this company to double-track its line on Tulare Avenue from Angus Street to First Street in Fresno. The company intends to extend its present Arlington Heights line through Arlington Heights, and possibly even farther in the near future.

Pacific Electric Railway, Los Angeles, Cal.—Tracklaying on the San Bernardino-Los Angeles trunk line of this company has reached Etiwanda. The company has placed in operation its Riverside-San Bernardino branch.

San Rafael & San Anselmo Valley Railway, San Rafael, Cal.—This company has received a certificate of public convenience and necessity to construct and operate an electric railway between San Rafael and San Anselmo, under certain franchises transferred to applicant by S. J. Norton. The company has been authorized to issue its capital stock of the par value of $55,000 and its bonds of the face value of $45,000, both stock and bonds to be sold at par, proceeds to be used for construction purposes, only after a stated amount has been subscribed and paid in. The commission has made a supplemental order permitting applicant to begin the construction work. E. S. Rake, San Rafael, president. [E. R. J., Nov. 29, '13.]

Honolulu Rapid Transit & Land Company, Honolulu, Hawaii.—During 1914 this company will award contracts to build 6 miles of new track in Honolulu.

Hagerman Valley & Twin Falls Traction Company, Boise, Idaho.—This company has awarded the contract to the C. R. B. Welty Company, Oklahoma City, to build the first section of its line between Tuttle and Hagerman. H. A. Stout, president. [E. R. J., Dec. 13, '13.]

Idaho Falls (Idaho) Electric Railway.—This company has petitioned the Public Utilities Commission for a certificate of public convenience and necessity for the company to build 34 miles of interurban lines out of Idaho Falls in two distinct directions in the vicinity of Idaho Falls. James L. Milner, Idaho Falls, president. [E. R. J., Dec. 6, '13.]

New Orleans-Kenner Electric Railway, New Orleans, La.—This company has submitted two proposed routes to Mayor Behrman for consideration at a meeting when the Commission Council and the police jury of Jefferson parish will finally consider the interurban electric line in Jefferson parish and in New Orleans with the view of completing the franchise ordinance to be adopted at an early session of the Council.

Iron River, Stambaugh & Crystal Falls Street Railway, Iron River, Mich.—Construction on this 30-mile line to connect Iron River, Stambaugh, Crystal Falls, Spring Valley, Amasa and intermediate mining locations was begun in September and two sections of the railway have already been completed—one on Carnegie Avenue, Iron River, and the other between the towns of Stambaugh and Iron River. The company expects to have its Stambaugh-Spring Valley line completed and in operation in June, 1914, this being one of the four lines contemplated, all to radiate from Iron River, to connect with various mining locations. Surveys have been completed between Iron River, Stambaugh and Crystal Falls, including local lines, for a distance of 20 miles. The type of overhead construction will be ordinary trolley suspension, part steel and part cedar poles—part bracket and part cross span suspension. All material for track and overhead construction and equipment needed for 12 to 15 miles of track will soon be purchased. Hydroelectric power will be purchased for the present, and will be furnished by the Peninsula Power Company, Iron Mountain. F. D. Sullivan, 1023 Seventh Avenue, West, Ashland, president. C. A. Hutchinson, Ashland, chief engineer. [E. R. J., Oct. 11, '13.]

Nebraska Transportation Company, Omaha, Neb.—This company, formed to build an interurban line from Sioux City to Niobrara and other points in northeastern Nebraska, revived the project at a recent meeting at Lincoln, Neb. The company recently applied for an issue of $13,000,000 in stocks and bonds. It now wants $200,000 for immediate work. [E. R. J., June 28, '13.]

Brooklyn, N. Y.—The Public Service Commission has procured enough consents of property owners to legalize the Flatbush Avenue-St. Felix Street-Fulton Street route in Brooklyn. This is the route which connects the Fourth Avenue subway through St. Felix Street and Flatbush Avenue with the Brighton Beach line of the Brooklyn Rapid Transit system at Malbone Street.

International Railway, Buffalo, N. Y.—The Buffalo, Lockport and Olcott division of this company's line has placed in operation the double track on the section of the line between Lockport and Hinman, 3 miles, and from Pendleton to Dempsey's Crossing, another 3-mile section.

Hornell (N. Y.) Traction Company.—This company has completed the extension of its north Hornell line, and will place it in operation by the early part of January, 1914.

Independence, Caney & Oklahoma Railway, Bartlesville, Okla.—Plans are being considered by this company to build an electric railway between Caney, Havana, Wayside and Independence, Kan., and Bartlesville, Okla. Land owners along the proposed route have donated one-fourth of the

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right-of-way between Caney and Independence. [E. R. J., Dec. 13, '13.]

Hamilton (Ont.) & Mountain Park Railway.—An order was issued on Dec. 10 by D. M. McIntyre, chairman of the Ontario Railway and Municipal Board, under the terms of which this company is ordered to prepare and submit for the approval of the board engineers plans and specifications for the reconstruction of the inclined railway at Wentworth Street, in Hamilton. [E. R. J., Feb. 15, '13.]

***Sarnia, Ont.**—A new railway through Petrolia to Corunna with radials to Courtright, Bridgen, Arkona and Sarnia is now being projected by London and Petrolia capitalists, in conjunction with the Merchants' Mutual line and other lake package transportation companies. Rights-of-way have been secured in Moore Township. Hydro-electric power will be used, and it is expected that the amount of freight handled will more than compensate the provincial government for operation and equipment.

Southern Oregon Traction Company, Medford, Ore.—This company has completed 1 mile of track in Medford and plans to build 3 miles of new track within the next six months. It will purchase power from the California-Oregon Power Company, Medford. This railway will ultimately connect Medford, Siskiyou Heights, Phoenix, Talent, Ashland and Central Point. S. M. Bullis, Medford, president. [E. R. J., June 14, '13.]

Oregon Short Line Railway, Portland, Ore.—Plans and right-of-way for the new 80-mile belt line which this company plans to build between Idaho Falls and St. Anthony have been completed. Work will be begun as soon as the weather permits.

Ephrata & Lebanon Street Railway, Lebanon, Pa.—Grading has nearly been completed and construction will be begun in the spring on this company's line between Hopeland and Kleinfeltersville.

Dakota Eastern Railroad, Pierre, S. D.—Surveys are under way and construction will be begun in the spring by this company on its 47-mile line from Wallace to a point on Clear Lake. H. F. Hart, Webster, S. D., general manager.

Maryville-Knoxville Interurban Railway, Knoxville, Tenn.—Preliminary arrangements have been completed and construction will be begun in the spring by this company on its 14-mile line from Maryville to Knoxville, via Rockford, Little River and Vestal. Knox Burger, Maryville, secretary. [E. R. J., Aug. 2, '13.]

Cumberland Valley Interurban Railway, Nashville, Tenn.—Surveys have been completed by this company on its line through Alexandria, and they are now under way between Alexandria and Liberty. This company will build an 80-mile line to connect Nashville and Sparta, via Greenvale, Auburn, Liberty and Alexandria. J. H. Cartwright, 410 Union Bank Building, Nashville, president. [E. R. J., Sept. 27, '13.]

Nashville (Tenn.) Traction Company.—Bids are being asked by this company for the construction of its projected lines in Nashville. Walter O. Parmer, Nashville, president. [E. R. J., Nov. 15, '13.]

Shelbyville, Petersburg & Decatur Railroad, Shelbyville, Tenn.—Surveys are being made to build this 75-mile electric line between Shelbyville, Tenn., and Decatur and Athens, Ala. Among those interested in the project are J. F. Boyd, H. H. Nelson, W. G. Evans and T. G. Cunningham, all of Shelbyville.

Jefferson County Traction Company, Beaumont, Tex.—This company plans to place its line between Beaumont and Port Arthur in operation during this month. [E. R. J., Sept. 13, '13.]

Dallas (Tex.) Consolidated Electric Railway.—This company plans to double-track several of its lines in Dallas.

El Paso (Tex.) Electric Railway.—Work has been begun by this company on its new line from Arizona Street north to Hague Street and east on Hague Street to Kansas Street in El Paso.

***Fort Worth, Tex.**—Business men of Fort Worth and Denton have pledged $500,000 for the construction of a 32-mile electric railway between the two cities. Application for a charter will soon be made. William Capps is one of the promoters.

Fort Worth & Denton Interurban Railway, Fort Worth, Tex.—This company is reported to have been organized and will soon apply for a charter to build a 35-mile electric railway to connect Fort Worth and Denton. Capital stock, $500,000. Directors, E. E. Baldridge, S. Davidson, W. C. Stripling, B. J. Tillar, N. Harding, George T. Reynolds, W. E. Connell, Marion Sansom, John P. King and Benjamin O. Smith, all of Fort Worth; J. H. Paine, B. H. Davenport and J. R. Christal, all of Denton, Tex.

Morgantown & Fairmont Railway, Morgantown, W. Va.—This company, the incorporation of which is reported elsewhere in this issue, has completed surveys and located the route for its proposed line between Morgantown and Fairmont. This is supposed to be part of a plan to build a 31-mile line between Weston, W. Va., and Pittsburgh, Pa. William E. Glasscock is interested.

Beloit, Delavan & Clinton Railway, Beloit, Wis.—Right-of-way is being secured by this company for its 22-mile line between Beloit and Delavan. Charles F. Lathers, Beloit, is interested. [E. R. J., May 31, '13.]

Manitowoc & Northern Traction Company, Manitowoc, Wis.—Plans are being contemplated by this company to build an extension from Two Rivers to Mishicot, and also a connecting line from Sturgeon Bay to Mishicot.

Wisconsin Electric Railway, Oshkosh, Wis.—This company has secured options on a right-of-way along Lake Winnebago for an extension from Oshkosh to Neenah and Menasha. Work will be begun in the spring on this branch.

SHOPS AND BUILDINGS

Pacific Electric Railway, Los Angeles, Cal.—This company's carhouse No. 2 was damaged by fire on Dec. 10 to the extent of about $25,000.

Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind.—This company has purchased the old Y. M. C. A. Building at Crawfordsville at a cost of $18,000, and will proceed to remodel the structure for use as a terminal station.

Kentucky Traction & Terminal Company, Lexington, Ky.—This company has moved its offices from the First & City National Bank Building to the building recently occupied by Hughes & Company on West Main Street, in Lexington. The Hughes Building has been entirely remodeled to accommodate the needs of the traction company. The first floor will be used as a waiting room, the second floor for a rest room for the employees, and the third floor for the general offices of the company.

Bay State Street Railway, Boston, Mass.—This company has completed its new carhouse on Middlesex Street, in Lowell. The structure is one story in height, 145 ft. x 280 ft., and contains ten tracks and can accommodate about eighty cars.

Ottawa (Ont.) Electric Railway.—Plans are being made by this company for a new boiler and engine house on Middle Street, in Ottawa.

Niagara, St. Catharines & Toronto Railway, St. Catharines, Ont.—Plans are being prepared by this company to build a new passenger and freight station at Niagara-on-the-Lake.

Lehigh Valley Transit Company, Allentown, Pa.—Plans are being considered by this company to build new repair shops in Manchester in the near future.

POWER HOUSES AND SUBSTATIONS

Huntsville Railway, Light & Power Company, Huntsville, Ala.—This company has installed additional equipment at its power plant in Huntsville.

Geary Street Municipal Railway, San Francisco, Cal.—Sheppard & Warrack Company, Seattle, has been awarded the contract for the construction of a new substation at Dexter Avenue and Aloha Street, in Seattle.

Toledo Railways & Light Company, Toledo, Ohio.—The addition to the central generating station of this company of 16,500-hp capacity was placed in operation on Dec. 13.

Eastern Pennsylvania Railways, Pottsville, Pa.—Plans have been completed by this company to begin work in the spring on the construction of a new power house at Palo Alto.

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Manufactures and Supplies

ROLLING STOCK

Honolulu Rapid Transit & Land Company, Honolulu, Hawaii, expects to purchase fifteen passenger cars.

Salt Lake & Utah Railroad, Salt Lake City, Utah, has ordered three motor cars from the Hall Scott Motor Car Company.

Ohio Electric Railway, Cincinnati, Ohio, has ordered five steel passenger side-entrance cars from the Cincinnati Car Company.

Port Arthur & Fort William Electric Railway, Port Arthur, Ont., expects to purchase at once three or four single-truck cars, fully equipped, Westinghouse equipment and Brill trucks preferred, cross seats, air-brake equipment, storm sash, Peter Smith heaters or electric heaters, and to be painted to suit the purchaser.

Jamestown, Westfield & Northwestern Railway, Jamestown, N. Y., formerly known as the Jamestown, Chautauqua & Lake Erie Railway, a steam road, which will be equipped in the early spring electrically, expects to purchase electric passenger cars, combination passenger and freight, combination passenger and express cars and electric locomotives.

British Columbia Electric Railway, Vancouver, B. C., has purchased three snow sweepers from the Ottawa Car Company for use in Vancouver, Victoria and New Westminster, B. C. The new sweepers, which are equipped with General Electric motors of 50 hp, are specially arranged for left-hand operation, the three cities named being the only ones in Canada where this custom prevails.

Windsor, Essex & Lake Shore Rapid Railway, Kingville, Ont., has ordered two interurban cars from the Tillsonburg Electric Car Company, Ltd. The following details are specified:

Seating capacity 62	Roof .....monitor deck style
Length over body.....44 ft.	Bottom frame.....composite
Length over bumpers...55 ft.	Interior finish.....oak
Width over all....9 ft. 1½ in.	Heaters .....Smith
Interior trim.polished bronze	Couplers .....radial

TRADE NOTES

Wendell & MacDuffie Company, New York, N. Y., agent for the Consolidated Car Fender Company, has received an order to equip the entire 100 cars of the Jacksonville (Fla.) Traction Company with H-B lifeguards.

J. G. White returned from abroad on Dec. 10 after six months' absence in England and the Continent. Much of his time was spent in London at the home office of J. G. White & Company, Ltd., of which he is president.

William J. Norton and **Paul P. Bird** have severed their connection with the Commonwealth Edison Company, Chicago, and will engage in private practice as consulting engineers, with special reference to public service properties, under the firm name of Norton & Bird.

Hale & Kilburn Company, Philadelphia, Pa., has elected S. M. Vauclain, vice-president of the Baldwin Locomotive Works; S. M. Curwen, president of The J. G. Brill Company, and Thomas Newhall, of Edward B. Smith & Company, directors to succeed W. H. Marshall, R. B. Caverly and F. H. Greene, resigned.

Goldschmidt Thermit Company, New York, N. Y., has issued a catalog describing and illustrating its rail grinders, designed for the purpose of finishing rail joints welded by the thermit process. Special grinders are also made for corrugation or joint grinding in subway or on elevated roads equipped with either a shoe or a trolley.

Gold Car Heating & Lighting Company, New York, N. Y., has appointed Frank A. Purdy sales manager of its New York office. Mr. Purdy will also act as sales manager for the Canadian Gold Car Heating & Lighting Company. The W. W. Butler Company, Ltd., Montreal, Que., will act as selling agents for the Canadian Gold Car Heating & Lighting Company.

ADVERTISING LITERATURE

Reagan Grate Bar Company, Philadelphia, Pa., has issued a folder describing its new improved grate and stoking device.

Wallace Supply Company, New York, N. Y., has issued a catalog describing its hand-power bending tools, bar cutters, shears and punches.

W. S. Rockwell Company, New York, N. Y., has issued a catalog describing its various types of furnaces for annealing, melting, hardening and other purposes.

W. N. Matthews & Brother, St. Louis, Mo., have issued a folder illustrating the application, under various conditions, of their guy anchors for electric transmission poles.

Union Switch & Signal Company, Swissvale, Pa., has issued a catalog describing in detail its T-2 d.c. and a.c. signals and also its method of mechanism wiring and typical circuit arrangement in connection with automatic block signaling.

General Railway Signal Company, Rochester, N. Y., has issued a catalog describing the G. R. S. selector system, which is equipped for primary battery or motor-generator control and combines the features of ruggedness and simplicity. Illustrations show the selector with cover removed and with the cover locked in place.

Alexander Milburn Company, Baltimore, Md., has issued a catalog describing its acetylene lights. Its handlights of 500 cp for ten hours are invaluable for electric railway emergency departments. The catalog also describes oxy-acetylene welding and cutting plants for repairing broken machine parts, welding boilers, tubes, tanks, etc., reclaiming defective castings and cutting up steelwork.

Perry, Coffin & Burr, Boston, Mass., have issued a pamphlet setting forth the tax clauses from the trust deeds securing various electric railway and other public utility bonds in which that company is interested. The book contains a complete alphabetical bond list, giving the tax clause and other pertinent data. Following this list is a compilation of bond issues with regard to clauses providing for income tax payment and a similar compilation for bond issues without any clause in regard to income tax payment. The last section of the book contains a list of bond issues arranged according to coupon dates. According to a statement accompanying the pamphlet, most of the corporations named in the book are obligated by their mortgage covenants to pay the normal 1 per cent federal income tax.

NEW PUBLICATION

American Railroad Economics. By A. M. Sakolski, Ph. D. New York, N. Y.: Macmillan Company. Size, 5 in. x 7½ in.; 295 pages. Price, $1.25.

This publication is intended as a text book for investors and students. The author is a staff lecturer in New York University School of Accounts, Commerce and Finance. His purpose was to examine critically facts and figures derived from railroad reports and other publications with a view to assist in the correct judgment of railroad activities and operating results. The book is divided into twelve chapters and takes up in turn railroad rates, railroad securities, railroad systems of the United States, economics of railroad construction, physical factors in economic operation, traffic statistics, the Interstate Commerce Commission's system of railroad accounts, the income account, net income and its distribution, the general balance sheet and railroad capitalization. A vast amount of information is crowded into the twenty-seven pages devoted to the subject of railroad securities. A particularly interesting chapter is the one on the Interstate Commerce Commission's system of railroad accounts. The aims of the commission in prescribing its system of accounts are set forth, and the author has pointed out wherein the system has failed in some of its purposes. The chapter on the general balance sheet is a particularly good one. When studying railroad financial progress the balance sheet as a rule is hurriedly passed over because it is less readily understood than the income account, but the author says that the general balance sheet, when properly interpreted, furnishes a better indication of financial status and of investment value than current earnings, which frequently are the result of temporary conditions. As part of this chapter, he has included the condensed general balance sheet of the Erie Railroad as of June 30, 1912.

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Consolidation of Street Railway Journal and Electric Railway Review

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OUR SEMI-ANNUAL INDEX

Although the electric railway industry is constantly changing, many of the problems remain the same, and it is not infrequent that a question in economical maintenance or some other branch of electric railway work can be settled by a reference to a back number of the Electric Railway Journal. For this purpose the index which accompanies each volume of this paper is invaluable, and as we pay a great deal of attention to the compilation of this index, a few words of explanation may be of help in its use. The index which appears in this issue is both a geographical index and a subject index. In the latter, an effort is made to index every important subject discussed, whether the statement indexed appears by itself or forms part of a longer article. By this plan a single article may have as many as ten or fifteen entries. The key-words are selected as carefully as possible, and cross references are provided frequently so as to facilitate the work of the reader. We believe that the more the index is used the greater its convenience will be found and that after the subscriber acquires the "index habit" he will find that his back copies have a value of which before he had no conception.

TRAINING OF PLATFORM MEN AND SAFETY

An essential element in the keeping down of accidents is intelligent operation of cars. That this is well understood is evidenced by the increasing attention being given to training motormen and conductors for their duties. A considerable proportion of men hired do not stay long enough to become expert. They decide to take up car work without due investigation of the hardships to be encountered and the responsibilities to be incurred. To the layman the duties of the motorman or conductor appear pleasant and easy; hence the work is apt to appeal to men who dislike hard manual labor. When they get to work they find that the duties of motormen and conductors are not only onerous but require attention to business and ability to take responsibilities. Those who are not qualified soon drop out. Before doing so, however, their lack of aptitude for railway service is likely to produce accidents; in fact, a large share of the total of all accidents has usually been found to be due to inexperienced men. For this reason the new method of training men which has been employed for a year or more by the New York State Railways at Rochester is of interest. The company has set aside a large area of ground and several thousand feet of track for practice purposes. The track is equipped with all devices used on the road and with special track work. The men are drilled on this track under all kinds of service conditions. This drill is superior to that given on stationary cars, where the men are relieved of the most serious causes of distraction. The advantages of removing service practice from the streets are so obvious as to require no supporting arguments. While the officials of the Rochester Lines are not yet ready to announce the statistics of the results of operation of the new plan, upon which they are now at work, they state that the reduction in number of accidents is remarkable. It is likely also that they will find an increase in the average length of service, for the try-out period will serve as a sort of practical examination and will weed out the applicants who are not fitted for railway work by temperament and mental capacity.

COMPANY BULLETINS IN PUBLICITY WORK

Since electric railways began to appreciate the value of publicity in establishing a better feeling between the public and themselves, many and diversified have been the means adopted to aid in this work. Single advertisements, series of advertisements, car posters, pamphlets and folders—all of these have served to bring to the public a truer realization of the problems, demands and rights of electric railways. When the information which the companies wish to put before the public is sufficient in amount to warrant it, the next step is a regular publication or bulletin. Such a bulletin, although it has its advantages, is in no sense a newspaper. It does not carry advertisements or compete with existing newspapers for news even about the company's own affairs. It simply provides an opportunity for a heart-to-heart talk between the company and its customers, which is in addition to and beyond that which is within the scope of the daily press even if most friendly to the public utility. The distribution of such a paper to the riding public is easily accomplished through the medium of the company's own cars, with a maximum thoroughness and a minimum of expense,

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and the passengers sometimes pick up the sheets for a momentary diversion which later develops into a desire for serious home study. There is no doubt that the regular publication of an electric railway bulletin can be often made a very useful bond between the public and the company. It can also largely overcome a hostile attitude on the part of the public, when such unfortunately exists, especially if it maintains an even, moderate tone in the face of all hostile criticism. The point to be understood clearly is that it is much more difficult for an electric railway to regain public esteem than it is for its opponents to load it with public disfavor, and that this handicap can be overcome only by absolute facts and persistent moderation in all details. High-sounding persiflage, baseless countercharges, bitter excoriations of opponents—these are worse than useless—they are harmful to the company's interests. Nothing but a plain, unvarnished, intimate statement of facts is effective, and if this policy is firmly adhered to, the public will gladly listen to the company's story.

RAIL CORRUGATION AGAIN

A most interesting contribution to the literature on rail corrugation is embodied in the article by Charles M. Gidanski, of the Brooklyn Rapid Transit System, published elsewhere in this issue. As responsible head of all surface grinding on a great city system, the author has had splendid opportunities for noting the origin and following the development of corrugation under the most diverse conditions of car operation and track construction. Thus it was possible for him to check the hypothetical causes of corrugation to determine which, if any, answered the dictum of science that a true theory is one that satisfies all conditions. His long series of observations has shown definitively that a sharp distinction should be made between apparent and real corrugations. The former were found to consist simply of irregular streaks and markings, whereas true corrugations on any given length of rail always showed waves of practically constant characteristics.

From these observations Mr. Gidanski argues that any abrupt forces due to excessive braking, trucks out of square, isolated chemical or mechanical defects in the rail, variations in the substructure, etc., must lead to groups of non-related markings and that only a constant force can produce consistent markings. He finds that the only constant force with which rail corrugation is associated is the cold rolling of car wheels over the track and therefore believes that it is the only force which can generate waves of constant periodicity. In short, Mr. Gidanski's argument may be expressed in this sentence: "Surely the uniformity of the phenomenon indicates a corresponding uniformity in the cause."

Nevertheless, the author has not summarily rejected all other theories of corrugation, but has merely relegated some of them to the class of contributory or secondary causes. While he considers cold rolling to be the fundamental reason, he acknowledges that when once begun the process of corrugation, which has been defined as an anvil effect, will be accelerated by a non-resilient roadbed, by hard tires and by rails of deficient elastic limit. From this it follows that corrugation can be greatly minimized if the rail and its support are so elastic that instead of violently re-arranging the particles of the rail-head to form crests and depresssions, the shocks from the cold rolling ot the wheels shall be harmlessly absorbed. It may be too soon to say that the primary and secondary causes of corrugation are so well understood that they can be eliminated at this time, but it is surely reasonable to hope that the united data from the studies of American and British operators and from the pending experiments at Berlin of the International Street & Interurban Railway Association will help to reduce rail corrugation to really insignificant limits.

In conclusion, it is well to point out that Mr. Gidanski has not confined himself to the theoretical aspects of the problem. His observation that corrugations on a given section of rail never exceed a certain maximum under a like set of conditions has led to the very practical deduction that it is a waste of money to begin grinding the rail until the known maximum has been attained.

FREQUENT CHANGES IN COMMISSION PERSONNEL

In the study of the practical workings of public service commissions one point which stands out prominently is the importance of experience in the office of commissioner. One of the latest bodies to deprecate frequent changes in these commissions is the executive committee of the Railway Business Association. We heartily indorse this position. When commissioners have once shown their fitness for positions on a regulatory body the success of the institution demands that they be retained as long as is reasonably possible. We have always insisted that public service commissioners should be men of the highest type, and we have at various times criticised appointments that seemed likely to limit the ability or capacity of the whole commission and result in gross inaccuracies of decision. Unfortunately, men acquainted with public utility operation, accounting and finance and possessed of a keen, logical and judicial mind for the application of such knowledge are far from being at one's beck and call. When a man is found, however, who in the refining-pot of experience exhibits such requisites he certainly is too valuable to be dropped from commission work at the first possible moment.

The fact is, as the committee report states, that not even an enlightened public opinion will insure the success of the present regulatory system unless commissioners who have acquired experience and knowledge are retained in service. Security of tenure not only minimizes the waste of time and the danger of mistakes in breaking in new commissioners but also bestows on the older commissioners a stalwart independence and a serenity that promote the efficiency of the organization and the quality of the regulatory work accomplished. Furthermore, a reasonable assurance of retention in office upon the exhibition of the proper capacity therefor is something that enables the appointing power to command the services of men who would never dream of accepting the offer if they believed that the position was one which was periodically open as a reward for activity in party politics.

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This question is of vital importance to-day, in view of the fact that many appointments to the Interstate Commerce Commission and various state commissions are to expire with the coming of the new year. Moreover, it brings into greater prominence the problem of the short term of office. Experience points out with unmistakable directness the insufficiency and dangers of a short term, such as the present five-year term of the New York State commissions. Not the most insignificant danger of such a term is the fact that it tempts commissioners to keep several political anchors set and to study and take advantage of the relation existing between themselves and the public, in order to obtain a reappointment. Commissioners often make artificial appeals for public support. It is true that watchfulness on the part of railway men will counteract these to a great degree, as is evidenced by the way in which President Ripley of the Atchison company recently uncovered an error of only $211,000,000 in the computations of the chairman of the Iowa Railroad Commission in an argument in favor of government ownership.

A longer term of office, however, is the best means of avoiding such evils. The ten-year term adopted under the new Pennsylvania public utility law is a step forward, but a tendency to make appointments, like those of our highest judges, for fifteen years or even for life, would be far from deserving censure. Until such longer terms are put into practice, however, the process of choosing public service commissioners should be one of evolution, with the public weeding out the unfit and insisting on the retention of those of proved worth.

REAL MAINTENANCE

A wise man seeks his tailor when a button begins to loosen and not after it falls off, and he saves his button. How many golden buttons are lost by American electric railways through ignorance of this distinction between maintenance and repair? Scores of dollars will maintain whereas hundred are required to repair. Necessarily those who believe that it is better to repair pay for their blindness in both higher shop costs and lower mileage from equipment. If it is cheaper to tighten a button than to replace it, is it not likewise cheaper to gage the clearance of the armature regularly than to wait until it falls upon the pole pieces?

We regret to say that the fundamental obstacle in the way toward real maintenance is usually this: The financiers who control the property are rarely men who have a practical knowledge of electric railroading. A New York manufacturer of carpets may have a voice in the operation of a railway in China, while the village grocer fixes the policy of the local interurban. Since such owners of a railway property think principally of a quick profit on their investment, they are only too apt to lose sight of the fact that the best ultimate results must be achieved with well-paid specialists.

The first duty of the directors of a road is to offer enough salary to attract a competent shop superintendent, and this means that the manager of men and the guardian of costly equipment must get more than $75 to $100 a month. It is fatuous to expect a competent executive and all-around mechanician for a carpenter's or machinist's wage. The master (?) mechanic who asked in all seriousness why an axle crack could not be tooled out is typical of a class far too numerous.

The second duty of the board of directors is to give the shop manager an absolutely free hand in selecting all his men. Nothing is more demoralizing to discipline than to have the workmen see an inefficient man placed at responsible work at the request of the men higher up. We know of one road where the gardener of one of the directors wintered in the carshops very comfortably at the cost of the railway. On another road, with directors of similar stamp, the shop superintendent conceals his draftsman in a garret and carries him on the payroll as a mechanic, as the aforesaid directors believe that drawings are a needless luxury.

Not only should the shop manager be permitted to select his own men but he should also be permitted to pay them such wages as will secure that degree of maintenance which is the cheapest in the long run. In "A Piecework Dilemma," published in our issue of Dec. 6, we noted an instance where the president of a railway company will not permit a sure reduction of 20 per cent in labor cost because he does not believe that a workman should be allowed to earn more than $2 to $2.50 a day. While the electric railway shop does not need watchmakers, it does require conscientious, intelligent men even for the very simple task of measuring the length of a brush or taping the circumference of a wheel. The class of labor obtained by a railway company which insists upon paying 10 per cent to 20 per cent below prevailing rates is usually of a sort that cannot understand plain English.

It is not fair to judge widely different localities on a cost-per-car-mile basis. There is another and a better way, namely, to study the character and number of defects for each class of equipment and the proportion of time lost by cars in the shop. The most efficient shop will be that which presents the lowest rates of repeaters. Almost any workman can learn how to replace a ruined part, but brains are needed to eradicate the cause. A good shop superintendent will soon discover whether the trouble is inherent to the apparatus. If it is, he will be likely to recommend the complete replacement of the motor or other part which may be at fault.

This last thought brings to mind the truly remarkable improvements which have been made during recent years in the electrical equipment of cars. The use of the commutating pole produced a motor which was designed especially to cut down sparking and flash-over troubles. Field control has made it possible to reduce energy consumption, and the new non-platform control systems for city cars mean much in freeing the vestibules from space-stealing apparatus. With all the advantages possible from this trio of improvements, it is up to the user of old equipment to determine its scrapping possibility, along such lines as were brought out by Mr. Thirlwall in our issue of Sept. 27. Then he should keep both new and retained equipment in accordance with the principles of real maintenance, namely, employ the best help and reduce repair by increasing inspection.

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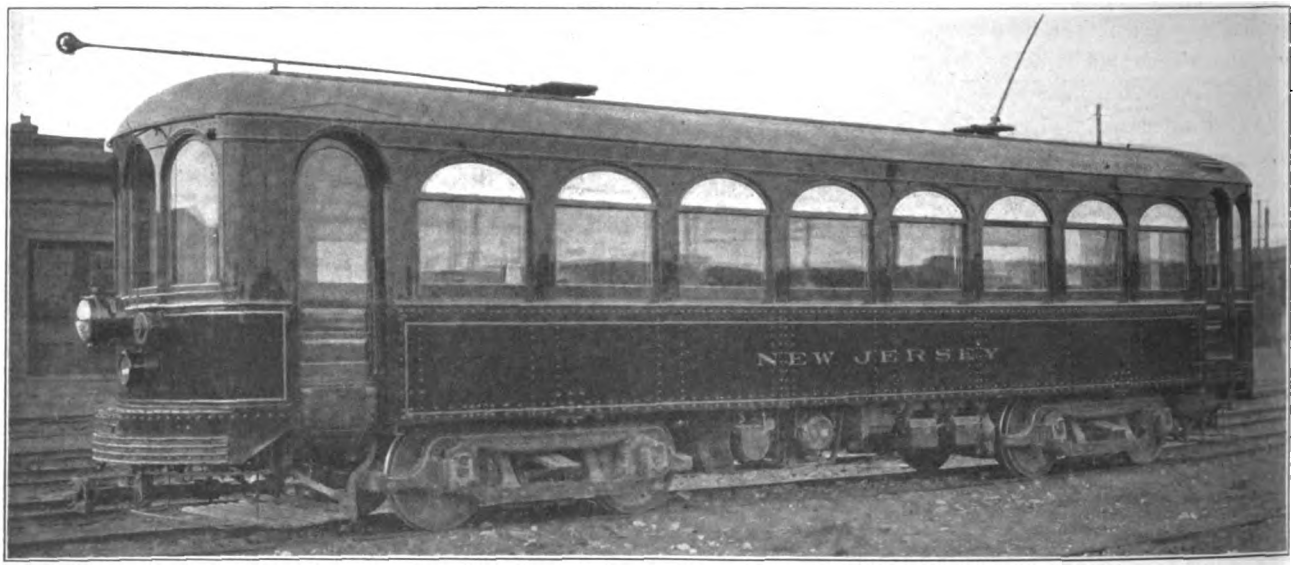
The Private Car "New Jersey"

This Is a Dust-Proof and Sound-Proof Car Built for the Officials of the Public Service Railway, Newark, N. J.—A Number of the Details Are Applicable to Cars for Regular Passenger Service

The Public Service Railway, Newark, N. J., has recently completed at its Plank Road shops the private car "New Jersey," as shown in the accompanying plan and halftones. This car will be used for inspection purposes by the officers of the company and is fitted with all the conveniences which are provided in an office. It is the second car of that name, the first having been built in 1910 and described in the Electric Railway Journal for June 11, 1910. The older car will be retained under the name of "North Jersey" for service in and about Newark, while the new car will be used for all of the standard-gage track of the system, comprising nearly 700 miles. From a constructional standpoint the new car differs from the old in possessing such innovations as a single-arch roof, steel construction up to the window line, disappearing step mechanism and such general construction as is required to make the car suitable for high-speed service. In its interior fittings it bears evidence of the great improvements which have been made in later years in car ventilation, heating and lighting.



Public Service Private Car—General Exterior View

GENERAL DIMENSIONS AND CONSTRUCTION

The new car is 44 ft. over all. Preliminary surveys showed that this length was the maximum for a car that would be capable of traveling over every part of the standard-gage divisions. But roominess has been secured by using a width of 8 ft. 2 in. over all. The height from rail to roof is 11 ft. 10½ in. The underframe is composed of commercial steel sections, covered by two floors of yellow pine with an intermediate noise-deadening layer of ¾-in. felt. Built-up steel bolsters are used. The superstructure of the car comprises wooden posts, steel-plated carlines and 3/16-in. plate up to the window sills. The arch roof was put on as a single piece of duck with no holes except for the small openings through which the wires from the trolley bases are led. Copper flashing is provided at these apertures to prevent the pocketing of water.

WINDOWS AND DOORS

The value of the car for inspection is greatly enhanced by the use of the maximum amount of glazed surfaces. Thus the window posts of the sides are placed 48 in. center to center, and all doors at the ends are furnished with glazed upper panels. The side windows are double and are fitted with Edwards fixtures and balanced sash. For these windows the best French plate was selected, while the arch section was fitted with an opalescent copper-ribbed glass which matches the lighting fixtures. The inner opalescent sash is movable to permit the cleaning of all sashes.

Unlike the first car, this one is built without platforms. End doors are provided on both sides, one for the platform men and one for the passengers. The former type of door leads directly into a fully inclosed cab and the latter into one of the two duplicate seating compartments. The motorman enters the cab by the use of a strap-iron step and grab-handles. A feature of the latter is their outward curving at intervals to form steps to the roof and the accompanying use of metal strap facing at such steps to protect the varnished woodwork from foot scratches. Parallel to the entrance door is another of swinging type which leads into the seating compartment. The rear partition of the cab is also glazed, although part of it is used for carrying equipment as hereinafter noted. The motorman is therefore within the view of the passengers in the front compartment. The motorman's cab is so compact that ample observation room alongside is left for the riders.

The passenger doors are operated as part of a trapdoor and step mechanism which was invented by H. A. Benedict, mechanical engineer Public Service Railway. The main feature of the design is that the unhooking of a short, inconspicuous handle, which is set in the side of the car close to the floor line, eliminates the clumsy, heavy levers commonly used on vestibuled cars for similar door and step openings. The return of the handle, of course, serves to close the trapdoor and fold the step within the car line, as illustrated. Solid doors are used for the aisle between compartments, the kitchen and toilet.

EXTERIOR AND INTERIOR FINISH, LIGHTING AND FURNISHING

The exterior is finished in Palmetto green, and this color, with the addition of the simple striping adopted, gives the car a very dignified appearance. Inside, the car is treated with African mahogany rubbed to a dull finish, while the Agasote headlining is tinted in dark old ivory above the windows with a gradual lightening toward the center of the

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ceiling. The lighting of the seating compartments is of the semi-indirect type with clusters of five 23-watt tungsten lamps for each lighting fixture. These fixtures, which are of copper-ribbed opalescent glass, were furnished by the Public Service Electric Company. The interior metal trim is of bronze and the floor covering of Saxine carpet.

The general arrangement of the car is shown in the accompanying plan. Reference has already been made to the motorman's compartments and to the duplicate seating sections. The kitchen and toilet are placed midway but with a 26-in. aisle for passage along one side. The seating compartments are upholstered in high-grade Spanish leather, aerated removable spring cushions being used both for the chairs and partition seats. Portable tables for the use of sixteen people are provided, in addition to which a similar hinged table can be installed at the front of the vestibule either for dining or observing purposes. The kitchen equipment naturally is of the most advanced character, all pantries being of metal, the iceboxes perfectly ventilated, the stove of alcohol type, etc. Pyrene extinguishers furnish protection against fire.

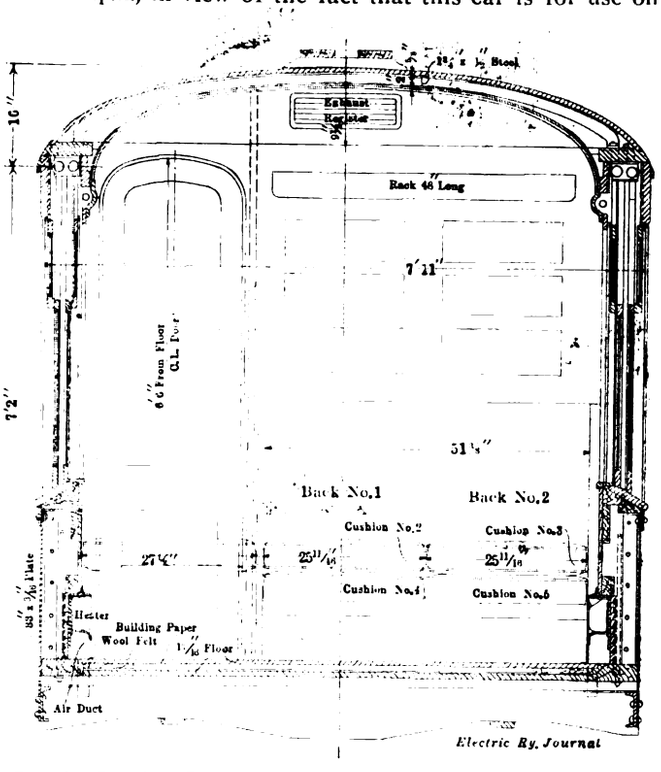
NOISELESS, DUSTLESS HEATING AND VENTILATING FEATURES

A prime object in the design and equipment of this car was to make it noiseless, dustless and yet perfectly comfortable as to ventilation and heating. The carpeted double floor, the double windows and the general absence of openings to the atmosphere are features that have made the car noiseless. The dustless quality of course, is due largely to the system of ventilation hereinafter described, but it was still further improved by furnishing all doors with weather strips and doing all cleaning with vacuum apparatus. The heating outfit consists of continuous electric heaters of Consolidated type, including thermometers in each compartment. The heaters are carried along the sides of the car at the floor line. When in use they warm the ventilating air as it enters the car. Air is drawn into the car by means of two blowers, each of 500 cu. ft. per minute capacity, through a set of cheesecloth screens which are placed under the cabs close to the strap-iron step, as illustrated. These screens each consist of six V's with the apexes facing outward to expose the largest possible area. The filters are protected by a wire cage, but the whole battery is arranged for easy removal and replacement. After the air has been drawn through the intake duct and over the heaters, it passes into the car, whence it is discharged underneath the car between the trucks by means of a ¾-hp motor which has a capacity of 1000 cu. ft. per minute. The ordinary rate of discharge is 700 cu. ft. per minute. In the passenger compartments the air is exhausted through a louver in the partition back of the stationary seats, but in the kitchen and toilet the exhausts are directly overhead. Even with the aisle doors open, therefore, the car should prove odor-proof.

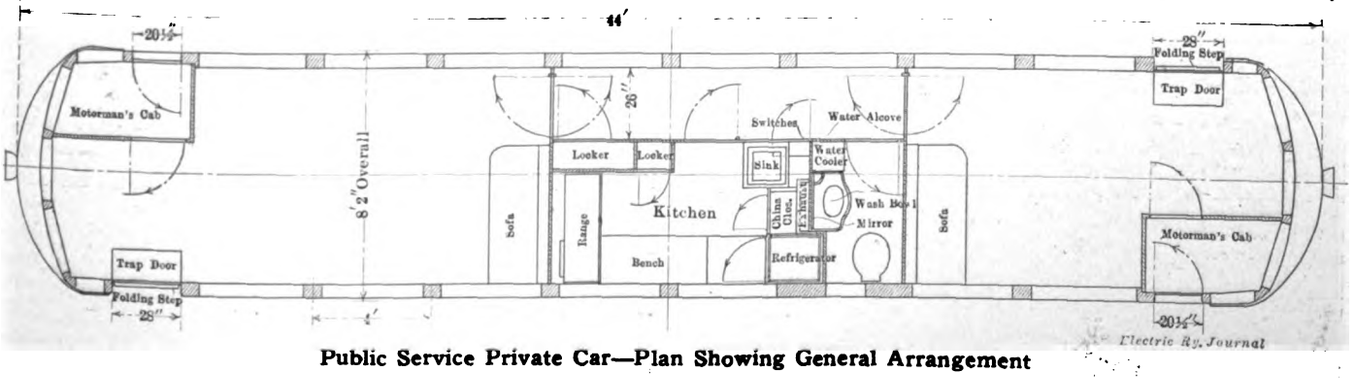
Special ventilation for the cabs has been provided by means of natural draft. This consists of six copper-screened holes of elliptic form, say 1-in. x ½-in., and cut in the base of the window frame, which the motorman can regulate at will by manipulating a sliding shutter.

MECHANICAL AND ELECTRICAL EQUIPMENT

The body is carried on two Standard C-55-P trucks of 6-ft. 1-in. wheelbase and furnished with 4¼-in. x 8-in. journals. These trucks carry four Westinghouse 310-C-2 motors arranged for field control and HL multiple-unit operation. The motors are geared for a maximum speed of 60 m.p.h., in view of the fact that this car is for use on high-speed right-of-way sections as well as on city tracks. The braking equipment comprises the General Electric Company's air brakes with CP-27 compresser and the Pittsburgh hand brake of the Dayton Manufacturing Company. The dashers, which are protected with Hedley anti-climbers, support Knutson No. 5 trolley retrievers, Tomlinson couplers, one GE removable luminous arc headlight for country use and two Golden Glow incandescent headlights for city use. The shim type brake slack adjuster of the National Coupler Company, now standard on this system, is also used. Other outside equipment comprises H-B life guards and Hanlon air sanders. Car replacers are installed behind the bumpers, and a set of wrecking tools and lamps are placed in a box under the center of the car. Air whistles are used on this car.



Public Service Private Car—Cross-Sectional Elevation



Public Service Private Car—Plan Showing General Arrangement

CAB EQUIPMENTS, ETC.

The switches for the control of car lighting, heating and ventilation are mounted on a panel set in a compartment along the aisle, but all other control devices are placed in the cabs. The ventilation of the cabs has already been mentioned, and note may also be made of the separate cab

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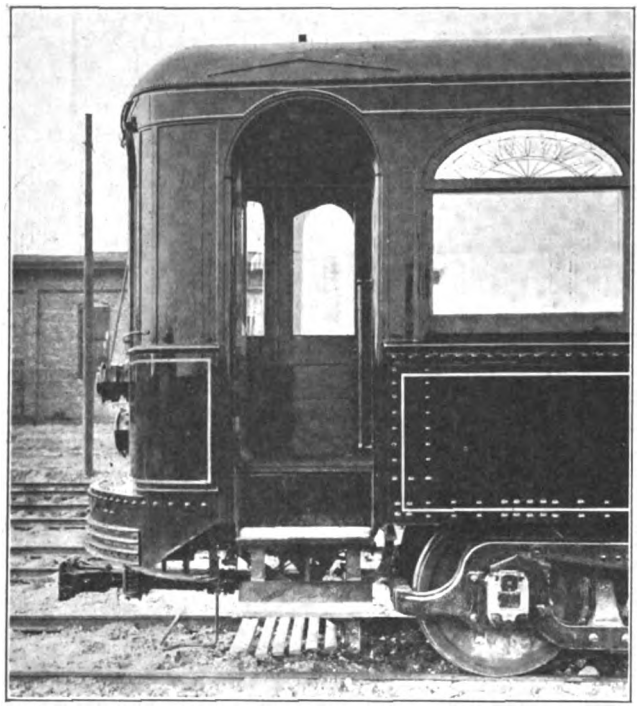
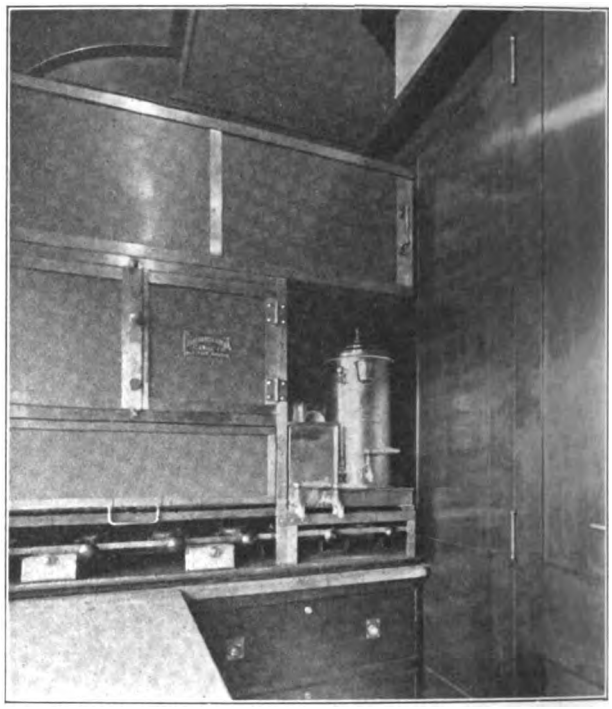
heaters. The motorman (or conductor) has a leather-covered stool, but the partition behind him carries a folding seat for a pilot. The same partition also carries racks for flags and fusees. At night, of course, the motorman is

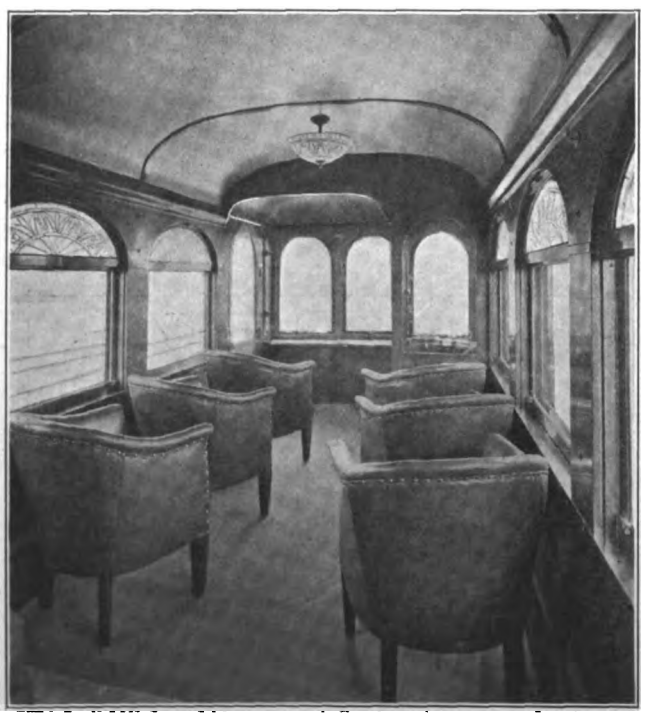


Public Service Private Car—View Showing Folding Steps Lowered



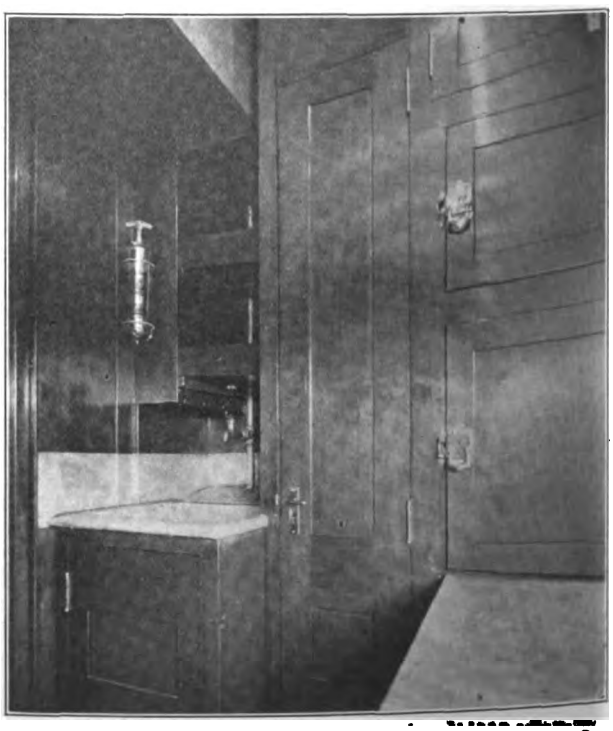
Public Service Private Car—Gas Range and Bench in Kitchen

screened from the illuminated seating compartment by a curtain which he can draw down. Should he desire to read train orders, gages, etc., he can get ample light by drawing back the bottom shutter of a cylindrical lamp cas-



Public Service Private Car—Interior View of Observation Room

ing placed just above the control equipment. Communication between the motorman and conductor while they remain in their respective cabs is established in two ways, namely, by means of a speaking tube and single-stroke bell signals. The bell signals, which can be heard only within the cab, are wired in series so that the sender knows positively whether or not the signal has been properly transmitted. The buzzers in each cab are operated by using the upper row of push buttons in the seating compartments; the lower row is used to show signals on an annunciator in the kitchen.



Public Service Private Car—Lockers and Sink in One Corner of Kitchen

While this car is not intended to carry specialized equipment to show the condition of line and track, it has been furnished with a speedometer, this device being a volt-

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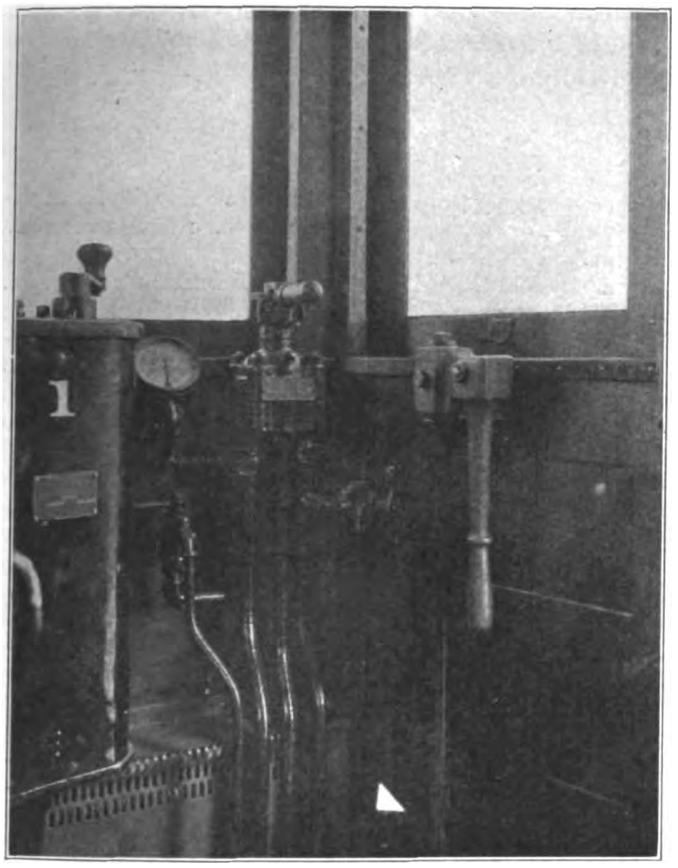
meter graduated in miles per hour and operated by means of a magneto which is chain-driven from one of the car axles. The speedometer is mounted on the vestibule sash.



Public Service Private Car—Motorman's Cab

Just below this instrument it is proposed to place a voltmeter to show the line potential variations as the car travels from place to place.

INTERNATIONAL EXPOSITION OF SAFETY

The first International Exposition of Safety and Sanitation was held from Dec. 11 to Dec. 20 at the Grand Central Palace, New York City, under the auspices of the American Museum of Safety. The exhibits were of a great variety—safety devices for the home and factory, sanitary equipment, first-aid facilities, propaganda material relating to public health.

A number of the exhibits were of interest in the electric railway field, all of them showing how some employers are working on the safety problem for the benefit of their employees. The Southern Pacific company, which was awarded the E. H. Harriman medal for safety work accomplished during the year ended June 30, 1913, had 132 exhibits of safety devices, including many pictures showing accidents that might occur in connection with operation and the way to prevent them. The Pennsylvania Railroad had exhibits including automatic signal stops, efficient and defective tools and a section of single track with third-rail and overhead signal bridge. The New York Central lines displayed photographs of improved practice in operation, of standard safeguards and of the road's efforts to combat the trespass evil.

One of the most interesting exhibits was that prepared by the Brooklyn Rapid Transit Company. Besides extensive models of safety devices used in the shops and the elevated and surface branches of the service, details of the public school safety crusade, such as pictures, bulletin boards, etc., were shown and moving-picture reels illustrating how accidents occur and how to avoid them were also run off. The exhibit contained a chart illustrating the evolution of the surface car from 1870 to 1912, and models were shown of the new center-entrance car now used by the company and the subway car proposed for use by the New York Municipal Railway Corporation. The company also offered for distribution in its booth pamphlets describing its medical inspection bureau, its welfare policy and future plans and its safety crusade in Brooklyn. A medal was awarded to the Brooklyn Rapid Transit Company for the booth with the best appearance at the exposition.

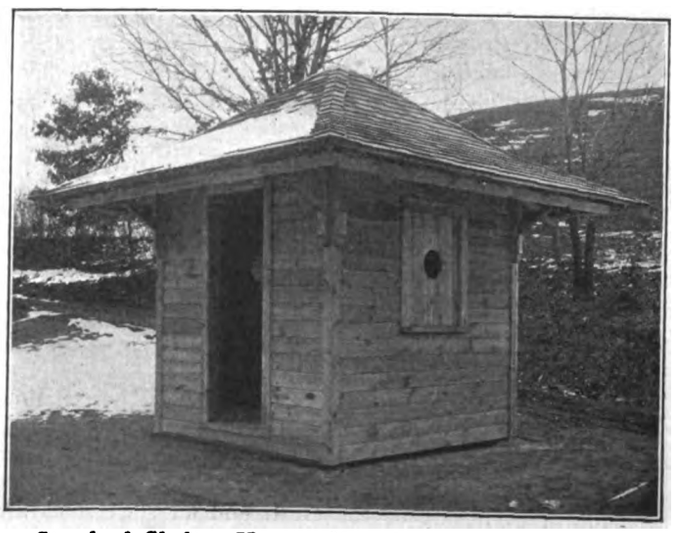
An attractive foreign exhibit was arranged by the Allgemeine Elektricitäts Gesellschaft, Berlin, comprising safety switches and cut-outs, insulated tools for handling high-tension apparatus, protective clothing and eye shields for electric welders and similar contrivances.

STANDARD SHELTER HOUSES OF THE NEW YORK STATE RAILWAYS, ROCHESTER LINES

An attractive but inexpensive waiting room for interurban lines has been used with good results by the New York State Railways, Rochester Lines. The shelter house is 8 ft. square and 8 ft. high inside and can be used to shelter a dozen passengers. It costs less than $200 to build, and it is so portable that it can be built in the company's shop and taken to its place on a flat car.

The framing is of 2-in. x 4-in. No. 1 hemlock, exposed timbers being surfaced, and is carried on 4-in. x 6-in. mudsills. Walls and ceilings are ceiled with ⅝-in. clear Georgia pine, matched and beaded. Windows and door casings are of ⅞-in. by 3½-in. Georgia pine. The siding is No. 1 common Novelty siding, and door and window frames are of whitewood. The roofing is of ⅞-in. hemlock laid with 1-in. spaces between boards and covered with "Star A" grade shingles laid not to exceed 5 in. to the weather, all hips being double-shingled. The rafters are 2-in. x 6-in. hemlock. The exterior receives three coats of standard depot paint, body yellow and trim maroon. The roof shingles are stained green.

The shelter is lighted from the wire-glass panel in the door, as it has been found difficult to keep glazed window sash intact. Peepholes in the paneled sash permit waiting passengers to see approaching cars. A five-lamp cluster is



Standard Shelter House—New York State Railways

placed above a wire glass sash in the ceiling for artificial illumination, the wire glass giving fairly effective protection to the lamps.

A seat 14 in. wide extends across the rear of the house and half way along the two sides. This is made of a single 1½-in. plank supported by wooden brackets at 2-ft. intervals at a height of 16½ in. from the floor.

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Rail Corrugation

The Writer Describes Corrugation on the Brooklyn Rapid Transit System—He Also Develops the Theory that the Principal Cause Is the Cold Rolling of the Rails by the Car Wheels and that Rigid Roadbeds, Rails of Deficient Elastic Limit and Hard Tires Are Accessory Causes

BY CHARLES M. GIDANSKI, WAY AND STRUCTURE DEPARTMENT BROOKLYN RAPID TRANSIT SYSTEM

Corrugation waves in a series show a number of definite characteristic features. These features are evidence that corrugation is an established deformation which results from a perfectly natural, definite stress.

The wave length of early rail corrugations on the Brooklyn Rapid Transit Company ranges from the infinitesimal to about 2 in., and of fully developed corrugations from 2½ in. to 6 in. The depth on straight track varies from a thousandth of an inch or less to 0.058 in., which is an extreme case. These depths, of course, are understood to apply to series corrugation as distinguished from the dish which is found opposite or at a joint. It is a notable fact, however, that in any given series on any practically homogeneous rail and roadbed with like traffic the corrugations are remarkably near the same wave length. It has also been found that under given maximum loads at given maximum speeds on a given rail the lengths and depths of the waves do not exceed a certain ultimate maximum but will grow larger only when a heavier load or higher speed is introduced.

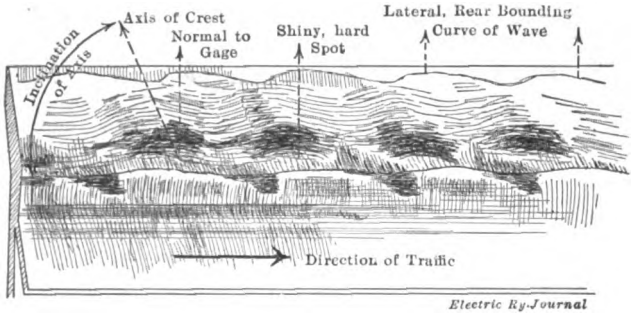

Fig. 1—Rail Corrugation—Well-Developed Corrugation

Hence, if only the rail is to be considered, it is not economical to grind it until corrugation has been developed fully. When a newly ground surface is subjected to the old conditions, re-corrugation is only a matter of time. But as a corrugated rail is injurious to the substructure, pavement and rolling stock it is our practice to grind out the corrugations before they reach their full stage of development; in fact, we grind the rail when the corrugations reach a depth of 0.01 in. to 0.012 in. This means that grinding should be done just before the effect of corrugation begins to tell on the substructure, pavement and rolling stock.

Fig. 1 shows characteristic well-developed corrugation. In contrast to the rest of the rail surface each crest is marked with a streaky spot of light gray, lusterless color, as shown in Fig. 1. Often this spot extends well down each side of the crest, and all such spots are on one straight line on the rail. Sometimes a secondary series of longer and narrower streaks may also be observed between the gage line and the more prominent series on the head of the rail. These streaks and spots evidently indicate impact from the wheel tread, and in well-developed corrugations they are frequently as well defined as those on the head of the rail. The longitudinal streaky formation of all of these markings is with the axis parallel to the length of the rail, and usually in any one series all of these shiny spots lie on one straight line without deviation and in regular order. Some of them have even their longitudinal edges on what is very nearly a straight line. The more solid and less streaky the formation of the spot, the more compact is the metal from continued pounding after the complete development of the wave. In old corrugations also the shiny streak extends some distance down the vertical surface of the gage line at each hollow, in each case close upon the following crest, as illustrated in Fig. 1. A corrugated rail may not show these characteristics distinctly at all times, but nevertheless the waves are there. In new corrugations the hardened and shiny spots are sometimes isolated and small, and between these spots and the gage there is often another row or series of longer disconnected streaks.

On old corrugations the width of the wave in some series extends part way, and in others all the way, across the rail head. The crest seldom reaches laterally as near the back of the rail as does the hollow, the latter extending nearer to the back by anywhere between 1/16 in. and ¼ in. Thus there is an accompanying horizontal wave, as shown in Fig. 1, as well as a vertical one. In the old corrugations there is still another wave formation. This is along the gage line where the metal has flowed laterally over the gage line from the hollow and has been pressed down by the wheel fillet and flange. This deformation is present only at the hollows. At the crests the metal does not come beyond the gage line, but there is a polished hard "gage line" surface. This is shown in Fig. 1, but it is noticeable only on mature corrugations.

How Corrugation Grows

On some rails wearing, but still non-corrugated, the surface of contact shows a continuous bright and light-colored streaky, skin-surface formation. The width of this surface depends upon the amount of contact of wheel treads. Other rails either show no such streaks at all or very few, the color being the ordinary dull one. While the evolution of corrugation is the same everywhere, it manifests itself more clearly on streaky rails, as shown in Fig. 3.

As soon as the corrugations are at all perceptible, the continuous streaks begin to break longitudinally into detached streaks. The depth of the wave at this stage is so small as to be practically immeasurable. While this periodic detachment is going on, the region of detachment still shows thinner and sparse streaks, while the region of isolation appears more solid and brighter. During the process those regular interval regions where parts of the continuous streak are disappearing and becoming narrower

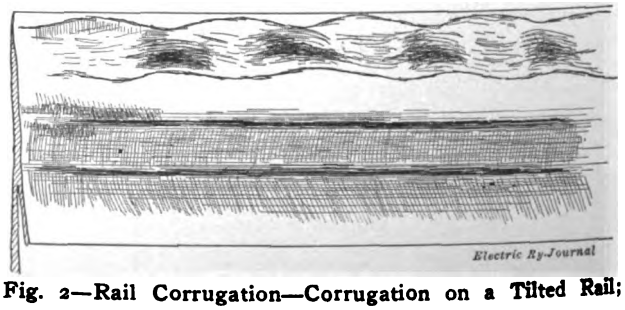

Fig. 2—Rail Corrugation—Corrugation on a Tilted Rail; Wheel Rides on Back of Rail

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are forming what will eventually be the hollow. Those parts which remain to become denser and wider are forming the crest. The breaking up continues until the continuous streaks have been transformed into a series of distinct and more or less isolated bright spots. The metal is evidently flowing and is being displaced from the hollow to form the crest. The streaks are fast merging into one another laterally to form the solid bright spot on top of the crest. By this time there is a marked difference between crest and hollow, and the wave has assumed that characteristic profile which keeps developing to the maximum. The corrugation is getting worse. That part of the hollow which is the deepest is near the gage and underneath the greatest diameters of contact, as indicated in Fig. 7.

ANGLE OF CORRUGATION

A very important characteristic of all corrugation is that the axis of the crest transverse to the longitudinal axis of the rail is in almost all cases oblique to the gage line in a greater or less degree. The inclination is as shown in Fig. 1. If we assume that the primary cause of corrugation is a cold flowing of the metal under the action of the wheel tread, and the writer has no doubt in regard to this being the correct explanation, this obliquity of the wave axis is easily traceable to the coning of the wheel tread. Hence we should expect to find, as we actually do, that when the wheel tread is wide and makes a contact all or almost all the way across the rail, as on steam railroads, the axes of the crests approach more nearly to right angles with the gage. The greater the contact the nearer the approach. In other words, when the coning presents a full contact, that part of the crest which lies nearer the gage has been extruded further forward than that part of the crest which is further from the gage.

An excellent example for the study of the wave shape of developed corrugation is on a rail so tilted that the back is slightly higher than the gage, the wheel thus riding on the back and middle of the rail only. The result of the metal flow is well seen in Fig. 2. The hollow is wider than the crest, and the winding edge of the wave is traced or generated by the extreme point of pressure of the wheel. If the wave had reached the gage line the result would have been as already described.

IRREGULAR AND REGULAR CORRUGATIONS

When the surface and alignment of track are irregular and uneven or the substructure is loose, the corrugations will not be uniform in appearance, length and depth because the forces at work and their direction are constantly changing. Differences in length will also be found depending upon whether the rail is in straight or curved track. Thus, in Brooklyn, where the corrugation on the inner rail of a curve may show wave lengths of 8 in. or 10 in., those on the outer rail of the same curve may show wave lengths of only 3 in. or 4 in. The gage line of a badly corrugated

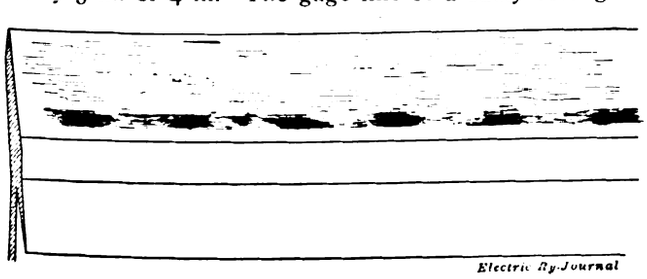

Fig. 3—Rail Corrugation—Beginning of Corrugation

inner rail on a curve will also be found to be stripped and torn while wear and corrugation smooth and polish the outer rail. A curve of "corrugation permitting" radius corrugates more quickly and deeply than a tangent on the same line.

EFFECT OF BRAKING

The worst corrugation on straight track is to be found on that part of a run or street where the cars maintain the greatest speed. This applies to lines operated with single cars. On a street where the stops are at long intervals, as with 600-ft. or 800-ft. blocks, the worst corrugation is on the middle 400 ft. or 600 ft., respectively, of the stretch. In many cases it is almost continuous for this length. That portion of the rail on which the cars are accelerated or retarded has little or no corrugation. It is said that in many cases this result is contrary to that on T-rail used

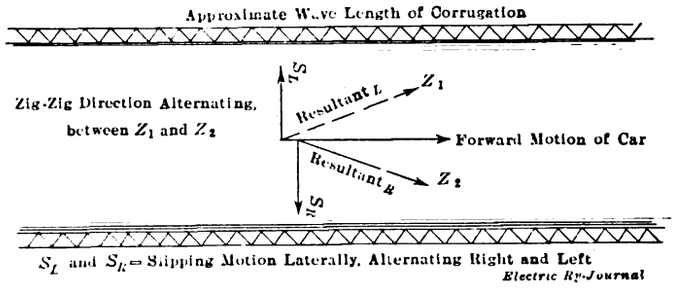

Fig. 4—Rail Corrugation—Theoretical Effect of Side Slip of Car Wheels at Intervals of 3 in. to 4 in.

by trains of cars, where the rail near and at stops is corrugated. The only reasonable explanation is that the marks which appear on the rails as a result of many repetitions of train braking are not of the same kind as true corrugations which are caused by a strictly rolling wheel load. False corrugation is the result of intermittent sliding, of diminished rolling and of jolting. Some of the metal must be dissipated by sliding friction and impact. Thus this action modifies the true shape of what would be corrugation if rolling friction was a greater factor. On a street track with singly operated cars little or no corrugation is noted at starting or stopping places, and very little corrugation exists on lines operated at low speed.

On a street where cars may run at full speed on the down grade without the use of brakes and with minimum slipping or skidding the corrugation on the down track is worse than on the up track; but if the fast cars slide, the corrugation is less than from rolling friction alone. On light grades where cars take the up track at good speed the rails on that track will corrugate more than on the corresponding down track if the latter is subjected to skidding.

As a rule the Brooklyn Rapid Transit system has more and deeper corrugations on the inner rail of straight track than on the outer rail while development is going on, the most likely reason being that only the inner rail is sanded. Probably if both rails were sanded the corrugation would be much less pronounced on each rail than it now is on the inner one alone.

CAUSES OF CORRUGATION

The following are the principal causes to which corrugation has hitherto been attributed: (1) lateral slipping and oscillation due to distortion of truck and play in its parts; (2) wide gage and loose track, vibration; (3) application of brakes; (4) inequality of homologous diameter elements of a pair of wheels on the same axle; (5) rigidity of roadbed; (6) deficiency in elastic limit of rail to resist loading; (7) tires harder than rails; (8) cold rolling by car wheels going over the track.

Attempts have been made to prove each, several or all of these causes responsible for corrugation. Is it not possible that there is but one cause and that the other causes alleged are in reality only accessories which are subordinate to the prime cause?

LATERAL SLIPPING

If lateral slipping, longitudinal slipping or both combined caused corrugation on straight track, not to speak of curved track, such slipping would have to be in the form of a transverse vibration of the car wheels across the rails. Yet, in some cases, the corrugation occurs first on one rail, with none or hardly any on the opposite rail, but a little beyond this place a series of corrugations are found on the

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opposite rail. If transverse and longitudinal slipping was the cause, why did it not simultaneously produce the same effect on the opposite rail? The wheels which we are asked to believe vibrate transversely on one rail are rigidly attached to their axles, and their mates are likewise; and if one wheel fixed on an axle vibrates and produces a certain effect the wheel fixed on the other end of the axle would vibrate in unison in the same manner and produce the same effect on the opposite rail.

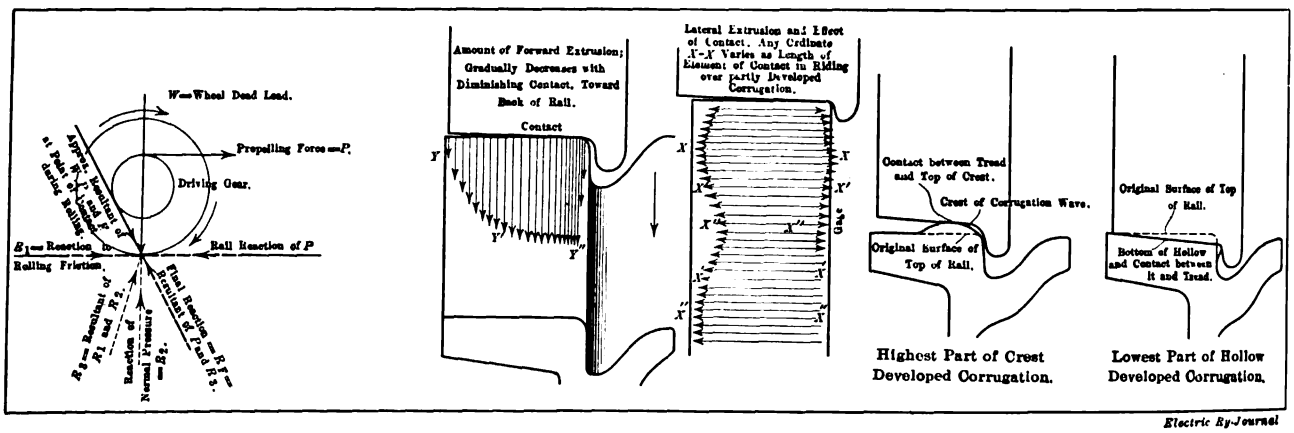
Besides, in order to create the remarkably persistent uniformity and periodicity of waves, the vibratory slipping would have to be of perfectly uniform occurrence and of constant wave length and interval in the one series of vibrations. This would have to occur not only with one set of wheels or occasional sets, but with almost every set of wheels. Can such a singular action be possible? Is the amount of wear and play in all trucks, journals and wheel gages, respectively, equal on all cars? Do corresponding diameters of one pair of wheels vary the same on all or on almost all pairs operating on a line?

No doubt there is occasional slipping, but this merely modifies the form of corrugation wherever such slipping may occur. In fact, slipping actually tends to remove incipient corrugations, thereby retarding their development.

nues, Brooklyn, furnishes an excellent example. Between Fourth and Sixth Avenues the grade is one of the steepest in the city. Sixth Avenue is the top of the hill. East of Sixth Avenue to Thirteenth Avenue the track is almost entirely level. On the heavy down grade derailing switches were placed at intervals. Cars run down grade under brake control and have to stop before passing the derails. Of course, in climbing the grade to Sixth Avenue, the cars cannot get full speed out of full power. No corrugation exists on this steep grade on either track between the bottom and top, although a few holes have been burned or gouged into the rail by the friction of spinning wheels that made no forward headway on the up-grade. These holes must not be mistaken for nor confounded with corrugation, as there is no regular interval between them. They are not depressions nor is there any uniformity in their size. But on the level stretch between Sixth and Thirteenth Avenues, where cars run free and fast, corrugation is plentiful. The brakes and the sliding and rolling friction of cars at practically uniform speed contribute toward rubbing out what little corrugation might be started on the grade sections.

INEQUALITY OF WHEEL DIAMETERS

Inequality of wheel diameters is related to causes Nos.



Rail Corrugation—Fig. 5—Diagram of Forces and Their Reactions Composing the Resultant Force and Reaction Which Cause Corrugations; Fig. 6—Generation of the Lateral Curves of the Corrugation Waves Due to Coning of the Wheels; Fig. 7—Exaggerated Cross-Section at Hollow and Crest

Furthermore, the wave length of the curve generated on straight rail in such oscillation by a coned wheel 30 in. in diameter is far greater than the 3-in. or 6-in. wave length of corrugation. The lateral play in gage which will permit oscillations might be ⅛ in. to 1 in. Given these two varying conditions and also the forward variable speed of a car, the resulting wave length is anywhere between 6 ft. and 15 ft.

But even if the interval of vibration during transverse slipping on straight track was short enough to produce 3-in. to 6-in. corrugation waves, it is impossible to imagine that every car, in traveling in a straight line along a straight track, would follow exactly the same staggered course of 3-in. to 6-in. zigzags (Fig. 4).

WIDE GAGE AND LOOSE TRACK; VIBRATION

Wide gage of track would bring about the same effect as the narrow gage of a pair of wheels, if either could produce corrugation. But well-developed corrugation occurs in about two years on a new track of uniform gage, and the corrugation becomes bad long before the gage can widen appreciably. The only effect that wide gage has upon corrugation is to modify the shape of occasional wave lengths, thereby tending to some extent to prevent uniformity and periodicity of the waves.

APPLICATION OF BRAKES

Argument against this "cause" has already been given. Thirty-ninth Street, between Fourth and Thirteenth Ave-

1 and 2, and the arguments already stated against them apply to this theory. The coning of wheels does not cause corrugation, but it does give to the waves part of their peculiar shape. If the wheels were not coned, corrugation would still occur, but the form would be a little different.

RIGIDITY OF ROADBED

The rigidity of the roadbed does play a very important part in the production of corrugation. It is really the vehicle for the primary force which creates corrugation. The less the rigidity, the less rapid the start and subsequent development of corrugation.

DEFICIENT ELASTIC LIMIT OF RAIL

Most naturally any deficiency in the elastic limit of rail will also contribute to the production of corrugation. It does not require argument to show that any body of matter which has been dented or permanently deformed by a given force has not sufficiently resisted that force so far as elastic limit is concerned. The effect itself is proof enough.

HARD TIRES

Hard tires also contribute toward corrugation as they constitute the transmitting medium of the causing force.

COLD ROLLING BY CAR WHEELS

Cold rolling by car wheels is the cause which will be the theme of the remainder of the discussion. It is responsible for true corrugation wherever that corrugation is seen. The question is: Why does a new, electrically

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operated, straight track, with a thoroughly substantial though rigid substructure and with first-class surfacing and joints, corrugate in about two years? At the start the rail surface is perfectly smooth, no joints have begun to pound, and there are no "bumps," however small, to cause slipping from unequal wheel pressure and stressing of trucks.

The complete corrugation force is the resultant of three forces which act in a fixed straight line. Under certain conditions this resultant is counteracted by other forces, but the fact that the effect when matured is almost universal shows that this resultant force alone is of greater magnitude than the counteracting ones. If still other forces through the mediums of certain alleged causes collectively produced corrugation, or rather acted so as to leave an impression on the wearing surface, the result would not be corrugation as we see it. It would not be uniform and periodic with similar and recurring characteristics. As previously stated, it would be a medley, because the lines of action of these forces are constantly changing, their points of application are scattered and variable and their coincidence or concurrence is so remote as to be an impossibility.

Before proceeding further, the writer wishes to acknowledge that the well-known British engineer, W. W.

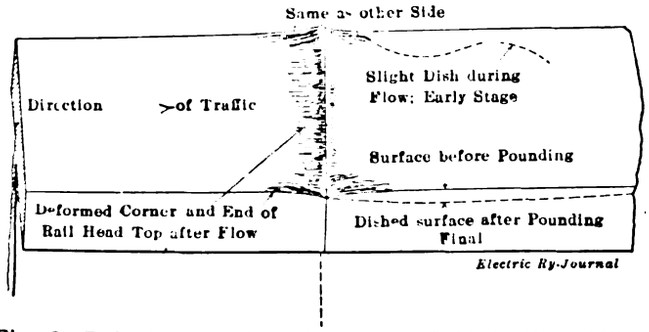

Fig. 8—Rail Corrugation—Effect of Cold Rolling Which Leads to Dished Joint

Beaumont, and G. E. Pellissier have already described the correct cause of corrugation. But that their assertions are capable of demonstration is being shown.

Assume a loaded wheel which if at rest on an area of contact on the rail would transmit a static, compressive stress through that contact area. When the loaded wheel rolls forward at a high enough speed two other new simultaneously acting forces are introduced, as shown in Fig. 5. One of these is the force of rotary motion, and the other that of translation. We have then three concurrent forces acting simultaneously at every infinitesimal instant and on every infinitesimal element of area during the rolling of a car wheel over the track. Of course, there is a certain variable amount of independent forward sliding or skidding, but this is working against the resultant of the other three forces.

But, to make matters worse, the area of contact at any instant approaches a theoretic line or spot, as G. E. Pellissier* and Mr. Beaumont have shown, and the resulting unit stress is far beyond the elastic limit of the rail. In consequence, the metal will flow because the surface of the rail is malleable. Moreover, where the rail is laid on a foundation more or less rigid, the bed acts as an anvil upon which the malleable rail surface may be hammered.

As the rolling load advances, the surface metal on the railhead in the area affected is compressed, and most of it "creeps" forward under the action of the rolling, advancing load. Since the wheels are more or less coned, the intensity of contact and pressure, and therefore the extrusion stress, increases nearer the largest diameter of contact, which is near the gage. Consequently, the metal nearer the gage which is subjected to the greatest and most frequent stresses creeps forward further than the metal of less contact. For this reason, the crest axis is made oblique to the gage line. When the tread makes full contact the obliquity is almost absent. This result is shown in Fig. 6.

As the metal creeps forward it is compacted, becomes denser and harder, and is piled up into a minute crest. This creeping and piling goes on until it has acquired compactness enough to resist the one given load rolling at given velocity over the roadbed of given elasticity. The load then rolls over the minute hard crest and tends to repeat the process and effect upon the next interval of area, leaving another minute hollow with a succeeding crest. After many such rolling loads at high enough velocity have repeated this process, the effect becomes marked enough to be visible as corrugation. Most of the extruded metal forms the crest that is seen on each wave. Some of it flows toward the gage and the back, and can be seen there at each hollow in well-developed corrugation. After the hollow and crest have become developed to an appreciable degree, the wheel tread rolls a full contact in the hollow, whereas it rolls only a partial contact in the crest. As it travels from the lowest part of the hollow to the highest part of the crest the width of contact across the rail diminishes, and in going from the crest into the next hollow the amount of contact again increases as shown in Fig. 7. This variance of contact and flow (after the waves have already become partially established) produces the horizontal boundary curve along the back of the rail side of the corrugation and another along the gage side. That phase of the curve which is in the hollow is concave to the gage line; at the crest it is convex to the gage line. The location of any point of this bounding curve referred to the gage line is a function of the amount or length of contact on which the point lies, as shown in Fig. 6.

If the elastic limit had not been exceeded from the very start, there would have been no corrugation. Sliding friction has rubbed out some corrugation in its first stage of development when the internal resistance of the small amount of extruded metal was not equal to the friction stress. One car caused the initial minute corrugation wave, and the following car, if it happened to skid over it, rubbed it out; but if that following car rolled instead of skidding over it the minute wave was enlarged.

Of course, there is also corrugation on street tracks not laid with or in concrete, although not so much. After the track has been down for some time and loaded often enough, the hard earth under the tie becomes more compacted in some places than in others and loses much of its resiliency. Hence the "anvil" condition arises eventually, although the corrugations will be less and shallower than on hard, unyielding roadbeds. Manganese rail is malleable and consequently is affected in the foregoing way.

There is a reason for the almost uniform length of waves in a series of corrugations on a rail. The wave length is a function which varies directly as the force or load, velocity and malleability of the rail, and inversely as its density. The extent to which corrugation is retarded, prevented or kept down to a minimum is determined by the extent to which the counteracting force of elasticity of roadbed opposes the force which persists in producing corrugation.

CAUSE OF DISHED JOINTS

The cause which is instrumental in producing corrugation is also the primary cause of the dishing of a well-laid joint. Take a perfect substantially spliced joint in city track when it is new. The heads butt well and coincide horizontally with perfect evenness. Under the early stressing some of the metal flows in front and some to the

*See "A New Theory of Rail Corrugation," ELECTRIC RAILWAY JOURNAL, Sept. 30, 1911.

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sides of the wheel. The joint has not yet begun to dish or pound. The loaded wheel rides perfectly smoothly over it. The continued course of the displacement of the metal during flow, as shown in Fig. 8, is broken, partly, at the end of the "delivering" head of such a joint, owing to the fact that there is a seam in the tightest joint unless it is perfectly welded. Since the transmission of flow is thus broken, the end of the delivering head is deformed to a certain small extent laterally and vertically, as shown in Fig. 8. Even then there is no appreciable sign of dishing, but there is a flow with slight deformation. The impact of the rolling load is gradually, though very slightly, increased at the area of flow due to the flow itself, and subsequently it begins to affect the receiving head by its increased momentum. The normal flow on the receiving head is thereupon increased beyond the normal amount. After a short time the joint begins to dish on the receiving head. The dish causes a pounding on that head, and this pounding in turn makes a worse dish. At the same time the pounding produces a dish on the other rail opposite the joint.

Very often there is a secondary dish right next to and beyond the principal dish at the joint. This secondary dish is the result of the continued abnormal flow and consequent pound brought about by what remaining energy there is left in the rolling load immediately after the pounding into the first dish. The rolling caused flow; the flow caused a slight dish; the slight dish then caused pounding. Thereafter the pounding made the dish much worse, without affecting the solidity of the joint.

TIME REQUIRED FOR RAIL CORRUGATION

Frequently, almost or quite before the tangents of a new track have begun to show corrugation a curve on the same line is already well affected. The centrifugal force of the cars rapidly rounding the curve, and the rolling impact increased thereby, increases the stress upon the riding surface of the curved rails. Thus, as the corrugating force on the curve is naturally greater than on the straight track, the curved rail corrugates much sooner and worse. Of course, there is oscillation or appreciable sidewise vibration on some curves, but that alone does not cause the corrugation on curves. It is the rolling process that corrugates the top of the rail.

Corrugation is very slow in developing, and very little of it is to be seen on straight T-rail, which is laid on ballast embankment or over steel elastic structure. If it does develop at all, the rail does not corrugate beyond what might be called the maximum for the governing conditions.

On the Brooklyn Bridge trolley tracks the T-rail and girder rails laid on rigid roadbed on the approaches and anchorages are well corrugated. The T-rails lying on the elastic framed roadway of the bridge span and used by still more cars are corrugated very little or not at all. The little corrugation that does exist is in shorter wave lengths. The bridge tracks used by the elevated railway trains are corrugated, but not by any means so much as they would be if they were not on an elastic structure. The depths of waves on the elevated tracks of the bridge vary from about 0.001 in. to about 0.010 in., the shallower depths predominating. The traffic here is the heaviest elevated service on the system. The trolley car traffic is also the heaviest of its kind.

On outlying surface roads which bear elevated trains and which are laid on partly elastic cinder or stone ballast corrugation develops very slowly, if at all. The waves are 0.001 in. or less in depth where they do occur.

CONCLUSION

The writer believes that the ordinary cold rolling by car wheels is the only cause of corrugation. That this cold rolling may be effective, there must be an anvil upon which to roll the rails. The problem, therefore, is to design a roadbed which will make this anvil effect insignificant.

INSPECTION SHOP BONUS SYSTEM

BY P. V. SEE, SUPERINTENDENT OF CAR EQUIPMENT HUDSON & MANHATTAN RAILWAY

If an efficiency engineer ever attempted to get high efficiency out of the car equipment department of a railroad, his main stumbling block would be the inspection pit. As every railroad man knows, there is no way of "speeding up" this class of work. The usual method is to have a foreman follow the men more or less closely and look over the cars after the inspector is through. The foreman has not enough time to examine all work done by the inspectors, so that the real criterion of efficiency of car inspection is usually summed up in the old saw: "The proof of the pudding is in the eating." In other words, the question is, how common are pull-ins or detentions and other delays to cars reported defective? This criterion is often supplemented by various means of producing interest or fear among the men, such as a comparison of the results of different carhouses and of the delay records of the same months of different years.

The Hudson & Manhattan Railroad has combined two schemes into a bonus system that is producing inspectors who do follow details closely. On the theory that money talks, seven of the men who are responsible for those parts of the work that are most liable to produce road troubles were offered a bonus of 25 cents per day. This bonus is contingent on a week's operation and special weekly inspection to show that not a single detention on the cars passed by each man is chargeable to his work. The men were informed that this was not a raise in pay but a bonus given by the company for careful inspection. The weekly efficiency test referred to is made by a man who is not in the inspection shop organization. This man gets the cars before they come in to his shop and sets a variety of traps to catch the careless inspector. Below is a list of one week's test:

Efficiency Test—Nov. 18, 1913.

Car No. 1954	
No. 7 finger in controller not making contact No. 1 end	O. K.
Bottom disk bent on No. 9 contactor	O. K.
One train line terminal bent out of shape, No. 2 end	O. K.
Cover off marker snap switch, No. 1 end	O. K.
Finger on reverser board No. 2 not making contact	O. K.
Lock washers loose on nuts holding axle cap-bolts, top of No. 2 motor	O. K.
Heater switch bent	O. K.
Clamp holding bell cord, No. 2 end, loose	O. K.
Screws loose holding brass rods swing sash, No. 2 end	O. K.
Eye off ventilator, No. 2 side of car, No. 2 end	O. K.
Car No. 358.	
Screws missing top hanger end door, No. 2 end	O. K.
Bolt missing cab seat, No. 2 end	O. K.
Wire loose on coil, No. 1 door	O. K.
Cotter key missing, brake rod T.T. off slack adjuster	O. K.
Screws holding rheostat, connection loose on No. 3 block	O. K.
Dirty cab, No. 1 end	O. K.
Lock washer on tripper nut bent off T. T.	O. K.
Car No. 331.	
Safety device bent, No. 1 end	O. K.
End door bumper missing, No. 2 end	O. K.
Red hand off gage, No. 1 end	O. K.
Car No. 203	
Seal on brake cylinder cock broken	O. K.
Screws loose holding wire on coil of No. 11 contactor	O. K.
Screws loose holding cable top of No. 14 contactor	Missed
Screws loose holding No. 10 finger in controller, No. 1 end	Missed
Car No. 331	
Screws missing holding snap switch for markers, No. 1 end	Missed

On this list only three tests out of twenty-five were missed. This means an inspection efficiency of 88 per cent. All the tests made were for defects that might occur in service. Some of them, as cutting out a triple valve, are of great importance, while others are such small matters as a loosened screw in the woodwork. As the men never know on what car or at what time the test is to be made, they must exert constant vigilance to prevent being caught.

The inducement to secure the extra $1.50 per week has proved very great. The men show more interest in their work and are keener to suggest improvements and run down reported troubles.

The Board of Railway Commissioners has approved the fares of the Montreal & Southern Counties Railway, on the basis of 2½ cents a mile south of the St. Lawrence.

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Choice of Electrification for a Concrete Case

This Is a Supplement to W. S. Murray's Discussion Before the Canadian Society of Civil Engineers on A. H. Armstrong's Paper Entitled "The Engineering Problem of Main-Line Electrification"

[The ELECTRIC RAILWAY JOURNAL for Dec. 20 contained a telegraphed report of the discussion by W. S. Murray, formerly electrical engineer New York, New Haven & Hartford Railroad, on the paper "The Engineering Problem of Main-Line Electrification" which was presented and read by A. H. Armstrong before the Canadian Society of Civil Engineers at Montreal, Que., on Thursday evening, Dec. 18. Owing to the date of the meeting it was impossible to publish other than a condensation of Mr. Murray's remarks. The following paragraphs give a full account of this part of his discussion.—EDS.]

MR. MURRAY'S COMPARISON FOR A CONCRETE CASE

"Having shown the application of single-phase traction to extremely heavy and dense traffic on the New York, New Haven & Hartford Railroad, let us make a study of the relation of electrification costs to the density of traffic.

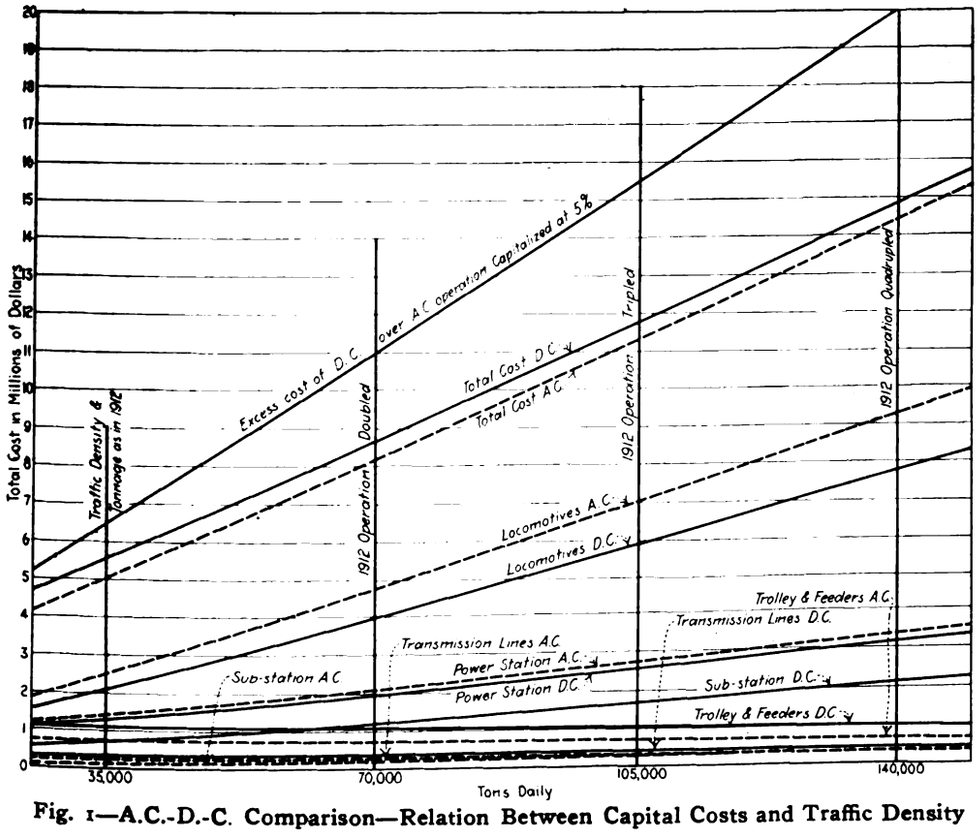

Fig. 1—A.C.-D.-C. Comparison—Relation Between Capital Costs and Traffic Density

"We must again resuscitate the single-phase system in order to compare it to d.c. working, and to avoid being charged with generalizing, an actual case will be selected. This concrete example is offered by a Western railway where the electrification territory comprises a route distance of 119 miles, or a total of 260 miles of single track, including a summit grade rising 3700 ft. with a maximum grade of 2.4 per cent for a length of 12 miles.

"The application of known cost constants of construction was made, and the efficiencies of generating, line and motive power apparatus were included in the consideration of this case. This comparison between the a.c. and the d.c. systems of train propulsion was made upon the basis that the total costs of electrification necessarily increase in proportion to the density of traffic. The curves developed in Fig. 1 start with the translation of 35,000 tons a day over a road 119 miles between terminals. These curves indicate the investment which is required to take care of an increase in density of traffic up to 140,000 tons per diem. The graphs themselves are perfectly self-descriptive in that they are segregated into the major factors going to make up a complete electrification, such as power station, transmission line, substations, feeder, trolley and locomotive costs, with, finally, a summation of the details. It is interesting to note the parallelism of the two lines which represent the total costs for the two systems. However, the grand economic advantage of the a.c. over the d.c. system of train propulsion is graphically expressed by the curve lying above the investment cost for the two systems, for this curve represents the capitalization of the difference in operating cost in favor of a.c. which can properly be charged against the d.c. system of train propulsion. This advantage, although great, is not comparable to that shown in Fig. 2, in which the relative advantages of the two systems are presented upon the very essential operating basis of the number of tons that can be delivered per hour per mile of track. I do not know that I have ever seen the relation of the two systems brought out in a way which shows so clearly the superiority of alternating current.

"Let us refer now to Fig. 2, remembering that the train speeds are entirely dependent upon the amount of voltage that is supplied to the current collectors of the electric engines, that we are dealing with a given weight of train over a given amount of track with a stated number of a.c. or d.c. substations and that the investment cost of the d.c. and a.c. substations is arranged in accordance with the intersection of the lines that represent an equality of cost for investment of apparatus versus cost of power. The average voltage curve of the line as one, two, three or four trains are operated can be plotted for the a.c. and d.c. contact wire. Thus, this diagram develops the average voltage of the line for the increase from the operation of a single train to the operation of four trains, and in turn it shows the decrease of speed which occurs in proportion to the drop in line voltage. It is, therefore, a simple matter to develop from the relative speed relation of the two systems the relative capacity of tonnage delivered per mile of track per hour for each system. This relative rate of tonnage delivered is made clear in the examination of the lines so marked in the figure. An inspection of the curves shows that for single-train operation the capacity of the a.c. system is four and one-half times that of the d.c. system, but that if the operation is increased to four trains in flight, the capacity of the a.c. system rises to six and four-tenths that of the d.c. system. In the consideration of these tonnage capacity curves, it should be emphasized that they apply to the field of heavy traction from which Mr. Armstrong has now so ruthlessly taken the single-phase system.

"Still holding to this specific case, it is interesting to

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refer to Fig. 3, in which the general efficiency of the two systems between the driving wheels of the electric engines and the generators of the power station is compared from two points of view. The first comparison reverses this order by tracing the cost of the electrical energy from the driving wheels of the electric engines to the generators of the power station. The reverse order offers a better opportunity to see the effect of efficiency at its various points of application in the chain. Ordinarily, if serial efficiency between two systems is stated at, say, 15 per cent, it is natural but erroneous to assume that the energy loss in one system is 15 per cent more than that of another. For example, it is noted on the curve in Fig. 3 that the serial efficiency of the a.c. system is 67 per cent, while that of the d.c. system is 54 per cent. Apparently there is a difference of 13 per cent. But now observe that the a.c. system is really much more than 13 per cent superior, for if we refer to the area of the lower curve, which starts at the driving wheels of the locomotives, and integrate the kilowatt-hours required at each step for each system to produce the same train schedule, then on arriving at the power house we find that the generating requirement of the d.c. system is 55,000,000 kw-hr., whereas that of the a.c. system is only 45,000,000 kw-hr. From the ratio between these two amounts, it is seen that the power station which furnishes direct current to the locomotives will have to generate 22 per cent more energy than the power station which furnishes a.c. energy to the locomotive. These figures are based upon the translation of 35,000 tons per diem between terminals 119 miles apart.

"The principles used in Fig. 3 may now be applied to another point of view, as recorded in Fig. 4. By referring

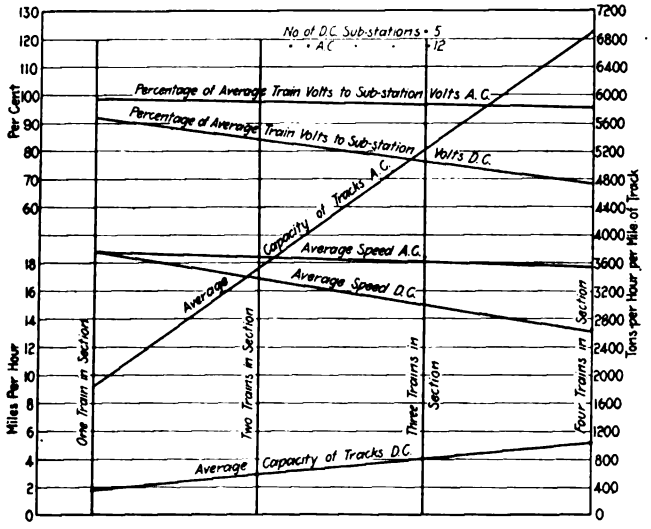

Fig. 2—A.-C.-D.-C. Comparison—Effect of Voltage Drop on Speed and Capacity of Trains

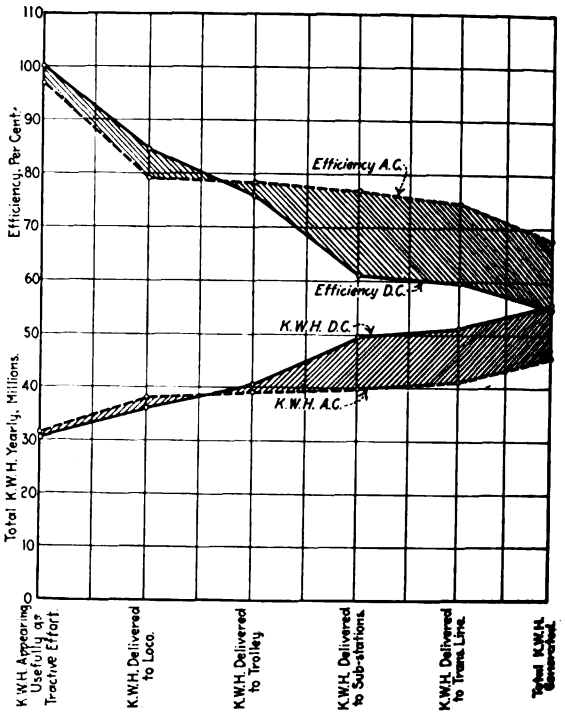

Fig. 3.—A.-C.-D.-C. Comparison—Efficiencies Between Power House and Locomotive

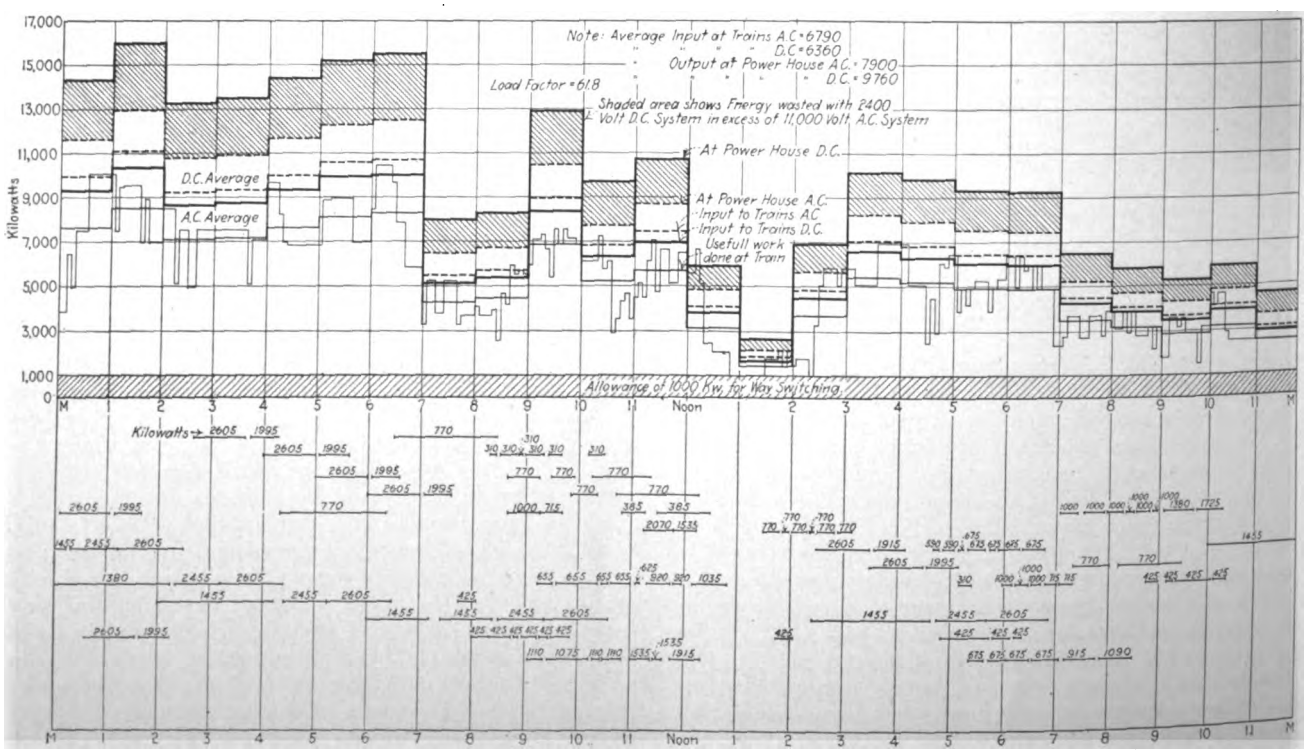

Fig. 4—A.-C.-D.-C. Comparison—Comparison of Train Energy Requirements for Given Schedule

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to the lower part of this figure, the train schedule on the 119-mile section will be found indicated. With the weight and speed of trains known, the actual amount of wheel energy is developed and indicated. It is seen that the difference in weights of the a.c. and d.c. engines is credited in favor of the d.c. The demands for the two systems are so built up that the curve limiting the bottom of the shaded area represents the amount of energy which must be generated for a.c. train propulsion, while the curve limiting the top of the shaded area represents the amount of energy which must be generated for d.c. train propulsion. The area represented by the shaded section indicates the energy loss to which the railroad is subjected because of the use of d.c. train propulsion.

"While Fig. 1 indicates that the power station investment for the two systems is very nearly equated, it can be readily seen from Fig. 4 that a large amount of energy may be saved by using the a.c. system. For example, in the concrete case at hand there is a maximum machine difference of 3000 kw, which could well represent the size of one generating unit.

"To summarize, these curves show that the single-phase system of distribution of power provides a means whereby the railroad manager may feel the highest assurance that trains can be dispatched on time irrespective of track conditions, for it is shown that flights of trains may be dispatched from one up to four with insignificant effect upon the transmission system. On the other hand, the d.c. system of train propulsion, in the absence of proper spacing and resulting congestion, will have its capacity of tons delivered per hour per mile of track lowered to impracticable limits and thereby prove a severe handicap rather than an advantage to the railway operator. It follows, then, that for an equality of heavy traffic conditions the a.c. system of train propulsion can be installed for a lesser investment and with a very much higher economy of operation.

"It should be added here that the estimates made for the 119 route miles in question cover the use of three-phase generators supplying single-phase current and that the extra size of generators due to this practice was taken fully into account. Further, as to telegraph and telephone circuits, experience with single-phase lines has now indicated the method whereby they may be constructed to provide at no extra cost the automatic elimination of electromagnetic induction.

"I do not doubt that there may be isolated cases of short roads in localities with extremely favorable prices for sixty-cycle energy where the high-voltage d.c. system of train propulsion is applicable to heavy trains. Such an example is at present offered by the Butte, Anaconda & Pacific Railway. The development of large sixty-cycle central stations cannot possibly be an argument against the application of single-phase to railway electrification, for it is entirely feasible to change sixty cycles to a lower periodicity for railway application at a cost comparable to, if not less than, that required to transform it to direct current. It might be interesting to have Mr. Armstrong explain the insuperable difficulty in turning sixty-cycle into twenty-five-cycle energy when he eliminates with such ease the difficulties of its transformation into direct current. We admit that the rotary converter is more efficient than the motor-generator set, but we should be assured of Mr. Armstrong's conjoint admission that a.c. is more efficient than d.c. distribution. Strangely enough, however, he specifies motor-generator sets for the substations of 2400-volt d.c. systems, and these machines may well be fairly matched against the frequency changers with the advantage of higher efficiency for the latter."

CONSTANTINOPLE ELECTRIC RAILWAY

On Aug. 4, 1913, the first electrified line of the Constantinople Street Railway was opened with an experimental service. This line, known as Tunnel-Chichli, is single track and gives a four-minute service with trains consisting of a motor car and two trailers. The company now has available forty single-truck motor cars for first-class passengers and seventy single-truck cars for second-class passengers; also twenty new trailers and thirty-one trail cars converted from horse service. The motor cars have cross seats for eighteen passengers and standing room for sixteen more. A movable partition isolates women passengers in accordance with Mohammedan custom. The electrical equipment per car includes two 40-hp commutating pole motors. The total weight of a motor car exclusive of the load is about 12 tons. On account of the grades, which are as high as 7.3 per cent, and the sharp curves all motor cars are equipped with track brakes and hand brakes, while trailers have hand and solenoid brakes. The complete system, comprising three routes with a total of 29 miles single track, will be supplied by a power station transmitting three-phase current at 9600 volts, fifty cycles, to three substations. One of these substations is equipped with two 400-kw rotaries and each of the others with three 400-kw rotaries. These were furnished by the French Thomson-Houston Company, the electrical equipment of the cars by the Siemens-Schuckert and Allgemeine companies and the overhead construction by the Allgemeine Company alone.

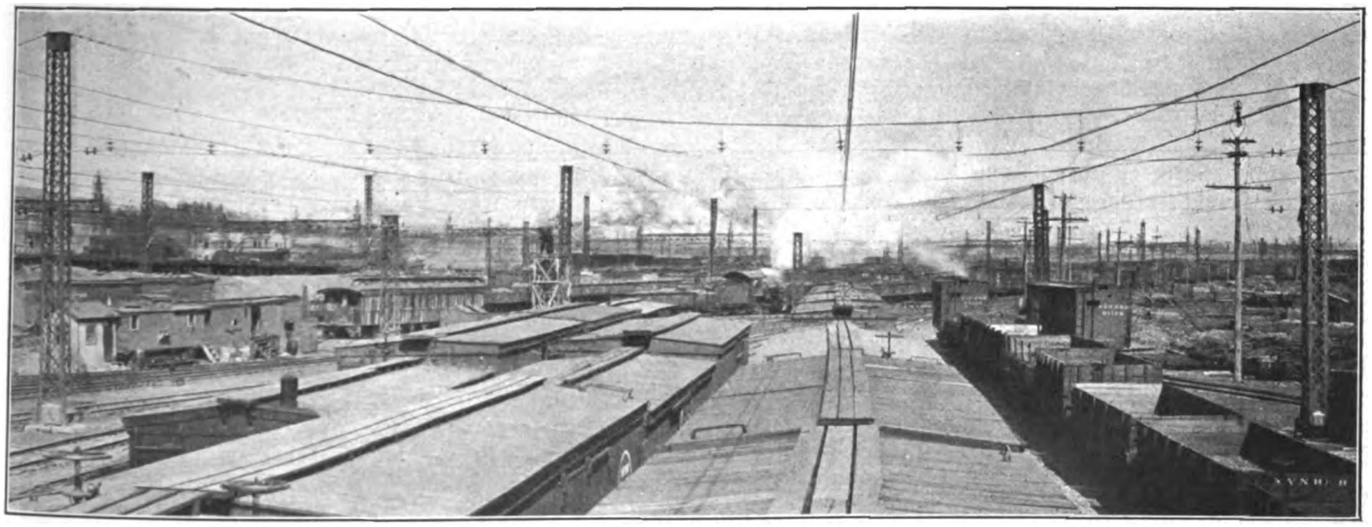

Fig. 5—A.-C.-D.C. Comparison—View of Westchester Yard, New York, New Haven & Hartford Railroad, Showing Simple Overhead Single-Phase Construction

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The Economic Aspect of Benefit Association Work at Montreal

This Article Shows the Sources of Revenue and Character of Disbursements of the Montreal Tramways Mutual Benefit Association and Includes Abstracts from an Actuary's Report Which Indicates That the Income of the Association Should Suffice to Keep It in Good Financial Condition

The Montreal Tramways Mutual Benefit Association was founded in October, 1903, and therefore is among the oldest electric railway organizations of the kind. Unlike most other benefit societies, its financial policy has always been dictated by the vital statistics used by life insurance companies. Exceptional interest should attach, therefore, to the following data from an actuarial report on the condition of the Montreal association as of April 30, 1912, prepared by B. Hal Brown, president and general manager Prudential Trust Company, Montreal. Before these figures are presented, however, it will be illuminating to summarize the sources of income and the character of the disbursements of the association. Its clerical expenses are borne by the company. Accounts of the scope of the association were published in the STREET RAILWAY JOURNAL for Sept. 23, 1905, and Feb. 17, 1906. Patrick Dubee, secretary Montreal Street Railway, has been secretary-treasurer of the association since its beginning.

SOURCES OF INCOME

The association was organized with 1152 members, but by the year 1913 the membership had increased to 3200. The regular source of income consists of an initiation fee of $1 and monthly dues of 50 cents, to which the company contributes amounts equal to 100 per cent of the initiation fees and 50 per cent of the monthly dues. The company also makes a gift of $4,000 at Christmas. The remaining regular source of revenue is the annual picnic, which in recent years has added $8,000 to $10,000 to the funds, or, roughly, $3 per member. This picnic is Montreal's most popular event and, in fact, it has reached such dimensions that larger park grounds must be sought if previous records are to be exceeded. During the week of Aug. 11 to 17, 1913, 150,000 10-cent admissions were sold to Dominion Park, and on the concluding Sunday 45,000 people were in attendance. These enormous figures are due to the popularity of the event and to the encouragement of ticket sales through employees by means of prizes and lotteries. Publicity is assured to the picnic by a reception given to the press on the first night, and this is followed by receptions to other influential bodies.

CHARACTER OF DISBURSEMENTS

The disbursements of the association for sick members are as follows: 60 cents a day for the first ninety days and 30 cents a day for the next ninety days. The death payment is $500, plus $50 for funeral expenses. A pension of 50 cents a day is granted to all retiring employees who have reached the age of sixty-five years and served for not less than twenty-five years. The other expenses of the association comprise medical supplies and salaries for five physicians who spend one hour a day at each car center and visit patients at their homes. Of course, this medical attention and the necessary supplies are furnished to the members without charge. Employees injured in the course of their duties receive some aid, starting from the first day of their disability, and in addition are cared for by the compulsory compensation act of the Province of Quebec.

It may be noted that if men resign after five years' membership they are entitled to one-third of all dues paid in by them less the cash benefits received; after ten years' membership this proportion is raised to two-thirds.

An abstract follows the report made by Mr. Brown in compliance with a request from Mr. Dubee.

NUMBER OF MEN EMPLOYED BY YEARS OF SERVICE

The data on the number of men employed by years of service reveals the interesting condition that a large proportion of the men stay longer in platform service than is customary in other large American cities. Of the total membership of 2795, comprising practically all of the employees, 369 had been in service for one year, 312 for two years, 219 for three years, 173 for four years, 154 for five years, 164 for six years, 140 for seven years, 149 for eight years, 188 for nine years and 109 for ten years. Excluding the first year as one during which discharges and resignations are most frequent, it is found that 1608 men, or 57.5 per cent of the members, have served from one to ten years. To this number of experienced men should be added 818, or 29 per cent, embracing members who had served from eleven to forty-two years. Of men in their second decade of employment, the number for each year ranged from forty-eight to eighty-seven.

AGES OF RESIGNING MEMBERS

Since the association was formed 2877 members out of an enlistment of 5705 have resigned. It is unnecessary to quote their ages in detail as they correspond very closely to the resignations from the service of the company. However, the figures show that the number of resignations among men twenty-one to thirty-one years of age was more than 100 for each age.

SERVICE PERIODS OF RESIGNING MEMBERS

The service periods of resigning members showed that, out of the total of 2877, 1010 resignations, or 35.5 per cent, came from men who had been in the association one year or less; 676, or 23.5 per cent, from two-year men; 319, or 11 per cent, from three-year men; 243, or 8.4 per cent, from four-year men, and 159, or 5.5 per cent, from five-year men, the remainder, or 16.1 per cent, being scattered among men who had been in the association from six to twenty-one years.

YEARS OF SERVICE OF MEMBERS BY AGES

The statement covering years of service of the members by ages showed the following proportions for each age of men who had served less or more than one year: twenty-one years, thirty less and sixteen more; twenty-two years, thirty-nine less and fifty-three more; twenty-three years, thirty-eight less and seventy-seven more; twenty-four years, thirty less and ninety-three more; twenty-five years, eighteen less and 107 more, etc. The proportion of one-year men naturally tend to decrease among the greater ages because they include men who entered the service some years younger and also because older men are less likely to seek a change in position. Platform men are not accepted unless more than twenty-one years and less than forty years old.

MATURING OF PENSIONS

The number of members who will be entitled to pensions will not exceed twenty-five per annum until the year 1925 and will not exceed fifty until the year 1934. Of the remaining years, 1937 will be the heaviest, with 457 pensions. All other years remaining are much lighter.

DEATHS OF MEMBERS

Since the association was organized the total number of deaths has been 141 out of an enlistment of 5705. Fifteen deceased members had been in service one year or less, fourteen two years or less and five ten years or less. For

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all other periods of service the deaths were less than ten each.

INSURANCE CONTRACTS IN FORCE

The insurance contracts in force April 30, 1912, and the average age of groups is shown in Table I.

TABLE I—INSURANCE CONTRACTS IN FORCE APRIL 30, 1912

Class	Number	Total Amount Due for Insurance	Total Amount Due for Burials	Grand Total	Average Age of Group, Years
A. Value of certificate, $500	2374	$1,187,000	$118,700	$1,305,700	32.25
B. Value of certificate, $250	205	51,250	10,250	61,500	49.68
C. Value of certificate, $166.66	107	17,833	5,350	23,183	63.49
Total	2686	$1,256,083	$134,300	$1,390,383	34.82

Total amount in reserve at credit of death and burial fund, $9,219.33.

SICKNESS AND INJURY FUND

Statistics relative to the sickness and injury fund are shown in Table II.

Table II is interesting as showing the variations from $10.77 to $18.58 in the average amount paid per claim, which fairly parallel the range of 18.23 to 33.09 days paid per claim. The members are not paid for the first seven days of disablement. The average amount paid per member ranged from $2.68 to $5.32 per annum.

ACCOUNTS WITH RESIGNED MEMBERS

Since the organization of the association 2877 members have resigned. Since the year 1910 the average membership period of those resigning has ranged from 1.55 years to 2.13 years, their mean age 27.93 years to 28.26 years and their mean period of service 1.67 years to 3.06 years. From these men the association has received $28,230, plus $15,360.75 from the company, in return for which it expended $17,930.85 for sickness and injury and $2,769.99 for medicine. The sum of $680.30 was refunded in accordance with the conditions previously quoted.

FINANCIAL CONDITION IN 1912

Table III shows the revenues and expenses of the association for the fiscal year ended April 30, 1912, while Table IV shows its resouces and liabilities.

TABLE III—REVENUE AND EXPENSES FOR YEAR ENDED APRIL 30, 1912

Revenue	1912	
Accumulated reserve from preceding years		$82,685.01
From members:		
Fees	$611.00	
Dues	15,201.00	
		15,812.00
From company:		
Fees	$611.00	
Dues	7,600.50	
Special donation	4,000.00	
Expenses of management	6,704.11	
		18,915.61
Picnic	$8,149.20	
Interest on investments	4,603.60	
Interest on bank deposits	173.69	12,926.49
Total		$130,339.11

Expenses	1912	
Sickness and injury	$10,274.10	
Medicine	1,725.95	
Deaths and burials	12,533.35	
Medical attendance	2,720.00	
Medical examination	331.00	
Pensions	354.50	
Withdrawals	310.64	
Expenses of management	6,704.11	
		$34,953.65
In bank		8,696.70
Invested		86,688.76
Total		$130,339.11
Accumulated reserve:		
To 1911		$82,685.01
For 1912		12,700.45
Total accumulated reserve		$95,385.46

The revenue of the association was apportioned during the fiscal year ended April 30, 1912, on the following basis: sickness and injury fund, 30 per cent; pension fund, 40.5 per cent; death and burials fund, 2.65 per cent, and withdrawals reserve, 0.03 per cent.

TABLE IV—RESOURCES AND LIABILITIES OF ASSOCIATION, APRIL 30, 1913

Resources		Liabilities	
Cash	$8,844.30	Sickness and injury fund	$6,157.36
Investments	86,688.75	Pension fund	73,652.03
		Death and burial fund	9,219.33
		Withdrawals reserve	6,371.07
		Accounts payable	133.26
Total	$95,533.05	Total	$95,533.05

CONCLUSIONS

Mr. Brown concludes his report in the following terms:

"The provisions advised in 1903 were calculated upon the estimates supplied by the Montreal Street Railway Company, the average experience furnished in actuarial tables being relied upon as the underlying basis. In advising the provision necessary to be set aside annually for certain benefits more or less deferred, it is well known that averages must be employed and, further, that large numbers are dealt with in ascertaining the same; consequently when such are made to apply to comparatively small numbers, as we are doing, it must be expected that the experience realized will vary considerably, either favorably or adversely, necessitating periodical expert examinations, enabling revisions and adjustments to be made which will cause a satisfactory status to be maintained.

"The methods which have been followed in conducting the affairs of the association and recording the experience realized reflects great credit upon those in charge.

TABLE II—STATISTICS RE SICKNESS AND INJURY FUND, 1904 TO 1912

	1904	1905	1906	1907	1908	1909	1910	1911	1912	Total
Average membership during year	1,137	1,416	1,776	1,832	1,891	2,196	2,367	2,565	2,625	2,095
Total number of claims paid	283	520	638	584	497	209	487	603	613	4,734
Total amount paid for sickness and injury	$3,049.95	$6,239.10	$8,706.70	$9,737.00	$7,321.30	$9,457.40	$8,874.90	$10,035.00	$10,278.30	$73,699.65
Average amount paid per claim	$10.77	$11.99	$13.64	$16.67	$14.74	$18.58	$18.20	$16.64	$16.77	$15.57
Average number of days disabled per claim	22.60	24.84	27.70	34.12	30.46	37.09	36.44	34.46	35.04	31.88
Average number of days paid per claim	18.23	20.79	23.87	29.72	26.59	33.09	32.56	30.23	30.54	27.86
Gross amount paid per day	$0.48	$0.48	$0.49	$0.49	$0.48	$0.50	$0.50	$0.48	$0.48	$0.48
Net amount paid per day	$0.59	$0.58	$0.57	$0.56	$0.55	$0.56	$0.56	$0.55	$0.55	$0.56
Average amount paid per member	$2.68	$4.40	$4.90	$5.32	$3.87	$4.31	$3.75	$3.91	$3.92	$4.14

"The results of the operations since organization, are, speaking generally, quite satisfactory and lead to the conclusion that the receipts have been sufficient to provide for the payment of the amounts representing the benefits set forth under the following four headings: (1) sickness and injury; (2) deaths and burials; (3) pensions; (4) withdrawals, the conditions pertaining thereto being fully set forth in the rules and by-laws of the association.

"At date of organization the membership enrolled numbered 1152. In 1912 the membership numbered 2625, and the average membership throughout the period under review numbered 2100. The receipts per capita have averaged $14 per annum. If interest and the variable revenue from the annual picnic be omitted, the per capita receipts have averaged $11 annually. In the latter case the amount is slightly, and in the former considerably, in excess of the contribution advised as necessary, which was $10.96.

"The three sources from which augmented receipts have been obtained are rate of interest, the annual picnic and withdrawals, the returns in each case being greater than was assumed in the original estimate.

"The disbursements for sickness and injury and for deaths and burials have been considerably heavier than expected, while the amounts paid for pensions and withdrawals have been found less than the percentages of revenue allocated thereto and are quite sufficient at least, and probably more than sufficient in the pension fund, to meet requirements for some time to come.

"A reference to the foregoing tabulated statements will show more fully the position and the detailed experience realized which have all been considered in the examination carried on and furnish the bases of this report.

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"It is unnecessary to extend in this report the tables which I have deduced from the recorded experience and have on file for future reference, setting forth the resultts of the calculations employed, inasmuch as you are interested more in the results arrived at than the methods employed.

"The revenue has been allocated for some time past as set out below and has been sufficient to satisfy the expenditures presently arising as well as to create reserves as noted in the subsequent paragraph: to sickness and injury, 30 per cent; to death and burial fund, 26.5 per cent; to pension fund, 40.5 per cent; to withdrawal fund, 3 per cent.

"The financial position at the close of the last fiscal year, April 30, 1912, shows that an apparent surplus has been created amounting to $95,533.05 after providing for all expenditures applicable under the various classes, and this is held as a reserve to meet future requirements.

"I am of the opinion that, assuming receipts from all sources are proportionately maintained in the future, having regard to the number of members, the same will be sufficient for the purposes of the association and provide for the contingent benefits undertaken. Carrying out the principle enunciated in 1903 respecting the interdependence of the classes and the provisions therefor, I beg to advise a readjustment of the reserves held.

"Table V sets forth the present percentages, the amounts held in reserve and the proposed allocation and readjustment both by percentages and amount reserved for each class, taking the revenue of the year 1912 as amenable thereto at $40,950.

Table V—Re-allocation of Funds

Class	Present Method		Readjustment	
	Percentage	Amount	Percentage	Amount
Sickness and injury..	30	$6,157.36	35	$8,204.86
Death and burial	26.5	9,219.33	52	19,661.58
Pension	40.5	73,652.03	10	61,162.28
Withdrawals	3	6,371.07	3	6,371.07
	..	133.26	..	133.26
	100	$95,533.05	100	$95,533.05

"The percentages shown under the heading 'readjustments' in the above table should be continued in allocating the revenue to the four funds respectively, until a subsequent examination of the affairs of the association, which should be made within a period not exceeding three years."

THE TRANSANDINE RAILWAY

The Transandine Railway, which connects the railways of the Argentine Republic with those of Chile, starts from Mendoza and runs along a valley formed by the Rivers Mendoza and Cuevas, which presents many difficulties for railway construction owing to its tortuous course, its narrowness in many places and the steep rise of the valley bed. There are numerous side streams, and the slopes of the mountains on either side of the valley are at such an angle that location work was exceedingly difficult.

The highest point on the line is in the Summit Tunnel, under the Uspallata Pass, where a height of 10,521 ft. is reached, this being some 6700 ft. higher than the St. Gothard summit, but it is considerably lower than other railways in South America; for instance, the summit of the Galera Tunnel of the Central Railway of Peru is 15,583 ft. above sea level. Although the construction of the railway was commenced in 1887, for financial reasons the work was not pushed on with and the line was only completed throughout in 1910.

It was found impossible to locate an adhesion line for the whole length of the line and, therefore, it became necessary to employ a rack system. The locomotives used are four-wheeled, coupled with a leading axle and trailing axle. There are two rack cogwheels engaging with the rack. The hind cogwheel axle is worked by outside cylinders 13 in. in diameter by 18-in. stroke. The front cogwheel runs free and is used only for braking purposes.

SYSTEM OF DISCIPLINING TRAINMEN AND RECORDING TURN-INS AT MUSKOGEE, OKLA.

The system of disciplining trainmen of the Muskogee (Okla.) Electric Traction Company for failure to conform to the rules is original, for instead of discharging or suspending men for violations of the rules, R. D. Long, general manager, instituted a schedule of fines. In many instances the suspension of a trainman for several days cripples the transportation department of small companies and then does not accomplish the desired reformation. Under the fine system, the trainman violating the rules is forced to work for a reduced compensation per hour, depending on the seriousness of his offence. This novel method, after two years' trial, proved equally satisfactory to the men and the management.

Before instituting fines Mr. Long considered the subject of discipline from the quality-of-service standpoint. It was his desire to pay the efficient trainman more wages than the inefficient. According to the usual scale of wages, after a trainman has been in the service five years he receives the maximum wage, and his weekly or monthly income is not affected unless he is suspended. Under the fine system, trainmen guilty of petty violations which would not be subject to a period of suspension under the old system are assessed a small amount.

Prior to the time that this system of disciplining trainmen was adopted, the scale of wages ranged from a 17-cent per hour minimum to 22 cents per hour. This rate was increased to 19 cents per hour minimum and 25 cents per hour maximum at the end of five years' service. Since its inception these results have been observed: Inefficient men automatically discharge themselves when the total fines assessed equal the wages received. The total amount of money collected annually for fines was very small for the first year, and the effect of the discipline was quite marked in that but few men were fined, and new rules as well as the old were carefully observed.

In determining the amount of the fines, the general manager considered every form of violation carefully and then based it on the effort required on the part of the man to bring on the penalty. The table of the fines assessed and effective one full month has not been changed since the system was inaugurated and is as follows:

GENERAL

Ten cents per hour for drinking on or off duty.

Ten cents per hour for failing to report accident on trip when accident occurs and securing all available witnesses.

Ten cents per hour for gambling on or off duty.

Ten cents per hour for failing to flag railway crossings.

Five cents per hour for smoking cigarettes on or off duty.

Five cents per hour for colliding with vehicles or animals.

Five cents per hour for impoliteness.

Five cents per hour for chewing tobacco while on duty.

Two cents per hour for backing car without changing trolley.

Two cents per hour for failing to wear a full uniform.

Two cents per hour for leaving wearing apparel on cars.

Two cents per hour for failing to pull trolley off wire when cars are turned in.

One cent per hour for failing to report for duty on time.

One cent per hour for not displaying proper destination sign.

CONDUCTORS

Five cents per hour for failing to collect and register all fares.

Three cents per hour for failing to enforce the "Jim Crow" law and properly display marker.

Two cents per hour for failing to call streets.

Two cents per hour for failing to keep car clean.

Two cents per hour for failing to give proper signals.

One cent per hour for accepting old transfers.

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One cent per hour for failing to punch transfers properly.

MOTORMEN

Five cents per hour for failing to ring gong on approaching street intersection.

Five cents per hour for sitting down while car is in motion.

Two cents per hour for starting a car on one bell.

Two cents per hour for passing passengers who wish to board car.

Two cents per hour for talking to passengers or trainmen while car is in motion.

Two cents per hour for arriving at end of run more than one minute ahead of time.

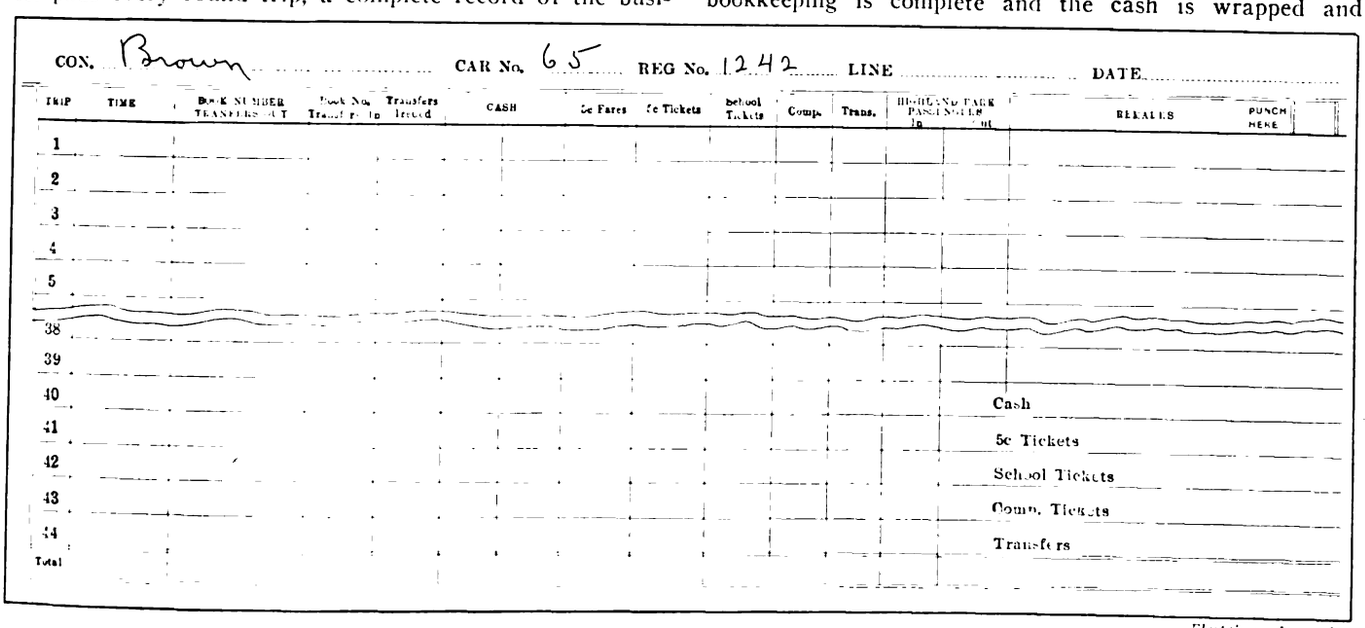
TURN-IN SYSTEM

The turn-in system of the company also is quite original and has proved very satisfactory in operation. A combination dispatcher's and cashier's office is maintained at a central point where all cars pass. This office is located so that the one man in charge has a clear view of street traffic and may know what car is approaching. Essentially the turn-in system includes the exchange of transfer pads every round trip, a complete record of the business transacted on each car for each round trip and the compilation of a complete record of this information, along with reports of accidents and causes of delays, for each round trip. In other words, it is a complete operating performance record to which the manager may refer at any time during the day it is being compiled, and it also forms a valuable record for future reference. The form of this record is shown in the accompanying illustration. One sheet is maintained for each crew. The information recorded is the exact time at which the crew passes the office, the book number of transfers, the number of transfers and the statements contained in the turn-in envelope.

The turn-in envelope is handed to the cashier each round trip, and the conductor in turn is supplied with a new pad of transfers and turn-in envelope. The envelope which the cashier receives contains the tickets and transfers collected as well as a record of the register reading at the dispatcher's office and at the end of the line for both the out and in trips. This system reduces the conductor's calculations to a simple subtraction of his register readings. As this company uses a recording fare box on all its cars, the cash collected is not turned in until a crew has completed its run. An accurate check which may be used in cases of complaint is obtained by requiring an exchange of the transfer pad with each trip and the recording of the number of the pad as well as the number of transfers issued. In many instances the company has been able to produce evidence which could not be refuted by a complaining passenger, and as a result the misuse of transfers has been, for all practical purposes, eliminated.

The cashier furnishes every conductor with $10 change when he takes out his run. When he receives his supplies for the day—that is to say, tickets, pad of transfers and the turn-in envelope—this change accompanies it. As a form of acknowledgment for the change the conductor must punch the individual record sheet which the cashier prepares. When the change is returned at the close of his day he punches the record sheet again, the second punch mark serving as his record of money returned to the cashier.

This system of checking the receipts for each round trip permits the work of compiling office records and checking cash in the fare box against the register record to be distributed over the entire day. Hence when the last car reports in at the end of the last trip at night all bookkeeping is complete and the cash is wrapped and



Individual Turn-in Record of Muskogee Electric Traction Company

ready for the bank. In addition to compiling the performance record, the cashier answers all questions of service, keeps the trouble man informed as to where he is required and takes charge of the accidents reported, making such arrangements as their seriousness may require.

Two men serve as cashiers, one reporting for duty at 5 a. m. and the other relieving him at 3:15 p. m. The second man completes his day when the last car has reported at night. Each cashier checks the other's reports. A third man receives the cash boxes and checks the receipts against the daily reports. At the close of each day a recapitulation of the data shown in total at the bottom of the individual reports is made on a separate report form. This transfer of each record also includes everything which may come under the general head of remarks.

The Cincinnati Traction Company is grinding both steel and chilled-iron wheels. It has been found that the cost of restoring a pair of steel wheels to normal by grinding instead of turning is approximately 20 cents where the cost of turning was 75 cents. All new wheels both chilled-iron and steel are pressed on the axle and ground before being placed in the truck. The new chilled-iron wheels are ground for twenty minutes and the new steel wheels reduced about 1/16 in. in diameter.

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INDIANAPOLIS TRACTION & TERMINAL COMPANY'S METHOD OF INDEXING PATTERNS

Every electric railway, whether it manufactures its own castings or not, is called upon from time to time to prepare patterns for different parts of its rolling stock. This may be due to the fact that the part required is of an old design

Pattern No. ..... *Shelf No.* .....

Name .....

Where used .....

DEPARTMENT	METAL CAST OF	APPROX. WT. ONE CASTING

GATED OR LOOSE PATTERN			CORE BOXES			
NO. GATED	LOOSE PIECES	MATERIAL MADE OF	NO.	PCS.	MATERIAL	CORES TO CSTG.

Remarks .....

Pattern held by .....

Record of Pattern Kept in Office

and is not carried in stock by the manufacturers or that it is possible to obtain quicker delivery from local firms or from the railway company's own foundry. As the number of patterns increases from year to year, the question arises as to whether certain patterns are in stock. When the number is large, it is very difficult to pick out the pattern required unless it has been properly indexed or cataloged.

The shop of the Indianapolis Traction & Terminal Company at Indianapolis, Ind., has passed through this period of accumulating patterns and has experienced the difficulty of a lack of knowledge of just which ones it had in storage. In order to eliminate the delay and errors made in selecting the proper patterns from the stock L. M. Clark, master mechanic, has devised a scheme for requisitioning and indexing his patterns. Four forms have been prepared for this purpose. The first is the requisition which is issued by the different department heads when patterns are required. The requisition is turned into the office to the master mechanic, who approves it and turns it over to the storeroom in case the records show a pattern is on hand. If the pattern has not been made, the requisition is forwarded to the pattern shop. When instructions were issued in connection with the use of this requisition considerable stress was laid on the fact that the correct name of the part must appear on the requisition. These correct names may be obtained from diagrams and tables of various parts of equipment prepared by the mechanical department.

In case the pattern is in stock, the second form, which is called the pattern report, is employed. This report accompanies the pattern to the department requesting it and is an acknowledgment of its receipt by the department head. This receipt is forwarded to the master mechanic's office and affords a record of the disposition of the pattern until it has been restored to the pattern stockroom. From this form, as shown in the reproduction, it will be noted that, in addition to the correct name, the pattern is listed as one of two types, gated or loose pattern. In case it is of either type, the number of gates or number of loose pieces is shown as well as the material from which the pattern is made. A statement of these details is also required for the core boxes accompanying a given pattern.

The office record, which is shown on form three, contains details not only of the make-up of a pattern but the metal from which the casting should be made and the approximate weight of one casting. This form is also a record of the location of a pattern at any given time. In order to make this record complete, it was necessary to arrange the pattern shelves in the storeroom so that the shelves could be divided by partitions and numbered. It was also necessary to give to each pattern an index number which would correspond to the correct name.

In a number of instances it is necessary to send the pattern to an outside foundry for casting. In this case a

INDIANAPOLIS TRACTION AND TERMINAL COMPANY
REQUISITION FOR PATTERNS

MR. 19

PLEASE MAKE THE FOLLOWING PATTERNS AND CHARGE ALL LABOR AND MATERIAL AS SHOWN BELOW

MATERIAL	NAME	WHERE USED	DEPARTMENT	CHARGE

PROBABLE NUMBER OF CASTINGS REQUIRED .....

APPROVED: ..... ORDERED BY .....

MASTER MECHANIC. FOREMAN

Requisition for Patterns

INDIANAPOLIS TRACTION AND TERMINAL CO.
MASTER MECHANIC'S DEPARTMENT
PATTERN REPORT

Mr. ..... M. M. ..... 19....

I have received your order and completed the following Pattern, including Core Boxes, Gates, Etc.

Name ..... No. .....

Where used .....

Ordered by ..... Date ordered .....

MEMORANDUM OF PATTERN PIECES

GATED OR LOOSE PATTERNS			CORE BOXES			
NO. GATED	LOOSE PIECES	MATERIAL MADE OF	NO.	PCS.	MATERIAL	CORES TO CSTG.

FOREMAN

Pattern Report

INDIANAPOLIS TRACTION AND TERMINAL COMPANY
PATTERN NO. .....

NAME .....

MATERIAL .....

WHERE USED .....

DATE SENT TO FOUNDRY 19

GATED OR LOOSE PATTERN			CORE BOXES				SHELF NO.
No. Gated	Loose Pcs.	Material	Number	Pieces	Material	Cores to Cstg.	

REMARKS: .....

PATTERN NO. .....

FOUNDRY .....

IMPORTANT—THE FOUNDRY WILL PLEASE CHECK PIECES RECEIVED WITH MEMORANDUM ON THE OTHER HALF OF THIS TAG. NOTE ANY SHORTAGE ON THIS HALF. RECEIPT FOR SAME IN SPACE BELOW, AND RETURN THIS TAG BY BEARER. NO OTHER RECEIPT IS REQUIRED.

REMARKS: .....

RECEIVED BY: .....

PATT. NO.

SHELF NO.

PTT SENT TO

DATE SENT

ORDERED BY

Tag Used with Patterns Sent to Outside Foundry

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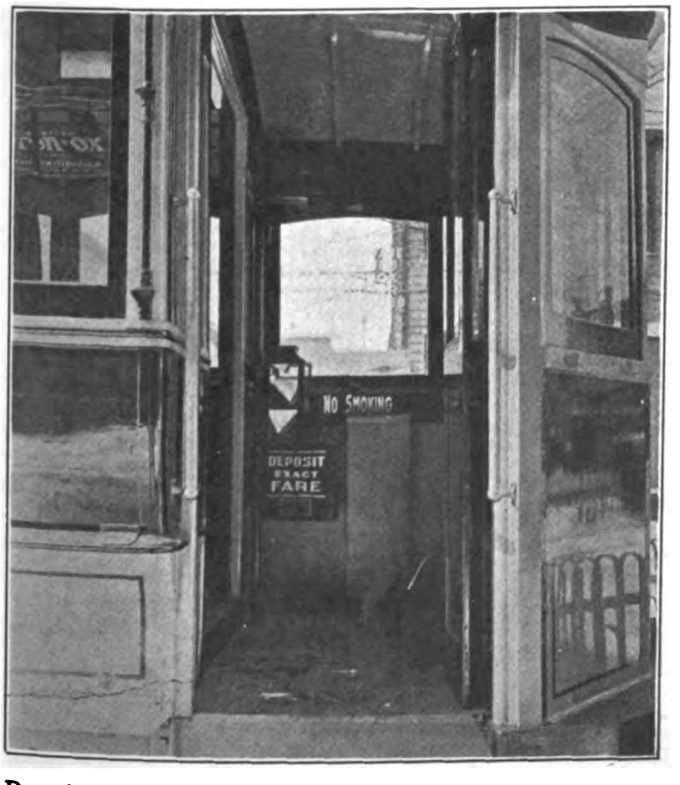
special tag, which consists of three coupons, is applied to each. When the pattern is prepared for delivery to the foundry the first coupon is detached at the storeroom. This forms the record of the pattern sent as well as the party to whom it was delivered. It also contains the date of delivery as well as the name of the foreman ordering it sent. The second coupon is detached by the foundry receiving the pattern. It requests that the foundry check the number of pieces according to the memorandum attached on the third coupon, and that it receipt for the patterns on delivery. The remaining coupon remains with the pattern and is a correct record of the type, number of parts and number of core boxes as well as the correct name and the material to be employed in the casting.

The first coupon, which is detached by the storeroom keeper, is sent to the master mechanic's office and the record it contains is copied on the permanent office record. This permanent office record is changed from time to time and the latest card inserted in the card index. From this it will be seen that not only is a record of the patterns on hand available at any time, but its location in the company's shop or outside foundry is a matter of record. The system is comparatively simple and is working to the entire satisfaction of the Indianapolis Traction & Terminal Company's mechanical department.

ONE-MAN CARS OF THE DETROIT UNITED RAILWAYS

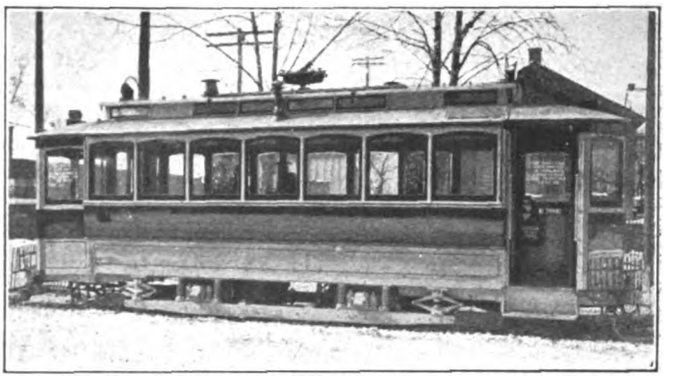
A combination of the one-man operation and pay-as-you-enter principles for lines where the service requires only a single-truck car has been put into successful practice by the Detroit United Railway at Ann Arbor, Mich., a city of 15,000 population. The change from two-men cars was made to reduce the cost of operation and yet give better



Detroit United One-Man-Operated Car—View Showing Platform Arrangement

service than before. While the single-truck, double-end car shown in the three accompanying illustrations had become obsolete for city service in Detroit, it was still serviceable for some of the smaller communities served by this company.

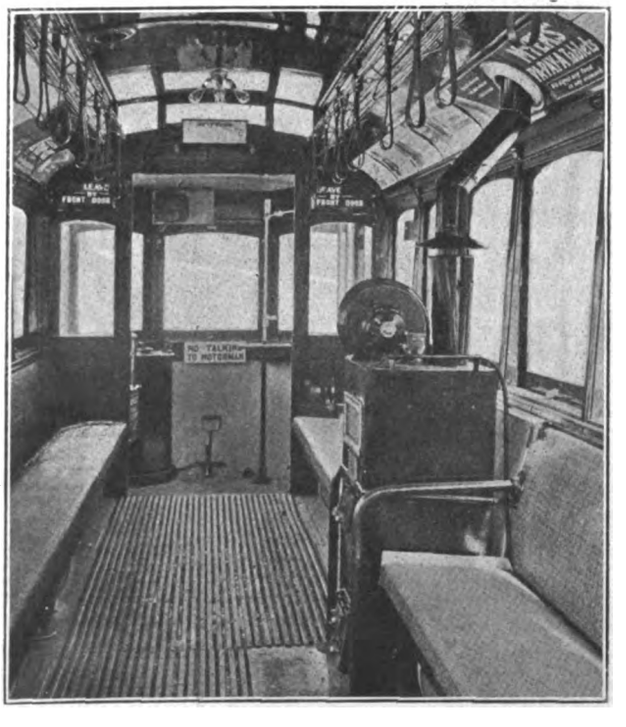
The application of the one-man and prepayment features involved only a small outlay for overhauling compared with the saving in operation. In making the change, it was necessary so to arrange the vestibules that the doors could be opened and closed mechanically by the motorman at one end and locked at the other. The usual manual door-



Detroit United One-Man-Operated Car—General Exterior View

operating mechanism is applied, but the handle can be readily removed for use at the opposite end when the car is turned.

Thus it is practically impossible for a passenger to open the rear door. The removal of the bulkhead, except for a portion as wide as the longitudinal seats, gives the motorman a clear view of the car interior, while a system of push buttons enables passengers to signal for a stop. A non-counting fare box of the Cleveland type is installed in the corner of the vestibule just back of the controller, which is situated on the left side, opposite the entrance doors. This arrangement is convenient for the motorman in observing fare collections, and also leaves a clear aisle for boarding and alighting passengers. In addition to the fea-



Detroit United One-Man-Operated Car—View of Interior Showing Platform Arrangement

tures mentioned the car is equipped with a forced-draft heater and globe-type ventilators. Two "Golden Glow" headlights have been mounted at the extreme ends of the monitor deck. The cars have been rebuilt for this service by the Detroit United Railway at its shops located in Detroit.

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NEW INSTRUCTION METHODS AT ROCHESTER

The Rochester Lines of the New York State Railways have recently devoted considerable attention to the instruction of trainmen, both during the breaking-in period and after they have entered into regular service, an effort being made to reduce to a minimum the amount of verbal instruction given and at the same time to insure that new men are made familiar with all the details of their work. To accomplish these results the company has built 2000 ft. of track on a part of its property on Blossom Road, on which an instruction car is operated. As the track is situated entirely on private property, its operation does not interfere in any way with the schedule of regular cars, and the public is protected from danger due to the handling of cars on the streets by inexperienced men.

Along the instruction track are erected standard signs to designate passenger stops, safety stops, fire-house stops, ends of line and circuit-breakers. The track is laid out to include a curve of 300 ft. radius, a branch-off and a standard loop, of which the switch tongue is sufficiently loose to be thrown from the rear end of a car as it leaves the loop. The instruction car is one of the older cars taken from regular service, with the same equipment as other cars of the same type that are in regular operation. It is proposed to add to the equipment of the track a number of movable dummies to represent vehicles and pedestrians that may be made to cross over or approach the track in front of the instruction car.

At the time of employment the company requires a deposit of $12.50 from conductors and $10 from motormen and a fee of $1 for a physical examination. Applicants must also purchase a cap and make a first payment of $5 on their uniforms, making a first cost of $19.75 for conductors and $17.25 for motormen. While this large cash requirement may prevent a number of desirable men from entering the service, the company considers that it also reduces the number of "floaters." The deposit with the company may be made in instalments when such procedure is desirable in the opinion of the employing official.

After making their deposits and receiving the necessary badges and equipment, students report to the instructor at the school. Here they are shown how to copy their time from the blue-printed schedules, the use and importance of which are explained. They are then sent out to the instruction car and make a number of trips back and forth on the track. The conductors are drilled in working up trip sheets, registering fares, punching transfers, giving bell signals, changing trolleys and other details. They are also taught how to stop a car with air and hand brakes. At the same time the motormen are instructed on the equipment of the car and how to locate trouble and are drilled in the use of the controller and the air and hand brakes. They are also taught to examine facing switch points and how to operate past the standard circuit-breakers, stop signs, etc. After the men have become familiar with their work on the instruction track they are sent out on cars in regular service to learn the lines of the division to which they are assigned. Students are kept at work on the instruction car until the instructor is satisfied that they are thoroughly conversant with their work. They are, therefore, able to commence active work on their first day of practice on the road, and the time that is usually spent watching the regular men and finding themselves on a car is considerably reduced. This method of preliminary instruction has this advantage over instruction on dummies in a schoolroom that some visible result follows each effort of the student in his work. For instance, the motormen will not start on bell signals improperly given, which demonstrates to the conductor the necessity of giving his signals distinctly, and the motorman learns by actual test that he cannot start a car with the trolley off or the rear brake set. These facts can be much more firmly impressed on the mind by a few minutes of actual demonstration than by several hours of verbal instruction.

The time spent on the instruction track varies with each individual, ranging from five hours with very bright students to three days with others. From the way the men pick up their preliminary work it is possible to form some opinion of their capabilities and of the amount of attention which they must receive later when they engage in regular service.

Experience during the past year has shown that when students are sent out on the road after this instruction they are familiar with the mechanical part of their duties and therefore are able to devote more attention to the operating rules and other details of their work in actual service. Motormen, for instance, know how to handle their brakes and controllers and can therefore concentrate on watching vehicular traffic, operating electric switches, locating section insulators and so forth, while conductors can pay particular attention to learning streets, collecting fares and issuing transfers, being already familiar with the entries on trip sheets, bell signals, etc.

Conductors average seven days of practice on the road, and motormen are required to practise ninety hours before returning to the instruction department for final examination. Motormen are questioned on details of the equipment, cutting out motors, schedules and operating rules, and conductors on trip sheets, transfers, fare collection and registration, accident prevention and accident reports. The instructor also goes over the rule book and bulletin book with all men and discusses various features of operation on individual lines, such as where to watch trolleys, what kind of a load to expect, where to begin collecting fares, how to make up time, when to run carefully and so on.

After this examination and instruction, trainmen are put to work on the extra list and are followed up by the traveling instructors, who ride with them four or five times a day during the first week and less frequently as they improve in their work. Reports are sent in daily to the supervisor of instruction, who thereby keeps in touch with the performance of the men and can call them in for additional instruction if necessary. He also investigates accidents of men under six months in service, putting them back on the road for additional practice or giving such other supplementary instruction as may seem advisable. By keeping in as close personal touch as possible with the men, he endeavors to instil a feeling of loyalty to the company and to promote co-operation between the men themselves. All men are given to understand that the instructors are not directly concerned with the administration of discipline and that no demerits, under the merit and demerit system, are given on account of any report made by them. While it is a part of the instructors' duties to note violation of rules and warn the new men at fault, their chief endeavors are directed toward helping and encouraging the new men and making their work as easy and as interesting as possible. The company thereby hopes to be able to keep the men in the service and reduce to a minimum the continual change in the personnel of the operating department.

The instruction department is in charge of the supervisor of employment and instruction, George Lawson, who also investigates reports of accidents and violation of operating rules of men under six months in the service. He is assisted by a chief instructor and five traveling instructors, one of whom is assigned to the motormen of each of the divisions, one to the conductors and one to the instruction car.

Manager Anderson of the Sandwich, Windsor & Amherstburg Railway, Windsor, Ont., notified all street car crews recently that beards would no longer be tolerated by the company. Furthermore, each man is required to report for duty with his shoes shined and a clean collar.

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LETTER TO CONGRESS BY AMERICAN ASSOCIATION COMMITTEE ON MAIL COMPENSATION

The committee on compensation for carrying United States mail of the American Electric Railway Association has sent a letter to Congressman Moon, chairman of the House committee on post offices and post roads, as stated previously in the ELECTRIC RAILWAY JOURNAL. An abstract of the letter follows:

INDEPENDENT CAR SERVICE

"As to the criticism of Second Assistant Postmaster-General Stewart, it is principally that the compensation to the carriers will be increased. As the present rate for independent cars is 1 cent per linear foot of inside measure, and as the proposed rate is 1½ cents, the Second Assistant Postmaster-General is correct in his conclusion that the cost would be increased 50 per cent, or approximately $198,331.43 per annum; 25 per cent additional equipment must be held in reserve to allow for inspection, maintenance and accident.

"A minimum mileage of 30,000 per car for each car required to perform the service would undoubtedly in some instances cause a further increase in the cost, but the Second Assistant Postmaster-General fails to take into consideration in his criticism salient features of this independent car service.

"The carrier in order to perform the exacting service of the Post Office Department must keep the equipment in the very best physical condition to avoid failures and delays. A right-of-way must be accorded mail cars over all others. To perform the service efficiently the best class, and therefore the highest paid class, of operators must be assigned to the mail cars. Each of these items imposes expenses in excess of the expense incident to the operation of passenger cars, the prime object and duty of the carrier.

"The service of carrying mail by electric or cable cars is a substitute in cities and interurban districts for wagon or automobile service. If the carriers discontinue the service by cars, what would have been the increase in cost due to wagon or auto service before the parcel post law became effective, and what will be the increased cost of wagon service now that the parcel post law is in effect?

"The cost of wagon transportation, as shown by the reports of the Postmaster-General, is approximately 30 cents per mile (without the facilities for 'make up' and 'pouching' accorded by car service), while the cost per mile for car service will be, for a 16-ft. car at 1½-cent rate, but 24 cents, and for a 20-ft. car 30 cents per mile, and for the proposed maximum cars—30-ft.—45 cents. The capacity of a 16-ft. car is equal to the largest wagon or automobile, and the 20-ft. and 30-ft. cars are proportionately larger.

"Detailed data as to the cost of equipment, depreciation and operation have been furnished by the Boston Elevated Railway and the Brooklyn Heights Railroad, two of the carriers making the greatest mileage, and under conditions which should make their operating expense as low as, if not lower than, the expenses of smaller carriers. These data show conclusively that the service of the roads is rendered to the United States government at an actual money loss to the carrier. In these data no account is taken of the liability to loss due to accident to pedestrians and general street traffic. The mail-car schedules are all shorter than the passenger schedules and therefore require a greater speed and a consequent greater hazard to life and property, followed by a greater money loss in payment of damages.

POUCH SERVICE

"Three pouches (maximum 50 lb.) are the equivalent of the average passenger, 150 lb., and the space occupied is somewhat greater. The passenger fare is 5 cents for a varying distance, therefore the compensation is not disproportionate for the service rendered. When the number of mail pouches in a consignment is increased, the carrier performs an increased service and there should be an increased compensation paid. Business throughout the world is conducted upon this basis.

"The criticism of the Second Assistant Postmaster-General complains that the proposed law is impracticable because the Post Office Department cannot tell in advance what its expenses are to be. This, if correct, is unfortunate from the Post Office Department standpoint, but should not be advanced as a reason for not properly compensating the carriers for the service they render. The Post Office Department used as its yardstick a mile of travel regardless of the bulk or weight. We ask that, in using the yardstick of a mile of travel, limitation of the bulk and weight be fixed for the protection of the carrier, particularly with the increased amount of mail being thrown upon the carrier because of the parcel post law. There is one road in the far West that at times has such a bulk of mail matter thrown upon it for delivery under the pouch service that passengers cannot get on the cars on account of the amount of mail. In several instances on the Brooklyn Heights Railroad the amount of mail matter was so great as to prevent the motorman from properly operating his car, and thereby endangered the lives of every passenger on the car. It would be eminently unfair to expect the carrier to exclude the passengers and operate the car at a rate of 3 cents per mile.

"The intention of the bill is that each consignment be paid for at the rate of 5 cents per mile for the first three pouches within the limit of 5 miles; for each mile beyond the 5-mile limit, 3 cents per mile is charged for the consignment of three pouches. Each pouch in the consignment over three would require 1 cent per mile for its transportation.

"The proposition of the Post Office Department to pay the carriers on the basis of 6 per cent upon the capital invested is not believed to be a practicable proposition, as it is not believed that the Post Office Department and the carriers could ever agree upon the valuations involved.

"We therefore again respectfully refer to the report of the committee dated May 14, 1912, which states very briefly the position of the companies which this committee represents in regard to proper compensation for carrying mail, and which recommends the rates shown in the accompanying table.

RECOMMENDED RATES

CLOSED POUCH CITY OR SUBURBAN SERVICE

From one to three pouches (inclusive), maximum weight 50 lb. per pouch, carried on passenger cars— Per Annum

For 2000 miles or less..... $150

For 2000 miles and up to 3500 miles..... $175

Over 3500 miles for each consignment moving 5 miles or less, 5 cents per mile; each mile in excess of 5 miles, 3 cents per mile.

All pouches in a consignment in excess of three, 1 cent per mile per pouch additional.

Deliveries to and from the car to be made by the Post Office Department.

CLOSED POUCH INTERURBAN SERVICE

Maximum compensation paid steam railroads for like service.

RAILWAY POST OFFICE SERVICE

For independent cars or compartments in cars—

City service: 1½ cents per linear foot of interior length per car mile.

Interurban service: Maximum compensation paid steam railroads for like service.

Minimum mileage either city or interurban service to be 30,000 miles per year per car required in service.

"The condition of the companies two years ago was onerous, and therefore, as a result of the passage of the parcels post law and the increased cost of labor and material, is now very much more so. A great many of the companies represented by this committee are considering, in justice to the interests which they represent, the advisability of discontinuing their mail service, and of this number a few, we understand, have directly notified the Post Office Department within the comparatively recent past of the discontinuance of all or a portion of their railway mail service.

"It is eminently proper that the electric railway companies of the United States, occupying the unique position they do, should be of inestimable value to the postal service and to the public, and it is the desire of these companies

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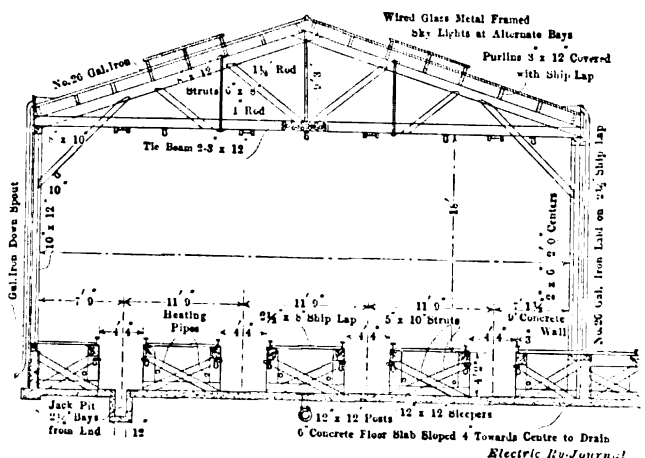
that they shall have more of this work to perform, with the assurance from them to the Post Office Department of their earnest co-operation in maintaining the highest kind of efficiency to the service, but it is absolutely unfair and inequitable that they should be called upon to render this service, not only without a fair return, but absolutely at a loss."

The letter is signed by the chairman of the committee, Matthew C. Brush, second vice-president Boston Elevated Railway.

An exhibit sent with the letter is a copy of the report made on May 14, 1912, to the committee of Congress by a sub-committee of the association committee.

AN INEXPENSIVE CARHOUSE

A carhouse which has just been completed for the British Columbia Electric Railway Company in Kitsilano, one of the outlying districts of Vancouver, B. C., has been designed to require the absolute minimum initial expenditure compatible with a layout which can be readily extended for a much greater capacity. At the time of construction storage room sufficient for sixty-four city cars had to be provided as speedily as possible, but the necessity for housing was not urgent, and consequently half of the



Elevation of Closed Section of Kitsilano Carhouse

proposed building area was inclosed and the remainder was left open. In the open section, however, the construction below the rail level was exactly the same as in the inclosed portion, so that the housing could be extended at any time without any change in foundations. Open and inclosed sections each have plan dimensions of 52 ft. x 400 ft.

A distinctive feature of this carhouse is that all the tracks, both indoors and out, are supported on timbers so that the rail base is 4 ft. 2 in. above the depressed floor level. The rails are laid on 12-in. x 12-in. stringers, supported every 8 ft. by 12-in. x 12-in. posts, as shown in the sectional drawing. Thus on each side of the track there is a clearance of 3 ft. 2 in. between floor and the lower side of the stringer, affording easy access to the under side of the car.

In the work of erection the site was first excavated to a depth of 4 ft. 8 in. below base-of-rail level, and by a steam shovel the cost of this work was kept down to 35 cents per cubic yard. The site was practically all underlaid by hardpan, and after the surface was carefully leveled and rolled a concrete floor slab 6 in. thick was poured, and 9-in. walls were built up to the street level. The floor slab has no expansion joints but is reinforced with wire cloth to take care of temperature stresses. It has a slope of 1 in. in 6 ft. toward the center line of indoor and outdoor sections alike. Beneath the center line of each section an 8-in. vitrified tile drain was placed into which rain water is conveyed through the floor slab by downspouts placed 20 ft. apart. Lines of 4-in. agricultural tile are placed laterally on 20-ft. centers to drain the subsoil. These empty into the 8-in. drains on the center lines. The only break in the continuity of the floor slab is that made to provide for a jack pit, 1 ft. wide and 3 ft. deep, extending for 200 ft. under the track nearest the west wall. In order to distribute the loading on the floor slab in some parts where the quality of the foundation is not quite up to standard, 10-in. x 12-in. sills are placed beneath each pair of stringer posts. In this connection it may be said that a carhouse was recently constructed by this company on similar lines at a site where the foundation was comparatively soft, and in this case piles were driven at such points that a pair of piles came under each sill.

When the housing is extended to cover that part of the carhouse which is being left open for the present, a concrete partition is to be built between the two halves to serve as a fire wall. For the present this wall consists of a timber frame covered with galvanized iron. Special provision was made for the future construction of this fire wall by covering the framework of the present wall with ship-lap before the galvanized iron was put on, the idea being that the galvanized iron could be removed and the ship-lap used as half of the formwork when the concrete was placed. The roof truss is the simplest form of wood construction and supports a galvanized-iron roof.

Fire protection is provided in the inclosed section by a sprinkler system and on the outside by five monitors mounted on towers. These monitors are placed at the outer edge of the exposed trackage so that they will be on the center line of the ultimate yardage when the present outdoor area is doubled. The monitors are spaced 50 ft. apart and serve an area with a maximum radius of 65 ft. Their maximum range is 70 ft. when a 2½-in. nozzle under the normal pressure of 100 lb. per square inch is used. The monitors are about 20 ft. high, having a base set in cement, and they are constructed as self-supporting 6-in. standpipes, to which are attached iron ladders and grid platforms, the latter being just large enough for the operators.

Lighting for the inclosed section will be effected by 100-watt metal-filament lamps attached to the roof-truss tie-beams, which are 18 ft. above the rail level. The lights are placed over the aisles between the tracks, one lamp being provided for each 192 sq. ft. of floor area. Sockets are provided on the timber work beneath the rails for the repair lamp plugs. All wiring for lighting purposes is in galvanized conduit. The inclosed section is to be heated by low-pressure steam pipes 3½ in. in diameter, which are attached to the stringer posts under the rails. In zero weather it is planned to use a steam pressure of 5 lb. and to keep the pipes at a temperature of approximately 40 deg. Fahr.

The inclosed section complete, including all construction and material costs, except heating and sprinkling systems, was 2½ cents per cubic foot. The carhouse was designed by R. Lyon, architectural engineer for the British Columbia Electric Railway Company, and it was constructed entirely by day labor under supervision by the company's regular engineering force.

Three pamphlets have been recently issued by the Forset Service, United States Department of Agriculture, in regard to the wood-using industries of Florida, Iowa and Minnesota. A page in each report is devoted to a description of the extent and kind of wood used for car construction in each of these three states, respectively. Tables are given showing the quantity in feet, average cost per 1000 ft. and total cost of each kind of wood in each state. Of the 4,146,600 ft. used annually for car construction in Iowa it is estimated than 1,000,000 ft. is employed for street car construction.

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DRIVING SYSTEMS OF ELECTRIC LOCOMOTIVES*

BY F. LYDALL

I propose to give a few details of the drive of various electric locomotives actually in service or in course of construction. The list does not pretend to be exhaustive, but it is intended to give an example of each different class of locomotive.

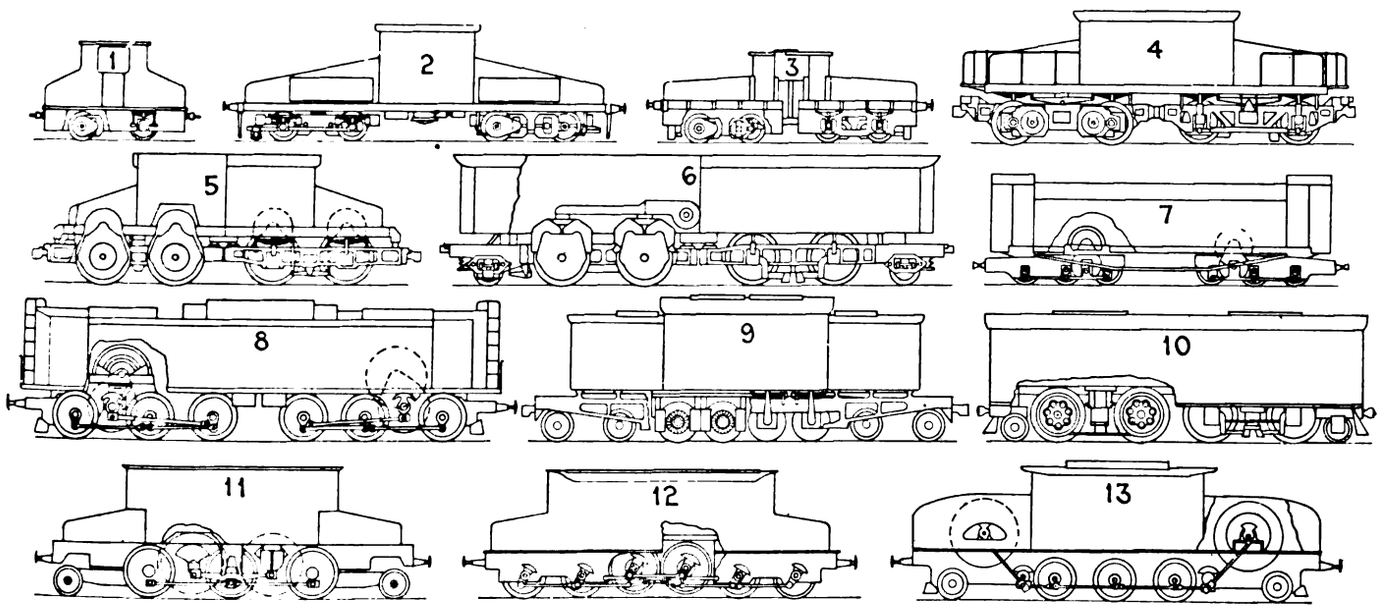
Fig. 1—Simple type of two-axle locomotive with central cab and sloping ends. The motors are supported with the tramway type of suspension and are geared to the driving axles.

Fig. 2—Simple locomotive. The body is built on a frame of steel channels, etc., and usually consists of a central cab between sloping ends. The body rests on a pair of four-wheel trucks, each equipped with two motors geared and suspended as on street cars. The illustration shows the freight locomotive supplied to the North-Eastern Railway by the British Thomson-Houston Company. This class can also be constructed with a sunk cab, provided there is sufficient space between the trucks.

Fig. 3—Articulated four-axle locomotive. Under certain circumstances the foregoing locomotive may fail when used for hauling trains round very sharp curves. Under such circumstances it is very probable that the buffers of the locomotive will get locked with those of the wagons. To overcome this difficulty there are two possibilities: first, to put the buffers and drawgear on the trucks; second, to construct the locomotive in halves articulated together with links, each half having two fixed axles with motors geared to them in the usual way. The latter alternative, at all events for moderate-sized locomotives, leads to a cheaper and simpler construction, but where powerful engines running at fairly high speeds are required the former alternative is probably to be preferred. The locomotive shown is one of those supplied to the Harton Coal Company by the Siemens Brothers Dynamo Works.

Fig. 4—Articulated locomotive. The difficulty of constructing a double-truck locomotive capable of exerting a tractive effort equal to the strength of standard drawbars, in such a way that the truck centers are not subjected to excessive stresses, can be met by articulating the two trucks at their inner ends and fitting buffers and draft gear on the outer ends. One truck center is fixed and the other is free to move within small limits so as to allow the trucks to radiate. The locomotive body, which in this way is not required to transmit any draw or buffing stresses, is carried by the trucks in the ordinary way and provides accommodation for the driving equipment, the control gear and the brake apparatus. The drawing shows the Detroit River tunnel locomotives of the Michigan Central Railroad. Similar locomotives are in use in the Baltimore & Ohio Railroad tunnel, Baltimore. To insure easy riding the spring suspension system is specially designed with a view to flexibility. The bearing springs on one truck are equalized longitudinally; on the other truck the bearing springs of one axle are suspended from fixed points, those of the other axle being equalized transversely.

Fig. 5—Locomotive with raised motors. The general arrangement of a locomotive of this class is shown in the drawing of the New York, New Haven & Hartford Railroad. The motors are geared to the driving axles, but instead of being in the usual position they are vertically above the axle. To allow the ordinary vertical movement of the axle boxes without any corresponding movement of the motors the wheels are driven by spring couplings attached to spiders carried by hollow shafts surrounding the axles. The gear wheels which mesh with the pinions on the armature shafts are mounted on these hollow shafts.



Figs. 1 to 13—Locomotive Drives—Diagrams of Arrangements

Fig. 6—Locomotive with twin geared motors. The drawing shows the articulated locomotives of the New York, New Haven & Hartford Railroad. This is a modification of the type shown in Fig. 5, each single motor being replaced by a pair of smaller motors gearing on to the same gear wheel on the hollow shaft. As the maximum speed is fairly high, each truck is fitted at its outer end with a pony axle.

Fig. 7—Locomotive with geared motors and connecting rods. The drawing shows the locomotive on the St. Pölten Mariazell Railway, Austria. The body is carried on two three-axle unsymmetrical trucks, each equipped with a single motor geared to a countershaft. The countershaft which carries the gear wheel is slightly above the driving axles and is connected with them by cranks and slotted connecting rods. The brasses of the crank pins on the countershaft cranks fit in the slots in the connecting rods, so that the driving axle boxes are free to move up and down without transmitting their vertical movement to the countershaft. The motor is mounted on the top of the truck frame and is situated between the center and the inner end of the truck, the truck pivot being displaced from the geometric center toward the outer end. The locomotive was designed for a narrow gage, the special advantage of the construc-

*Abstract of paper on "Electric Locomotives" published in the *Journal of the Institution of Electrical Engineers*, London, October, 1913.

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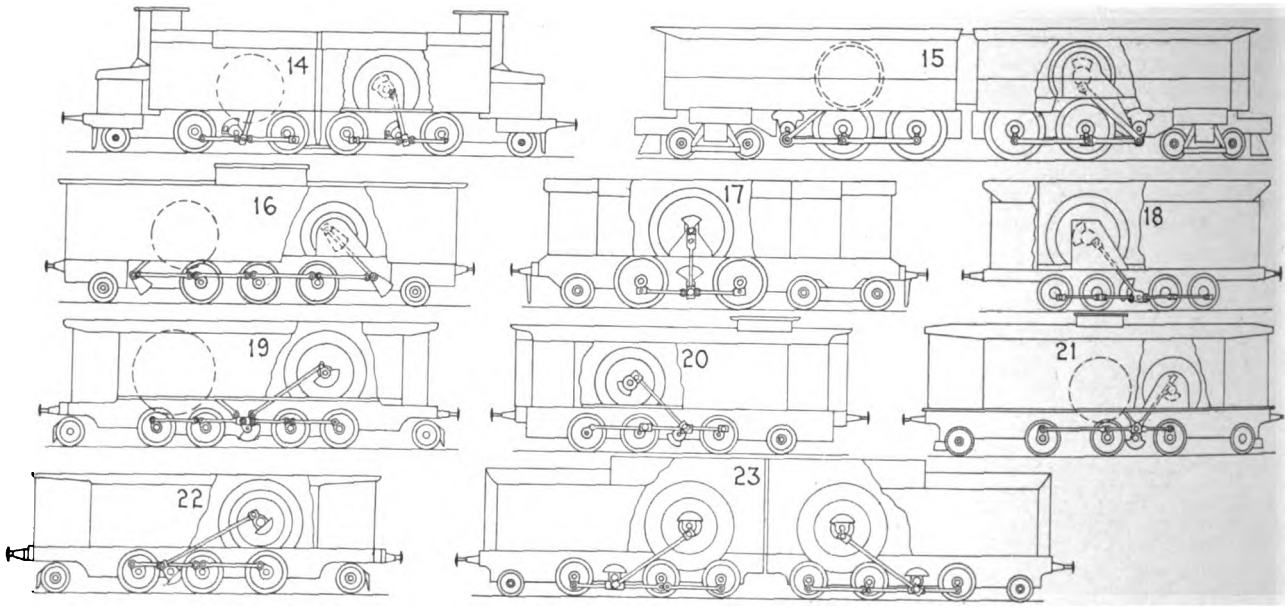
tion being that the motor is not limited in width by the space between the wheel flanges.

Fig. 8—Bogie locomotive with geared motors and connecting rods. The drawing shows the locomotive supplied by the Oerlikon Company for the Lötschberg Railway. This is very similar to Fig. 7, the principal difference in the mechanical arrangement being the substitution of the slightly inclined connecting rod between the countershaft and the inner driving axle of each bogie for the slotted connecting rod already described.

Fig. 9—Gearless locomotive with armatures built on the driving axles. The principal example of this construction is the d.c. locomotive of the New York Central & Hudson River Railroad. The special feature of this design is the construction of the motor as a two-pole motor, the armature being built direct on the driving axle and revolving between two vertical pole pieces. The pole tips are chamfered off just sufficiently to allow the axle with the armature and the wheels to be removed without in any way interfering with the field magnets. The field-magnet system of the four motors forms part of the frame of the locomotive. The ture of this design is the arrangement of the leading and trailing driving axles that are allowed to radiate and yet are coupled up with the other driving axles by standard connecting rods.

This is effected by mounting the outer pairs of wheels on hollow shafts surrounding the actual driving axles. The latter run in fixed bearings and are coupled up by cranks and connecting rods to the other driving axles. The hollow shafts are fitted at their centers with flexible half-couplings engaging with similar half-couplings on the fixed axles passing through them, so that the wheels are driven by the fixed axles but are at the same time free to radiate. The drawing shows the Brown-Boveri locomotives for the Simplon tunnel.

Fig. 13—Class 1-C-1 locomotive with two jackshafts, and two motors mounted in the ends of the body. The drawing shows the locomotive of this class built by the Maffei Company, Munich, and equipped by the Siemens-Schuckert Company for the Wiesental line of the Baden State Railways. Ten locomotives were ordered, but the one shown was built first in order that the design might be



Figs. 14 to 23—Locomotive Drives—Diagrams of Arrangements

locomotive has a leading and a trailing four-wheel truck to permit high-speed service.

Fig. 10—Gearless locomotive with motors built on hollow axles concentric with the driving axles. The drawing shows a New York, New Haven & Hartford single-phase d.c. locomotive of this class. The hollow axle, or quill, on which the motor is built is bored with sufficient internal clearance to permit the usual vertical movement of the axle boxes in their guides without actual contact between the quill and the axle. The quill carries at each end a spider which forms a flexible coupling with the driving wheel. The locomotive is arranged as a double-truck machine, each truck having two driving axles and a single-axle sub-truck at its outer end.

Fig. 11—Class 1-C-1 locomotive with two motors coupled to three driving axles by one pair of slotted connecting rods and two pairs of ordinary connecting rods. This design has been worked out on the Continent, by Kando, and is used on several railways, including the Valtellina Railway in Italy and the Simplon tunnel line connecting Switzerland and Italy. A similar arrangement is used on the Giovi Railway locomotives, except that all five axles are coupled together. The drawing shows the Valtellina locomotives.

Fig. 12—Class o-D-o locomotive with two motors driving four axles by ordinary connecting rods. The principal feathoroughly tested before the others were put in hand. The tests were carried out on the electrified line between Dessau and Bitterfeld with very good results. The remaining nine locomotives are now being built to a slightly modified design, shown in Fig. 21.

Fig. 14—Class 1-C-1 locomotive with two jackshafts and two motors mounted near the center of the locomotive body. The drawing shows the locomotive supplied by the Allgemeine Elektricitäts Gesellschaft to the Chemin de fer du Midi in France. This experimental locomotive is one of six ordered in 1909 from six different electrical firms and set to work in 1912.

Fig. 15—Class 1-B + B-1 articulated locomotive with one motor and one jackshaft in each half. The motor is mounted in the body, nearly but not quite vertically above the jackshaft, the latter being coupled to the motor shaft and the driving axles by cranks and connecting rods in the ordinary way. The drawing shows the locomotive ordered from the Allgemeine Elektricitäts Gesellschaft for the Lötschberg Railway.

Fig. 16—Class 2-B + B-2 articulated locomotive with one motor and one jackshaft in each half. In this case the jackshaft is not immediately below the motor, but is between the driving axles and the leading bogie and is connected to the motor shaft by connecting rods inclined at about 45 deg. to the vertical. The drawing shows the ar-

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rangement of the Pennsylvania Railroad locomotives as supplied by the Westinghouse company.

Fig. 17—Class 2-B-1 locomotive with a single motor and a single jackshaft vertically below the center of the motor. Three locomotives of this class have been supplied for the Dessau-Bitterfeld line of the Prussian-Hessian State Railways. The three locomotives are similar in many respects, the motor capacty of the different locomotives being as follows; Siemens, 1100 hp; A. E. G., 1200 hp; Bergmann, 1500 hp. The drawing shows the arrangement of the Siemens locomotive.

Fig. 18—Class 0-D-0 locomotive with single motor and single jackshaft. Five locomotives of this class have been supplied for freight service on the Dessau-Bitterfeld line. Three of these have single motors of 600-hp capacity, the remaining two having motors of 800 hp.

Fig. 19—Class 1-D-1 locomotives with two motors and a single jackshaft. Two locomotives of this class have been constructed for the Lauban-Königszelt line, Prussian-Hessian State Railways, one by the Siemens-Schuckert Company and the other by the Allgemeine Elektricitäts Gesellschaft. The two motors are mounted in the body of the locomotive symmetrically about the center line, and their shafts are coupled by cranks and connecting rods approximately at right angles to the single jackshaft, which occupies a central position midway between the two pairs of driving axles. The drawing shows the Siemens-Schuckert locomotive. The Allgemeine locomotive is similar but has two 900-hp motors and driving wheels of 1500 mm (59 in.) diameter.

Fig. 20—Class 1-C-0 locomotive with one motor and a single jackshaft. Nine locomotives of this class have been built by the Allgemeine Elektricitäts Gesellschaft for the Mittenwaldbahn, Austria, and eight are under construction by the same firm for the Vienna-Pressburg line. The locomotive has three driving axles with a single jackshaft about the center of the locomotive coupled to the motor, which is mounted in the body of the locomotive above the middle driving axle.

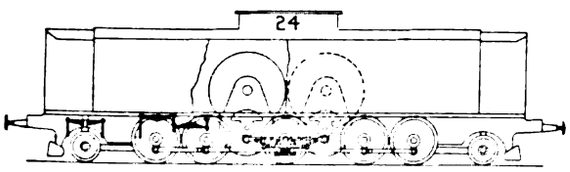

Fig. 24—Locomotive Drives—Lötschberg Railway Standard

Fig. 21—Class 1-C-1 locomotive with two motors unsymmetrically placed in the body connected to a single jackshaft midway between them. Nine locomotives of this class are under construction by the Siemens-Schuckert Company for the Wiesental line, Baden State Railways, in Germany.

Fig. 22—Class 1-C-1 locomotive with a single motor and a single jackshaft. A number of these locomotives are under construction for the Prussian-Hessian State Railways. Three are equipped with a 1000-hp motor in each, one with a motor of 1250 hp and one with an 1800-hp motor. The last mentioned, which is a Siemens locomotive, is shown in the drawing.

Fig. 23—Class 1-C + C-1 articulated locomotive with one motor and one jackshaft in each half. Thirteen locomotives of this class intended for heavy freight service on the Kiruna-Riksgraensen Railway are under construction by the Siemens-Schuckert company.

[Fig. 24—Class 1-E-1. This drawing was not a part of Mr. Lydall's paper, but is added to show the latest Oerlikon locomotive which has been made standard on the Lötschberg Railway. It is of the geared jackshaft type with a drive composed of a double helical gear, two jackshafts, a joint triangular yoke and crank connections to five pairs of driving wheels.—EDS.]

CHICAGO, MILWAUKEE & PUGET SOUND ELECTRIFICATION

The management of the Chicago, Milwaukee & Puget Sound Railroad has definitely decided to electrify the Deer Lodge-Three Forks section of its Rocky Mountain division, using 2400-volt d.c. propulsion current. This division contains 113 miles of main line, or the equivalent of 168 miles of single track including sidings and yard tracks. Overhead trolley, suspended from mast arms on wooden poles, will be used on tangent track and span-wire construction on wooden poles over curves. This type of construction will be changed to steel poles and overhead bridge trolley construction in yards containing four tracks or more. It also has been definitely decided that the transmission voltage will be 100,000 volts a.c., feeding five substations ranging in capacity from 3000 kw to 4500 kw, depending on their relative location to heavy grades. Essentially, the entire electrification, including the rolling stock, will conform to that installed by the Butte, Anaconda & Pacific Railroad. C. A. Goodnow, assistant to the president Chicago, Milwaukee & St. Paul Railway, authorizes the statement that no contract for the equipment has been let.

BROOKLYN RAPID TRANSIT INSURES ABROAD

The Brooklyn (N. Y.) Rapid Transit Company has transferred all its fire insurance—$22,000,000—on which the premiums have been about $100,000 a year, from the companies represented by the New York Fire Insurance Exchange to Lloyds, of London, thereby saving about $27,000 a year. President Timothy S. Williams of the transit company says that this was done because the higher rates recently prescribed were discriminatory and unjust.

President Williams makes the following statement: "Our insurance was placed last year through the companies represented in the New York Insurance Exchange at an average rate of about 34.7. This insurance expired Nov. 15 last. Early in September we were suddenly notified that the Fire Insurance Exchange had increased the average rate from 34.7 to 62.3. This came as a great surprise to us, for in ten years we had paid the insurance companies over $1,000,000 in premiums and had called upon them to pay in losses only about $27,000.

"Feeling that, in view of our experience and the condition of our risks, the new rate promulgated by the New York Fire Insurance Exchange was discriminatory and unjust, we sought for several weeks to procure a reduction, and were able, if certain changes were made, to get the average rate reduced to about 43.8. This decision did not come until about nearly a month after the policies taken out last year had expired, and in the meanwhile our agents took the usual form of binder subject to the fixing of a satisfactory rate. The rate finally fixed at 43.8 was not satisfactory, and we therefore placed the entire schedule of $22,000,000 in London Lloyds, saving $27,000 in premiums. We regretted the necessity of going outside our own country for insurance, but there was no other proper course."

President Williams also disclosed the fact that the Brooklyn company for several years past had been gradually setting aside an insurance fund of its own and that it eventually hoped to carry its own insurance. The accumulations in the fund now amount to over $600,000.

Willis O. Robb, manager of the Insurance Exchange, in defending the higher rates, says that there would have been no raise in rates if the Brooklyn Rapid Transit Company had not failed to make improvements which were promised. Although the transit company has not replied to this statement, it is believed that the basic charge is that the rate reduction received, even if the improvements referred to had been made, would have amounted to but a fraction of 1 per cent. The ease with which the low rate was obtained abroad speaks well for the character of the risk.

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TESTING TROLLEY INSULATORS IN PLACE

BY G. H. M'KELWAY, ENGINEER BROOKLYN RAPID TRANSIT SYSTEM

One of the duties that fall to line engineers whose companies use metal instead of wooden poles is that of periodically testing the insulators between the trolley and span wires and between the span wires and the poles. The same necessity for this does not exist with wooden poles because the pole itself is so good an insulator, but the iron pole is a conductor, and a leak to it will go directly to the ground unless the pole is set in an insulating foundation like rock or concrete. If the latter is the case, the pole is even more dangerous than if it completes a dead ground because persons or horses are liable to receive shocks from it. When set in concrete but a very small leak is required to make the pole alive and dangerous. Nevertheless, the insulations have to be badly damaged before they will pass enough current to burn down the trolley wire even if the pole itself is well grounded. As nearly all iron poles are set in concrete, they must be considered as being possibly, if not probably, insulated from the earth surrounding them and therefore as affording a chance to shock anyone who would touch them "hot."

While such a shock is seldom dangerous to a human being, many horses have been killed by contact with charged poles and sometimes merely by stepping into pools of water surrounding the poles. Even if the shock received by a person is not severe, it is often enough to cause a claim for injuries. If, in reply to such a claim, the railway can show that its poles are regularly inspected, that testimony will go far toward refuting any assertions of negligence, although the inspection may be nothing more than the sending of a man over the line to feel all poles with his hand and report any "hot" ones.

While the hot-pole test locates the charged poles it does not prevent them. A better test is one that will locate the trouble when only one of the insulators between the pole and the trolley wire has broken down and, therefore, ere the pole has been made alive. To do this properly both insulators, the hanger and the strain insulator, must be tested. As these tests are conducted in different ways, it is difficult to make both at one time. In each test the span wire is wiped by a wire attached to a voltmeter or lamp, but as one test is to see if the span is alive and the other to learn if it is grounded, the wire through the voltmeter must be differently connected for them. In one test the lead goes through the voltmeter to a source of power and in the other to the ground.

On lines with comparatively few poles to be tested this work can be done by one man with either one or two long light rods and a lamp or voltmeter, but on large systems the work can best be done from a special car which is run over the tracks.

TESTING HANGER INSULATORS

When the hangers are to be tested a long light rod can be used. At the upper end is a piece of old trolley wire or an iron rod which is placed against the span and which connects through an insulated wire with a voltmeter or lamp installed about 5 ft. from the ground and consequently fairly in line with the tester's eyes, thus permitting him to observe results with the least trouble and delay. The circuit is extended from the lamp or meter through insulated wire to an iron rod attached to the bottom of the pole and which is to be placed on the rail while the test is being made. While, of course, the voltmeter is much more sensitive than the lamp, yet the latter will light up enough to show against a black background if only 25 volts or 30 volts are impressed upon it. To make the apparatus as sensitive as possible the inside of the box which contains the lamp should be painted black. It may be thought dangerous to place a circuit containing only one incandescent lamp against a span wire which may have full trolley voltage on it, as will be the case if the insulator has broken down entirely. However, full voltage is seldom impressed if the span is merely touched with the end of the wiping wire as a preliminary to holding the rod more firmly against it if necessary. Still, the voltmeter is the more desirable as well as safer, and the pocket-size instruments are small and light enough to be easily attached to a rod.

TESTING STRAIN INSULATORS

To test the strain insulators at the poles two test poles should be used or else one with a Y at the top. Here one lead must touch the trolley wire and the other the span as the test is to learn whether or not the span can be grounded through the insulator at the pole. It is much safer to use a voltmeter than a lamp, because a damaged insulator may pass the very small quantity of current which serves to shock a man without being enough to heat visibly the filament of a lamp.

APPLIANCES, ETC.

When many poles are to be tested the use of a car supplies the only satisfactory way, as the hand apparatus is too slow. By running a car over the line tests of either hangers or strain insulators can easily be made on 50 miles of line a day.

Owing to the different character of the tests applied to the two types of insulators it is difficult to test both at the same time, especially where there is much special work, because there is a chance that the grounded lead of one voltmeter will touch one part of a bridle at the same time that the live lead from the other meter comes into contact with another part. The connections inside of the car are the same as for the hand tester, and the wiping wire is either attached to the trolley pole of the car or is held in the hand of a man sitting on the roof of the car. While the former plan requires one man less than the latter, it has the disadvantage that in heavy special work the wiper is liable to be caught and pulled off or at least cause a delay until it can be cleared.

Generally the wiper is made of trolley wire, the leads to the meter being insulated, but on one line where the spans were very rusty it was thought better to use a hack saw blade because the insulating effect of the rust was great enough to make accurate readings impossible so that many spans which should have been reported as defective were passed as good.

When a span is found to be grounded or when a hanger fails on a double-track line it is necessary to remove both insulators and replace them with good ones as the test cannot determine which is defective while both are in the circuit. Later, both insulators can be tested out separately and the good one returned to stock while the other is scrapped.

Tests such as these will be found especially important during the summer months when thunderstorms subject the insulation to a much more severe test than at other times. Furthermore, insulators are liable to break down at any time, so that tests should be made oftener than only once or twice a year, although inspection at other seasons of the year need not be so frequent as in the summer.

The number of passengers transported by the Paris subway in 1912 was 310,782,098, or an average of 850,000 per day. The tickets collected were divided into the following categories: Workmen's, 79,877,382; first-class, 32,773,335; second-class, 198,060,192; collective (school), 71,189. To these should be added the return coupons of the workmen's tickets (79,877,382), making the total passenger traffic for the year 390,659,480. The number of tickets delivered in certain of the last ten years was: 1903, 100,090,833 tickets; 1905, 148,700,821 tickets; 1907, 194,823,182 tickets; 1909, 254,445,992 tickets; 1911, 305,442,992 tickets.

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COMMUNICATIONS

IMPARTIAL STUDY OF ELECTRIFICATION

McHENRY & MURRAY, CONSULTING ENGINEERS
NEW HAVEN, CONN., Dec. 23, 1913.

To the Editors:

I have naturally read with a great deal of interest the editorial on main-line electrification in your issue of Dec. 20. It is my intention to supplement my discussion of Mr. Armstrong's paper before the Canadian Society of Civil Engineers in a pamphlet which will be placed in the hands of those railroad executives who are vitally interested in the facts concerning railroad electrification.

I will therefore only refer to your excellent suggestion regarding the appointment of a committee. Such a committee should logically be appointed by the executive committee of the American Railway Association and should set forth the fundamental requirements and conditions to which any and all electrical systems should conform in order that specified conditions of passenger, freight and switching service be met. This suggestion comes by virtue of the fact that the service requirements are best understood by the railway officials themselves. This committee should have the freest access to all sources of information, data, etc., having reference to investment cost and operation, inclusive of maintenance of power stations, lines and locomotives. So far as it is possible for me to assist, I will most cheerfully contribute all the facts on this subject in my possession.

W. S. MURRAY.

ELECTROLYSIS TESTS

NEW YORK, Dec. 19, 1913.

To the Editors:

I have read with interest Carl Hering's "Errors in the Interpretations of Tests for Electrolysis" in your issue of Nov. 20. Many of the tests to which he points as erroneous have been repeatedly brought forward by the writer in articles appearing from time to time in this journal during the last twelve years. I think that Mr. Hering's use of the word "static" in reference to a potential existing between structures under ground is unfortunate because such a potential is not a bound charge but a potential that can exist only by virtue of the earth's resistance, which is low compared with what is classed as insulation.

The measurement of current and voltage between buried structures to discover their electrical relation is important and useful in electrolytic investigation. It does not directly give the resistance, but where the resistance is varied by known quantities in the ammeter circuit it does help in the analysis, and when the results obtained are taken in connection with the potential gradients on the structures relative to the zero of the system of negative distribution, they have an analytic value in clarifying this complex problem. The cause of warpages of the pipe contours from the superimposed rail contours can be discovered from these tests whether they are caused by shuttling or earth resistances.

The measurement from plug to plug shows the extent to which the pipe line is acting as a conductor. This action will be immediately detected when connections are made between discontinuous conductor systems and the resistance in the ammeter circuit is varied. The drop in volts divided by the flow in amperes would not give the same results. The effect of open pipe joints along the section tested or of poor connections between main and lateral to plug are eliminated when these records are analyzed. The diversion method is useful and is of sufficient accuracy to give results in practical work. Finally, these methods were adopted by me after employing a great many others, and they have proved successful after a trial of many years.

ALBERT B. HERRICK.

PREDETERMINATION OF TRAIN ENERGY

NEW YORK, Dec. 23, 1913.

To the Editors:

We were greatly interested in Dr. Hutchinson's letter of Dec. 15, discussing our article on the "Predetermination of Train Energy," published in your issue of Nov. 15. We beg to take exception, however, to Dr. Hutchinson's statement that his method involves one less assumption than ours, because the principles of dynamics require certain data to go into the problem in order to get the answer. No matter how they may be disguised, these assumptions must be used. The real difference between Dr. Hutchinson's method and ours is that the former assumes the rate of braking retardation, while the latter assumes the length of run with power on.

We believe that our method, by dividing the energy into four items relating respectively to acceleration, friction, grades and curves, has the advantage of keeping the dynamical elements of the problem in sight throughout the calculation. This enables one to ascertain immediately the effect of changing any of the fundamental variables.

We further beg to take exception to Dr. Hutchinson's statement that the approximate methods of predetermining train energy devised by himself and by us are not of much value because neither leads to a determination of motor capacity or best initial acceleration. This criticism is based on the conception that the predetermination of energy consumption and of motor capacity are parts of the same problem. Doubtless this is true in a theoretical sense, but we consider that in practice they are entirely different. The problem solved by the methods under consideration is the approximate determination of power station, substation and feeder capacity, and of the power station output. This problem has generally to be solved independently of the determination of motor capacity. In fact, it is usually solved by the engineers of railway companies, while the motor capacity is usually determined by the manufacturers from data supplied by the railway engineers.

We are highly appreciative of Dr. Hutchinson's contributions to this subject, and while we prefer our method to the approximate one devised by him, we do not offer it as a substitute for the more elaborate one so ingeniously worked out by him in his now classical paper. It is merely offered for use where the uncertainty of the given factors do not warrant the use of the more accurate methods devised by him and Mr. Mailloux.

W. A. DEL MAR,
D. C. WOODBURY.

GASOLINE CARS ON THE EAST INDIA TRAMWAYS

The East India Tramways, a small company operating a system of gasoline tramcars in Karachi, and which was described a year ago in an article of the ELECTRIC RAILWAY JOURNAL, recently held its annual meeting. Formed in 1882, this company appears to have solved the problem of instilling the habit of traveling into the poor native population by means of moderating capital cost and reducing operating expenses to a point to enable an adequate profit to be made on the money invested. More than 5,500,000 passengers were carried last year; profits have increased in the last four years by 380 per cent.

The gross receipts for the year ended July 31, 1913, amounted to $109,214, as compared with $94,930 in the preceding year and $71,704 in 1910-11, while the net receipts have increased from $22,210 in 1910-11 and $41,504 in 1911-12 to $47,210 in the year just ended.

The improvement in the company's fortunes is attributed entirely to the adoption of the gasoline motor cars, which for the fourth year of operation are said to show an average cost for working expenses of 10 cents per car mile, inclusive of 1.64 cents per car mile for depreciation.

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ELECTRIC RAILWAY LEGAL DECISIONS

CHARTERS, ORDINANCES, FRANCHISES

Kentucky.—Jim Crow Law Applicable to All Passengers.

The separate-coach law (Ky. St. 795-800) applies alike to both white and negro passengers, the latter being entitled to the same redress as the former for injuries growing out of its violation. (Conley v. Central Kentucky Traction Co., 154 S. W. Rep., 41.)

Louisiana.—Street Paving—Liability for Cost of More Expensive Kind.

While, under a provision in a street railway franchise providing that when any street shall be paved or repaved the company must pay the cost of paving or repaving between the rails of its tracks and for 1 ft. on the outside of each rail, the company is not primarily liable for a more expensive kind of paving covered by such space than that ordered for the entire street, it is estopped to deny responsibility for the cost of such paving or repaving where it permits the work to be done without giving notice to the city that it will not pay the excessive cost thereof. (Southern Bitulithic Co. v. Algiers Ry. & Lighting Co., 58 Southern Rep., 588.)

Maine.—Street Railroads—Operation—Defects—Piling Snow Outside Track.

A street railway which was required by its charter to maintain its railway so that the part of the highway occupied thereby should be safe for travelers cleared snow from its roadbed and piled it up at the side. Held, that if the slope thus created was sufficient to overturn a cab driven with due care the company was liable. (Mansell v. Lewiston, A. & W. St. Ry., 85 Atlantic Rep., 473.)

Massachusetts.—Street Railroads—Collision—Crosswalk Over Reservation—Rights of Railroad.

Where an electric railway has been built under authority of Statutes 1894, Chap. 324, Sec. 1, upon a reservation in the middle of a street, and this reservation is intercepted by crosswalks for pedestrians, such excepted parts are for the common use of pedestrians and street cars, like other parts of the street. Hence a street railway company in running its cars over such a crosswalk has no rights which are either exclusive of or paramount to the rights of pedestrians thereon. (Welch v. Boston Elevated Ry. Co., 100 N. E. Rep., 1069.)

Pennsylvania.—Liquidated Damages for Failure to Construct—Breach of Bond.

Where a street railway company acquires from a borough the right to occupy its streets and gives a bond for $5000 conditioned to lay its tracks and connect them with others 2 miles away within a specified time and fails so to do, the borough can recover the $5000 as liquidated damages. (Ambridge Borough v. Pittsburgh & B. St. Ry. Co. et al., 82 Atlantic Rep., 1105.)

Wisconsin.—Transportation of Repair Parts Not Freight—Fellow Servants.

Under a street railway's franchise which provides that it shall be used for no other purpose than to transport passengers and their ordinary baggage the tracks and cars may be used to carry repair materials to various portions of its line.

The motorman of a repair car of a street railway company and the custodian of the tools therein were fellow servants, so as to preclude recovery by the latter for the act of the motorman in negligently moving the car whereby plaintiff was injured. (Waskiewicz v. Milwaukee Electric Ry. & Light Co., 133 N. W. Rep. 596.)

LIABILITY FOR NEGLIGENCE

Alabama.—Carriage of Passenger Beyond Destination—Actions—Damages.

A street railway is liable for damages for carrying a passenger beyond her destination going out and where, on the return trip, the conductor again failed to stop at her stopping place. (Birmingham Ry., Light & Power Co. v Arnold, 60 Southern Rep., 988.)

Alabama.—Duty to Passengers—Opportunity to Safely Alight.

When a car is at a regular stopping place for letting off passengers it is the duty of the conductor to know whether passengers are in the act of leaving the car and so in a position which would be rendered perilous by putting the car in motion. (Birmingham Ry., Light & Power Co. v. Mayo, 61 Southern Rep., 289.)

Indiana.—Collision with Vehicle—Last Clear Chance Doctrine.

To establish negligence against a street railway company in a collision under the last clear chance doctrine, it must be shown that immediately before the collision plaintiff was in imminent peril, that the employees on the car saw him and his danger in time to have avoided the collision in using reasonable care, or that, by using ordinary care, his danger could have been discovered and the injury prevented or mitigated. (Schilling v. Indianapolis & C. Traction Co. et al., 96 N. E. Rep., 167.)

Indiana.—Injuries to Child on Track—Last Clear Chance.

A child between eleven and twelve years old was struck by a street car. She understood and appreciated the danger of being injured by street cars in crossing the tracks. She walked across the street looking straight ahead, and walked on the track 3 ft. or 4 ft. in front of the car. Held, as a matter of law, that she failed to use due care in view of her age and experience, which were sufficient to make her carelessness unreasonable.

To hold a street railroad company liable under the last clear chance doctrine, it must appear that the company's opportunity of preventing injury to plaintiff struck by a car was later in point of time than that of plaintiff, and that the company failed to take advantage of the last clear chance. Where the situation of the parties just prior to the injury was such that the company by the exercise of due care should have prevented the injury and plaintiff could not, the rule applies, but where the opportunity of plaintiff to avoid the injury was as late as or later than that of the company the rule is inapplicable.

Where a person walked across a street in plain view of an approaching street car moving at a rapid rate and stepped on the track 3 ft. or 4 ft. in front of the car, his negligence was concurrent and not antecedent to that of the motorman in failing to observe the danger and avoid the accident, and there could be no recovery under the doctrine of last clear chance.

An instruction, in an action against a street railroad company for injuries to a child struck by a car, that if the motorman saw plaintiff and her peril, or could have seen it by due care, and failed to stop the car or failed to take other precautions to prevent injuring her, she was entitled to recover, was erroneous for failing to state that some appreciable time must intervene after the motorman saw plaintiff's danger and before the injury occurred within which time some precaution could have been taken to prevent the accident. (Indianapolis Traction & Terminal Co. v. Croly, 96 N. E. Rep., 973.)

Kentucky.—Defective Condition of Apparatus.

If the defective condition of appliances on a street car, which caused a derailment, was not known by the employees and could not have been known by the highest degree of care, the company was not liable for resulting injuries, unless, by the exercise of such care, the car could have been stopped and the accident prevented by other available means. (South Covington & C. St. Ry. Co. v. Barr, 144 S. W. Rep., 755.)

Massachusetts.—Team on Track.

The driver of a team moving ahead of a slowly moving street car may assume that the motorman will sound the gong before changing the course of the car and crossing the path of his team. (Morrissey v. Boston Elevated Ry. Co., 97 N. E. Rep., 83.)

Massachusetts.—Injury to Passenger from Door Mechanism.

That while plaintiff was entering a street car a door, which was operated by levers under control of the car employees, was closed, causing plaintiff's injury, shows prima facie negligence of the street railway company, though a passenger may have intentionally started the mechanism by which the door was closed. (Craft v. Boston Elevated Ry. Co., 97 N. E. Rep., 610.)

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Massachusetts.—Passengers' Assumption of Risk on Overloading Crowded Car.

It is not negligence for a street car company to permit passengers to enter cars which are already crowded, and a passenger who voluntarily enters a crowded car and has to stand on the rear platform assumes any risk of injury from being crowded or pushed from the car when it stops. (Seale v. Boston Elevated Ry. Co., 100 Northeastern Rep., 1020.)

Massachusetts.—Master and Servant—Doctrine in Carhouse.

One in charge of the controller used in moving a shifting table was a fellow servant of plaintiff, who was injured while engaged in holding the trolley while a car was shifted, so as to preclude recovery for injuries resulting from the former's negligence in starting the table without warning. (Ridge v. Boston Elevated Ry. Co., 100 Northeastern Rep., 667.)

Massachusetts.—Dress Caught in Sand Plunger.

In a street car passenger's action for injuries by falling by her dress catching upon the sand plunger in the vestibule, which projected above the floor, evidence held to sustain a finding of negligence by the motorman in not taking precaution for plaintiff's safety, either by removing the plunger or guarding it with his foot or warning her of its presence. (Martin v. Old Colony St. Ry. Co., 98 Northeastern Rep., 579.)

Massachusetts.—Injuries While Attempting to Board Car.

Where plaintiff, as she was about to board a street car at a terminal, was gradually encompassed by other passengers moving toward the same car until she was pushed over the platform and into a pit, receiving injuries complained of, and no measures were taken by the carrier to protect her or control the press of people seeking to board the car, it was guilty of actionable negligence. (Kelley v. Boston Elevated Ry., 96 N. E. Rep., 1031.)

Massachusetts.—Loss of Personal Property of Passengers—Refusal to Stop.

Where plaintiff, a passenger on a subway car, lost his violin because of a jerk of a car, not due to the carrier's negligence, the carrier was under no obligation to accede to plaintiff's request to stop the car that he might get the instrument, such a stop between stations being fraught with danger of collision with the following car. (Bursteen v. Boston Elevated Ry. Co., 98 Northeastern Rep., 27.)

Massachusetts.—Personal Injuries by Ejection of Another Passenger—Liability.

A carrier is bound to protect a passenger from personal harm at the hands of its servants whether the injury is wilful or negligent, and proof that it ejected another passenger with no more force than was reasonably necessary does not relieve it from liability to a passenger whom its method of ejection forced from the car to the ground. (Thayer v. Old Colony St. Ry. Co., 101 Northeastern Rep., 368.)

Massachusetts.—Trespassers on Cars—Liability.

A boy a little more than ten years of age boarded a car of an elevated railway company to steal a ride. The conductor, on observing him, ordered him to get off, shaking his fist at the same time. The boy either lost his balance or fell in attempting to jump off. Held, that the boy was a wilful trespasser, the company owed him no duty except to refrain from wilfully or wantonly and recklessly exposing him to danger, and the act of the conductor did not show a cause of action. (Shelly v. Boston Elevated Ry. Co., 98 Northeastern Rep., 575.)

Massachusetts.—Injuries to Persons Near Track at Sharp Curve from Rear End of Car.

Where a street railroad track turned a sharp curve and the rear end of a car rounding the curve projected toward the curb so as to leave insufficient room for vehicles at the point where the car was passing, the motorman of a car was guilty of negligence when he proceeded on the curve knowing that there was a vehicle with which the rear of the car might collide, and the street railroad company was liable for injuries to a pedestrian on the sidewalk who was injured by the vehicle being thrown against him. (Bryant v. Boston Elevated Ry. et al., 98 Northeastern Rep., 587.)

Michigan.—Injury to Conductor, Master and Servant.

Absence of a step which belonged at the rear end of an electric car through which the conductor in descending from its top after ascending by another way was injured being obvious to ordinary observation, or to even the most casual observation, his failure to discover and avoid the danger was contributory negligence. (Leary v. Houghton County Traction Co., 137 Northwestern Rep., 226.)

Michigan.—Distance at Which Approaching Car Could Be Seen.

Where, on a former appeal, the court held that the plaintiff could have seen the car by which she was struck when it was 400 ft. or 500 ft. from her last point of safety and that a verdict should have been directed for defendant, the testimony of a witness on a new trial that an unobstructed view could be had of an approaching car for 217 ft. from the same point, not being in conflict with the previous showing, did not relieve the court from its duty to direct a verdict. (Folkmire v. Michigan United Rys. Co., 136 Northwestern Rep., 442.)

Missouri.—Imputed Negligence—Driver of Vehicle.

The negligence of an employee while driving a vehicle obtained by third persons from the employer is not imputable to the third persons, who only directed the employee to drive to a particular place. (Farrar v. Metropolitan St. Ry. Co., 155 Southwestern Rep., 439.)

Missouri.—Riding a Bumper.

While a street car passenger permitted to ride on the bumper because of the crowded condition of the car assumed the risk of riding in that position, he did not assume the negligence of the carrier and may recover for injuries resulting from such negligence. (Kirkpatrick v. Metropolitan St. Ry. Co., 143 S. W. Rep., 865.)

Missouri.—Alighting from a Car in Motion.

It is not negligence per se for a street car passenger to attempt to alight from a car in motion, unless the risk involved in the act, because of the speed of the car, appears to be so great that an ordinarily prudent person would not incur it, and the question of negligence is for the jury. (Haskell v. Metropolitan St. Ry. Co., 142 S. W. Rep., 1091.)

Missouri.—Commencement of Relation of Carrier and Passenger.

One becomes a street car passenger the instant he starts to board a car, and it then becomes the duty of the operators of the car not to start it until he has had a reasonable opportunity to reach a place of comparative safety (Conway v. Metropolitan St. Ry Co., 142 S. W. Rep., 1100.)

Missouri.—Injury to Passenger Preparing to Alight.

Where a passenger on a street car, after signaling for a stop, went to the platform to alight when the car which was slowing down stopped, she was not guilty of negligence, for the car company permitted persons to ride on platforms and in the aisles and for the further reason that if passengers were not ready to alight when cars were stopped traffic would be delayed. (Anderson v. Metropolitan St. Ry. Co., 141 S. W. Rep., 461.)

Missouri.—Collision with Fire Hose Wagon—Care Required of Drivers.

An ordinary traveler must approach a street railroad track cautiously with his vehicle under control, looking and listening, ready to stop and give way to street cars, and must exercise reasonable prudence to avoid injury according to the facts. But a driver of a hose wagon of a city fire department need not proceed with the deliberation of an ordinary traveler and need only drive with the care which a prudent person would exercise in view of the circumstances, such as municipal ordinances giving fire department wagons the right-of-way and the constant signaling of the approach of such wagons. (Green et al. v. United Rys. Co. of St. Louis, 145 Southwestern Rep., 861.)

Missouri.—Escape of Electricity—Intervening Cause.

Where defendant railroad company negligently permitted the escape of electricity to and through a guy wire attached to a supporting post in a street and thence to a private wire attached to the guy wire by a third person, the fact that the private wire intervened

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and conducted the electricity and caused the injury to plaintiff, who came into contact therewith while walking in the street, did not relieve defendant from liability for its own actionable negligence in permitting the electricity to escape. (Campbell v. United Rys. Co. of St. Louis, 147 Southwestern Rep., 788.)

New Jersey.—Collision with Noisy Wagon.

An instruction to the effect that if the plaintiff drove along and upon the street railway track in a noisy wagon, so that he could not hear the gong of defendant's car approaching from behind, the plaintiff cannot recover, is erroneous, because the driving of a noisy wagon along and upon a street railway track does not in itself necessarily constitute such contributory negligence as will relieve the defendant from responsibility for an accident which might have been avoided by the exercise of due care upon the part of the defendant. (Luby v. Morris County Traction Co., 83 Atlantic Rep., 184.)

New York.—Speed of Car When Passing Standing Car.

It is gross negligence for a street railway company to run a car at nearly 30 m. p. h. past another car standing to discharge passengers. (Provost v. International St. Ry. Co. et al., 136 New York Sup., 131.)

New York.—Injuries to Boy Ten or Eleven Years Old—Presumption of Sense of Danger.

A boy ten or eleven years of age, not shown to be deficient mentally, must be presumed to know of the danger to be anticipated from crossing in front of a moving street car. (Byrnes v. Brooklyn Heights R. Co., 133 N. Y. Sup., 243.)

New York.—Master and Servant—Safety of Place of Work.

An employer's duty to provide a reasonably safe place of work does not involve the following up of the details of work and seeing to it that the conditions brought about by progress of the work are at all times such as to afford a reasonably safe place. (Edgar v. Brooklyn Heights R. Co. et al., 131 N. Y. Sup., 286.)

New York.—Crossings—Rights of Parties.

The rule that neither a street car crossing a street nor a vehicle on such street has a paramount right but that the right of each must be exercised with due regard to the right of the other applies to a vehicle coming out of a street which meets but does not cross the street on which cars are operated, and where it is necessary for the vehicle to cross the tracks to obey the law of the road. (Moore v. Rochester Ry. Co., 97 N. E. Rep., 714.)

New York.—Injuries to Passengers—Starting Subway Train.

Where a subway train was stopped at a regular station for the purpose of taking on passengers the employee in charge thereof was chargeable with notice that passengers were getting on, and before starting was bound to look and see if he could shut the doors and start the train with safety to those boarding it. (Lang v. Interborough Rapid Transit Co., 134 New York Sup., 627.)

New York.—Boarding Car in Motion—Doctrine of Last Clear Chance.

One intending to become a passenger on an electric street car who attempts to board the car while in motion and when the gates are closed is chargeable with negligence as matter of law, which will bar recovery from the company for an injury received by striking or being struck by another car while so outside the gates, unless, after his peril was apparent, defendant negligently failed to protect him when it was within its power by the exercise of reasonable care to do so. (Norfolk & A. Terminal Co. v. Rotolo, 191 Fed. Rep., 4.)

New York.—Excessive Damages.

Where plaintiff had his collar-bone broken and sustained various lacerations and contusions, which confined him to the hospital from Aug. 17 to Sept. 12, and which interfered with his work until Oct. 24, and at the time of the trial in April he complained of slight difficulties, but there was no evidence of any permanent injury, and he showed a loss of earning power of $16 or $17 per week for about eight weeks, $3,500 damages was excessive and will be reduced to $2,000. (Crantz v. Nassau Electric Ry. Co., 138 New York Supplement Rep., 966.)

New York.—Negligence and Contributory Negligence—Basis of Doctrine.

The doctrine of contributory negligence does not rest on the maxim that no one shall be permitted to take advantage of his own wrong, but on the fact that the law will not undertake to apportion the consequences of concurring acts of negligence, and when an injury is caused by the concurring negligence of two or more persons the law will not hold either liable to the other. (McKay v. Syracuse Rapid Transit Ry. Co., 101 Northeastern Rep., 885.)

New York—Carrier's Assault on Passenger—Contract or Tort—Death to Party—Survival of Action of Contract.

A passenger's action against a carrier for its violation of its contract to carry him as a passenger, by assaulting and ill treating him, is an action of contract.

A passenger's action for an assault and ill treatment, based on an alleged breach of the carrier's contract to carry safely, may be revived in the name of plaintiff's personal representative after his death pending reversal of judgment for the carrier and a second trial. (Rundlett & Reynolds, Inc., v. Whitall, 135 New York, Sup. 698.)

New York.—Injury to Servant from Defective Structures.

A trackwalker of an elevated railroad company used a temporary passage over an opening incidental to the unfinished work of an independent contractor in lowering the structure and fell through into the street when a plank on which he stepped turned. There was no evidence that trackwalkers when in the discharge of their duties as such were accustomed to use the temporary passage. Held, that the company was not liable on the theory that it ought to have known of the use of the temporary passage by its employees. (Eddery v. Interborough Rapid Transit Co., 135 New York Sup., 170.)

Pennsylvania.—Injuries to Trespasser.

Where plaintiff was injured while walking on a trestle on defendant street railroad's private right-of-way, when he could easily have got to a place of safety before he was struck by stepping on crossbeams at either side of the track, and the motorman, on discovering that plaintiff was making no attempt to avoid a collision, did all he could to stop the car, a nonsuit was properly entered in plaintiff's action to recover for the injuries. (Bliss v. Pittsburgh Rys. Co., 83 Atlantic Rep., 278.)

Wisconsin.—Injuries to Passengers in Dangerous Position.

Where a conductor of a trolley car knows of a passenger's dangerous position on a step within the vestibule of a crowded car and fails to warm him of the danger, or where he negligently fails to learn of the dangerous position of the passenger, he is guilty of negligence, making the carrier liable for injuries to the passenger caused by his being forced outward so as to collide with a trolley pole. (Tolleman v. Sheboygan Light, Power & Ry. Co., 134 N. W. Rep., 406.)

Wisconsin.—Meddlesome Act of Fellow-Passenger—Carrier's Liability.

As carriers are not responsible for acts of third persons not under their control which they could not reasonably foresee, a street railroad company is not liable for injury to a passenger injured while standing in the rear vestibule of a car through the meddlesome act of a fellow passenger in suddenly releasing a brake in such manner that the handle swung around with great force, when there was no showing of previous and similar meddlesome acts of passengers. (Sure v. Milwaukee Electric Ry. & Light Co., 133 N. W. Rep., 1098.)

Wisconsin.—Master and Servant—Inspection of Span Wire Hangers.

The appliances being of approved pattern and there being nothing in their appearance to indicate any defect, the master cannot be held liable for presence of electricity in a span wire, through defective insulation in hangers by which trolley wires were suspended therefrom, unless its thorough inspection twice a year was not sufficiently frequent. This cannot be held, as there is not evidence that hangers easily or frequently become defective, but the inference is to the contrary, and there is no evidence that more frequent inspection is customary with others. (Doyle v. La Crosse City Ry. Co., 134 N. W. Rep., 364.)

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News of Electrical Railways

Review of the Stotesbury Management in Philadelphia

In Co-operative Bulletin No. 25, issued under date of Dec. 18, 1913, the results are reviewed which have been attained by the Stotesbury management of the Philadelphia (Pa.) Rapid Transit Company since it undertook the work of rehabilitation on June 5, 1911. The statement is made that it was necessary, first, so to increase wages and improve working conditions as to establish harmony and unity of effort between the management and its motormen and conductors; second, to provide for the purchase of a sufficient number of additional cars of modern type having the largest possible seating capacity to relieve the over-crowding of cars; third, so to increase the capacity of the tracks in the downtown district by a general re-routing of car lines as to permit the operation of a larger number of cars during the rush hours. The statement follows in part:

"The wages of motormen and conductors, by the co-operative plan and the use of the 22 per cent fund, have been raised from a maximum of 23 cents to a maximum of 30 cents per hour. This scale will be continued until the accumulations in the 22 per cent fund make further advances possible. The present wage scale was made effective Sept. 1, 1913, two and one-half years earlier than had been considered possible.

"This management at its incoming undertook to supply during the ensuing five-year period 1300 cars of modern type. As against this promise, 1500 new near-side cars have now been purchased and are in service. The standard near-side car has nearly double the seating capacity of the obsolete equipment retired from service. There has therefore now been accomplished within a two-and-one-half-year period an increase in the total car capacity greatly in excess of that which was undertaken to be performed in the entire five-year period.

"The re-routing plan, necessitating the changing of over fifty lines, has been practically completed. This improved routing has already enabled the company to increase the car capacity now operated in the business district during the rush hour nearly 20 per cent as compared to the service of one year ago. That the re-routing changes are proving to the advantage of the great majority is now evidenced in the greater proportion of passengers carried direct to their destination and in the shorter time required for the ride.

"The timetable department is checking the new traffic requirements on the several lines, and the car schedules are being so adjusted as to place the cars on the street in direct accordance with the needs of the public.

"The co-operation of the bureau of police and also of the team owners is being enlisted in a campaign having for its object the elimination of all unnecessary delays to street cars, thus insuring that cars follow each other on the street with such dependable regularity as to permit the displaying of the 'car full' sign whenever necessary to avoid extreme overloading.

"A complete guide book containing descriptions of the street car routes, including rates of fare and transfer and exchange privileges, will be issued by the company for free distribution to the public not later than Jan. 1, 1914.

"The co-operative plan, adopted in August, 1911, under which this management is now working with its motormen and conductors, has exceeded all expectations in securing increased wages, improved working conditions and in providing the means for adjusting every difference before it becomes a grievance. Discipline of the men is at a higher standard than ever before, while the number of motormen and conductors discharged from the service averages only thirty per month as against an average of 130 per month prior to the inauguration of the co-operative plan.

"Direct representation in the discussion and adjustment of all matters affecting their interests is assured to the men through the co-operative committee, whose members include two representatives from each depot, chosen by the direct vote of the motormen and conductors. This is representation in a larger sense than was ever attained through any grievance committee.

"A new book of rules for the guidance and information of motormen and conductors, including rules governing working conditions, was prepared and issued in February, 1913. The beneficial effects of co-operative effort were never more apparent than in this instance, inasmuch as the rules by which the men are governed were passed upon by the co-operative committee directly representing the men in joint council with the operating officials of the company.

"The co-operative committeemen now pass upon all timetables before the schedules are put into force, thus insuring that the car hours required upon the street to serve the public properly are divided into such runs for the men as best suit their convenience.

"No regular run now pays less than nine hours' time (except for trippers and Sunday timetables). All regular runs are based on a minimum of nine hours and a maximum of eleven hours, to be completed within a maximum of fourteen consecutive hours; this as against the former practice of spreading runs over a sixteen-hour to seventeen-hour consecutive period.

"To give the motormen and conductors the benefit of buying their uniforms on an instalment plan without subjecting them to the extra charge of 10 per cent usually required, a plan of buying uniforms has been instituted whereby the man makes a first payment of $3 and the company advances the balance, which is thereafter payable from the man's wages at the rate of $1 per week.

"The co-operative beneficial association, launched in November, 1912, now has a total membership of more than 8500. This association provides sick benefits of $1 per day for 100 days following the first week's illness and a death benefit of $150.

"Following a careful analysis of the cost of living among the motormen and conductors, carried on by members of the co-operative committee, a plan of co-operative buying was instituted in June, 1913. More than 150 stores are now listed where purchases can be made with the cash coupon books issued by the co-operative beneficial association at a saving to the members of 8 per cent on the cash selling price. The insurance and pension plan, which provides a pension of $20 per month and death benefit of $500, has been broadened to apply to employees of all departments of the company, and the administration of the plan has been placed more directly under the supervision of the men themselves.

"The effective application of the near-side principle, together with the perfecting of platform and seating arrangements, ventilating system, car route signs, life guard and other details for enhancing the public safety, health and convenience, are included in the standard near-side car, which, experience has shown, effectually remedies the shortcomings of existing car designs.

"The total number of accidents now occurring shows the astonishing decrease of more than 25 per cent as compared with the total accidents in the year immediately preceding the incoming of the Stotesbury management, although 14 per cent more passengers are carried now.

"Accident prevention work is being carried on in co-operation with the school authorities by illustrated talks in the public schools, explaining how accidents may be avoided. More than 1,000,000 illustrated blotters, together with a display of posters and photographs illustrating the 'safety first' principle, have been used. Co-operation of the motormen and conductors has been most beneficial in the prevention of accidents.

"The practice of smoking and spitting and the carrying of partly consumed cigars or cigarettes on the cars has been practically eliminated following a vigorous campaign instituted in January, 1913.

"The efficiency of the emergency service has been greatly improved by the purchase of additional high-speed auto wreck wagons and the installation of new emergency stations at locations where they are required. The average time now required to make a 'run' from the nearest emergency station is not more than five minutes, and any point in the downtown district can be reached in an average of three to four minutes.

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"The capacity of the surface car subway, which before the re-routing was confined to fifty-six cars per hour, has been increased to 140 cars per hour by the use of block signals and the 'berth' system of dispatching at the Juniper street station.

"The capacity of the company's power plants as of June 5, 1911, was not sufficient to propel additional cars or to heat the cars properly. To meet this shortage, contracts were closed for approximately 35,000 hp of purchased power, and the output of the Beach Street power house has in addition been increased approximately 20,000 hp by the installation of new power-generating machinery.

"Two modern concrete carhouses have been built, one having a capacity of 336 cars, and the other having a capacity of 333 cars.

"At the time that the present increased wage scale was made effective, Sept. 1, 1913, a guaranteed minimum wage for extra men was put into force. This guarantee was, as set forth at the time, $2 per day minimum for each day upon which an extra motorman or conductor was required to report for duty. The $2 a day guarantee to the extra men, added to the amount received when working runs in relieving the regular men, is not only producing a higher average rate of wage to the extra men than that received by the newer regular men, but is also resulting in an excessive drain upon the 22 per cent fund, the accumulations in which are of vital interest to every motorman and conductor because of the fact that further increases in their wages must be derived therefrom. The co-operative committee decided unanimously that the adjustment of this matter be left to Chairman Mitten. Effective Jan. 1, 1914, the minimum wage guaranteed to extra men will be changed from the stipulated guarantee of Sept. 1, i. e., $2 per day minimum for every day upon which the men are required to report for duty, to a guaranteed minimum wage of $12 for each week of seven days. This weekly guarantee assures to the extra men a steady wage of not less than $12 per week until such time as they secure regular runs. At the same time it will fully protect the interests of the regular men in the 22 per cent fund. Extra men are paid a minimum rate of 25 cents per hour, and are not confined to the minimum weekly wages of $12, as they may, when substituting on regular runs, earn as much as $18 per week."

Indianapolis Employees Close Their Case

The employees of the Indianapolis Traction & Terminal Company ended their side of the hearing before the Public Service Commission of Indiana on the evening of Dec. 20. On Dec. 18 J. J. Thorpe, first international vice-president of the Amalgamated Association, was called to the stand. He told of his coming to Indianapolis in August, prior to the calling of the strike of the employees of the interurban lines operating out of Indianapolis. Mr. Thorpe described his attempts to organize the city men in Indianapolis. Figures were submitted showing wages in cities where unions have been established. Mr. Thorpe said that many cities pay as high as the 32 cents an hour flat rate demanded for the men at Indianapolis. Chairman Duncan of the commission pointed out that the cities on the list were on the Pacific Coast, where wages are much higher, and that the list showed union men receiving as low as 18 cents and 20 cents per hour.

When the matter of arranging the schedules so that 75 per cent of all runs should be straight earlies and lates was discussed, Mr. Latta, for the company, submitted a schedule of one of the lines of the Indianapolis Traction & Terminal Company and asked that Mr. Thorpe prepare a schedule showing how the runs on that line could be arranged in accordance with the demand. Mr. Duncan overruled the objections which were raised to this, stating:

"You are asking that these demands be granted, and we want to know how much it will cost the company. You should be prepared to sustain your demands with proof. Do your best to have the information ready for the commission."

On Dec. 19 and the morning of Dec. 20 Mr. Thorpe was very closely cross-examined, not only by the attorney for the company, but also by each of the commissioners. The commission insisted that the witness should be required to disclose the details of the work of organization and the happenings prior to and during the strike. It was then brought to light by the cross-examination that no local union existed in Indianapolis the day the strike was called; that the election of local officers was held the day following, when mobs had prevented the operation of the cars; that Mr. Thorpe himself had drawn up the original brief demands, with only two men present, on Oct. 30; that he had written the paper calling the strike for the night of Oct. 31, and that this paper was in the hands of the printer before the expiration of the twenty-four hours which had been given the company to make a reply.

Under cross-examination by Mr. Latta, it was stated by Mr. Thorpe, in spite of his former testimony that the last thing the Amalgamated Association ever did was to call a strike, that in this case a strike had been called without a vote being taken by the men and without there even being a local organization actually in effect. Mr. Duncan asked Mr. Thorpe whether the union thought it had the right to stop the operation of cars by force, or whether it thought it had the right to prevent a man operating a car in case he did not wish to join in the union movement. Mr. Thorpe said that the policy was persuasion and arbitration.

Attorney Latta asked the witness whether he had investigated labor conditions and wages in Indiana and adjoining states before making demands for the increase. Mr. Thorpe said he had not. Questioned as to why, for example, the company should pay 30 cents an hour for a laborer to shovel gravel, as demanded, when the same class of labor in Indianapolis was paid only 20 cents, Mr. Thorpe contended that the union man had an inherent right to higher wages than a non-union man. Mr. Thorpe said that if the union was recognized and it became necessary for the company to lay off men, the union men would dictate which men should be laid off. Mr. Duncan asked the witness if the strike had been called for Hallowe'en night because Hallowe'en was known to be a night when a certain amount of lawlessness was expected. Mr. Thorpe said he did not know just what the conditions were.

Attorney Latta brought out the fact that in many cities where the Amalgamated Association had conducted campaigns the militia had to be called to suppress riots. Mr. Latta read into the record the detailed financial report of the Amalgamated Association as given in its official organ. He also read from the same source a statement signed by the executive council of the union that "the producer, the worker, should receive all of the fruits of the production." Mr. Latta also read from the official organ of the Amalgamated Association a statement of the executive officials of that association that the union had found that strikes could be won by conducting a contest that would prove more expensive for the company than to grant the demands of the employees.

W. D. Mahon, international president of the Amalgamated Association, took the stand for the employees on the afternoon of Dec. 20. Mr. Mahon's testimony related almost entirely to a description of the Amalgamated Association and its purposes. He informed the commission that in the matter of the schedules which they had been instructed to prepare in order to show how the company could arrange that 75 per cent of the runs should be straight earlies and lates, it was impossible for them to prepare such a schedule, even with an expert schedule maker, as only those fully conversant with the local conditions and operation of the lines of the company could possibly arrange these schedules satisfactorily.

E. B. Peck, vice-president of the Indianapolis Traction & Terminal Company, was called to the stand by Mr. Roby, one of the attorneys for the employees. He was questioned as to the financial affairs of the company and asked for operating figures for different periods during the last five years. Mr. Peck informed the commission that it was impossible to give this information off-hand. This finally led the commission to ask that the company prepare and file with the commission as soon as possible statements giving all the necessary information regarding the financial condition of the company. The commission stated that as the employees are asking for increases in wages and changes in working conditions which will add to the expenses of the company, it wishes to go thoroughly into the matter of in-

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come and expenditures in order to ascertain if it is possible for the company to meet the increase in expenditures.

The attorneys for the employees rested their case on the evening of Dec. 20.

Mr. Latta opened the company's side of the case on the morning of Dec. 22, and will probably require about ten days to introduce the company's testimony.

Means of Securing Rapid Transit for Cincinnati Discussed

At a meeting of representatives of the interurban committee of the Business Men's Club, Chamber of Commerce, Federated Improvement Association, Taxpayers' Association, City Club and Real Estate Exchange, after a dinner at the Business Men's Club on the evening of Dec. 17, the proposed loop for the purpose of giving Cincinnati rapid transit and allowing the entrance of interurban cars to the heart of the city was discussed. Mayor Hunt opened the proceedings with an address in which he pointed out the need for the improvement in order to preserve the importance of the city as an industrial and commercial center. He referred to the Cincinnati Southern Railroad, which was built by the city years ago for the purpose of opening the southern country. It is one of the city's chief assets now, he said. There is competition and strife between cities, and Cincinnati must realize that it is necessary to keep fully abreast of the times in all kinds of improvements.

In his address to the representatives of the civic associations, G. F. Swain, chairman of the Boston Transit Commission and consulting engineer of the Cincinnati rapid transit loop, said in part:

"The congestion of the streets is increasing and transit by surface means becomes slower and slower. Three remedies are possible: First, new streets; second, elevated lines; third, subways. New streets are generally impracticable. Elevated lines have the great disadvantage that they destroy property values. They are, however, relatively inexpensive. To-day subways are much more in favor. Subways, however, are very expensive. They increase property values. Generally speaking, an elevated road in a city, in the public streets, will cost from $500,000 to $750,000 per mile of double track. The cost of subways will vary, not including equipment, from about $2,000,000 to $6,000,000 per mile of double track.

"The conclusion which I have reached after studying the problem is that your great opportunity, if not, indeed, your only salvation, lies in making use of the canal and in constructing a loop along its line and around the easterly portion of your city. This loop should be part subway and tunnel and part surface line, connecting with all the interurban lines around the circumference. With a subway along the line of your canal you will avoid some of the principal elements of cost and reduce by more than one-half the usual cost of a subway. The surface line would involve some difficulties, but none of them, in my opinion, serious. On this loop line a train service may be run connecting by transfer with all the outlying lines and freight cars may be brought in at night to some central freight station.

"This loop line would afford the citizens of Cincinnati a train service in which trains of four or more cars could run on two-minute headway or less and at a speed of 30 m.p.h. Cars could be used seating, say, seventy-two passengers and carrying more than 200 when full. Stations could be located about a mile apart with the platforms on a level with the floors of the cars so that loading and unloading would be quick and easy. The suburban districts of your entire city would, in my opinion, grow more rapidly than they are growing at present. The project should be thoroughly investigated, for it is in line with the tendency of the times."

City Engineer Waite told of the appointment of Messrs. Procter, Julian and Schneider by Mayor Hunt as a commission on high-speed interurban electric railway service for Cincinnati and of their employment of Bion J. Arnold to make an investigation, and he outlined Mr. Arnold's report. He said in part:

"A study of the situation by Mr. Arnold and the commission developed the fact that by the construction of a section between Norwood and St. Bernard a loop could be made which would give to the city of Cincinnati a belt line.

"Council passed a resolution authorizing a bond issue of $50,000 to make the necessary surveys for a subway, and as a result in June, 1913, an organization was started with F. B. Edwards, formerly of the Boston and Cambridge subways, in charge. George F. Swain, of Harvard University and president of the Boston Transit Commission, was engaged as consulting engineer. At this time we are not able to give you any definite figures as to the probable cost, but we are able to say that the lines suggested by Mr. Arnold are possible of construction. From the study which we have made of the entire situation, we believe that the proposed route by occupying the canal will give to Cincinnati a solution of its rapid transit perplexities at a cost within its earning capacity and add to it an impetus of growth which it has needed."

The City Council has taken the first step toward the revocation of the White-Bleekman franchise for an interurban depot, and it is said that the majority of the members are in favor of final action to that effect. Mayor Hunt is also in favor of nullifying the franchise on the ground that its terms have not been complied with. Both A. S. White and James E. Bleekman have entered protests against such action and assert that it has been almost impossible to make a move toward the construction of the depot because of the opposition made by the city.

Strike on Allegheny Valley Railway

The unionized car men on the Allegheny Valley Railway, Tarentum, Pa., have been on a strike since Dec. 10. The cars were started out with non-union men promptly after the strike and regular service was maintained until the afternoon of the first day when rioting began. The cars were also started on Dec. 11 and operated until stopped by rioters in and around Tarentum, who stoned the cars and pulled the crews off the platforms. Owing to the failure of the local authorities to protect the company and its men properly no further attempt to resume service was made until 10 a. m. on Dec. 16, at which time the members of the State Constabulary arrived on the scene. They immediately restored order and since that time cars have been run on regular schedule by non-union men with little or no interference.

The trouble between the company and the men originated when the president of the local union was discharged for violation of the rules and fighting in the crew room. The employees who were members of the union insisted upon their president being reinstated and voted, thirty-nine to three, there being only forty-two men on the line, to strike unless he was reinstated. Without waiting for the strike order to be carried out the management notified the men to come and get their pay and immediately placed non-union men on the cars.

The Allegheny Valley Railway is one of the constituent lines of the West Penn Traction Company. It comprises 22 miles of track out of a total of 314 miles for the entire West Penn system.

Proposal to Increase Stock of Cleveland Railway

At a special meeting of the directors of the Cleveland Railway on Dec. 19, it was decided to take final action at the regular monthly meeting on Dec. 26 on a proposition to ask the stockholders to authorize an issue of additional stock. It is thought the amount will be $2,000,000. It is said that $1,600,000 is needed at once to take care of extensions and betterments already planned and make good the deficits incurred. The new carhouse and shops in the southern part of the city and the Harvard-Denison line, recently put into operation, were the principal works completed during the year. Most of the replacements were taken care of as maintenance charges. The proposed increase in the capital stock of the company will mean larger fixed charges, and if the increase is opposed by the city officials the case will likely be argued at length before the Public Utilities Commission.

The village of East Cleveland has passed an ordinance offering the Cleveland Railway the privilege of laying a double track on Superior Avenue to its intersection with Euclid Avenue, the final step having been taken on the evening of Dec. 17. This comprises a stretch of about 2000 ft. Both thoroughfares are extensions of city streets of the same name. The village requires the company to accept a

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fare of 3 cents on the Superior Avenue line until the running time between the village and the Public Square in the city is reduced to twenty-five minutes, when 5 cents may be charged. This is an inducement to the city to build four tracks on Superior Avenue between East Ninth Street and East Fifty-fifth Street, so that express cars may be operated for the East Cleveland people. The fare on the Euclid Avenue line is to remain 3 cents.

The city engineers have prepared plans for a subway terminal under the Public Square, and they will be presented to Council at an early date. The plans include a subway from East Ninth Street to the Public Square on one of the principal thoroughfares.

Furthering Rapid Transit Construction in Brooklyn

During the week ended Dec. 20 the Public Service Commission for the First District of New York took another important step in the furtherance of the construction work in Brooklyn under the dual system subway contracts. This was the conclusion of an agreement with the New York Municipal Railway Corporation for the acquisition of an easement by the city in the property of the South Brooklyn Railway in the right-of-way of that company along Thirty-eighth Street, Brooklyn, from Fourth Avenue to Tenth Avenue. This right-of-way is to be used by the city for the construction of a depressed railroad to connect the Fourth Avenue subway with the proposed elevated lines to Coney Island through New Utrecht and Gravesend Avenues over the routes now known as the "West End" and "Culver" lines. The city agrees to pay $1,000,000 for this easement and to credit the New York Municipal Railway Corporation with that amount against its promised contribution of $13,500,000 toward the cost of construction of the new lines. At the same time the commission adopted the form of two agreements with the New York Municipal Railway Corporation modifying the dual system operating contract, and these will be executed as soon as the deed for the easement is signed. The modifying agreements authorize the New York Municipal Railway Corporation to undertake and complete the construction of the depressed railroad through the Thirty-eighth Street cut and the reconstruction of the Centre Street loop so as to fit it for permanent operation. The Centre Street loop has four tracks, and at present only the two easterly tracks are being operated. The agreements provide that the Thirty-eighth Street work shall be completed within eighteen months and the Centre Street loop work within nine months from the delivery of the agreements. The commission also approved an agreement between the New York Municipal Railway Corporation and Jacob & Davies, Inc., construction engineers, to take exclusive charge of the work required in the Thirty-eighth Street cut and the Centre Street loop. The company agrees to pay the engineers $27,500 per year while the work in Thirty-eighth Street and that in the Centre Street loop are going on simultaneously, and $20,000 a year while such works are not prosecuted at the same time.

Railroad Valuation Plan Outlined

The government Board of Engineers and the committee of railroad engineers in charge of physical valuation of the railroads have agreed upon a tentative plan of procedure in carrying out the work. The railroads will furnish the government with a complete inventory of all property owned, exclusive of grading. This inventory will give three valuations—original cost, replacement cost and replacement cost less depreciation. The army board will survey all rights of way and make cross-section surveys of the grading elevations and cuts and in conjunction therewith will check up the inventories previously submitted by the railroads. A railroad engineer representing the road under investigation will be permitted to accompany each government board, and the railroads will receive daily copies of the reports submitted by the government engineers. It is estimated it will cost the government between $25,000,000 and $30,000,000 to make a complete valuation of all the railroads. The cost to the railroads will be between $15,000,000 and $20,000,000.

Work will be started upon an experimental basis early in January. The preliminary valuations will cover the properties of the Atlanta, Birmingham & Atlantic Railway and City Southern Railway in the Middle West, including about 100 miles of the Santa Fé, and of the Rock Island in Oklahoma, where the railroads recently made reports upon physical valuation to the state commission, and of the San Pedro, Los Angeles & Salt Lake Railroad, running from Salt Lake to Los Angeles.

Traffic Problems in Liverpool

The traffic problem at the Liverpool (England) docks and the question of the transport of goods in the district generally have caused considerable discussion for some time, and various schemes have been propounded, particularly for the relief of the congestion at the docks. The Liverpool City Council requested that a report be prepared on the practicability of using the tramway system for the conveyance of goods to neighboring towns, with which Liverpool is linked by the route passing through Knotty Ash on to St. Helens and so to the various important manufacturing centers not only of Lancashire but of Yorkshire. That report has now been prepared by C. W. Mallins, manager of the Liverpool Corporation Tramways, and will be brought before the Council. In the report the question is dealt with under two heads: (1) local traffic between the docks and railway stations and warehouses, and (2) the transport of merchandise between the Liverpool docks and the manufacturing centers. In regard to the first point, Mr. Mallins expresses the opinion that if a thoroughly well-organized system, equipped with the most modern type of mechanically propelled vehicles, were provided to deal with the work now done by the horse-drawn vehicles, that work could be done by half the number of vehicles, thus materially reducing the congestion and the cost of the present methods. In regard to the second point the first consideration is the facilities the Mersey Docks and Harbor Board are prepared to grant to enable any new system of transport to enter the dock estate. Mr. Mallins is of the opinion that it is quite impracticable to operate a good service of any magnitude over the existing lines. The most that could be done with the existing lines would be to run three or four trains a day at a small capital expenditure. If this were successful and the Dock Board and the Bootle Corporation provided the necessary facilities, a more elaborate system could be established. The scheme suggested would involve the electrification of the dock railway, or the construction of a new line of tramways parallel with it, and the construction of tramways dealing with the north and south docks traffic and connected with Knotty Ash, at an outlay of £246,750.

Progress with Kansas City Franchise

An entirely new ordinance, to be independent of the franchise now before the Council, and to provide for the routing of cars at the new Union Station, will probably be presented by the committee of the Council of Kansas City, Mo., which is considering the Metropolitan Street Railway grant. The proposed new ordinance also is likely to specify the extensions which shall be built during the next three years. The question of whether cars shall run on the plaza at the new depot has been a troublesome one and may be disposed of by the new plan. L. R. Ash and P. J. Kealy, engineers for the Metropolitan Street Railway and for the city, have recommended the building of 18½ miles of extensions, which they regard as reasonable.

Members of the committee of the Council considering the Metropolitan Street Railway franchise introduced the reduced fare idea recently. Ford Harvey, receiver for the company, asserted that it would be impossible to finance the company were fares to be reduced. Alderman Frank Welch advocated ten tickets for 25 cents to school children, good on school days between 7.30 and 9.30 a. m. and 3 and 5 p. m. Alderman George Hoffman went further and asked for six tickets for 25 cents for everyone, half fare for school children and free service for children under seven years when accompanied by an older person.

The joint committee of the Kansas City Council which is considering amendments to the Metropolitan franchise ordinance adjourned until Dec. 26, because of the inability of Alderman George H. Edwards to attend meetings prior to

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that date. It was planned to resume hearings at that time and to get the ordinance back to the City Council early in January if possible. Of the hundreds of suggestions which have been offered few have been important enough to warrant inserting in the ordinance.

New Texas Road Opened.—The Jefferson County Traction Company placed its new line between Beaumont and Port Arthur, Tex., in operation on Dec. 16, 1913.

Cards Advertising Liquor Removed.—As the result of the passage of an ordinance prohibiting advertisments of liquors in Kansas City, Kan., the Metropolitan Street Railway has removed all such cards from cars entering that city. The ordinance took effect Dec. 15.

Route Signs in Pittsburgh.—The Pittsburgh (Pa.) Railways has adopted the car-numbering system and has placed figures 2 ft. high on the cars of the lines running through the city. It is proposed after the patrons have become familiar with the new system to remove the names of streets from the cars.

New Depot Loop Line in Detroit.—First operation of the new depot loop and the opening of the new Michigan Central station in Detroit have been arranged for Jan. 4. Depot cars will operate from the station on Fourteenth Avenue to Michigan Avenue, thence to Woodward Avenue, to Congress Street, to Griswold Street and back to Michigan Avenue.

Toronto Purchase Held Up.—On Dec. 18 the Board of Control of the city of Toronto, Ont., reversed its decision of the day previous and passed a motion to notify Sir William MacKenzie that all negotiations for the proposed purchase of the Toronto Railway and the Toronto Electric Light Company were at an end. The resolution must now go before the City Council for ratification, where it may be negatived by a straight majority vote. Another solution to the transportation problem of the city has been presented to the Board of Control by W. H. Widmer and referred to Commissioner Harris for a report thereon. The plans show a belt line around the city in a semi-circle, extending as far north as York Mills, with a line along the waterfront. The system provides for a four-way track, the two inner lines to be devoted to rapid transit service at 30 m.p.h. including stops.

Arrests in Connection with Wrecking Street Car in Cincinnati During Strike.—William Molloy, metal worker, thirty-nine years of age, and John Brulard, twenty-four years old, a marble setter, were arrested on Dec. 18 on the charge of taking part in wrecking a Warsaw Avenue car of the Cincinnati Traction Company in front of the new Union Central building in Cincinnati during the strike of the street railway employees last May. Both were working on the new building at the time and are accused of throwing missiles from the upper floors of the building at the car. Molloy confessed that he had thrown a bag of plaster and a metal window weight out of a window to the street. Brulard denied that he threw anything into the street. Both were locked up. Warrants have been issued for fourteen other workmen on this building on similar charges.

Report on Underground Franchises in Toronto.—City Solicitor Johnston of Toronto, Ont., reported to the Board of Control on Dec. 16 that the only underground suburban railway franchises affecting Toronto and adjoining municipalities that he was aware of are held by the Hamilton Radial Electric Railway and the Hamilton, Waterloo & Guelph Railway. Mr. Johnston said: "The rights possessed by these different companies can only be gathered from a perusal of all the statutes relating to each company. I do not, however, take the above order to mean that you wish all the powers of each of the companies to be extracted from the statutes. If this is the meaning of the order, it will take a very considerable time to peruse all these different statutes and agreements." Comptroller Foster thought that there was a franchise from the east, but the Mayor told him that he was wrong. Comptroller Church remarked that there were about seventeen radial and electric and railway franchises, some of them provincial charters, and that under the Ontario Railway Board act of 1906 all these lines could exchange traffic with the civic lines.

Final Brakeshoe Hearing in New York.—On Dec. 19 the final hearing in regard to the installation of composition brakeshoes on the surface railways of New York City was held before the Public Service Commission for the First District of New York. After a conference between representatives of the New York Railways, the Brooklyn Rapid Transit Company, the Third Avenue Railway and others and the engineers of the commission, an order was issued by the commission to the effect that the companies will have until March 1, 1915, to equip all their cars with brakeshoes containing a lubricant or with some other effective device for the mitigation of "squealing." This time is given the companies in order that they may complete their tests to ascertain what kind of device it will be best to install. It is expected that the formal acceptance of the order by the companies will be received by the commission in the near future. As has been previously stated in the ELECTRIC RAILWAY JOURNAL, a composition-filled shoe is already in operation for experimental purposes on the Montague Street line of the Brooklyn Rapid Transit Company and the Madison Avenue line of the New York Railways.

PROGRAMS OF ASSOCIATION MEETINGS

International Electrical Congress, San Francisco, 1915

The International Electrical Congress is to be held at San Francisco, Cal., Sept. 13 to 18, 1915, under the auspices of the American Institute of Electrical Engineers by authority of the International Electrotechnical Commission, and during the Panama-Pacific International Exposition. Dr. C. P. Steinmetz is the honorary president. The deliberations of the congress will be divided among twelve sections which will deal exclusively with electricity and electrical practice. There will probably be about 250 papers. The first membership invitations will be issued in February or March, 1914.

Attention is drawn to the distinction between this electrical congress and the International Engineering Congress which will be held at San Francisco during the week immediately following the electrical congress. The engineering congress is supported by the civil, mechanical and marine engineering societies and by the Institutes of Mining and Electrical Engineers, as well as by prominent Pacific Coast engineers who are actively engaged in organizing it. This congress will deal with engineering in a general sense, electrical engineering subjects being limited to one of the eleven sections which will include about twelve papers treating more particularly applications of electricity in engineering work.

Wisconsin Electrical Association

Secretary George Allison, of the Wisconsin Electrical Association, has given out a revised program for the annual meeting of this association, which will be held in the Hotel Pfister, Milwaukee, on Jan. 15 and 16. In addition to the following program of papers the secretary intends to add a paper on the commercial department of electric utilities:

Paper, "High Efficiency Incandescent Lamps and Their Central Station Applications," by Prof. S. E. Doane, chief engineer of the National Lamp Association.

Paper, "Some Problems of Public Utility Accounting and Rate Making," by Halford Erickson, member of the Wisconsin Railroad Commission.

Paper, "Street Railway Traffic Surveys in Relation to Railway Operation, Management and Regulation," by C. M. Larson, chief engineer of the Wisconsin Railroad Commission.

Paper, "A Practical Accounting System for Small Central Stations," by H. G. D. Nutting, assistant to the president of the Clement C. Smith properties.

Paper, "Voltage Regulation, Its Necessity and How Accomplished," by G. G. Post, electrical engineer of the Milwaukee Electric Railway & Light Company.

Paper, "Review of New Laws Affecting Public Utilities," by John B. Sanborn, of Sanborn & Blake, attorneys.

Paper, "Comparative Maintenance of Car Electrical Equipment, Modern vs. Old Type," by experts from the General Electric Company and the Westinghouse Electric & Manufacturing Company.

Several standing committees will also report.

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Financial and Corporate

Stock and Money Markets

Dec. 23, 1913.

Stocks were strong at the opening of trading on the New York Stock Exchange to-day, but toward the close the market eased off and trading became dull. Sales to-day total 368,860 shares. The local traction bonds were strong, the Interborough-Metropolitan 4½'s advancing nearly a point, while New York Railways 5's gained more than a point. Rates in the money market to-day were: Call, 3 @ 3½ per cent; thirty days, 5¼ @ 5½ per cent; ninety days, 4¾ @ 5 per cent; four, five and six months, 4 @ 4¾ per cent.

There were very few changes in prices of stocks traded in on the Philadelphia Exchange to-day. Philadelphia Rapid Transit, after advancing to 19 for an odd lot, reacted to 18½ and was later offered at 18⅝. Union Traction sold at 44¼.

The Chicago market was narrow to-day, and the volume of transactions was small.

Trading in Boston to-day was broad and fairly active. New Haven advanced to 73½. The demand for bonds was fair.

Trading in stocks in Baltimore was extremely narrow and dull. The bond transactions totaled $103,200, par value.

Quotations of traction and manufacturing securities as compared with last week follow:

	Dec. 17	Dec. 24
American Brake Shoe & Foundry (common)	87	86
American Brake Shoe & Foundry (preferred)	127	126½
American Cities Company (common)	36	36
American Cities Company (preferred)	63⅞	60
American Light & Traction Company (common)	333	334
American Light & Traction Company (preferred)	106	106
American Railways Company	38¼	38
Aurora, Elgin & Chicago Railroad (common)	a42	a42
Aurora, Elgin & Chicago Railroad (preferred)	*84	a84
Boston Elevated Railway	85	86½
Boston Suburban Electric Companies (common)	7	7
Boston Suburban Electric Companies (preferred)	60	58
Boston & Worcester Electric Companies (common)	*6½	*6½
Boston & Worcester Electric Companies (preferred)	37	37
Brooklyn Rapid Transit Company	86¼	88
Capital Traction Company, Washington	111	110½
Chicago City Railway	160	160
Chicago Elevated Railways (common)	25	25
Chicago Elevated Railways (preferred)	75	75
Chicago Railways, ptcptg., ctf. 1	a90	91½
Chicago Railways, ptcptg., ctf. 2	28½	28¼
Chicago Railways, ptcptg., ctf. 3	7	7
Chicago Railways, ptcptg., ctf. 4	1⅜	1¾
Cincinnati Street Railway	110	107½
Cleveland Railway	103½	103½
Cleveland, Southwestern & Columbus Ry. (common)	*5½	*5½
Cleveland, Southwestern & Columbus Ry. (preferred)	*30	*30
Columbus Railway & Light Company	18	18
Columbus Railway (common)	59½	59¼
Columbus Railway (preferred)	88	88
Denver & Northwestern Railway	*80	*80
Detroit & United Railway	a80	80
General Electric Company	135⅜	140
Georgia Railway & Electric Company (common)	119	119¼
Georgia Railway & Electric Company (preferred)	84½	84
Interborough Metropolitan Company (common)	14⅜	15
Interborough Metropolitan Company (preferred)	59	60¼
International Traction Company (common)	*30	*30
International Traction Company (preferred)	*90	*90
Kansas City Railway & Light Company (common)	*20	*20
Kansas City Railway & Light Company (preferred)	*30	*30
Lake Shore Electric Railway (common)	6	*6
Lake Shore Electric Railway (1st preferred)	92	*92
Lake Shore Electric Railway (2d preferred)	24	*24
Manhattan Railway	127	125
Massachusetts Electric Companies (common)	10	10¼
Massachusetts Electric Companies (preferred)	64	63
Milwaukee Electric Railway & Light Co. (preferred)	95	*95
Norfolk Railway & Light Company	24¾	24¾
North American Company	66	67
Northern Ohio Light & Traction Company (common)	70	70
Northern Ohio Light & Traction Company (preferred)	101	101
Philadelphia Company, Pittsburgh (common)	39	39
Philadelphia Company, Pittsburgh (preferred)	39	39
Philadelphia Rapid Transit Company	18	18
Portland Railway, Light & Power Company	53	53
Public Service Corporation	105	105
Third Avenue Railway, New York	39¾	41⅝
Toledo Traction, Light & Power Company (common)	15	30
Toledo Traction, Light & Power Company (preferred)	75	80
Twin City Rapid Transit Co., Minneapolis (common)	103	105½
Union Traction Company of Indiana (common)	11½	*11½
Union Traction Company of Indiana (1st preferred)	80	*80
Union Traction Company of Indiana (2d preferred)	14	14
United Rys. & Electric Company (Baltimore)	24⅞	24⅞
United Rys. Inv. Company (common)	16	20
United Rys. Inv. Company (preferred)	32	37
Virginia Railway & Power Company (common)	56	56
Virginia Railway & Power Company (preferred)	97½	99¼
Washington Ry. & Electric Company (common)	85	85
Washington Ry. & Electric Company (preferred)	86½	87
West End Street Railway, Boston (common)	67½	68
West End Street Railway, Boston (preferred)	90	90
Westinghouse Elec. & Mfg. Company	63	65
Westinghouse Elec. & Mfg. Company (1st preferred)	112	114

*Last sale. a Asked.

Columbus Utility Merger to Go in Effect in February

It has been announced that the consolidation of the Columbus (Ohio) Railway, the Columbus Edison Company and the Columbus Railway & Light Company, as the Columbus Railway, Power & Light Company, will become effective Feb. 4, 1914. Owing to the fact that but a little more than 40 per cent of the Columbus Light, Heat & Power Company stocks have been deposited with the committee in charge of the consolidation, that company will not be included, but the lease of its properties will continue to be held by the Columbus Railway & Light Company, and they will be operated by the consolidated corporation. The work of the reorganization of the Columbus public utility companies has been delayed by the refusal of the majority of the stock of the Columbus Light, Heat & Power Company to agree to the merger.

A meeting of the Columbus Railway & Light Company will be held Jan. 5, 1914, at which the lease held by that company on the properties of the Columbus Railway, Power & Light Company, the Columbus Railway and the Columbus Edison Company will be cancelled. At the same time, the stockholders will vote upon the sale of a part of the assets of the company to the Columbus Railway, Power & Light Company.

The assessment of $20 a share on the stock of the Columbus Railway & Light Company, noted in the ELECTRIC RAILWAY JOURNAL of Dec. 13, 1913, will realize $1,000,000 for use in paying off floating debt of the company. With this done the company will be free from debt and have in its treasury a substantial amount of the common stock of the Columbus Railway, Power & Light Company. It is expected that this stock will be exchanged for Columbus Railway & Light Company stock, after the assessments have been paid, in the ratio of three shares of Columbus Railway, Power & Light Company common stock for five shares of Columbus Railway & Light Company stock.

Series A and B of the preferred and the common stock of the Columbus Railway, Power & Light Company will be exchanged for the common and preferred stocks of the Columbus Edison Company and the Columbus Railway. With all these exchanges completed the Columbus Railway, Power & Light Company will have outstanding $10,738,600 of Series A and B preferred and common stocks, with underlying bonds to the amount of $8,091,000. In addition, through the Columbus Railway & Light Company, it will control the leases on the properties of the Columbus Light, Heat & Power Company, which has $726,800 of stocks and $471,700 of bonds.

Soon after the meeting of the Columbus Railway & Light Company the Columbus Edison Company and the Columbus Railway stockholders will meet and approve the terms of consolidation.

The consolidated properties will be under operating management of E. W. Clark & Company, of Philadelphia. C. M. Clark, representing the company in the reorganization proceedings, recently issued the following statement relative to the situation at present and the prospects for the future:

"A great many inquiries have been received from the Columbus Railway common stockholders and the Columbus Railway & Light Company stockholders in regard to the prospects of the new company and the probability of dividends on the new common stock. Of course, it is impossible for anyone to forecast the future, but an answer can be made to such inquiries, based upon experience extending over a great many years in the public utility business. Assuming that business conditions are normal, the management fully expects to continue the 5 per cent dividends upon the common stock without interruption. Estimates made indicate that a safe margin will be earned over and above these dividends. The rate of fare, namely, eight tickets for 25 cents, is extremely low, and were it not for the fact that the Columbus street railway system has for years been operated on a most economical basis, because of good management and natural conditions which make economical operation possible, there would be no profit in such low fares.

"The reorganized company will be in a strong financial position and able to handle all requirements. Speaking for E. W. Clark & Company and their interest in the property, I desire to say that we purpose to pay our assessments and continue and increase our interest in the property, because we have faith in its future."

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East St. Louis & Suburban Company Readjustment

Notices of a proposed change of capitalization have been sent to stockholders of the East St. Louis & Suburban Company, East St. Louis, Ill., by E. W. Clark & Company, Philadelphia. In view of recent legislation in New Jersey, where the company was chartered, it is planned to organize, probably under the laws of Maine, a new corporation to be known as The East St. Louis & Suburban Company, to which all the assets, debts and obligations of the existing company will be transferred. In place of the $7,000,000 of preferred and $7,000,000 of common stock outstanding, the new capitalization will be as follows: 6 per cent five-year convertible bonds, $2,000,000; 5 per cent cumulative preferred stock, $6,000,000; common stock, $6,000,000.

Under the plan preferred shareholders receive the privilege of converting one-seventh of their holdings into an equal amount in par value of convertible bonds upon payment of $20 a share. The remaining six-sevenths of their stock will be exchanged for an equal amount of 5 per cent preferred stock in the new company. Common stockholders may exchange one-seventh of their holdings into bonds by paying $55 a share and surrendering the remaining six-sevenths for an equal amount of new common stock. In case the plan is declared operative, stockholders who do not desire to subscribe will be permitted to exchange their present stock, share for share, for a like amount in the new corporation, without any payment.

The $2,000,000 of bonds, which are part of an issue of $3,000,000, will be convertible up to July 1, 1918, into an equal amount in par value of 6 per cent cumulative preferred stock and, in addition, 33 1-3 per cent in common stock. The 5 per cent preferred shares may at any time be exchanged one-half into 6 per cent cumulative preferred and one-half into common stock.

Chicago (Ill.) Railways.—Holders of participation certificates of the Chicago Railways ratified on Dec. 22 the Council ordinance and operating agreement of Nov. 13 for unified operation of surface street railways in the city of Chicago. The vote cast in favor was 182,826, out of 261,802 outstanding. There were no dissenting votes.

Cities Service Company, New York, N. Y.—The Cities Service Company has declared regular monthly dividends of one-half of 1 per cent on its preferred stock and five-twelfths of 1 per cent on its common stock, both payable Jan. 1 to stockholders of record of Dec. 15. The board of directors also declared a monthly dividend of one-half of 1 per cent on its preferred stock and a monthly dividend of one-half of 1 per cent on its common stock, both payable Feb. 1 to stockholders of record of Jan. 15. This increases the disbursement on the common stock from 5 per cent to 6 per cent annual rate. It has been announced that Henry L. Doherty & Company and the Cities Service Company will open an office in London and several prominent London men will be added to the board of directors of the Cities Service Company. The capital stock of the company is listed on the London Stock Exchange.

Connecticut Company, New Haven, Conn.—The stockholders of the Connecticut Company at a special meeting on Dec. 22 amended the company's by-laws to provide for a chairman of the directors. The directors will meet in a few days and elect Howard Elliott chairman and L. S. Storrs president. Mr. Elliott is now president and Mr. Storrs vice-president of the company.

Dayton (Ohio) Street Railway.—The Dayton Street Railway has declared an initial quarterly dividend of 1½ per cent on the $650,500 of 5 per cent cumulative preferred stock which is outstanding.

Fayetteville Street Railway & Power Company, Fayetteville, N. C.—The property of the Fayetteville Street Railway & Power Company has been sold under foreclosure for $70,000 to H. T. Detchert, Philadelphia, Pa., representing the bondholders. The company was placed in the hands of H. L. Brothers, Fayetteville, N. C., as receiver in October, 1913.

Interborough-Metropolitan Company, New York, N. Y.—The $1,817,000 of 6 per cent two-year notes of the Interborough-Metropolitan Company which matured on Dec. 22 were paid on that date by the company. Payment was made from the proceeds of a new issue of $1,500,000 of 6 per cent notes running for six months and from funds already in the treasury. On Jan. 1, 1914, the company has $2,039,520 of collateral trust 6 per cent notes of 1908 maturing, and it is understood that these will be taken care of in the same manner as the first-mentioned issue.

Johnstown (Pa.) Traction Company.—Papers were filed at Harrisburg on Dec. 16 merging under the title of the Johnstown Traction Company, with $2,000,000 of authorized capital stock, the Johnstown Traction Company and its leased line, the Johnstown Passenger Railway. The American Railways, which formerly owned the Johnstown Passenger Railway, will receive approximately $2,700,000 for its investment of about $2,200,000 made four years ago in the stock of the Johnstown Passenger Railway. A large part of the price will be in cash and the balance in securities of the Johnstown Traction Company. In connection with the merger it is proposed to retire the $1,500,000 of American Railways-Johnstown Passenger Railway collateral trust 5's by offering them at 102½ for new 5 per cent first refunding mortgage bonds of the merged companies at 95. The American Railways owned 90 per cent of the capital stock of the Johnstown Passenger Railway. The road was afterward leased to the Johnstown Traction Company, which was organized by the du Pont interests, and an option was given to that company by the American Railways to purchase the Johnstown Passenger Railway within five years. The present sale is in exercise of that option.

Macon Railway & Light Company, Macon, Ga.—Jesse B. Hart, Curran R. Ellis and Orville A. Park have been elected directors of the Georgia Public Service Corporation to succeed John Walker, T. D. Massee and Jack Nyhan. Mr. Hart has been elected vice-president of the company, the stock of which is controlled by the Macon Railway & Light Company.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis.—The Milwaukee Electric Railway & Light Company has applied to the Railroad Commission for authority to issue $3,500,000 of 4½ per cent refunding and extension twenty-five-year bonds, dated Jan. 1, 1906. The bonds are part of an authorized issue of $20,000,000, and are to be deposited as collateral, under an authorized issue of $90,000,000 general and refunding mortgage bonds, of which $4,700,000 were issued from August, 1911, to October, 1913, for capital expenditures.

Northern Ohio Traction & Light Company, Akron, Ohio.—At the annual meeting of the stockholders, to be held on Jan. 24, the shareholders of the Northern Ohio Traction & Light Company will be asked to approve an increase in the 6 per cent preferred stock of the company from $3,000,000 to $5,000,000. All of the $3,000,000 preferred stock is now outstanding. None of the new preferred stock is to be issued, unless earnings applicable to the payment of preferred dividends are for the twelve months preceding the sale of the stock equal to three times the dividend requirements on the preferred stock then outstanding and also on the amount of new preferred stock to be issued. At present the Northern Ohio Traction & Light Company is earning about three and a third times the dividends on the present outstanding amount, so that a part at least of the new stock may be issued at once. The directors also will ask the stockholders to approve a plan by which the company will provide for the payment of the normal income tax on all Northern Ohio Traction & Light Company bonds, so that no deductions will be made on coupons deposited for collection.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—The Oakland, Antioch & Eastern Railway has obtained in New York convertible long-term loans, aggregating, it is reported, about $1,000,000, to provide for extensions and acquisition of rolling stock. The construction of an electric railway from Marysville to Colfax is proposed.

Ohio Service Company, Dennison, Ohio.—Application has been made to the Public Utilities Commission of Ohio for permission to consolidate the following companies under the control of the Ohio Service Company: The Twin City Traction Company, the Midland Power & Traction Company, the Coshocton Light & Heating Company, the Newcomers-

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town Electric Light, Heat & Power Company and the Lafayette Light & Power Company.

Portland Railway, Light & Power Company, Portland, Ore.—F. T. Griffith, president of the Portland Railway, Light & Power Company, has made the following statement in regard to the quarterly dividend of $1 payable Dec. 1, 1913: "On Dec. 1, 1912, the dividend on the stock was increased to $1.25 per share and has been continued at that rate quarterly. It was expected that Portland, and, therefore, our earnings, would continue to grow approximately as during the previous seven years. In order to provide for this anticipated growth, large investments were made during 1911 and 1912 for hydroelectric plants, equipment and extensions. During the past year Portland has not grown as expected. In many respects progress has been made, but the company and many other business institutions have been temporarily over-developed. As a result, interest charges and taxes have increased at a greater rate than net earnings, and the surplus available for dividends has therefore decreased. After careful consideration of the earnings of this year and the prospects for the coming year, the directors have decided that a conservative policy requires that the Dec. 1, 1913, dividend be reduced to $1 per share."

Reading Transit & Light Company, Reading, Pa.—At a meeting held in New York on Dec. 18, 1913, the following officers and directors were elected: Reading Transit & Light Company—Officers and directors: Norman McD. Crawford, president and general manager; J. B. Taylor, vice-president; F. V. Henshaw, vice-president; William Buchsbaum, treasurer; W. S. Barstow; G. L. Roller, assistant secretary and assistant treasurer; A. L. Kramer. J. R. Fusselman, secretary and assistant treasurer. Metropolitan Electric Company—Officers and directors: W. S. Barstow, president; Norman McD. Crawford, vice-president and general manager; J. B. Taylor, vice-president; William Buchsbaum, treasurer and assistant secretary; O. Clement Swenson. J. R. Fusselman, secretary and assistant treasurer. Neversink Mountain Railway—Officers and directors: W. S. Barstow, president; Norman McD. Crawford, vice-president and general manager; J. B. Taylor, vice-president; William Buchsbaum, assistant secretary and treasurer; O. Clement Swenson. J. R. Fusselman, secretary and assistant treasurer. Oley Valley Railway—Officers and directors: W. S. Barstow, president; J. B. Taylor, vice-president; Norman McD. Crawford, vice-president and general manager; William Buchsbaum, treasurer and assistant secretary; O. Clement Swenson. J. R. Fusselman, secretary and assistant treasurer

United Railroads, San Francisco, Cal.—Arrangements have been made through Ladenburg, Thalmann & Company, New York, N. Y., and E. H. Rollins & Sons, Boston, Mass., for the extension to Dec. 15, 1915, of $1,800,000 of first mortgage 6 per cent bonds of the Market Street Cable Railway, which mature Dec. 15, 1913. The bonds form part of an issue of $3,000,000, of which $1,200,000 were paid on maturity on Jan. 1, 1913.

Dividends Declared

American Cities Company, New York, N. Y., 3 per cent, preferred.

Birmingham Railway, Light & Power Company, Birmingham, Ala., 3 per cent, common and preferred.

Chicago City & Connecting Railway, Chicago, Ill., $2.25, preferred participating certificates.

Cincinnati, Dayton & Toledo Traction Company, Hamilton, Ohio, 2½ per cent, preferred.

Cincinnati & Hamilton Traction Company, Cincinnati, Ohio, quarterly, 1½ per cent, preferred; quarterly, 1 per cent, common.

City Railway, Dayton, Ohio, quarterly, 1½ per cent, preferred; quarterly, 2 per cent, common.

Columbia Railway, Gas & Electric Company, Columbia, S. C., quarterly, 1½ per cent, preferred.

Columbus (Ga.) Electric Company, 3 per cent, preferred.

Columbus, Newark & Zanesville Electric Railway, Cincinnati, Ohio, quarterly, 1½ per cent, preferred.

Commonwealth Power, Railway & Light Company, Grand Rapids, Mich., quarterly, 1½ per cent, preferred; quarterly, 1 per cent, common.

Consolidated Cities Light, Power & Traction Company, New York, N. Y., quarterly, one-half of 1 per cent.

Halifax (N. S.) Electric Tramway, quarterly, 2 per cent.

Honolulu Rapid Transit & Land Company, Honolulu, Hawaii, quarterly, 2 per cent.

Illinois Traction System, Peoria, Ill., quarterly, 1½ per cent, preferred.

Interstate Railways, Philadelphia, Pa., 30 cents, preferred.

Lake Shore Electric Railway, Cleveland, Ohio, quarterly, 1½ per cent, first preferred.

Little Rock Railway & Electric Company, Little Rock, Ark., 3 per cent, preferred; 5 per cent, common.

Memphis (Tenn.) Street Railway, quarterly, 1½ per cent, preferred; 1 per cent, common.

Northern Ohio Traction & Light Company, Akron, Ohio, quarterly, 1½ per cent, preferred.

Porto Rico Railways, Ltd., Ponce, P. R., quarterly, 1 per cent, common.

Public Service Corporation of New Jersey, Newark, N. J., quarterly, 1½ per cent.

Reading (Pa.) Traction Company, 75 cents.

Republic Railway & Light Company, New York, N. Y., 1½ per cent, preferred.

Rome Railway & Electric Company, Rome, Ga., quarterly, 1 per cent.

Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., quarterly, 1½ per cent.

Winnipeg (Man.) Electric Railway, quarterly, 3 per cent.

ELECTRIC RAILWAY MONTHLY EARNINGS

BATON ROUGE (LA.) ELECTRIC COMPANY

Period			Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1 m.,	Oct.,	'13	$15,028	*$9,994	$5,033	$2,125	$2,908
1 "	"	'12	13,315	*7,638	5,678	1,730	3,948
12 "	"	'13	158,139	*98,440	59,699	24,042	35,657
12 "	"	'12	143,664	*85,470	58,194	20,763	37,431

BROCKTON & PLYMOUTH STREET RAILWAY, PLYMOUTH, MASS.

1 m.,	Oct.	'13	$9,316	*$8,766	$550	$1,025	†$475
1 "	"	'12	9,595	*8,023	1,572	1,028	544
12 "	"	'13	124,943	*97,142	27,801	13,046	14,755
12 "	"	'12	120,265	*89,988	30,277	12,511	17,766

CAPE BRETON ELECTRIC COMPANY, SYDNEY, N. S.

1 m.,	Oct.,	'13	$36,794	*$18,752	$18,042	$6,082	$11,960
1 "	"	'12	31,133	*16,340	14,794	5,620	9,174
12 "	"	'13	378,884	*206,174	172,710	71,911	100,799
12 "	"	'12	353,635	*193,950	159,686	68,047	91,639

COLUMBUS (GA.) ELECTRIC COMPANY

1 m.,	Oct.	'13	$54,378	*$23,289	$31,089	$25,042	$6,047
1 "	"	'12	54,913	*22,434	32,480	18,952	13,528
12 "	"	'13	638,157	*293,984	295,104	261,118	83,054
12 "	"	'12	606,595	*268,726	266,799	225,021	112,848

DALLAS (TEX.) ELECTRIC COMPANY

1 m.,	Oct.,	'13	$226,968	*$121,011	$105,957	$26,493	$79,464
1 "	"	'12	202,728	*103,791	98,938	24,641	74,297
12 "	"	'13	2,129,316	*1,235,782	893,534	298,868	594,666
12 "	"	'12	1,782,511	*1,094,562	687,949	280,456	407,493

EL PASO (TEX.) ELECTRIC COMPANY

1 m.,	Oct.	'13	$74,566	*$40,092	$34,473	$3,993	$30,480
1 "	"	'12	71,029	*40,729	30,300	4,746	25,554
12 "	"	'13	883,873	*469,431	414,441	48,237	366,204
12 "	"	'12	773,258	*424,118	349,139	74,916	274,223

GALVESTON-HOUSTON ELECTRIC COMPANY, HOUSTON, TEX.

1 m.,	Oct.	'13	$193,411	*$114,879	$78,533	$35,493	$43,040
1 "	"	'12	175,449	*104,415	71,035	33,724	37,311
12 "	"	'13	2,322,358	*1,327,889	994,468	415,543	578,925
12 "	"	'12	1,932,298	*1,139,958	792,340	377,207	415,133

HOUGHTON (MICH.) COUNTY TRACTION COMPANY

1 m.,	Oct.	'13	$22,216	*$13,291	$8,925	$5,606	$3,319
1 "	"	'12	24,853	*13,202	11,650	5,677	5,973
12 "	"	'13	300,850	*179,876	120,974	67,758	53,216
12 "	"	'12	303,790	*173,860	129,930	66,270	63,660

NORTHERN TEXAS ELECTRIC COMPANY, FORT WORTH, TEX.

1 m.,	Oct.,	'13	$201,479	*$101,117	$100,362	$24,166	$76,196
1 "	"	'12	201,567	*89,710	111,857	24,940	86,917
12 "	"	'13	2,089,688	*1,143,153	946,535	288,137	658,398
12 "	"	'12	1,727,037	*916,645	810,392	258,756	551,636

TAMPA (FLA.) ELECTRIC COMPANY

1 m.,	Oct.,	'13	$73,998	*$40,961	$33,036	$4,539	$28,497
1 "	"	'12	65,640	*33,782	31,858	4,475	27,383
12 "	"	'13	815,033	*441,049	373,985	55,169	318,816
12 "	"	'12	751,601	*392,919	358,682	53,533	305,149

*Includes taxes. †Deficit.

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Traffic and Transportation

Increase in Wages in New Jersey

The following communication announcing an increase in wages was addressed to the 3850 motormen and conductors of the Public Service Railway, Newark, N. J., on Dec. 20 by Thomas N. McCarter, president of the company:

"At this Christmas season it is sincerely gratifying to be able to inform you that the company has decided to put into effect on Jan. 1, 1914, a new scale of wages which provides for marked increases over the present rates. Under the new schedule platform men will be paid as follows:

"During the first six months, 23 cents per hour; during the second six months, 24 cents per hour; during the second year, 25 cents per hour; during the third year, 26 cents per hour; during the fourth year, 26 cents per hour; during the fifth year, 27 cents per hour; during the sixth year, 27 cents per hour; during the seventh year, 28 cents per hour; during the eighth year, 28 cents per hour; during the ninth year, 29 cents per hour; during the tenth year, 29 cents per hour; after the tenth year, 30 cents per hour.

"The company has fixed the amount to be paid to regular employees who volunteer for extra duty when needed after the day's work is done at the rate of 37½ cents per hour, and has also decided to guarantee to men on the extra list who answer all roll calls and perform such work as may be assigned to them a minimum wage of $12 per week. Comparisons made with the wage scales in effect on other properties of like character, operated under conditions similar to those which confront us, demonstrate that the rate of pay about to become effective places this corporation in the very front rank of street railway companies with regard to compensation of employees.

"In making this announcement the management realizes, and wants the trainmen to realize, that the company has a threefold obligation which it is compelled to meet within certain limitations. This threefold obligation of the company is to the public it serves, the employees who operate the cars and to the security holders whose money is invested in the property. All three classes are entitled to consideration in the distribution of the company's revenues, for service, wages and interest on bonded debt or dividends on stock.

"This is the sixth time the company has voluntarily raised the pay of its trainmen since July 1, 1903. Each time until the present it has been done to the extent that the company's finances would warrant. This time the effort has been to adopt a consistent scale that would fully and properly compensate every man, new or old, according to the measure of his efficiency considered in connection with the present high cost of living.

"While the cost of living has increased, so has the cost of everything connected with the operation of street railways. Fares only have not increased, but, on the other hand, by means of additional transfers and the lengthening of the ride possible for a nickel, the fare per passenger has slowly but surely decreased, so that it is now clearly apparent that with this wage scale in effect the limit of wage scale has been reached unless fares are to be increased.

"Notwithstanding the added financial burden which the company is assuming for the benefit of its employees, there will be no diminution of the advantages accruing to the men by virtue of the sick benefit, insurance and pension features provided by the company's welfare plan. The company will, of course, continue to expect in the future, as in the past, the loyal support and honest co-operation of all its employees, which is essential to the accomplishment of all its great undertakings."

Fourth Year of Interborough Bulletin

The ELECTRIC RAILWAY JOURNAL has from time to time in the past referred to the *Interborough Bulletin* and the work which is being done through the paper in the interest of the employees of the Interborough Rapid Transit Company, New York, N. Y., and the patrons of the company. With the issue for December, 1913, the paper completes another volume, and the editors have taken occasion with the closing of the year to review the past, present and future in a statement in part as follows:

"The January number will begin the fourth year of existence of the *Bulletin*, and, with the continued hearty co-operation of the employees, for whose benefit it was promoted, the editors hope to make its contents during 1914 increasingly instructive, helpful and entertaining.

"The *Bulletin* during 1913 published many notable contributions from employees. This policy of throwing its pages open to all employees having anything to say on any subject relating to the operation or mechanism of the system will be continued, and the warmest encouragement is again extended to all wishing to contribute articles or news items on rapid transit matters or anything of value or interest to Interborough employees.

"During the year the columns have been enriched and enlivened by many articles and features of value written by employees. It is regretted that room for all the manuscripts that were received could not be found, but eventually room will be found, so we trust that contributors will not be discouraged by delay. A community of interest links the employees together, and the *Bulletin*, as their organ, reflects their work, welfare and progress toward efficiency and prosperity.

"The numerous letters from pleased patrons testify to efficient and courteous treatment from employees, and the few of the many pouring in that we are able to publish from month to month should be satisfying to those commended and encouraging to all.

"President Shonts' articles on 'Safety First—First Safety' and 'Perseverance' have been a most valuable feature, as also the lucid and informing papers on the instruction car and welfare work, the Panama Canal, transportation, etc., by other contributors. In the illustrations the editors have aimed not only to please the eye but to inform the mind. Many of them, it will be seen, depict important phases of the road's construction and operation. The editors in closing this brief résumé of work and progress heartily thank contributors and friends for their kind co-operation, and most cordially wish them a merry Christmas and a happy and prosperous new year."

New Commutation Fares.—On Jan. 1, 1914, the Providence & Danielson Railway, Providence, R. I., will establish a flat rate of $3.35 for each commutation book of 100 tickets good over its line. The company has previously followed the practice of charging $5 for the first book of 100 tickets.

Trailer Service Satisfactory in Louisville.—Officials of the Louisville (Ky.) Railway are pleased with the operation of the new trailers recently put into service. The trailers have entrances and exits at the center of the car, and the movement of traffic in and out is much more rapid than ordinarily. The cars were built by the company in its own shops.

Vote on Sunday Operation in London.—The London (Ont.) Street Railway has signified its willingness to give a Sunday service at the rate of seven tickets for 25 cents and maintain a schedule approximately half as frequent as on other days. The City Council at a special meeting on Nov. 28 decided to submit a by-law for Sunday cars to the people at the January elections.

Group Insurance for Colorado Springs Employees.—The Colorado Springs & Interurban Railway, Colorado Springs, Cal., will present each of its 225 employees with a $1,000 insurance policy in a New York company. The railway will continue to pay the premiums so long as the men remain in its employ and will continue to do so for any man who is disabled in its service. The ages of the men range from twenty years to sixty years. By special arrangement with the company no medical examination is required.

Crusade Against Expectoration in Lexington.—F. W. Bacon, vice-president of the Kentucky Traction & Terminal Company, Lexington, Ky., has issued orders to the conductors on the city and interurban lines of the company to enforce the anti-spitting ordinance. In case a passenger spits on the floor of a street car the conductor is to stop the car and call a policeman. The company did not issue this order until the local officials indicated that the company would be supported in its campaign against the abominable practice.

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Reduction Ordered in Commutation Rates.—Commutation passenger fares on the New York, New Haven & Hartford Railroad between points in Connecticut and New York City have been ordered reduced by the Interstate Commerce Commission. The charges fixed by the commission for sixty-trip tickets follow: Greenwich, $8.65; Cos Cob, $9.15; Riverside, $9.25; Sound Beach, $9.65, and Stamford, $10.25. The commission held that generally the commutation rates of the company from other points in Connecticut and New England than those specifically named were reasonable, and it declined, therefore, further to reduce them.

Will Take Fare Question to Court.—Acting on the advice of City Solicitor Hastings, the Board of Utilities Commissioners of Wilmington, Del., is to ascertain the right of the Wilmington & Philadelphia Traction Company to charge a straight 5-cent rate of fare on its local lines, in preference to six tickets for a quarter, by renewing the old action in the United States District Court at Wilmington. If a suitable agreement can be reached the question as to whether the charter of the company gives it the right to charge a 5-cent fare will be argued before the court, exclusive of any other questions involved in the old action.

Extending the Safety Campaign in Lexington.—In connection with the safety campaign of the Kentucky Traction & Terminal Company, Lexington, Ky., referred to recently, representatives of the company have recently delivered lectures in the schools on the subject of accident prevention. Blotters, cards and other literature have been distributed, and the co-operation of the teachers has been secured. M. A. Cassidy, superintendent of schools, has lectured in connection with the exhibition of the moving picture, "The Price of Thoughtfulness," which was shown by the company at a theater in Lexington for the benefit of the schoolchildren.

Perfecting Detroit's Safety Campaign.—With two mass meetings of Detroit employees on Dec. 15 the preliminary organization work in the "Safety first" campaign of the Detroit (Mich.) United Railway was completed. Division safety boards have been elected on all the interurban lines and a district safety board was elected for the city of Detroit as one unit. These boards will co-operate with the general safety board in formulating plans along which the campaign will be carried on. "Safety first" buttons already have been ordered for all employees, and the words "Safety first" appear on the trolley poles on all busy corners in the heart of the city.

Results with Freight on Lines of Massachusetts Electric Companies.—P. F. Sullivan, general manager of the Massachusetts Electric Companies, Boston, Mass., is quoted as follows in regard to the results which have been attained by the company with its freight service: "This year the gross receipts from freight will be about $300,000. Not much profit has been shown yet, because it is a business we are developing—studying it out carefully—and we are trying it entirely to the south of Boston, on what was formerly the Old Colony system. We have franchise rights in the north for about four-fifths of the territory, but we will not start operation in this territory until we have felt our way in the southern development. On the whole, however, the business is satisfactory."

The New Lexington Terminal Station.—The new terminal station of the Kentucky Traction & Terminal Company, Lexington, Ky., has been put into use. The first floor is given over to waiting rooms and conveniences for passengers. The second floor is fitted up for recreation purposes and is used by the trainmen. It has billiard and pool tables and other amusement devices. The third floor has the offices of F. W. Bacon, vice-president, and other officials. A window display showing a train of electric cars in operation is a feature of the first floor. Owing to the large amount of traffic brought to this point by the new terminal station, it has been proposed to have the company and the city share the expense of maintaining a traffic policeman in front of the building.

Dogs on Interurban Cars.—Because of complaints that passengers with dogs have been permitted to board interurban cars and ride in the smoker when it was crowded, to the annoyance of other passengers, a bulletin has been issued to the crews of the interurban lines of the Detroit (Mich.) United Railway calling attention to the following company rule: "Permit passengers with dogs attached to a chain or rope to ride on the rear platform or in the smoking compartment of interurban cars, provided the dogs do not make themselves obnoxious to passengers. This is in addition to lapdogs which passengers may carry on their laps in the body of the car." The bulletin adds: "Good judgment must be at all times exercised by both motormen and conductors to the end that passengers with dogs may not be permitted to board cars if the dogs would be obnoxious to passengers."

Interswitching Charges.—The question of the rates to be charged by the Galt, Preston & Hespeler Railway for interswitching was before the Ontario Railway & Municipal Board on Dec. 19. The application for an order of the board fixing the rates to be charged by the company was after a long discussion left over until the Ontario Railway Board has conferred with the Dominion Railway Board. It is charged against the radial railway that competitors of the Canadian Pacific Railway are discriminated against on shipments from all points, but particularly on shipments from non-competitive points. The Galt, Preston & Hespeler Railway asks that 2 cents per 100 lb. be charged in all the territory south of the Canadian Pacific Railway and 1 cent per 100 lb. north of the Canadian Pacific Railway, where there is little delivery of materials. On the Grand Trunk Railway the switching charges are absorbed partly by the shipper and partly by the railway, while in the case of the Canadan Pacific Railway they are all absorbed by the railway, which charges nothing for switching for goods shipped over its line.

Jurisdiction of Quebec Commission Argued.—The Court of Appeals at Montreal has heard arguments in the case of the Montreal Tramways vs. the Quebec Public Utilities Commission. The latter ordered the company to give detailed information relative to the service, number of cars, earnings, lines, etc., and the directors of the company declined to comply with the order on the ground that the commission had no jurisdiction. It was contended before the Court of Appeals that under the contracts with the various municipalities it is provided that in case of any disputes or differences, or alleged failure on the part of either the company or the municipalities to fulfil the obligations which have been entered into, the Recorder's Court enjoys exclusive jurisdiction. For the Public Utilities Commission it was argued that the commission was exercising supervising and governing powers specially conferred upon it by the Legislature and was thus constituted an extraordinary tribunal for purposes of public interest, and that it was clearly intended that a simple contract between the company and a municipality should not override the jurisdiction of the commission. Judgment was reserved.

Aurora, Elgin & Chicago Inaugurates Pick-Up and Delivery Service in Chicago.—On Dec. 1, 1913, the Aurora, Elgin & Chicago Railroad inaugurated a pick-up and delivery service in Chicago, Ill., through an arrangement with an independent transfer company. This transfer company will receive and deliver non-perishable and less-than-carload shipments at its own warehouses, which are centrally located, in the Chicago business district. Under this new arrangement outbound freight is received during the usual freight-house hours and promptly forwarded to destination, and inbound freight will be delivered to consignees at the same station. This additional service gives the merchants and manufacturers along the line of the Aurora, Elgin & Chicago Railroad extra freight service at reasonable rates, and at the same time extends the freight service from the railroad company's existing freight house at Fifty-second Avenue to the downtown district of Chicago. Freight will continue to be received and delivered at the Fifty-second Avenue freight house, the new service being added to stimulate business which would not come to the third-rail line owing to the long haul to the company's freight house in the outlying district. Non-perishable and less-than-carload shipments are received by the transfer company at a distribution and handling charge of 5 cents per 100 lb., with a minimum charge of 25 cents, while miscellaneous shipments are handled at 5 cents per 100 lb., minimum 35 cents. This charge is made by the transfer company in addition to the freight charge applied by the Aurora, Elgin & Chicago Railroad.

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Personal Mention

Mr. Charles W. Day has resigned as master mechanic of the Oklahoma Railway, Oklahoma City, Okla., to accept another position.

Mr. P. S. Young, comptroller of the Public Service Corporation of New Jersey, Newark, N. J., has been elected president of the National Commercial Gas Association.

Mr. George D. Baxter, Haverhill, Mass., has been appointed superintendent of the Exeter, Hampton & Amesbury Street Railway, Exeter, N. H., to succeed Mr. Charles W. Rogers, resigned.

Mr. J. R. Fusselman has been elected secretary and assistant treasurer of the Reading Transit & Light Company, Metropolitan Electric Company and the Oley Valley Railway, Reading, Pa.

Mr. John A. Cleveland, general manager of the Saginaw-Bay City Railway and vice-president of the Saginaw & Flint Railway, Saginaw, Mich., has been appointed to a position in the office of Hodenpyl, Hardy & Company, New York, N. Y., the members of which firm control the railway and light properties in Saginaw and Bay City.

Mr. S. L. Shober, who was connected with the engineering and maintenance of way departments of the Pennsylvania Railroad for many years, and subsequently was a member of the banking firm of Cramp, Mitchell & Shober, Philadelphia, Pa., has been elected president of the Protective Signal Manufacturing Company, Denver, Col.

Mr. Francis J. Hogan has been appointed counsel for the Capital Traction Company, Washington, D. C., to fill a vacancy caused by the approaching retirement of Mr. R. Ross Perry, general counsel of the company for several years. The title and some of the duties of general counsel will be taken over by Mr. George E. Hamilton, president of the company, who will be assisted by Mr. Hogan and Mr. G. Thomas Dunlop.

Mr. J. B. Sunderland has resigned from the British Columbia Electric Railway, Ltd., Vancouver, B. C., with which he had been connected for the past five years, filling an important post in the comptroller's department. Mr. Sunderland will take charge of the agency department of McDonald, Marpole & Company, Vancouver, and give his personal supervision to the extension and development of the firm's business.

Mr. Milo R. Maltbie, a member of the Public Service Commission for the First District of New York, has been appointed chairman of the executive committee of the committee of fifteen named by the National Association of Railway Commissioners to represent the various state commissions before the Interstate Commerce Commission in the work of appraising the railroad properties of the country. The executive committee consists of five members, who are all members of the committee of fifteen. Mr. Maltbie has accepted the appointment.

Mr. J. P. H. de Windt has been appointed assistant to the president of the Birmingham Railway, Light & Power Company, Birmingham, Ala., to succeed Mr. M. S. Sloan, who has become connected with the New Orleans Railway & Light Company, New Orleans, La., as noted elsewhere in this column. Mr. de Windt is thirty-one years of age, was born in Suffield, Conn., and prepared for college at the Phillips Academy. He took a three years' course in electrical engineering at the Williston Seminary. He was formerly general manager of the Shore Line Electric Railway of Connecticut. He served as superintendent of the light and water company in Suffield and was also connected for a time with one of the public service companies in Alberta, Can., as superintendent.

Mr. Kurtz A. Fichthorn has resigned as general manager, secretary and treasurer of the Metropolitan Electric Company, Reading, Pa., after a service of more than nineteen years in various capacities with the company and its predecessors. Mr. Fichthorn will also retire as second vice-president and director of the Reading Transit & Light Company. He entered the service of the Metropolitan Light Company in August, 1894, after it had leased the Reading Electric Light & Power Company, and rose from the position of assistant to the treasurer to the ones which he now resigns. Since Mr. Fichthorn's connection with the company the plant in West Reading has been erected and a system of underground wiring is being completed at a cost of $1,000,000. Mr. Fichthorn will retain his holdings in the subsidiary companies. He will in the future devote all his time to his private interests.

Mr. Walter A. Rigg has resigned as vice-president and general manager of the Reading Transit & Light Company, Reading, Pa., as general manager of the Neversink Mountain Railway and as vice-president of the Metropolitan Electric Company. Mr. Rigg had the management of over 200 miles of street railways, including extensive property holdings and lines in Lebanon and Norristown. Fifteen years ago he succeeded his uncle, the late Samuel E. Rigg, in the management of the system. During the last five years more than $2,000,000 has been expended in and about Reading, with other improvements contemplated. Mr. Rigg will retain his interest and holdings in the underlying companies, which were leased to the Reading Transit & Light Company. He intends after the first of the year to devote more attention to his banking interests in Philadelphia.

Mr. E. C. Carpenter has resigned as general manager of the Pittsburgh & Butler Street Railway and the Butler Passenger Railway, Pittsburgh, Pa., effective on Jan. 1. Mr. Carpenter became connected with the companies on Oct. 1, 1911. Since that time the power plant has been overhauled, the roadway and rolling stock improved and during the past summer the system was changed from 6600 volts a. c. to 1200 volts d. c. without interruption to travel or schedule. Before becoming connected with the Pittsburgh & Butler Street Railway and the Butler Passenger Railway, Mr. Carpenter was with the Union Traction Company of Indiana and allied interests for seventeen years and helped to construct the first interurban line in Indiana from Anderson to Alexandria and continued with that company through the various extensions, consolidations, etc. The installation of the plant and system of the Butler County Light Company was completed while Mr. Carpenter was at Butler.

Mr. M. S. Sloan, who has been assistant to the president of the Birmingham Railway, Light & Power Company, Birmingham, Ala., has been appointed assistant to Mr. J. S. Pevear, vice-president of the New Orleans Railway & Light Company, New Orleans, La. Both properties are controlled by the American Cities Company, the common stock of which is owned by the United Gas & Electric Corporation, New York, N. Y. Mr. Sloan became connected with the Birmingham Railway, Light & Power Company as chief engineer of the power station for the construction department of the General Electric Company, in July, 1906. In September, 1907, he was made superintendent of power of the Birmingham Railway, Light & Power Company, and in July, 1908, he was appointed superintendent of the business department of the company. On Dec. 22, 1909, Mr. Sloan was appointed superintendent of the lighting department of the Birmingham Railway, Light & Power Company, and in August, 1910, he was advanced to the position of assistant to the president of the company.

Mr. Norman McD. Crawford has been elected president and general manager of the Reading Transit & Light Company, vice-president and general manager of the Metropolitan Electric Company, vice-president and general manager of the Neversink Mountain Railway and vice-president and general manager of the Oley Valley Railway, Reading, Pa. He succeeds Mr. W. S. Barstow with the Reading Transit & Light Company and Mr. Walter A. Rigg with the Metropolitan Electric Company, the Neversink Mountain Railway and the Oley Valley Railway. Mr. Crawford was formerly president of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio. Mr. Crawford was for several years vice-president of the Ohio Electric Railway, Cincinnati, Ohio, and previously, for a long time, was general manager of the Hartford (Conn.) Street Railway. As a contractor he built the Glastonbury line of the Hartford Street Railway in 1891 and was afterward retained by the company as engineer. In 1894 he was made general manager of the company, which position he held until the Hartford Street Railway was taken over by the Connecticut Company. In December, 1908, Mr. Crawford was elected president of the Mahoning & Shenango Railway & Light Company.

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Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Goldsboro (N. C.) Street Railway.**—Application for a charter has been made by this company in Delaware, presumably to succeed the Goldsboro Traction Company. Capital stock, $50,000. W. J. Maloney, Wilmington, Del., incorporator.

Independence, Caney & Oklahoma Railway, Independence, Kan.—Application for a charter has been made by this company in Kansas to build an electric railway between Caney, Havana, Wayside and Independence, Kan., and Bartlesville, Okla. Officers: J. E. Stone, Caney, president; J. H. Stewart, Havana, vice-president; H. E. West, Independence, treasurer, and R. R. Bittman, Independence, secretary. [E. R. J., Dec. 20, '13.]

***Fort Dodge (Ia.) Street Railway.**—Incorporated in Maine with a capital stock of $100,000. Officers: Albert E. Jones, president; T. L. Croteau, treasurer, and James E. Manter, clerk, all of Portland.

***Carpenter Creek Railway, Musselshell, Mont.**—Application for a charter has been made by this company to build an electric or steam railway between Musselshell and Japan. Capital stock, $50,000. C. M. Jacobs, director.

***Gaffney & James City Railway, Gaffney, Pa.**—Chartered in Pennsylvania to build a 2-mile electric railway from Gaffney to James City. Capital stock, $20,000. George S. Stein, Philadelphia, president.

Fort Worth & Denton Interurban Railway, Fort Worth, Tex.—Application for a charter has been made by this company in Texas to build a 35-mile line between Fort Worth and Denton. Capital stock, $500,000. Incorporators: E. E. Bildridge, N. Harding and Benjamin O. Smith. [E. R. J., Dec. 20, '13.]

Tyler (Tex.) Traction Company.—Chartered in Texas to operate an electric railway in Tyler. Capital stock, $70,000. Incorporators: Daniel Hewitt, T. N. Jones, Laurence Hewitt, J W. Fitzgerald and T. B. Butler.

***Weston & Glenville Electric Railroad, Weston, W. Va.**—Chartered in West Virginia to build an electric interurban railway about 20 or 25 miles long to connect Weston and Glenville. Capital stock, $500,000. Incorporators: Louis Bennett, Andrew Edmiston, J. A. Chittum, R. T. Goe and Lloyd Rinehart.

FRANCHISES

Dixon, Cal.—The Northern Electric Railway, Chico, and the Sacramento Valley West Side Electric Railway, Willows, have received a franchise from the Council in Dixon for the use of a joint track in Dixon.

Galesburg, Ill.—The Rock Island Southern Railroad has asked the Council for a franchise on Kellogg Street from Berrien Street to Main Street in Galesburg.

Herrin, Ill.—The Southern Illinois & St. Louis Railway has asked the Council for a franchise in Herrin. This is part of a plan to build an electric railway between Marion and Harrisburg with branch lines to Benton and to Johnson City and Herrin. William Rothman, Chicago, is interested. [E. R. J., Dec. 20, '13.]

Minneapolis, Minn.—The City Council has granted a franchise for the Dale Street crosstown line in Minneapolis.

Olean, N. Y.—The Western New York & Pennsylvania Traction Company has received a franchise from the Council on Union Street and Barry Street in Olean.

Springfield, Ore.—The Oregon Electric Railway has asked the Council for a franchise in Springfield. This is part of a plan to build an extension from Eugene to Springfield.

***St. Michel de Laval, Que.**—Under a bill promoted by the village of St. Michel de Laval, near Montreal, the Quebec Legislature is asked to give authority to the municipality to enter into a contract for the construction of an electric tramway service and to grant to any firm or corporation an exclusive franchise and exemption from municipal taxes for a period not exceeding fifty years.

Dallas, Tex.—The Dallas Consolidated Electric Railway has asked the Council for a franchise to double-track certain sections of Bryan Street and San Jacinto Street in Dallas.

Centralia, Wash.—The Washington-Oregon Corporation has received a franchise from the County Commissioners along the county roads from the present line of the company 1 mile south of Centralia to connect with a line down Washington Street for which a franchise is being asked from the city. The company has also received a franchise to operate a line along the county roads to connect with its line on Grant Street in Centralia.

TRACK AND ROADWAY

Birmingham & Chattanooga Railroad, Birmingham, Ala.—Surveys have been completed for this 147-mile line between Birmingham and Chattanooga. Grading has been completed from Boaz, Ala., to Chattanooga, Tenn., 1 mile, and a contract has been awarded to Jordan & Phillips, Birmingham, for 20 miles of grading from Boaz to North East. Headquarters: Boaz, Ala. W. W. Shortridge, Boaz, secretary. [E. R. J., Dec. 13, '13.]

Birmingham Railway, Light & Power Company, Birmingham, Ala.—Extensions and improvements are being planned by this company for its lines in Birmingham.

Bakersfield & Kern Electric Railway, Bakersfield, Cal.—It is reported that this company's lines will be extended to the southwestern part of Bakersfield and also to the northern part of East Bakersfield and eventually to the Taft-Maricopa oil district. These extensions are being financed by local capital, and it is planned to obtain power from the San Joaquin Light & Power Corporation.

Fresno & Clovis Interurban Railway, Fresno, Cal.—Contracts will be awarded at once by this company for 1500 tons of 75-lb. rails and 50,000 redwood ties. Right-of-way has been secured and grading will be begun in the spring on this 24-mile line to connect Fresno, Clovis and Academy. Financial arrangements have been made and stock will be issued to the extent of at least $500,000. F. S. Granger, Clovis, promoter. [E. R. J., Dec. 6, '13.]

Fresno (Cal.) Traction Company.—This company has asked the Railroad Commission for a certificate of public convenience and necessity to construct standard-gage extension through additions to the city of Fresno known as North Park Terrace, College Addition and Van Ness Heights to the northerly line of Princeton Avenue, a distance of less than 1 mile. The company asks further for a certificate of public convenience and necessity to construct an extension approximately 9½ miles in length from Fresno through Normal View, across the Santa Fé Railroad tracks to the San Joaquin River.

***La Mesa, Cal.**—This city will vote $60,000 for a municipal electric railway from La Mesa to Fairmont and University in East San Diego.

Petaluma & Santa Rosa Railway, Petaluma, Cal.—Right-of-way has been secured by this company on its line from Petaluma to McNear's Point, and work will be begun at once on the extension from Forestville to Healdsburg.

St. Petersburg & Gulf Railway, St. Petersburg, Fla.—Work on the extension of this company's line from Davista to Jungle, 1½ miles, has been begun.

Carolina & Georgia Railway, Augusta, Ga.—This company has received the right to amend its charter so as to build a branch line between Johnson and Greenwood, 40 miles. James U. Jackson, Augusta, president. [E. R. J., Dec. 13, '13.]

Alton, Jacksonville & Peoria Railway, Alton, Ill.—This company has connected its lines at Akron with the lines of the Alton, Granite & St. Louis Traction Company.

Iowa Railway & Light Company, Cedar Rapids, Ia.—This company has completed its line between Cedar Rapids and Mount Vernon.

Kansas Central Traction Company, Topeka, Kan.—Voters of Coffeeville, Kan., registered in favor of the issue of $30,000 bonus bonds to build this railway between Coffeyville and Nowata. This railway will connect at Coffeyville with the lines of the Union Traction Company. Philip Strack Parsons, president. [E. R. J., Nov. 8, '13.]

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***Middlesboro, Ky.**—J. R. Young, Middlesboro, is reported to be promoting a plan for the construction of an electric railway to Pinnacle Rock, Ky., a distance of 16 miles.

***Mount Eden, Ky.**—Citizens of Mount Eden are negotiating with commercial interests of Shelbyville for the construction of an electric railway between Mount Eden and Shelbyville. It is proposed to continue the line ultimately to Harrodsburg, Danville and other Kentucky towns.

North Louisiana Electric Railway, Shreveport, La.—Surveys have been completed by this company on its 120-mile line between Shreveport and Monroe, via Homer, Minden, Ruston and West Monroe. Grading will be begun early in 1914. A. B. Blevins, Shreveport, president. [E. R. J., Sept. 6, '13.]

Aroostook Valley Railroad, Presque Isle, Maine.—Surveys have been completed for the St. John & Quebec Railroad, the western extension of the Aroostook Valley Railroad connecting with the St. John Valley.

United Railways & Electric Company, Baltimore, Md.—This company is asked to consider plans to extend its Garrison Avenue line to Park Heights and Belvidere Avenues in Baltimore.

Mesaba Electric Railway, Duluth, Minn.—An extension to Duluth is being contemplated by this company.

Electric Short Line Railway, Minneapolis, Minn.—The city of Brookings will raise $30,000 bonus to secure an extension of this company's line to Brookings. W. L. Luce, Minneapolis, president.

Minnesota Union Electric Railway, Minneapolis, Minn.—Surveys are being made and grading will be begun in the spring by this company on its 70-mile line between Minneapolis and St. Cloud, via Brooklyn, Corcoran, Burschville, Hanover, St. Michael, Buffalo, South Haven, Fair Haven, Maine Prairie and Luxemburg. Headquarters, 302 Plymouth Building, Minneapolis. Achile D. Pouliot, secretary. [E. R. J., Dec. 13, '13.]

Holly Springs (Miss.) Railway.—Surveys have been completed and construction will be begun in the spring if financial backing can be secured by this company for its 1-mile line from the Union Station to the business section of Holly Springs. Contracts for all material needed will probably be awarded in the spring. It is planned to use Edison-Beach cars. E. G. Hammer, Holly Springs, president. [E. R. J., July 13, '13.]

Caldwell County & Southern Railway, Kingston, Mo.—Surveys have been completed and grading has been finished by this company for its 9-mile line between Kingston and Hamilton. H. L. Gilbert, Kansas City, is interested. [E. R. J., Nov. 29, '13.]

Springfield & Western Railroad, Springfield, Mo.—Preliminary surveys are being made by this company for its line from Springfield to Carthage and Joplin. The line will fork to send one track west to Joplin and one track northwest into Carthage.

Butte (Mont.) Electric Railway.—A double-track line from Centerville to the Elm Orlu Mine and the Meaderville line to the Montana Union property will soon be built by this company.

Ismay, Ekalaka & Southern Electric Railway & Power Company, Ismay, Mont.—This company plans to begin work in the spring on its electric railway to connect Ismay and Ekalaka, Mont. Application for a charter will soon be made. The company is to be capitalized at $400,000. George Burke is interested. [E. R. J., Nov. 1, '13.]

International Railway, Buffalo, N. Y.—This company has placed in operation its double-track line between Lockport and Pendleton.

Sand Springs Interurban Railway, Tulsa, Okla.—Plans are being made by this company to double-track its entire line, a distance of 8 miles. The company recently completed a belt line in Tulsa connecting with every steam line entering Tulsa.

London & Lake Erie Traction Company, London, Ont.—Plans are being considered by this company to extend its line to Aylmer and Port Burwell.

Toronto (Ont.) Railway.—This company has placed in operation its new Wilton Avenue line in Toronto.

Sandy, Ore.—The Clackamas Development Company, of which E. J. Ellison is president, has asked for the use of the county road between Boring and Sandy as the roadbed for its proposed gasoline-electric railway. It will connect with the Portland Railway, Light & Power Company at Boring.

Nashville-Gallatin Interurban Railway, Nashville, Tenn.—This company has been asked to consider plans to build a line to Ridgetop, Hygeia, Greenbrier, Edgefield and Springfield.

Jefferson County Traction Company, Beaumont, Tex.—This company has placed in operation its line between Beaumont and Port Arthur. [E. R. J., Dec. 20, '13.]

Denison, Tex.—The proposed interurban electric railway to extend north from Denison over the new bridge on Red River, through Cobert, Calera and into Durant, Okla., a distance of 25 miles, has not been abandoned. Part of the preliminary surveys have been made and it is expected that they will be continued as soon as financial backing can be procured. John R. Cullinane, St. Louis, is the promoter. [E. R. J., Jan. 11, '13.]

Fort Worth (Tex.) Southern Traction Company.—Plans are being made by this company to build a 25-mile extension from Cleburne to Hillsboro, where a connection will be made with the Texas Southern Traction Company's line to Waco.

***Gulf & Pecos Valley Railway, Lufkin, Tex.**—Preliminary investigations have been under way for several months to construct a new railroad from one of the ports on the Texas coast, through Lufkin, Palestine, Dallas, Fort Worth and through the Panhandle of Texas to the Pecos Valley, N. M., by the Interstate Development Company. It is said that early next year active steps will be taken for the construction of the line. This line will probably be known as the Gulf & Pecos Valley Railway. Electricity may be the motive power. P. A. McCarthy & Sons, consulting engineers, Lufkin, Tex., have been conducting the work of investigation.

Salt Lake & Utah Railroad, Salt Lake City, Utah.—This company has completed the section of its line between Salt Lake City and a point 2 miles south of Pleasant Grove at the southern end of the Jordan Narrows. Grading has been completed on its line between Pleasant Grove and Provo, and it is expected that rails will be laid on this section early in January. W. D. Orem, Salt Lake City, president. [E. R. J., Oct. 4, '13.]

Virginia Railway & Power Company, Richmond, Va.—This company has been asked to consider plans to extend its line to the baseball park on McKenzie Street in Petersburg.

Monongahela Valley Traction Company, Fairmont, W. Va.—This company has placed in operation its 1-mile extension from the Clarksburg interurban line to Lumberport.

SHOPS AND BUILDINGS

Geary Street Municipal Railway, San Francisco, Cal.—The supervisors have directed the Works Board to prepare specifications under which bids may be invited for the enlargement of the Geary Street carhouse in San Francisco.

Holyoke (Mass.) Street Railway.—Work has been begun by this company on its new carhouse in Holyoke.

Mesaba Electric Railway, Duluth, Minn.—Work has been begun by this company on a new depot in Mountain Iron.

Toronto (Ont.) Civic Car Lines.—Assessment Commissioner Forman of the city of Toronto has purchased 4 acres of land on Danforth Avenue for $65,000 as a site for the carhouses of the Danforth Avenue civic car lines.

POWER HOUSES AND SUBSTATIONS

Birmingham Railway, Light & Power Company, Birmingham, Ala.—This company plans to extend and improve its power plant in Birmingham.

Houghton (Mich.) County Traction Company.—With the completion of the new substation building, adjoining the Laurium carhouse, the Houghton County Electric Light Company and the Houghton County Traction Company are preparing for the occupancy of the building and the transfer of the power equipment there.

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Manufactures and Supplies

ROLLING STOCK

Glendale & Eagle Rock Railway, Glendale, Cal., expects to purchase immediately a number of cars.

Gadsden, Bellevue & Lookout Mountain Railway, Gadsden, Ala., expects to purchase four additional city cars.

Altoona & Logan Valley Electric Railway, Altoona, Pa., is in the market for five 28-ft. passenger car bodies and four 32-ft. 6-in. car bodies.

TRADE NOTES

Ackley Brake & Supply Company, New York, N. Y., has received an order for 200 adjustable brakes from the Montevideo (Uruguay) Tramways.

Perry Ventilation Corporation, New Bedford, Mass., has received an order from the Pittsburgh Railways to equip with ventilators the seventy-five new cars which are being built by the St. Louis Car Company.

American Mason Safety Tread Company, Lowell, Mass., received a gold medal at the recent International Exposition of Safety and Sanitation held under the auspices of the American Museum of Safety at the Grand Central Palace, New York.

General Electric Company, Schenectady, N. Y., has received an order from the Detroit United Railways, Detroit, Mich., for two complete two-motor car equipments. The motors are of the GE-203 type, which has automatic ventilating features. The controller will be the K-35 arranged with full field control.

C. M. Paxton, whose retirement as assistant to the general manager of the American Railways, Philadelphia, Pa., was referred to in the Electric Railway Journal of Dec. 20, 1913, has been elected second vice-president of the Peter Smith Heater Company, Detroit, Mich., and will enter upon his new duties soon after Jan. 1, with headquarters in Detroit.

Railway Supply & Curtain Company, Chicago, Ill., received an order to equip with curtain fixtures the 100 cars which were ordered by the Chicago City Railway from The J. G. Brill Company. This item is in correction of a previous one which appeared in the Electric Railway Journal of Dec. 13, 1913, in which it was stated erroneously that the curtain fixtures were ordered from the Curtain Supply Company.

Mitsui & Company, Ltd., New York, N. Y., export agents, have received orders to export the following electric railway material manufactured by the General Electric Company: three 1200-volt 40-ton locomotives and power-station apparatus ordered by the South Manchurian Railway. Motor equipments have been ordered by the following Japanese railways: Kagoshima Electric Railway, Hankai Electric Railway, Kyushu Electric Railway and Keishin Electric Railway.

Nachod Signal Company, Philadelphia, Pa., has been reorganized and reincorporated as the Nachod Signal Company, Inc., under the laws of the State of New York; Carl P. Nachod, president; J. Ernest Nachod, vice-president; Joseph W. Stone, secretary; Alexander Perry, treasurer. The company will remove from Philadelphia and have its offices at 50 Church Street, New York, after Jan. 1, 1914. Nachod Signal apparatus will be manufactured exclusively and guaranteed by the Hall Switch & Signal Company, 50 Church Street, New York.

John Bellamy Taylor, after fourteen years' connection with the General Electric Company, has resigned as engineer of the foreign department in order to take up work independently as a consulting electrical engineer. Mr. Taylor has taken an active interest in the work of the American Institute of Electrical Engineers and other scientific and engineering societies. The past year he was chairman of the Schenectady Section of the A. I. E. E. He is an honorary member of the Association of Railway Telegraph Superintendents. Mr. Taylor will continue to live in Schenectady.

ADVERTISING LITERATURE

National Pipe Bending Company, New Haven, Conn., has issued three catalogs, two of which describe its feedwater heaters, the third its horizontal oil separator.

Allgemeine Elektricitäts Gesellschaft, Berlin, Germany, has issued a catalog in German describing and illustrating the process of manufacturing its a.c. kilowatt-hour meters.

T. L. Smith Company, Milwaukee, Wis., has issued a catalog describing and illustrating its concrete mixer equipments which include ropeless, sheaveless, geared sideloaders, hot mixers for handling bituminous concrete, mascot mixers and side-gate concrete cars equipped with rack and pinion gate and hand wheel discharging mechanism.

National Malleable Castings Company, Sharon, Pa., has issued a catalog describing and illustrating its electric steel castings. The process of making electric steel consists in melting down a charge directly in an electric furnace, or in transferring molten steel from the open-hearth or Bessemer to an electric furnace, and there maintaining the charge in a molten state, under complete chemical control in a neutral atmosphere, until it is refined and purified.

Railway Utility Company, Chicago, Ill., has issued Catalog No. 401, which describes in detail its thermometer control of electric heaters. The text matter deals with the economies possible through the use of electric car heaters controlled by a thermostat and illustrates these possibilities on a chart showing the actual saving in heating current on street cars where the thermometer control was employed. A complete description, with wiring diagrams, is given of the control apparatus, its operation and installation.

Eclipse Railway Supply Company, Cleveland, Ohio, has issued a catalog describing its trolley retriever designed for any range of service from low-speed city to high-speed interurban work. It is of standard size and weight and is provided with adjustable brackets to permit quick removal from one dash to another. The release from high-tension to low-tension spring after the retriever has operated is instantly accomplished by pressing a push button at the top of the retriever which releases the power spring and places the weak spring in action.

Ohmer Fare Register Company, Dayton, Ohio, has issued a booklet entitled "Fare Accounting," which contains extracts from the symposium on "Fare Accounting" which appeared in the Souvenir edition of the Electric Railway Journal, Oct. 4, 1913. The booklet gives expressions of opinions from officers of the following electric railways: Terre Haute, Indianapolis & Eastern Traction Company, Union Traction Company of Indiana, Illinois Traction System, Mobile Light & Railroad Company, Portland Railway, Light & Power Company, Memphis Street Railway, Chippewa Valley Railway, Light & Power Company, Carolina Light & Power Company, Dayton & Troy Electric Railway, Cleveland, Youngstown & Eastern Railway, Grand Rapids, Grand Haven & Muskegon Railway, Newport News & Old Point Railway & Electric Company, Greenville Traction Company, Southwest Missouri Railroad, Eastern Pennsylvania Railways, Pacific Electric Railway, Lehigh Valley Transit Company, People's Railway, Southwestern Traction & Power Company, Mankato Electric Traction Company, Chicago, Harvard & Geneva Lake Railway, New York State Railways, Denver City Tramway.

Fulton Iron Works, St. Louis, Mo., have issued a catalog describing Fulton-Tosi oil engines of the modern European Diesel type, which this company manufactures exclusively in the United States under license of Franco Tosi, of Italy. These four-cycle engines are built in the vertical form and in two-cylinder, three-cylinder and four-cylinder arrangement. The crank pins are set at such angles that the power impulses follow each other at regular intervals. The impulses being downward upon the bearings, which are close to the floor line, the vibrations are taken up by the foundation of the engine, making a structure of the most stable character. The engine is designed to operate reliably on the cheapest petroleum crude or fuel oils or tar oils, and as ignition is insured by the heat of compression, no hot head, hot plate, electric spark or other exterior means of ignition is required. The engine may be started up from cold within one minute, without any troublesome or time-consuming preliminaries. This quick-start feature is an advantage in any installation. The operation of the engine is quiet, clean and safe. On account of the absence of boilers, gas producers or other bulky auxiliaries, it may be installed in almost any available location.

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UNIVERSITY OF ILLINOIS
23 DEC 1913

ELECTRIC RAILWAY JOURNAL

PUBLISHED EVERY SATURDAY

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This article concludes the account of improvements made by the Berkshire Street Railway by descriptions of a new low-cost carhouse at Sheffield, Mass., of a carhouse extension at Pittsfield, Mass., and of new track work and bridges.

Central Electric Railway Accountants' Association - - - - - 1275

Proceedings of the twenty-third annual meeting, held on Dec. 12 and 13 at Cleveland, Ohio. Papers on the essentials of public service accounting and the federal income tax were presented.

Chicago City Railway's New Cars - - - - - - - 1281

These 100 new cars are the first double-end, inclosed-vestibule motor cars purchased for Chicago. Several new features are included in the steel-frame design and general arrangement.

The Illumination of Street Railway Cars - - - - - - 1282

At the regular monthly meeting of the Massachusetts Street Railway Association at Young's Hotel, Boston, on Dec. 10, G. H. Stickney presented a paper upon car lighting. An abstract of this paper and a short discussion at the conclusion of the paper are presented.

The Engineering Problem of Electrification. By A. H. Armstrong - - 1284

This is an abstract of a paper presented on the evening of Dec. 18 before the Canadian Society of Civil Engineers. The author presents lists of all American electrifications of high-tension a. c. and d. c. roads and offers comparative data to prove the superiority of high-voltage d. c. systems to a. c. systems of split-phase or other types. A report is also presented of the discussion. Among those who participated were Messrs. Vaughan and Murray. Written communications were also received from Messrs. Gibbs and Katté.

Investigation of Street Railway Service at Boston - - - - - 1296

An abstract of a series of hearings given by the Massachusetts Public Service Commission and the Boston Transit Commission at which testimony of the Boston Elevated Railway and the Bay State Street Railway in reply to persons desiring modifications in the street railway service of Boston was heard.

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Reciprocity

"JOE," said the General Manager to his master mechanic, "the price of these new Westinghouse Electric equipments is rather high. Do you think they are worth the money?"

"Boss," replied Joe, "I can only say that I was down at their factory, and what I saw convinced me that the Westinghouse Electric people put the very best material and workmanship into their motors and HL control. Don't the results we have secured in our own service show it?"

"Joe, you're about right," said the General Manager; "I hear excellent reports about Westinghouse Electric equipments from all parts of the country. If hundreds of other roads are reciprocating for the good work done by Westinghouse Electric, I guess we, too, can pay a reasonably higher price for their equipment. They saved us thousands of dollars by pointing out that the gear ratio on our old motors was consuming unnecessary power.

Bearing with Separate Oil Chamber

Commutating Pole Motor

Platform Controller

Switch Group, HL Type

Westinghouse Electric & Manufacturing Co.

Sales Offices in 45 American Cities **East Pittsburgh, Pa.**

Member Society for Electrical Development. **"DO IT ELECTRICALLY"**

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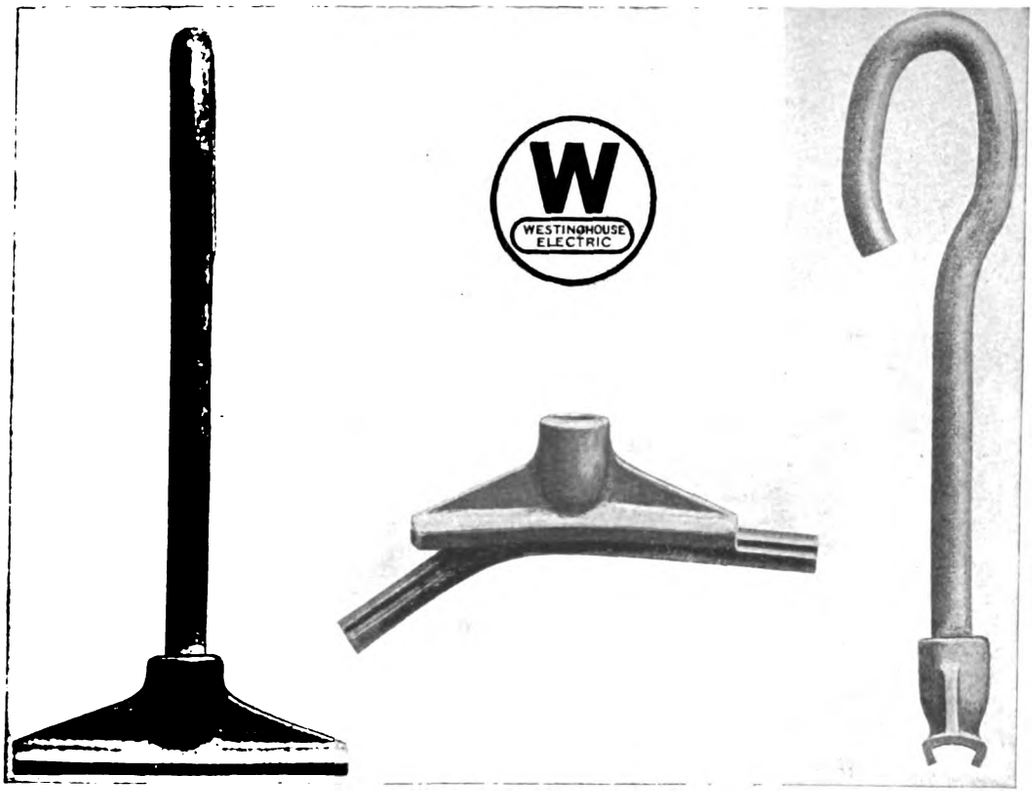

The only two-piece catenary hanger on the market

Westinghouse Type GF Hanger

Strong as the Strongest—The Simplest Made

No rivets or bolts used to connect rod to ear. Two blows of the lineman's hammer close the loop on the messenger wire. The ½-in. rod is accurately threaded, 13 to the inch, and screwed tight in the ear. Perfect clearance for the trolley wheel is obtained. The ear is easily applied and can be taken off and used again.

The bronze clamp ear consists of the toughest grade of material and is **made with a dry-sand core which leaves the inner surface of ear roughened, thus increasing its holding power and preventing the ear drifting when coming in contact with a wild trolley wheel.**

The rod has less resistance to the wind than a strap hanger in same plane with trolley wire, and is not so apt to become bent as a strap hanger in horizontal plane. Bronze clinch ears on copper wires eliminate the liability of corrosion, which is apt to occur with malleable-iron ears.

Note the center illustration, it shows the trolley wire starting to pull out under test at 2048 pounds.

Westinghouse Electric & Manufacturing Company

Sales Offices in 45 American Cities **East Pittsburgh, Pa.**

Member Society for Electrical Development "Do It Electrically"

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Summary

(*Westinghouse Brake Equipment and Facilities*)

Straight Air Brake for single cars only, in very light slow-speed city service. As a matter of fact, some form of semi-automatic equipment is now invariably recommended even for single cars, because of the greater factor of safety provided. Furnished also as a "feather-weight" schedule.

Semi-Automatic or Straight-Air Brake with Emergency Feature for single cars, or motor car with one trailer trains, operating in city or suburban service. Furnished also as a "Featherweight" schedule.

AMM Quick Service, Graduated-Release, High Emergency Pressure Automatic Brake for trains of from one to five cars, operating in suburban or interurban service.

AML Quick-Action, Quick-Service, Graduated-Release, High Emergency Pressure Automatic Brake for trains of any length.

Electro-Pneumatic Brake for special subway and elevated road high-pressure traffic conditions, including various combinations of the universal or "built-up" type of apparatus, as required.

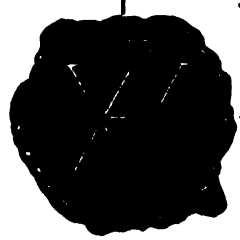
Governor Synchronizing System for insuring simultaneous starting and stopping of all compressors in a train, insuring equal diversion of pump labor, and reducing maintenance.

Single Systems. Pneumatic and electro-pneumatic, as required for single cars or trains of any length; reliable and positive in operation, as well as economical in air consumption.

Air Compressors and Governors particularly designed for the severe and exacting conditions of air brake service. Compact, light weight, reliable, easily maintained, and built in a wide range of capacities.

Special Shop Facilities for repairs to brake apparatus of all kinds, insuring accurate restandardizing at a minimum cost.

Engineers and Experts at headquarters and in the field, for consultation, advice, supervision, or assistance in getting the very best results possible from the use of air brakes.



Westinghouse Traction Brake Company
PITTSBURGH, PA.

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The Publisher's Page

"If times are going to be harder—let's work harder.

Let's get up a little earlier in the morning and go to bed a little later at night.

Let's do more advertising."

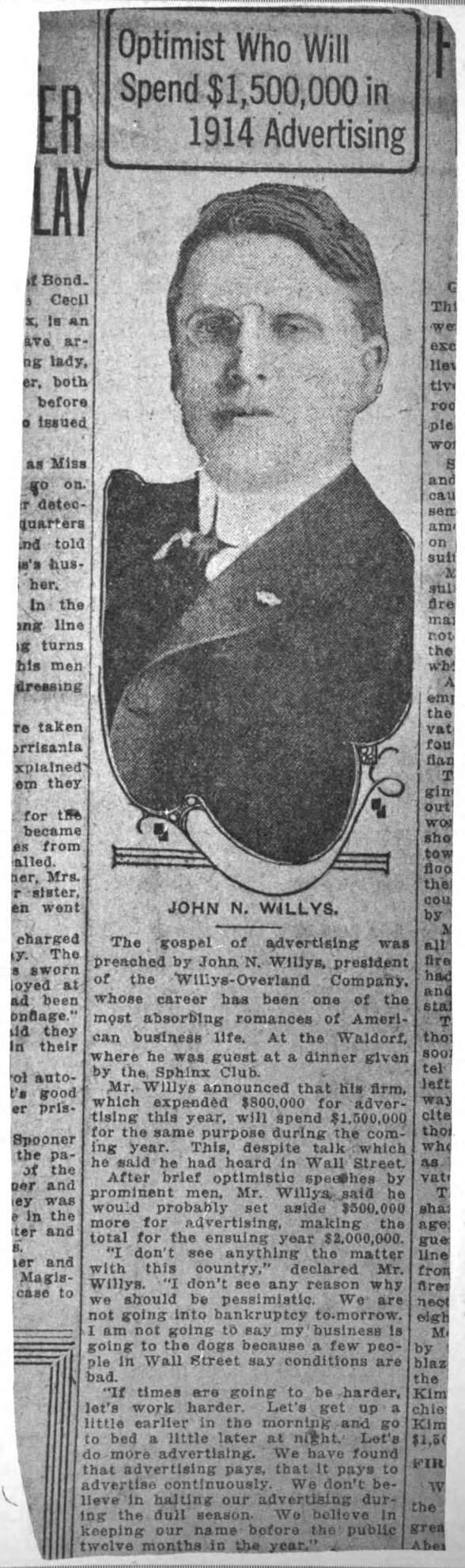
—JOHN N. WILLYS.

Much of the same spirit will be shown by the manufacturers who advertise in the Electric Railway Journal.

More advertising means more opportunities for buyers.

Make the Most of It.

Electric Railway Journal



Optimist Who Will Spend $1,500,000 in 1914 Advertising

JOHN N. WILLYS.

The gospel of advertising was preached by John N. Willys, president of the Willys-Overland Company, whose career has been one of the most absorbing romances of American business life. At the Waldorf, where he was guest at a dinner given by the Sphinx Club.

Mr. Willys announced that his firm, which expended $800,000 for advertising this year, will spend $1,500,000 for the same purpose during the coming year. This, despite talk which he said he had heard in Wall Street.

After brief optimistic speeches by prominent men, Mr. Willys said he would probably set aside $500,000 more for advertising, making the total for the ensuing year $2,000,000.

"I don't see anything the matter with this country," declared Mr. Willys. "I don't see any reason why we should be pessimistic. We are not going into bankruptcy to-morrow. I am not going to say my business is going to the dogs because a few people in Wall Street say conditions are bad.

"If times are going to be harder, let's work harder. Let's get up a little earlier in the morning and go to bed a little later at night. Let's do more advertising. We have found that advertising pays, that it pays to advertise continuously. We don't believe in halting our advertising during the dull season. We believe in keeping our name before the public twelve months in the year."

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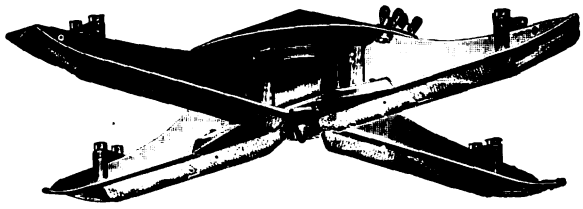

If it's good in winter
It's good all year-round.

Anderson

Sheet Steel Insulated Crossings

are designed for rough weather. Note the Sleet Hood.

They are adjustable to angles between 70° and 90°. Each approach is flared to meet the oncoming or leaving trolley wheel without bumping or loss of contact and the fibre hood renders it sleet proof.

Being made of sheet steel it is 25% lighter than other metal crossings.

See page 155 in Catalog No. 8, or if you haven't it, see that you get it.

Drop us a card.

A. & J. M. Anderson Mfg. Co.

289-293 A St., Boston, Mass.

BRANCHES:

New York, 135 Broadway
Chicago, 105 So. Dearborn Street
Philadelphia, 427 Real Estate Trust Bldg.
London, Moorgate Station Chambers

AGENCIES:

Kansas City, Moss and Satterlee.
Glens Falls, N. Y., John G. Phillips.
Denver, Northwestern Supply Co.
San Francisco, Los Angeles, } Eccles & Smith Co.

PROTECTION AGAINST ALL FIRES

TO BE EFFICIENT

A FIRE EXTINGUISHER MUST POSSESS CERTAIN CHARACTERISTICS.

Pyrene TRADE MARK

FIRE EXTINGUISHER

Has the following fundamental qualifications:

A. Easily operated and understood.

B. Operation not dependent upon stored power.

C. Constructed so that it cannot corrode inside or outside.

D. Can be operated in any position.

E. Can be refilled by anyone.

F. Can be shut off and balance of charge preserved for future use.

G. Bears the label of the National Board of Fire Underwriters.

The Pyrene Fire Extinguisher is "The Most Efficient Fire Extinguisher Known."

Nickel-plated and Brass Pyrene Fire Extinguishers are included in the lists of approved fire appliances examined under the requirements of the National Board of Fire Underwriters, by the Underwriters' National Electric Association after exhaustive tests by the Underwriters' Laboratories and approved for use.

Pyrene Mfg. Co.

1358 Broadway, New York

Alton	Denver	Oklahoma City
Atlanta	Detroit	Philadelphia
Baltimore	Duluth	Phoenix
Boston	Honolulu	Pittsburgh
Bridgeport	Jacksonville	Richmond
Buffalo	Louisville	St. Louis
Chicago	Memphis	St. Paul
Cincinnati	Milwaukee	Salt Lake City
Cleveland	New Orleans	San Antonio
Dayton	Norfolk	York, Neb.

PACIFIC COAST DISTRIBUTORS
GORHAM ENGINEERING CO., San Francisco, Los Angeles, Seattle

Distributors for Great Britain and the Continent:
The Pyrene Co., 29A Charing Cross Road, London, W. C.

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A NEW SPLICER

O-B Type C Splicer for Round, Grooved and Fig. 8 Wires

Has smooth under-run for trolley wheel. Lips fit closely around wire and there are no bumps on under surface.

Is very narrow, providing more clearance than ordinary splicers.

Wires enter without bending, making installation easy.

Holes near center enable lineman to see when ends are inserted the proper distance.

Light in weight and yet has sufficient strength to break trolley wire before slippage occurs.

Price and details on request.

The Ohio Brass Company, Mansfield, Ohio

This Tube

of dense heavily glazed porcelain, capped at the ends with bronze castings, is a

SAMSON
Pipe Insulator

It is used to keep the current you generate, running in its proper channels, instead of dissipating itself on innumerable return pathways, such as the iron water and gas pipes of the great underground interwoven service systems of a modern city.

Samson Pipe Insulators prevent electrolysis of these pipes by perfectly insulating them.

They are easily and quickly installed and their cost is small.

Write now for demonstrated proof of their success.

Drew Electric & Manufacturing Co.
714 Traction Terminal Building
Indianapolis, Indiana, U. S. A.

A Triumph
of the
Potter's Wheel

"Victor" Insulators

High dielectric strength and mechanically perfect, from core to glaze.
No "crazing" or cracking.
Made for all conditions of service.
Let us know your troubles, so that you may remedy them with a

"Victor."

The Locke Insulator Mfg. Co.
VICTOR, N. Y.
New York Office : 50 Church Street

2

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Important New McGraw-Hill Engineering Books

Still—Overhead Electric Power Transmission (Sept. 1913)

By Alfred Still, Mem. A.I.E.E., Int. of E. E., etc., Assistant Professor of Electrical Engineering, Purdue University.

306 *pages*, 6 *x* 9, *illustrated*, $3.00 (12/6) *net, postpaid.*

It covers fundamental principles and calculations from the viewpoint of the engineer responsible for the design and specification of long distance lines.

It is based on the author's wide experience with hydroelectric and transmission problems in England, Canada and the United States.

It aims to give in the simplest terms the "reasons of things"—to explain the derivation of practical methods and formulas, and avoids wherever possible the use of higher mathematics.

A COMPANION VOLUME

Lundquist—Transmission Line Construction (Oct. 1913)

METHODS AND COSTS

By R. A. Lundquist, E.E. 295 *pages*, 6 *x* 9, 183 *illustrations*, $3.00 (12/6) *net, postpaid.*

A practical treatise on the details of construction work.

It describes the various methods of high tension line construction and compares their merits. It has material on costs, with consideration of the conditions which affect them. It is essentially practical—a book for the man who builds. It does not give the electrical and mechanical calculations.

Taylor—Transformer Practice (Sept. 1913)

Manufacture, Assembling, Connections, Operating, Testing.

By William T. Taylor, Fellow A.I.E.E., etc.

Second edition, 278 *pages*, 6 *x* 9, 189 *illustrations*, $2.50 (10/6) *net, postpaid.*

A complete revision and enlargement of the author's earlier book, "Stationary Transformers," with practical suggestions on the connection, installation and operation of transformers and static induction apparatus. It is especially useful to engineers in charge of plant construction or operation. It is based on wide experience in the field.

Moyer—Power Plant Testing (Sept. 1913)

By James A. Moyer, Professor of Mechanical Engineering, Pennsylvania State College, and in charge of Pennsylvania Experiment Station.

Second edition, 486 *pages*, 6 *x* 9, *illustrated*, $4.00 (17*s*) *net, postpaid.*

An entire revision with much new material, including the new rules adopted by the Power Test Committee of the A.S.M.E., chapters on the testing of lubricants and of a Complete Power Plant.

The first edition was used in some 30 engineering schools and by engineers in practice. Especially valuable because of its compactness. Covers engine, turbine, boiler and miscellaneous machinery testing.

Clewell—Factory Lighting (Aug. 1913)

By Clarence E. Clewell, formerly Lighting Expert, Westinghouse Electric and Manufacturing Company, now of the Electrical Engineering Department, Sheffield Scientific School, Yale University.

160 *pages*, 6 *x* 9, 100 *illustrations*, $2.00 (8/4) *net, postpaid.*

Actual installations are made the basis for analysis and explanation so that they may be useful in similar problems under varying conditions.

This is the first book to cover the practical phases of factory lighting. It is based on a wide range of successful work and presents practical, useful material.

Mr. Clewell's book is an excellent manual for central station salesmen and managers. It is an argument for efficient installations.

Daugherty—Hydraulic Turbines (Sept. 1913)

By R. L. Daugherty, Assistant Professor of Mechanics of Engineering, Cornell University.

160 *pages*, 6 *x* 9, *illustrated*, $2.00 (8/4) *net, postpaid.*

A brief treatment of water power developments and conditions affecting turbine operation, a statement of the principal features of construction of modern turbines, an outline of the theory and the characteristics of the principal types, commercial constants, means of selection of type and size of turbine, cost of turbines and water power, and comparison of cost with steam power.

Weingreen—Electric Power Plant Engineering (July 1913)

By J. Weingreen. *New Second edition*, 458 *pages*, 6 *x* 9, 301 *illustrations*, $5.00 (21*s*) *net, postpaid.*

The modern material on equipment and installations makes this book especially valuable. It covers completely the entire subject of switchboards and switch gear.

In this new edition the chapters on Storage Batteries, Potential Regulators and Lightning Arresters have been supplemented by descriptions of European apparatus and practice.

McGraw-Hill Books may be seen at

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Chicago—A. C. McClurg & Co.
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Philadelphia—Phila. Book Co.
San Francisco—Mining & Scientific Press, and Technical Pub. Co.

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Publishers of Books for the Electric Railway Journal.

RETURN PRIVILEGE GUARANTEE

When cash accompanies an order for McGraw-Hill books the purchaser may, within five days of receipt of the books, return any or all of his purchase for any reason whatsoever, and his money will be refunded promptly and without question.

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Riveting and Spot-Welding Bottom Half West, 101 B Keystone Steel Gear Case

You Get These Features in Keystone Steel Gear Cases

STEEL—Best quality open hearth, deep drawing steel used. Very strong, absorbs vibration perfectly, and resists crystallization and fracture. Means long life.

BRACKETS—Eye brackets are solid castings, securely riveted to the case. Means practical elimination of bracket troubles.

RIVETS—Rivets are used only for holding sheets together. They are supplemented by spot-welding. These two mean a tight, rigid case.

SPOT-WELDS—Sheets are electrically spot-welded on the edges between the rivets. Prevents slippage between sheets due to vibration. Rivets can't work loose.

STRENGTH—The use of the best steel that can be bought, cast brackets, riveting and spot-welding, means an exceptionally strong case and one having low up-keep.

GUARANTEE—Every Keystone Steel Gear Case is guaranteed for one year's satisfactory service.

Why not get and use some Keystone Cases on 90 days trial?

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Sts.

NEW YORK
Hudson Terminal

CHICAGO
417 So. Dearborn St.

ALUMINUM

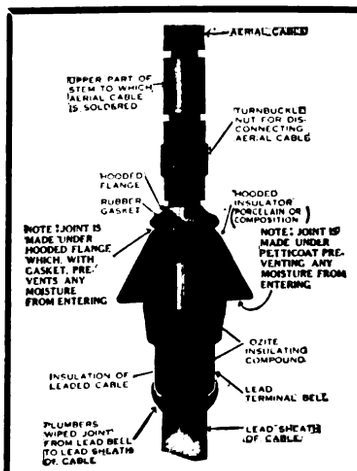
Railway Feeders

And all kinds of **Electrical Conductors**

Aluminum feeders are less than one-half the weight of copper feeders and are of equal conductivity and strength. If insulated wire or cable is required, high-grade insulation is guaranteed. Write for prices and full information.

Aluminum Company of America

PITTSBURGH, PA.



Sectional View of Single Conductor D. O. A. (Davis Open Air) Terminal for 1500-Volt Service.

Made by

Standard Underground Cable Co.

Pittsburgh, Pa.

New York, Philadelphia, Chicago, Boston, San Francisco, St. Louis

1850 **KERITE** 1913

The performance record of Kerite, covering over half a century, is absolutely unequalled in the whole history of insulated wires and cables.

KERITE INSULATED WIRE & CABLE COMPANY

General Offices, 30 Church Street, New York Western Office, Peoples Gas Building, Chicago

Transmission Line and Special Crossing Structures, Catenary Bridges

Write for Our New Descriptive Catalog.

ARCHBOLD-BRADY CO.

Engineers & Contractors SYRACUSE, N. Y.

ROEBLING

Trolley Wire

Wire Rope Wire Strand

John A. Roebling's Sons Company

TRENTON, N. J.

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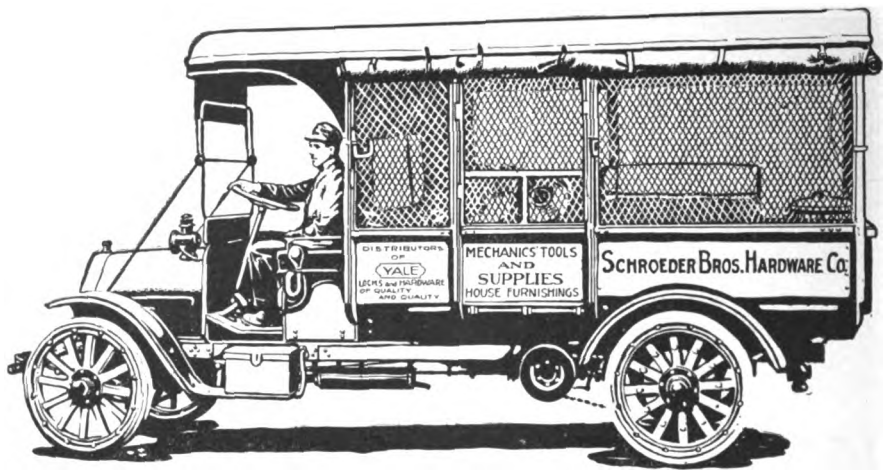
FEDERAL



Federal truck used by Schroeder Bros.' Hardware Co.
Federal trucks are used by every wholesale hardware house in Detroit.

175 Federals are owned and operated by 105 Detroit merchants in about 40 lines of trade.

17 motor car manufacturers and part manufacturers operate more than 20 Federals.

Packing companies, Telephone and Gas companies, Stove manufacturers, Furniture dealers, Grocers, Storage and Cartage companies, Breweries, Paint manufacturers, are among the prominent users of Federals.

Investigation will show a similar condition of Federal supremacy in almost every prominent city in America.

Let us send you Federal facts and figures in your line of trade.

PRICE Includes Seat, Lamps, Tools, etc. **$1800** F.O.B. DETROIT Body Extra Built to meet individual requirements

Federal Motor Truck Company
Detroit, Michigan.

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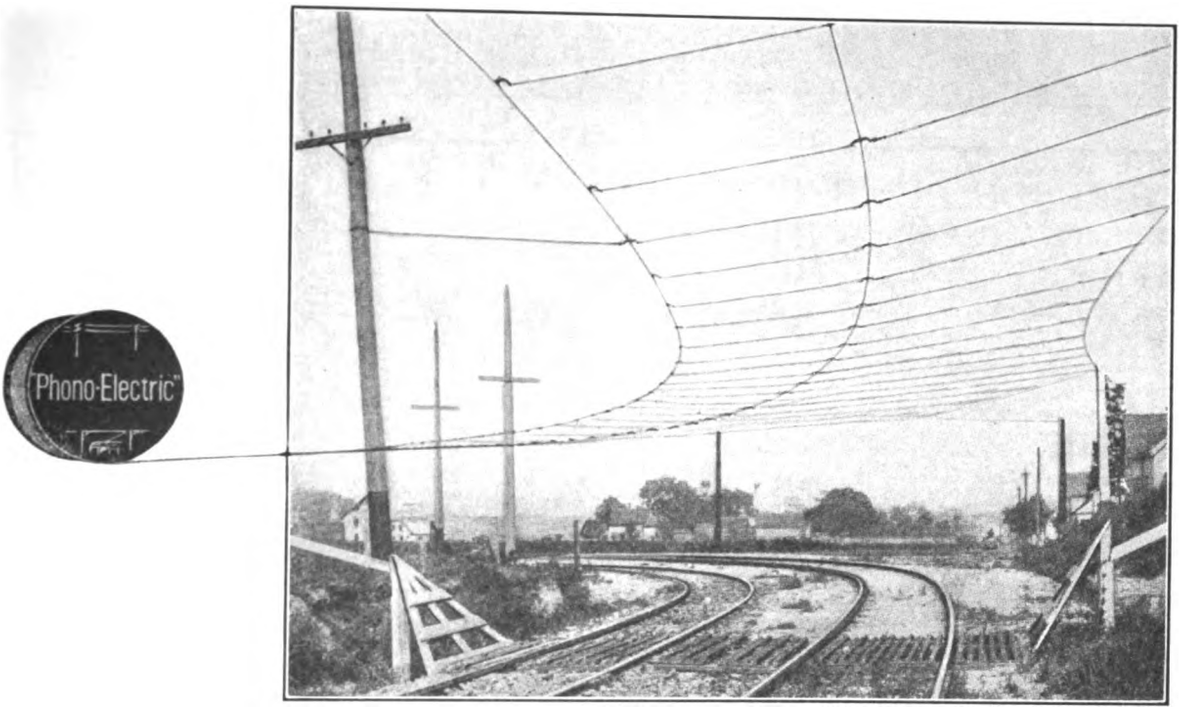

The Ever Increasing Demand

for a trolley wire that will give long service life—service life that means maximum efficiency at minimum cost—**"Phono-Electric"** stands pre-eminent as *the* trolley wire for overhead construction.

"Phono-Electic" is a wire you can absolutely depend upon. It does not rely upon a hardened skin for its strength—it's uniform throughout its cross-section—it's tough.

It will pay you to try it on your line where traffic is heaviest.

BRIDGEPORT BRASS COMPANY
BRIDGEPORT CONNECTICUT

North American Copper Company
164 Front Street, New York, U. S. A.

Pierson, Roeding & Company
San Francisco Portland Seattle Los Angeles

The Equipment & Engineering Company
2 & 3 Norfolk St., Strand, W.C., London, England

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WESTERN
CEDAR POLES
DOUGLAS FIR
CROSS ARMS
THE LINDSLEY BROTHERS COMPANY
Peyton Building "GOOD POLES QUICK" Spokane, Washington

HENDERSON LUMBER CO.
1710 COMMONWEALTH BLDG., PITTSBURGH, PA.
POLES
Chestnut, Any Length
TIES
Oak and Chestnut
Get our quotation on your next requirements

POLES WESTERN CEDAR PILING
We brag about the SERVICE we give
B. J. CARNEY & CO.
E. B. BRANDE, Manager, M. P. FLANNERY, Manager,
819 Broad Street, Grinnell, Ia. 606 Paulsen Bldg., Spokane, Wash.
Commit us to memory.

INTERNATIONAL CREOSOTING & CONSTRUCTION CO.
WORKS-BEAUMONT, TEX. TEXARKANA, TEX.
Capacity 100,000,000 FEET B.M. Per Annum
ADDRESS ALL COMMUNICATIONS TO OFFICE, GALVESTON, TEXAS
SEND FOR PAMPHLET
WOOD PRESERVING

Michigan Western
CEDAR POLES
POSTS, TIES AND PILING
We use C-A-Wood-Preserver in Treating
The Valentine-Clark Co.
Minneapolis, Minn. St. Maries, Idaho

TRADE MARK C-A WOOD PRESERVER REGISTERED U.S. PATENT OFFICE
"C-A-WOOD-PRESERVER"
is the highest grade Carbolineum, Creosote or Wood Preserver produced. For information write
C-A-Wood-Preserver Company
56 Liberty St., New York. 807 Wright Bldg., St. Louis

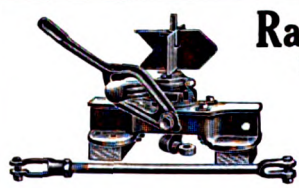
NAUGLE POLE & TIE CO.
5 SO. WABASH AVE.
CHICAGO, ILL.
The Trinity in Poles
"Service"-"Price"-"Quality"
POLES

"NATIONAL" Tubular Steel Poles
for Telegraph, Telephone, Electric Light and Electric Railway Construction. Write for literature.
National Tube Co. PITTSBURGH, PA.

HY-BOIL-OIL
A High-grade Carbolineum,
35 CENTS A GALLON Why Pay More?
The German Products Association
(Die Deutsche Produkten Vereinigung)
112 Pine Street St. Louis, Mo., U. S. A.

It Meets Every Requirement—The Celebrated
Trenton Trolley Wagon
J. R. McCARDELL & CO.
Patentees and Sole Manufacturers.
Correspondence Solicited TRENTON, N. J.

TOOLS for all classes of electrical construction and repair work.
MATHIAS KLEIN & SONS
Canal Station 25 Write for Catalog CHICAGO


Ramapo Iron Works
Main Office, Hillburn, N. Y.
New York Office: 30 Church St.
AUTOMATIC SWITCH STANDS — CROSSINGS
GUARD RAIL CLAMPS
SWITCHES, FROGS, Etc.

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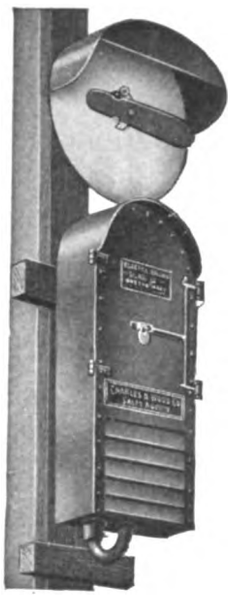
Mr. Signal Engineer:



When every signal manufacturer says that his signal is "The Best" you can't afford to take anybody's "say."

We don't merely claim that the Chapman Automatic Signal is the *best—we strongly assert it* and we *back up* that assertion with *service records.*

OUR past records show that not a single accident has been caused by faulty Chapman Signals.

When you are equipped with the Chapman Automatic you are getting a *faultless* installation—and you are not taxed an extra fee for this assurance.

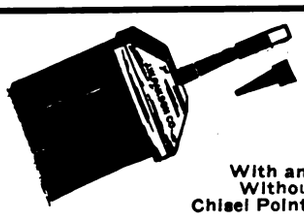
Write for Chapman Literature.

Charles N. Wood Co., General Sales Agent, 79 Milk Street **Boston**

Ready For Snow?

Some roads have already had occasion to call into use their Paxson Steel Wire frog and switch brooms. With and without chisel points. Don't make it a rush shipment. Order now.

J. W. PAXSON CO.
Philadelphia



With and Without Chisel Points

U.S. Metal & Mfg. Co.
165 Broadway, New York City
Chicago Atlanta
RAILWAY SUPPLIES

Selling Agents for Dunham Hopper Door Device—Feasible Drop Brake Staff—Columbia Lock Nut—Kling Bolts—Anglo-American Varnishes and Shop Cleaner—Traction Axles—Steel and Iron Forgings—Lincoln Arc Welder—"Texoderm." *Sole Eastern Agents for* St. Louis Surfacer & Paint Co. *General Eastern Agents for* Hutchins Car Roofing Co. *Special Agents for* The Tool Steel Gear & Pinion Co. *Special Agents for* The Pollak Steel Co.

Send us your orders and your requests for quotations for

ORIGINAL VULCANIZED FIBRE

Either hard or flexible in **sheets, rods, tubes or special shapes.** Send us your blue prints, drawings, gauges or samples of the parts you want to have made of Vulcanized Fibre and we will give you satisfactory prices and our usual high standard of accuracy in machining. **Send for catalogue.**

AMERICAN VULCANIZED FIBRE CO. Wilmington, Delaware

BAKELITE - DILECTO

Waterproof Permanent Strong
A laminated *insulating* material of highest efficiency. Also

VULCANIZED FIBRE
in sheets—rods—tubes—special shapes.

THE CONTINENTAL FIBRE CO.
NEWARK, DELAWARE
Chicago—McCormick Bldg. New York—Woolworth Bldg.

GEO. P. NICHOLS & BRO
OLD COLONY BUILDING CHICAGO, ILLINOIS
DESIGNERS AND BUILDERS OF
Electric Transfer Tables

Our transfer tables are used on nearly every important steam railroad system in this country and on many electric railways. We can furnish these in either the surface or the pit types, and to meet all requirements.

DISFICO
HORN INSULATION
can be pressed into any form and
Will—Not—Crack
IN ROLLS OR SHEETS
For Armature Insulation etc.
DIAMOND STATE FIBRE CO., Elsmere, Del.

The Protective Highway Crossing Signal offers you the solution of your crossing protection problem.

Protective Signal Mfg. Co.
1427 Eighteenth St. Denver, Colo.

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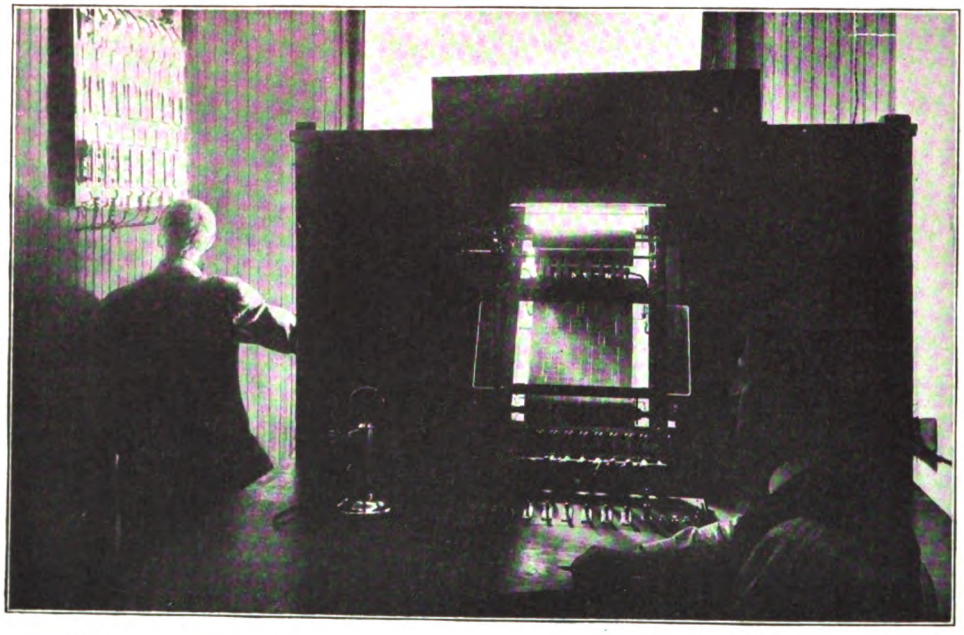
Meeting One Financial Obstacle to Adequate Signal Protection

There is little doubt that there would be a tremendously greater amount of mileage protected by automatic block if first cost were the only difficulty to be encountered. The great difficulty, however, in the universal use of automatic block track signaling is found in the continuous cost of maintenance.

The advantage in this respect of

Simmen Automatic Block Cab Signals



Flashlight picture of dispatcher's table in service. Observe perforations recording train movements.

is shown by the fact that none of the four roads which are operating the Simmen System have found it necessary to provide any special organization or additional labor for inspection purposes.

The reason for this is that the track and overhead installation of the Simmen System is so simple (involving no track signals, nothing but standard telephone overhead construction and simple signal rails, without any operating parts) that the regular track and line maintenance labor is ample to care for these elements.

All operating electrical apparatus is either in the cab or in the dispatcher's office.

The cab apparatus is easily inspected when the locomotive or car is in for regular inspection.

The apparatus in the dispatcher's office is readily inspected and cared for by the dispatcher with the occasional assistance of a lineman.

This enormous comparative saving in maintenance costs is **proved by the experience of the four roads** on which the **Simmen System** is now, and has for some time been, standardized.

The importance of this factor in any signal installation is obvious.

The Northey-Simmen Signal Co., Limited

BUFFALO, N. Y. INDIANAPOLIS, IND. TORONTO, CANADA

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Money is Always Available for Signals

Last week we showed the report of collisions on interstate electric railways wherein it stated that during January, February and March, 51 collisions had cost $45,961.00 on the one item of damage to road and equipment, and in cost of clearing wrecks.

This cost alone figures up to nearly $1000.00 per wreck.

Now, even if the **total** damage amounted to but $1000.00 per collision, then each accident made available for signals the sum of $13,000.00.

Here is why:

U. S. electric signals can be capitalized.

It is an accepted fact that 65% of accidents could be prevented by United States electric signals.

If you capitalize the $650.00 at 5% it means that you have $13,000.00 available for a signal investment on each $1000 spent for accidents.

Of course, that amount will far more than pay for the complete equipment of U. S. signals for an average road, but the figures show you how little accident cost it takes to more than pay for the signal investment.

And when you figure that your accidents must be paid for out of car earnings—the question of getting money for signals then becomes a simple matter.

Just figure it out for yourself.

United States Electric Signal Company

West Newton, Massachusetts

Foreign Representatives: Quilliam Brothers, Cleggs Court, Chapel Street, Salford, England

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DOES YOUR NEXT YEAR'S APPROPRIATION INCLUDE

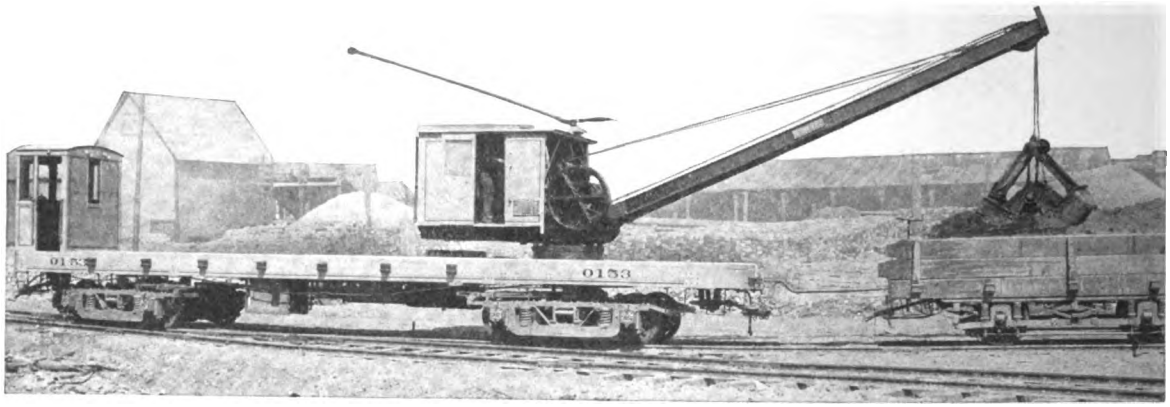
A BROWNHOIST Electric Work-car Crane

If not, you should investigate at once, for this crane will reduce your construction and maintenance costs by

rapidly loading and unloading sand, gravel, cinders, crushed stone, coal, etc., with a grab bucket, —and rails, ties, crossovers, etc., with hook. And the crane also hauls the work trains. Other roads are using this crane and you should at least investigate its possibilities on your own line.

Write for catalog I which shows how and where these cranes are used.

THE BROWN HOISTING MACHINERY COMPANY
Cleveland, Ohio



On Double Track Street Railway Work A THEW Shovel

This is a Standard Type O Thew Steam Shovel at work in Detroit, Mich. Our Standard STREET RAILWAY TYPE O ELECTRIC SHOVEL is becoming more popular with electric railway companies than the steam machine, but we reproduce this picture to show the manner in which a Thew works—the efficiency of the HORIZONTAL DIPPER CROWDING MOTION. Look at that level floor it's leaving—see how it loads the cars and works between tracks with full efficiency. Do you realize that we're ready to present cost data in full on shovel operations? We are. Write us for Circular "J 15."

Thew Automatic Shovel Co.
Lorain, - - - Ohio

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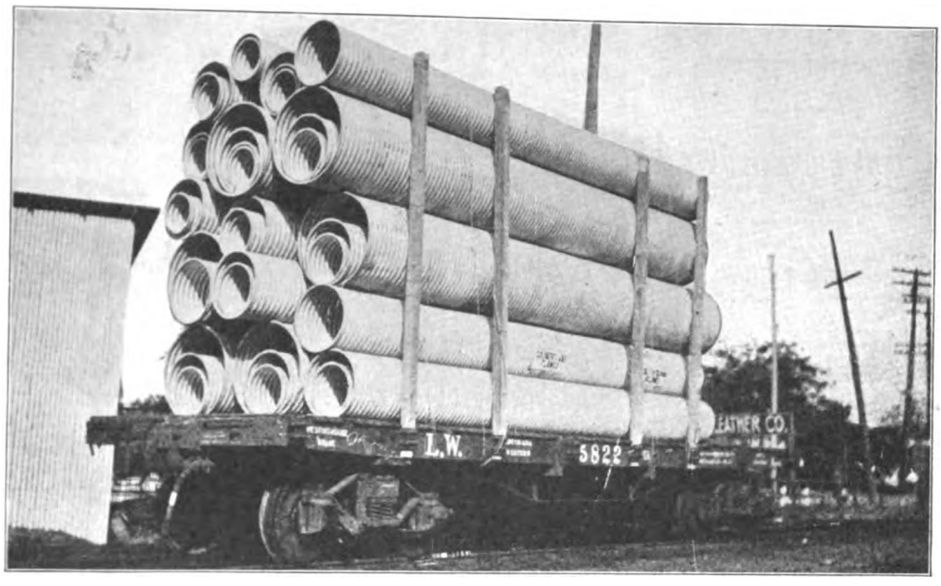
AMERICAN ARMCO INGOT IRON
PURITY



AMERICAN ARMCO INGOT IRON
PERMANENCE

Ninety-Seven of the Leading Electric and Steam Roads

of the United States during the year 1912 selected

AMERICAN INGOT IRON CORRUGATED CULVERTS

for installation under their roadbeds.

This, after the most thorough investigation of all kinds of culverts and culvert materials.

Under every test to which they were submitted American Ingot Iron Culverts demonstrated that they withstand the hardest kind of service, that they are practically indestructible, that they cost nothing for maintenance and are the most economical in the long run.

American Ingot Iron is 99.84% pure, taking into account *all* foreign substances, a standard absolutely unequalled.

Write the Nearest Manufacturer for Particulars and Prices on

American Ingot Iron Corrugated Culverts, (Full Circle and Segmental) Plates, Sheets, Roofing and Formed Products

Arkansas, Little Rock
Dixie Culvert & Metal Co.
California, Los Angeles
California Corrugated Culvert Co.
California, West Berkeley
California Corrugated Culvert Co.
Colorado, Colorado Springs
Colo. Ingot Iron Pipe & Flume Co.
Delaware, Clayton
Delaware Metal Culvert Co.
Florida, Jacksonville
Dixie Culvert & Metal Co.
Georgia, Atlanta
Dixie Culvert & Metal Co.
Illinois, Bloomington
Illinois Corrugated Metal Co.
Indiana, Crawfordsville
W. Q. O'Neall Co.
Indiana, Princeton
W. Q. O'Neall Co.
Iowa, Des Moines
Iowa Pure Iron Culvert Co.
Iowa, Independence
Independence Corrugated Culvert Co.
Kansas, Topeka
The Road Supply & Metal Co.
Kentucky, Beuchel
Kentucky Culvert Co.
Louisiana, New Orleans
Dixie Culvert & Metal Co.
Maryland, Havre de Grace
J. N. Spencer.
Massachusetts, Palmer
New England Metal Culvert Co.
Michigan, Bark River
Bark River Bridge & Culvert Co.
Michigan, Lansing
Michigan Bridge & Pipe Co.
Minnesota, Minneapolis
Lyle Corrugated Culvert Co.
Minnesota, Lyle
Lyle Corrugated Culvert Co.
Missouri, Moberly
Corrugated Culvert Co.
Montana, Missoula
Montana Culvert Co.
Nebraska, Lincoln
Lee Arnett Co.
Nebraska, Wahoo
Nebraska Culvert & Mfg. Co.
Nevada, Reno
Nevada Metal Mfg. Co.
New Hampshire, Nashua
North East Metal Culvert Co.
New Jersey, Flemington
Pennsylvania Metal Culvert Co.
New York, Auburn
Pennsylvania Metal Culvert Co.
North Carolina, Greensboro
Dixie Culvert & Metal Co.
North Dakota, Wahpeton
Northwestern Sheet & Iron Works
Ohio, Middletown
American Rolling Mill Co.
Ohio Corrugated Culvert Co.
Oklahoma, Shawnee
Dixie Culvert & Metal Co.
Oregon, Portland
Coast Culvert & Flume Co.
Pennsylvania, Warren
Pennsylvania Metal Culvert Co.
South Dakota, Sioux Falls
Sioux Falls Metal Culvert Co.
Tennessee, Nashville
Tennessee Metal Culvert Co.
Texas, Dallas
Atlas Metal Works
Texas, El Paso
Western Metal Mfg. Co.
Texas, Houston
Lone Star Culvert Co.
Utah, Woods Cross
Utah Culvert Co.
Virginia, Roanoke
Virginia Metal Culvert Co.
Washington, Spokane
Spokane Cor. Culvert & Tank Co.
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Bark River Bridge & Culvert Co.
Wisconsin, Madison
Wisconsin Culvert Co.

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BEFORE
NO-CO-RO

AFTER
STEEL

LOSS 2.7%

LOSS 93.2%

THE
ACID TEST

NO WONDER THEY LAST!

But don't let the acid test satisfy you—BE STILL MORE CRITICAL. We're ready to show as we've shown others, absolute perfection of "ACME" (Nestable) Culvert stability after years of service under corrosion-producing conditions.

Remember also, the wonderfully low transportation cost our Nestable feature makes possible.

Send for the big "ACME" Culvert catalog.

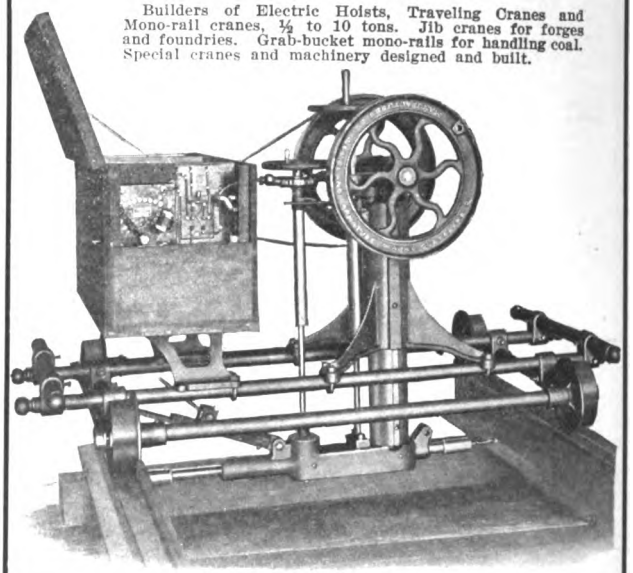
THE CANTON CULVERT CO.
MANUFACTURERS
CANTON, OHIO, U.S.A.

Ludlow Track Drilling Machine

You can crowd it; you can't stall it. You can use high speed drills on hard rails. It has a 2½-hp. motor and two heavy flywheels. It's heavy enough to stand the work and light enough to be handled by your track gang. Any gauge—any voltage—200 in use—one road has eight. Built by

The Johnston & Jennings Co.
Cleveland, Ohio

Builders of Electric Hoists, Traveling Cranes and Mono-rail cranes, ½ to 10 tons. Jib cranes for forges and foundries. Grab-bucket mono-rails for handling coal. Special cranes and machinery designed and built.



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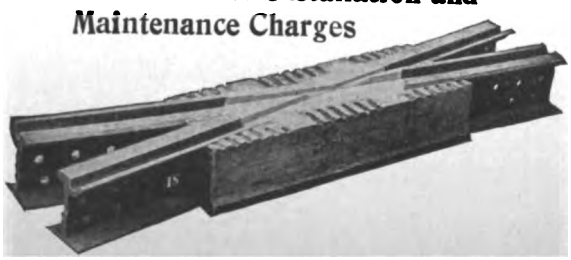
GENERAL OFFICES JOHNSTOWN, PA.
HIGH GRADE TRACK SPECIAL WORK
MANGANESE STEEL - SWITCHES - MATES - FROGS - CROSSINGS
GIRDER RAILS AND HIGH TEE RAILS - ELECTRICALLY WELDED JOINTS
EXPORT REPRESENTATIVES, UNITED STATES STEEL PRODUCTS CO., N. Y.

FALK SPECIAL WORK
Reduces Your Installation and Maintenance Charges



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Eastern Representatives: Wendell & MacDuffie Co., New York.
Western Representatives: Alphonso A. Wigmore, Los Angeles.

ESTABLISHED 1882
The Weir Frog Company
Manganese Track Work
Cincinnati, O.

MANGANESE STEEL TRACK WORK
FROGS, CROSSINGS
SWITCHES, ETC.
OUR SPECIALTY

St. Louis Steel Foundry, 1560 Kienlen, St. Louis, Mo.
Owned and operated by Curtis & Co. Mfg. Co., St. Louis.
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Grinding Rail-Joints with Little Interruption

Every traction man knows the part that interruptions play in the grinding of rail-joints. The man-with-the-wheel just about gets started when along comes another car and work is held up. With

ABRASIVE
Fast-Cutting Wheels
"Every Grain Bites"

the interruptions do not amount to much for so much can be ground between cars that the job is soon finished. Let us send you a sample wheel. That's the best way to prove whether or not ABRASIVE Wheels cut fast.

Abrasive Material Company
Philadelphia **Chicago Office, 566 W. Randolph St.**

KILBY FROG & SWITCH CO.

Birmingham, Ala.

Tongue Switches, Mates, Frogs, Curves, and Special Work of all kinds for Street Railways.

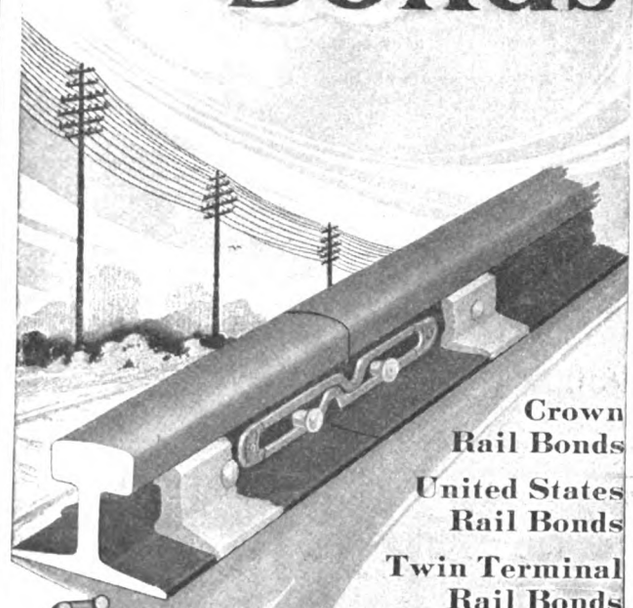
WYOMING
"21 POUND LOAD"
SHOVELS
Registered Trade-Mark
WYOMING SHOVEL WORKS,
Wyoming, Pa.

Cut about 50% from shoveling costs.
HOW?
It's all explained in "Scientific Shoveling," an excerpt from Taylor's "SCIENTIFIC MANAGEMENT"
Write us for a free copy.

FROGS, SWITCHES, CROSSINGS
SWITCH-STANDS, RAIL BRACES
The Cincinnati Frog and Switch Company
Cincinnati, Ohio

American Steel & Wire Company

Rail Bonds



Crown Rail Bonds
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Twin Terminal Rail Bonds
Soldered Rail Bonds

WE are extensive manufacturers of all kinds of stud terminal and soldered rail bonds. Nothing but pure drawn copper enter into their construction. These bonds have been developed to the highest possible state of perfection, the workmanship is of the best, and their design is correct for long life and high efficiency. We also make a complete line of tools for installing rail bonds.

Rail Bond Catalogue furnished upon application

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Just Like a Hole In Your Money Pocket

A faulty bond is like a hole in your pocket, in that it is a constant source of loss.
Patching it up simply postpones another leak. Make a clean job of bonding by welding the bonds to the rails. That assures **permanent** conductivity and saves money on the first cost of the job. How it is done and all about it told in our bonding book—a copy of which awaits your request.

Electric Railway Improvement Co.

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WHARTON SPECIAL TRACK WORK

TRACK WORK OF TISCO MANGANESE STEEL

OF EVERY DESCRIPTION
FOR ALL CLASSES OF SERVICE

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INCORPORATED.
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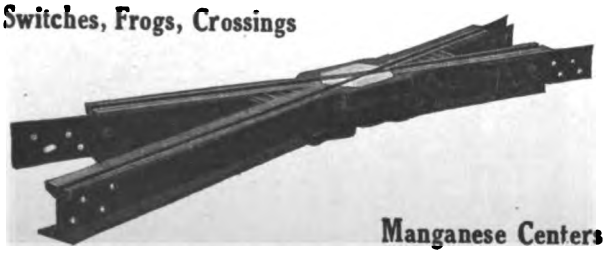
High Grade Track Work

Switches, Frogs, Crossings



New York Switch & Crossing Co.
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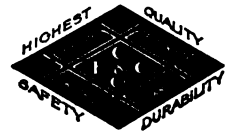
HIGHEST QUALITY

TRACK SPECIAL WORK



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CLEVELAND FROG & CROSSING CO
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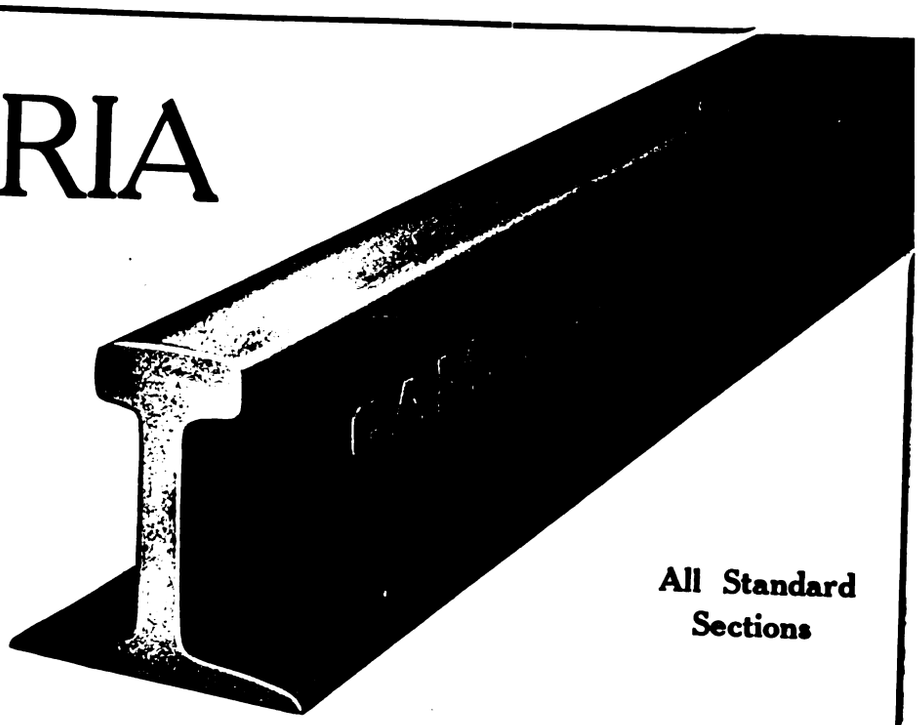
BOLTS AND NUTS

100% Splice Bars



All Standard Sections

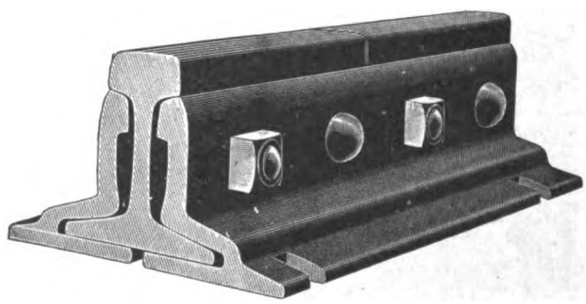
CAMBRIA STEEL COMPANY

JOHNSTOWN, PA.

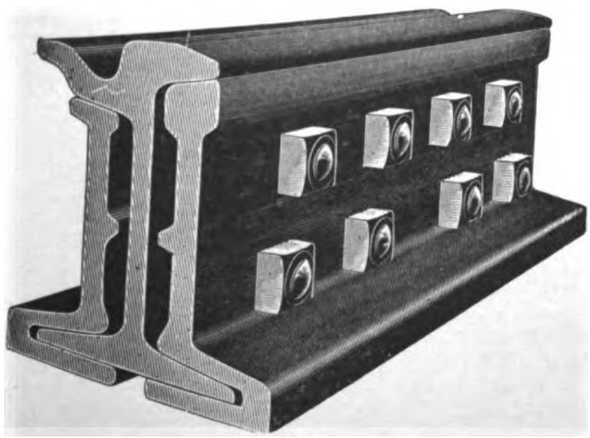
Sales Offices: Atlanta, Boston, Buffalo, Chicago, Cincinnati, Cleveland, New York, Philadelphia, Pittsburgh, St. Louis, San Francisco, Tacoma, Montreal

Over 50,000 Miles Of Track Equipped

or enough Continuous, Weber and Wolhaupter base supported Rail Joints to girdle the globe with a double-track railway, is practical proof of the value of The Rail Joint Company's product.



Continuous Rail Joint



Continuous Girder Joint

Makers of Base Supported Rail Joints for Standard and Special Rail Sections, also Girder, Step or Compromise, Frog and Switch, and Insulated Rail Joints, protected by Patents.

Catalog at Agencies

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St. Louis, Mo. Denver, Colo. New York, N. Y. Troy, N. Y.

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The Rail Joint Co.

General Offices

185 Madison Avenue New York

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See how the "Royal Worcester" gets right down to the pan of the switch.

Give this Man a Chance to Do Efficiency Work

Better work for less cost. That's ideal—and it's possible if you give the man at the switch a "Royal Worcester" Track Broom.

LESS COST is possible because when the corners of the broom become worn it costs only a few cents to slip in a couple of new inserts. That makes a new broom of it.

A partially worn broom is expensive because of its inefficiency.

BETTER WORK is possible because a "new broom sweeps clean" and the Royal Worcester broom is *always* new. Inserts are made of fine tempered round wire. Handle and head last indefinitely and the complete brush can be renewed for only a fraction of the cost of an inefficient fibre or rattan broom.

Let us show how little it costs to save a lot with this broom.

Worcester Brush & Scraper Co.
Worcester, Mass.

To keep step with the rapid advances in electric railroading, it is essential to read the Electric Railway Journal every week.

Special Work for Street Railways
Frogs, Crossings, Switches and Mates
Manganese Steel Center Layouts

BARBOUR-STOCKWELL CO.
205 Broadway, Cambridgeport, Mass.

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The Indianapolis Portable Electric Welder

Read What Some of The Biggest Roads In The Country Say of This Outfit

THERE is surely pretty convincing testimony in the extracts from letters presented herewith. These indorsements of the Indianapolis Portable Electric Welder come from railway men who had to be *convinced first*.

The work of our welder on the job did *that*.

Now they are willing to state that the outfit has fully come up to, if not exceeded, all they could possibly desire.

How about you, Mr. Railway Manager? You have unquestionably been reading from time to time about the Indianapolis Portable Electric Welder. Have you tried one out yet?

It will do for your road precisely what it is doing for the roads which indorse it so enthusiastically.

It will save you hundreds, perhaps thousands, of dollars by postponing the necessity of rail replacements.

It will repair your broken, worn, cupped and corrugated track and special work right on the job without involving tearing up and replacing with new equipment.

It will enable your shop men to repair broken and damaged car equipment of all kinds instead of consigning it to the scrap heap.

You certainly need one of these outfits and its companion, the Grinder.

You don't have to secure an APPROPRIATION as these outfits are furnished on a basis of paying for themselves and out of your maintenance fund thru the actual saving effected. See previous issues of Journal this year for further possibilities.

Following Are Extracts From Their Letters

One of the largest electric railways in the United States which had used the welder for several months, writes:
"Up to this time, the welder is entirely satis actory."

Eminently Satisfactory

Another large and important road, after 8 months' use of the welder, writes:
"We have used your Portable Welder since last October, principally in the reclaiming of worn special track work and the result has been eminently satisfactory; being much beyond my expectations. The machine has paid for itself many times in the saving resulting from its use, and in my judgment no street railway company can afford to be without one."

Working Night and Day

Still another railway of prominence writes: "The welder has been practically in constant use since we received it. In fact, it has been working night and day. We are very much pleased with the results obtained so far, and consider that this machine has saved us a great deal of money."

Saves 12 Frogs

Later the same road wrote us as follows:
"We have been enabled to hold over 12 intersection frogs in one special work layout until next year by aid of the welder. We have also found it very useful in repairing cupped joints and would recommend its use to anyone responsible for the maintenance of either special or straight track."

Enthusiastic

Another well-known road writes:
"We have filled a great many cupped rails at joints and are very enthusiastic about the results that we have obtained."

Warrants Recommending

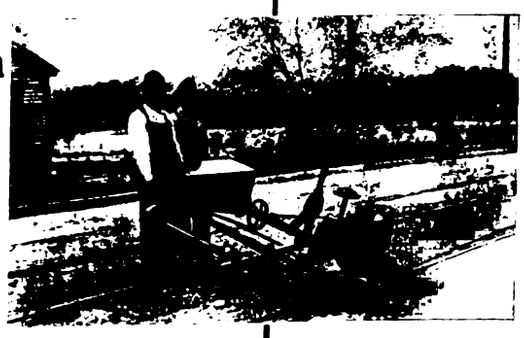
A road which is accounted unusually conservative stated in their letter:
"We have built up worn and battered crossings, reclaimed battered and cupped special work, both hard center and built-up construction and our experience thus far would warrant recommending your machine."

Fully Up to Expectations

A Southern road of magnitude and importance said in their letter:
"The Indianapolis Portable Welder has done some very good work for us in the repair of special work and has easily come up to expectations."

Thoroughly Satisfied

We wish to say that we are thoroughly satisfied with the Welder, having reclaimed a large number of worn and battered pieces of special track work. Also find it invaluable in the repair shop, repairing numerous breaks and cracks cheaply and quickly. We would dislike very much to give it up.



The Indianapolis Portable Electric Grinder for Resurfacing Track.

Indianapolis Switch & Frog Co.

Manufacturers of Only Highest Grade Manganese and Built-Up Special Work

SPRINGFIELD, OHIO

Sales Offices:

New York *Chicago* *Kansas City* *Spokane*
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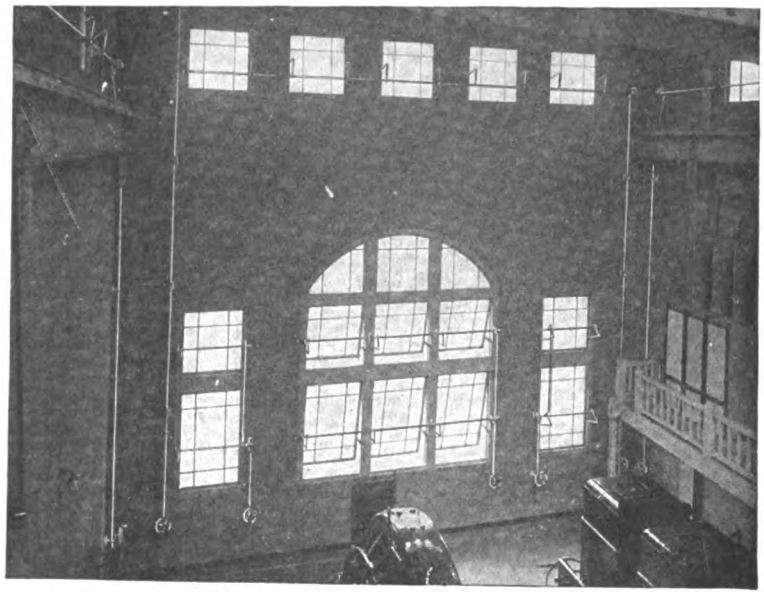
Sash Operating in N. Y. Central Power House



THIS is a striking example of numerous separate controls or the operating of individual groups, giving ventilation, where and when wanted, overcoming the arbitrary conditions imposed by limited controls.

The apparatus used, is our Standard Rocker Shaft. The castings are true and of ample weight. The gear worms are machine cut. The entire apparatus is made throughout with care, and if properly installed, is guaranteed to work the way we say it will work.

Send for catalog showing our complete apparatus for either long or short runs. Send your blueprints for estimates.

Lord & Burnham Co.

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Searchlight Department,
ELECTRIC RAILWAY JOURNAL.

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10 Walker Street, Detroit, Mich.

Cotton & Wool WASTE Wiping Cloths

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KINNEAR Steel Rolling Doors
FOR CAR HOUSES

Compact, Durable, Easily and Speedily Operated and Fireproof. Openings of any size may be equipped and the doors motor-operated if desired. Manufactured by the

KINNEAR MANUFACTURING CO., Columbus, Ohio
BOSTON PHILADELPHIA CHICAGO

GRECO
GREEN CHAIN GRATE STOKERS

For Water Tube and Tubular Boilers

GREEN ENGINEERING CO.
1300 Steger Bldg. Chicago, Ill.

Catalogue "G"—Green Chain Grate Stokers
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Sent on application

THE CUTTER ELECTRICAL AND MANUFACTURING CO. CIRCUIT BREAKERS PHILADELPHIA

I. T. E.
Circuit Breakers

for heavy street railway work are the best obtainable. Write for New Complete Catalogue.

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When Cars Are Stalled and Crews Are Calling For "Juice"

—when a blizzard drops into town without warning, and does its best to tie things up—do you ever wish you had about twice as many boilers?

Turbine capacity may be O.K. but it's steam that's needed —then's the time

The Taylor Stoker

Puts New Capacity-Ratings On Railway Plants—

Gets the coal under the boilers the right way—gets steam in a **hurry**, when you need it—

Gives just the right amount of air for **perfect** combustion —whether you're bucking a December blizzard, or dawdling along through an "off-peak" hour in the dog-days.

The stoker that's always on the job—that makes boilers worth 250 per cent—or more—of their builders' rating.

Coal rate where it belongs and the labor problem eliminated.

Ask for Taylor "Facts."

American Engineering Company, Philadelphia

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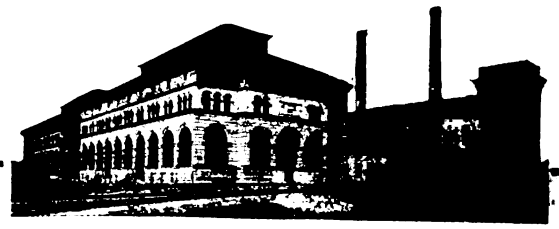
RIGHT METHODS and EQUIPMENT
For Treating Boiler Feed Water Troubles

Every Dearborn Formula is a **special** treatment—compounded to meet the precise conditions revealed by analysis of the feed water used. Expert analytical chemists, working in the most complete laboratory on water analysis in the country, determine the kinds and quantities of scale forming, corrosive, and other injurious mineral salts in the water samples submitted, and prepare formula for the required treatment.

Dearborn Service will solve your feed water problems.

Send gallon sample of feed water for analysis.

Dearborn Chemical Company
McCormick Building, Chicago



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you may not be interested in our business, which is to *save* our clients a percentage, in many cases 75%, of their expenses in

Handling Coal and Ashes

We hold no brief for any particular system or device. We design and erect the system that most efficiently and economically meets *your* individual conditions, after carefully studying them; combining the most suitable of the numerous standard units, to form the handling system best suited to *your* plant.

Write for our Booklet No. 20.

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Greatly Increase Efficiency and Power of Steam Turbines.
POWER SPECIALTY CO.
Trinity Building, 111 Broadway
NEW YORK

Improve Transformer Capacity and Life
by freeing the oil from impurities and water with the
Hunt Transformer Oil Dryer and Purifier
It's used here and abroad and makes big savings—Get the booklet and list of users.
Edward J. Hunt **Newark, N. J.**

Stock Motors Promptly Shipped
We always carry a very complete line of stock motors, both alternating current and direct, in our warehouses located at advantageous shipping points in various parts of the country. Write or wire your requirements to our nearest office.
Crocker-Wheeler Co. **Ampere, N. J.**

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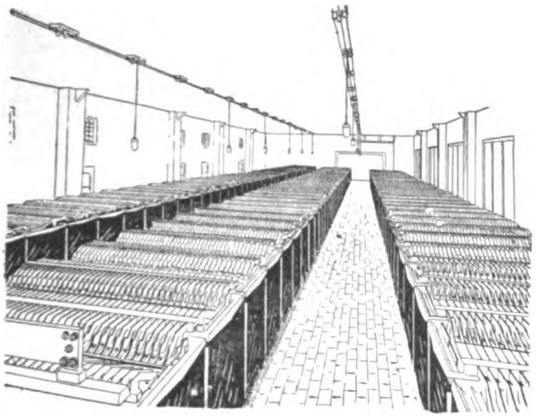

The GOULD Storage Battery Should Interest Any Plant Having Large Peak Loads

A Gould Regulating Battery to assist engine and generating units during peak loads, the battery being recharged by the generators during periods of light load, is a splendid investment.

For instance, a street railway installed a Gould Battery six years ago. This road operates comparatively few cars, but these are so heavy that the load fluctuates very greatly. The load on the line is sometimes very light, and at such times the battery is charging. During the rush hours, however, the cars more than use up the output of the generators and the deficiency is supplied by the battery.

The superintendent of this line tells us that they can then operate twice the number of cars with the battery as they could without it. He further states that there is absolutely no fault to find with the battery, and that it has made practically no maintenance expense.

A properly installed Gould Storage Battery provides amply for the peak loads in any electric plant and does so upon a cost basis that makes the installation highly economical.

Tell us your conditions and our engineers will quote figures.

Gould Storage Battery Co.

General Offices: 30 East 42nd St., New York City
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Boston: 89 State St. Detroit: 999 Woodward Ave
Philadelphia: 613 Betz Bldg Chicago: The Rookery
Cleveland: American Trust Bldg. San Francisco: 904 Rialto Bldg.
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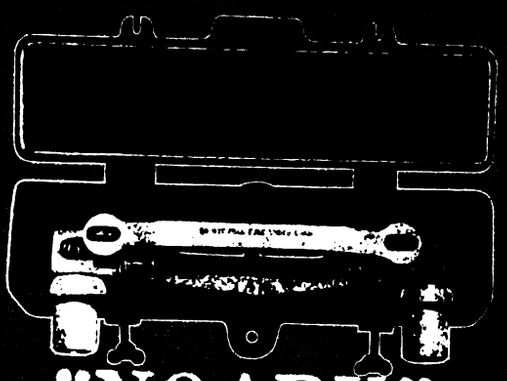

"NOARK" Car Fuse Boxes prevent overloads from reaching your motors

These boxes are a positive protection against overloads—They virtually are a barrier between your motors and destructive voltages.

"NOARK" Fuses withstand the heavy inrush of current in starting of car, but open the circuit instantly if the overload continues beyond a safe limit. They operate silently, with "NO-ARK" or flash.

Many railroads are now equipping their cars with "NOARK" Fuse Boxes in conjunction with circuit-breakers, as a double protection to equipment and passengers.

"NOARK" Boxes are substantially made of iron, with a snap-latch cover that makes it very easy to replace blown fuses. Furnished in several styles, vestibule and underslung types.

Write nearest Branch for Booklet and Prices.

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"BOUND BROOK" TROLLEY WHEEL BUSHINGS

The quality isn't imitated—nor is the trade name, but the green label is imitated. The label doesn't make the bushing genuine. Your protection from deception lies in the trade mark, "Bound Brook." Be sure that it is on every label and every bushing. For 25 years "Bound Brook" has been the standard of quality on leading trolley lines for interurban and city service.

Packed 50 in a box

Manufactured only by

GRAPHITE LUBRICATING CO.

Main & John Sts., BOUND BROOK, N. J., U. S. A.

The Construction of the

IDEAL Trolley Wheel

insures

A Balanced Wheel

Lumen Bearing Company

BRASS FOUNDERS

Buffalo Toronto

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.

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KALAMAZOO, MICH., U. S. A.

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is to tell something new in every advertisement. Modern advertising is **news.** Modern advertising makes the advertising section as valuable in one way to subscribers as are the editorial pages in another way.

That is why those who keep in touch with their industry make the reading of advertising a fixed practice.

Readers of Electric Railway Journal appreciate the value of the Journal advertising pages. The experience of Journal advertisers proves it.

Electric Railway Journal

239 West 39th Street
NEW YORK

Ample space in the Electric Railway Journal and the right copy will make a success out of the advertising of any worthy product which appeals to electric railway men.

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Everything for Winter Equipment

In getting your winter equipment ready you will find it economy to "bunch" your requirements on one requisition and send it to the nearest

Western Electric

house for prices on

Sweeper Rattan—Car Seat Rattan
Snow and Track Brooms—Sleet Wheels
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Address Electric Railway Department at our nearest house

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Manufacturers of the 7,000,000 "Bell" Telephones

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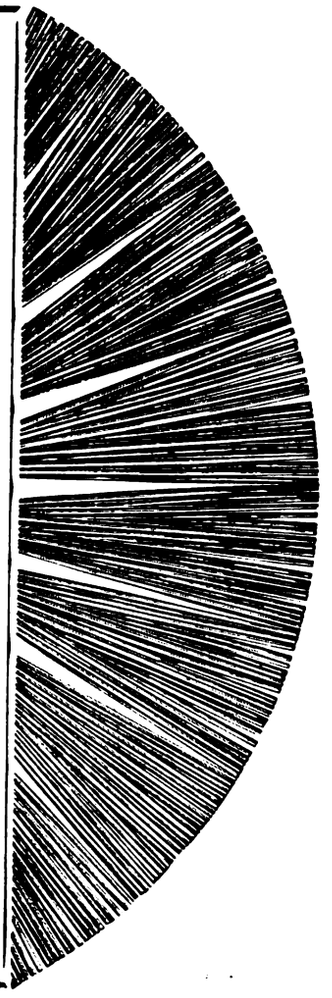
"Do It Electrically"



That Fly—

—ing trolley pole cannot damage the overhead equipment when cars are equipped with

Earll Retrievers and Catchers

Put them on all your cars — they'll quickly earn their cost by the reduction in repair expense. They are free from superfluous parts, and need no hooks, ferrules or knots to fasten the rope. Ask for bulletin.

Lord Mfg. Company
Bush Terminal No. 7
12-20-13 BROOKLYN, N. Y.

A Positive Anti-Slip Tread

Because it gives positive assurance against slipping—it pays.
Because it gives twice the wear of the next best—it pays.
Because it costs no more than the next best—it pays to specify it.

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The Eclipse Railway Supply Co.

CLEVELAND, OHIO

Manufacturers of the

ECLIPSE LIFE GUARD **ECLIPSE WHEELGUARD**
ECLIPSE TROLLEY RETRIEVER **ACME FENDER**

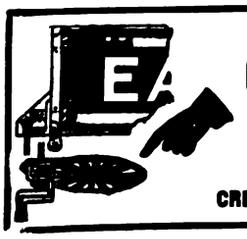
MASON SAFETY TREADS—prevent slipping and thus obviate damage suits. They have been used on the car steps and platforms of the leading Railroads for the past **18 years.** We are still receiving repeat orders—pretty good recommendation for efficiency—**DON'T YOU THINK SO?**
They reduce your accident costs and insure against wear.
We also make **STANWOOD** steps and treads and **KARBOLITH** fireproof composition car flooring.

American Mason Safety Tread Co. Lowell, Mass.

Air Brake Troubles

cease to exist if all parts of the air brake system are lubricated with Dixon's Graphite Air Brake and Triple Valve Lubricants. Best in all climates, under all conditions. Booklet 108-C free.

Joseph Dixon Crucible Company
JERSEY CITY, N. J.



See the Crank of the

CREAGHEAD DESTINATION SIGN

By means of it, conductor or motorman can change sign without leaving platform. All that has to be done is to turn the crank. Better investigate.

CREAGHEAD ENGINEERING CO., CINCINNATI, O.

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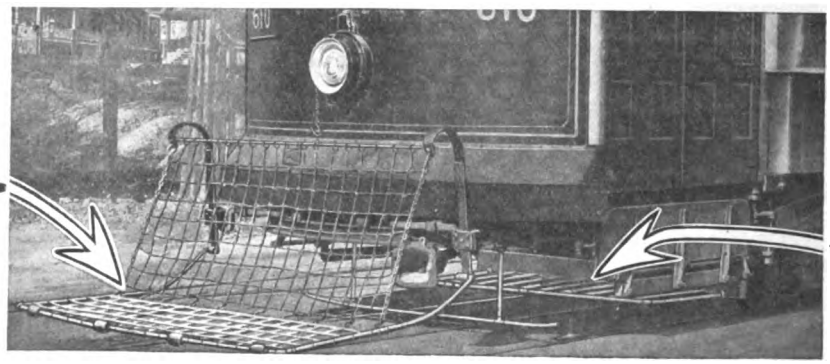
AUTOMATIC SENTINELS OF PROTECTION

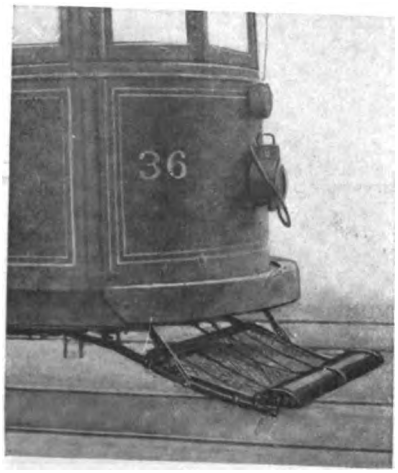
are safer to trust than the quickest eye or most agile pair of legs. The eye may not see and confusion may paralyze the legs, but if the cars are equipped with

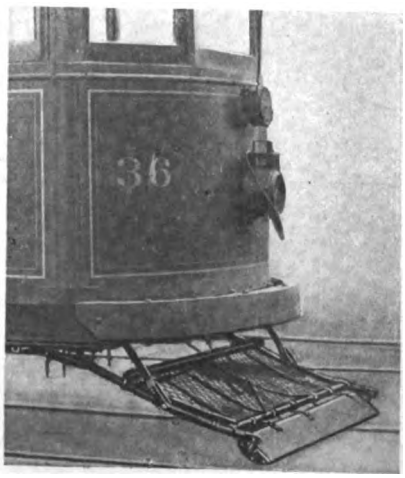
PARMENTER



there'll be no expensive "avoidable accidents" on *your* line.
Parmenter Fenders are carried "always ready" and dropped at the will of the motorman.
Our 1913 model is equipped with a new dropping device so that any one of four movements operate the fender, making it impossible to miss operation.
Parmenter Wheel Guards attached to the trucks protect both rails on the sharpest curve a car can take. This cannot be done by a body suspended guard.
Parmenter Fenders and Wheel Guards are two insurance policies which will repay multi-fold the negligible first cost and maintenance expense. Both devices have been standard for 16 years.

Parmenter Fender & Wheel Guard Co., 89 State Street BOSTON, MASS.





The Fender Problem Solved

BY THE

FONGER Tip-Tilting Automatic Fender

There is no opportunity for a person to get under this fender.

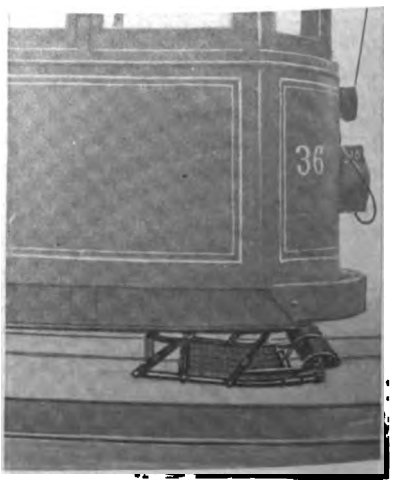
The Tip-Tilting or overturnable board prevents it by automatically and instantly tipping back and dropping to street thereby "scooping up" the person struck.

By depressing a plunger with his foot, motorman may quickly swing fender back under car in order to avoid contact with wagons or other obstructions.

In normal running position, fender projects but 2 feet ahead of car, as shown in first illustration above.

Photo at right shows position of the rear fender pulled up.

Trial set of these fenders sent on request, free of charge, and fitted to any type of car.



Fonger Fender Company

3852 Cottage Grove Avenue CHICAGO, ILL.

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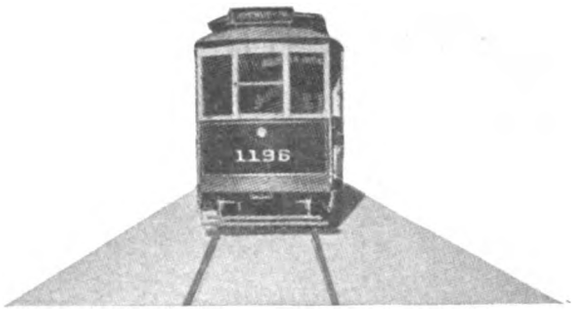
Providence



H-B

They have taken the DENT out of acciDENT

Every front end accident on your road makes a dent in car earnings unless the cars are equipped so that injury does not follow the accident.

Providence Fenders or H-B Life Guards provide such equipment.

They take the DENT out of acciDENT.

Send for the catalogs.

The Consolidated Car Fender Company

Manufacturers of

The Providence Fender and H-B Life Guard

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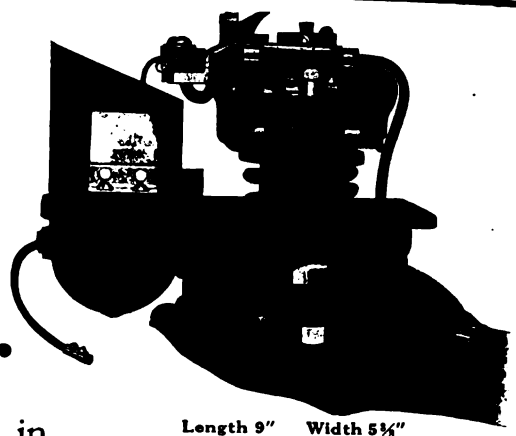
National

Type AR Governor



Length 9" Width 5⅛"
Height 7⅝" Weight 16 lbs.

Distinctive in design, ***smaller*** in size, ***lighter*** in weight. Has more power available for operation of contacts than any other governor of similar type now on the market.

Positive in operation because contacts become automatically locked in place and cannot become disengaged until the air pressure has reached the predetermined cutting out point.

It will pay you to investigate Bulletin E-417 illustrates and thoroughly describes it. Write for a copy today.

National Brake & Electric Co.

Works at Milwaukee, Wis.

Sales Offices

Chicago, Ill. New York, N. Y. Pittsburgh, Pa.
St. Louis, Mo.
London, England, ... 14 Great Smith Street

Do you realize the close relation between your Piston Rings and your claims account?

In general, "efficiency" in any piece of mechanism is a very desirable quality. It naturally indicates full measure of accomplishment and economy. But do you realize, Railway Managers, how very much more than that, the word "efficiency" means when applied to air brake compressors?

Do you realize that you not only must have efficient air compressors but that it is highly dangerous to operate cars without them?

And in that connection do you recognize the important part played by the piston rings in contributing to or detracting from air compressor efficiency?

If a compressor is equipped with piston rings which leak, or are likely to score the cylinder walls, it is equivalent to inviting the risk of accident.

Especially is this true in city service where cars make frequent stops and require rapid "pump-ups."

Think this over and also the fact that LEAK-PROOF Rings are the best rings you can get. When you appreciate their wonderful efficiency you will regret you didn't use them long ago.

Try out one set and see.

McQuay-Norris Mfg. Company, St. Louis, Mo.

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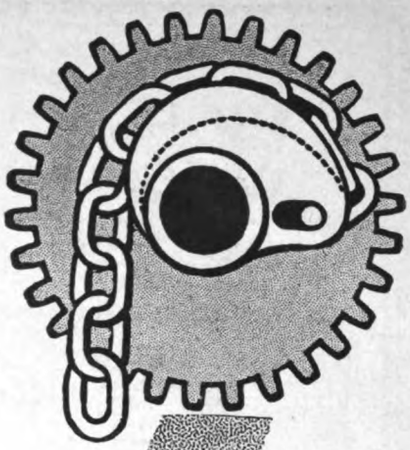
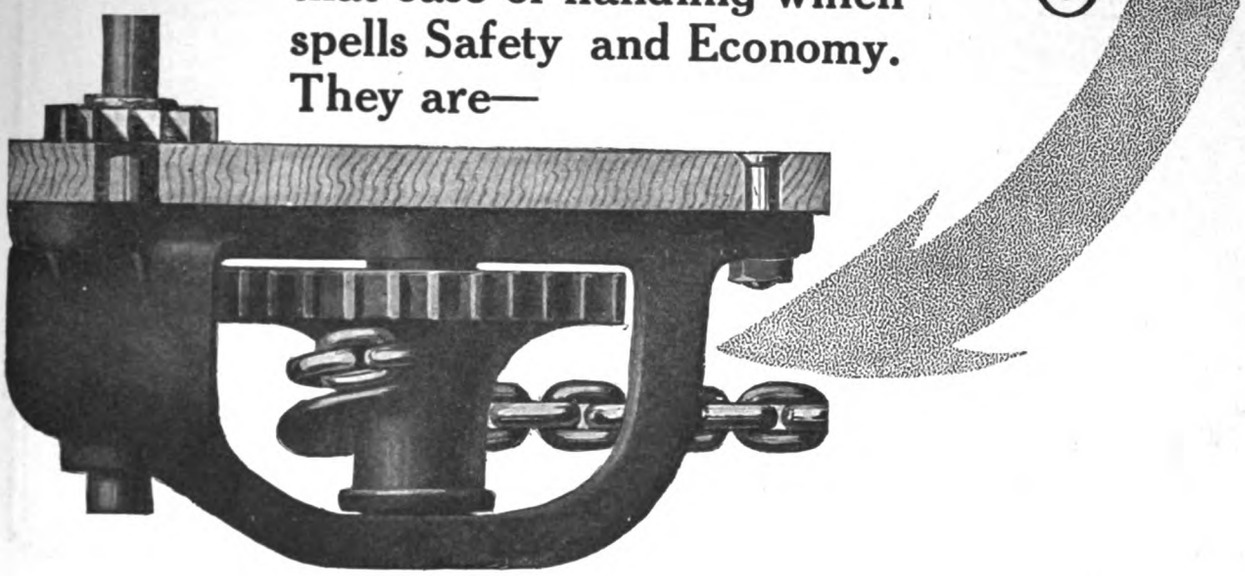
Get Brakes Like These Under the Platforms of your New Cars



—and they'll never lack that ease of handling which spells Safety and Economy. They are—



Peacock and Ackley Adjustable Brakes

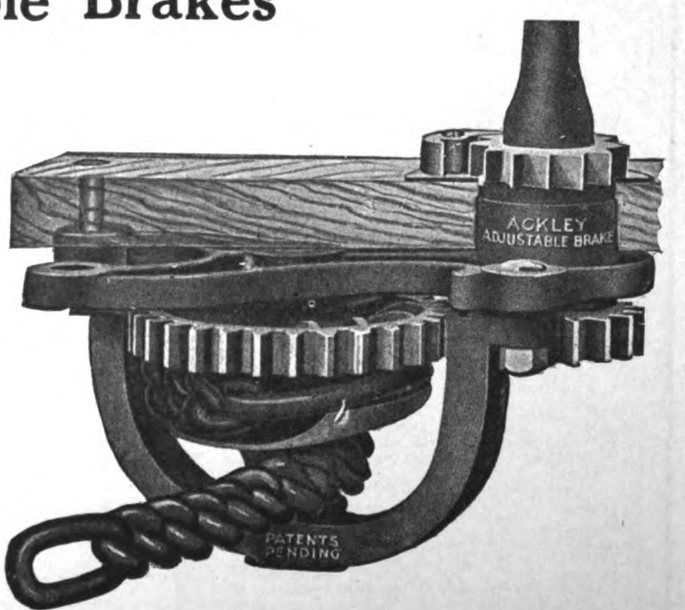
You put a car on the line, having in view the sole object of making money.

If that car can be provided with equipment by means of which it can give better mileage with fewer accidents and with less wear on truck or track—then the car is a bigger money maker, naturally.

That is just what Peacock or Ackley brakes can do for your cars.

We have records to show how they have increased the daily mileage of cars, reduced the accidents per 1000 miles, reduced the number of pull-ins per month—or in other words, *established efficiency*.

Get the National catalogs.



National Brake Company

888 Ellicott Sq. SOLE MANUFACTURERS FOR UNITED STATES, CANADA, MEXICO, HAWAIIAN ISLANDS **Buffalo, N. Y.**

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HIGH VOLTAGE DIRECT CURRENT WINS OVER ALL OTHER SYSTEMS

500 Volt and single-phase interurban systems, steam road electrifications and newly built roads—all acknowledge the supremacy of the G-E High Voltage direct current system. Here are a few of the typical roads which **have adopted this system during the past year.**

500 Volt Change Over—United Railways Co., Portland, Oregon—now operating at 1200 volts.

Single-Phase Change Over—Pittsburg and Butler, Railway Co., Pittsburg, Pa., now operating at 1200 volts.

Steam Road Electrifications—The Melbourne Railways, Australia, complete electrification of one of the largest terminals in the World will operate at 1500 volts.

The Butte, Anaconda & Pacific Railway began 2400 volt ope ation this year.

Newly Constructed Roads which have begun operation or are under construction this year, have selected the G-E High Voltage Direct Current System as follows:

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Southern Traction Co.
Pacific Electric.
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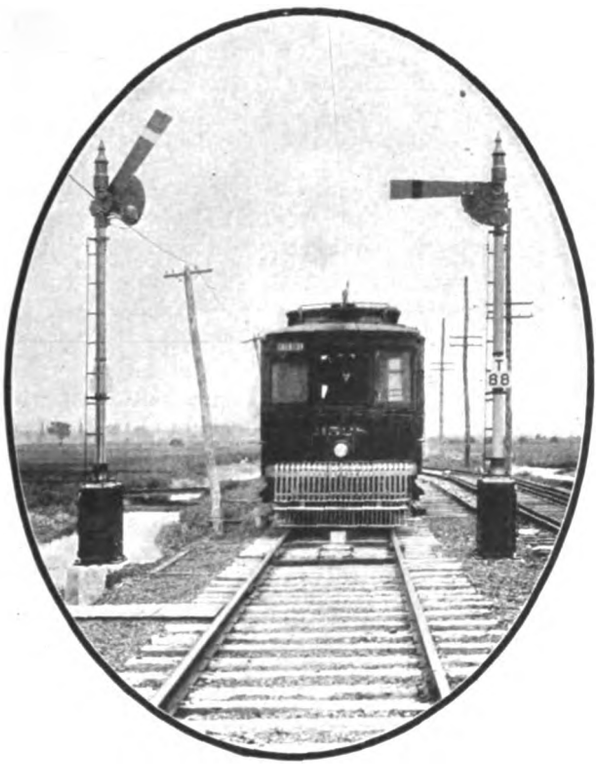

Style "B" A. C. Automatic Block Signals on the Public Service Railway of New Jersey

UNION APPARATUS is built for Service

Efficiency in the operation of your road can be completely attained only by the use of automatic block signals, controlled by continuous A. C. track circuits.

Automatic block signals controlled by continuous A. C. track circuits promote efficiency to the utmost, for they make it possible to utilize tracks to the limit of capacity consistent with safety. They help to keep trains on time, detect broken and defective power bonds, prevent collisions, and advertise the character of the road that uses them.

Union automatic block signals are most efficient because of the skill and care used in their design and manufacture. Each piece of apparatus is rigorously inspected and tested before shipment.

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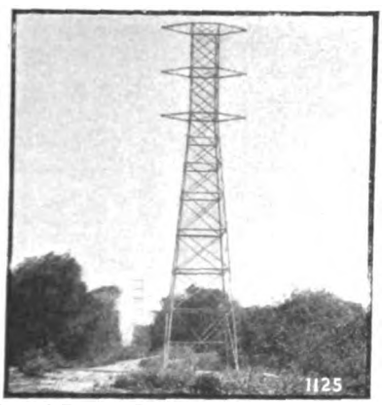

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for the balance, which will be payable in semi-annual installments over a period of ten years. We shall be glad to furnish particulars of the plan.

PHILADELPHIA EQUIPMENT SECURITIES CO., Franklin Bank Building PHILADELPHIA, PA.

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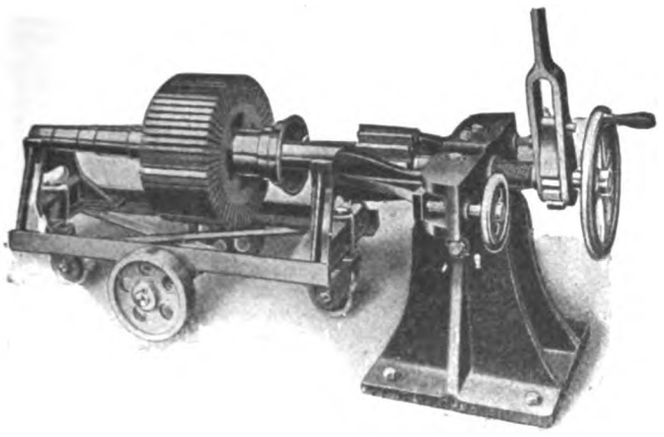

A Pinion A Minute

can be pulled off any armature without injury if you own this machine.

The Columbia Pinion Puller

combines giant power with delicate grip.

It saves the armature and it saves the pinion.
Swinging head adjusts itself to various heights and angles.
Large hand wheel gives rapid adjustment and the work is done as quick as a wink.
The cut also shows a

Columbia Adjustable Armature Buggy

delivering armature to the Pinion Puller.
This Buggy is easily adjusted to take any size motor car armature.
It saves time and saves your armature. Made of iron and very strongly constructed. It will pay you to learn about these and many other

Columbia Specialties

Write us.

Columbia Machine Works & Malleable Iron Co.

Atlantic Avenue and Chestnut Street, Brooklyn, N. Y.

ASSEMBLED COMMUTATORS
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COMMUTATOR SEGMENTS

Our Commutator Segments are made from absolutely pure Hard Drawn Copper to specifications, either stamped or sawed, to fit any size or type of motors and generators, same as original factory segments. Dense, smooth and soft Canada Amber Mica is used in our commutators. All work guaranteed.

The CAMERON ELECTRICAL MFG. CO., Ltd., Ansonia, Conn.

PROPER RESERVATIVE REPARATIONS **P & B**

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For Shop, Line and Station. These have been our successful specialties for over a quarter of a century.

SEND FOR CATALOGS. ALSO DESCRIPTIVE COLOR CARDS OF IMP CEMENT FLOOR FINISHES

IMP CEMENT FLOOR FINISHES

Prevent dusting and subsequent damage to generators and all machinery.
A hard, glossy, durable surface that is oil proof and easily cleaned.

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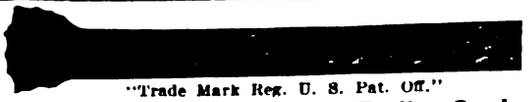

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Samson Spot Waterproofed Trolley Cord

Made of fine cotton yarn braided hard and smooth. Inspected and guaranteed free from flaws. Proved to be the most durable and economical. Samples and information gladly sent.

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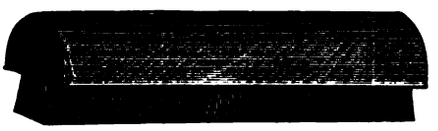

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BUMPERS
Various Shapes
Elastic Tip Co.
370 Atlantic Ave.,
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Structural Iron Works. (See Bridges and Buildings.)

Superheaters.
Babcock & Wilcox Co.
Power Specialty Co.

Sweepers, Snow. (See Snow Plows, Sweepers and Brooms.)

Switches, Automatic.
U. S. Electric Signal Co.
Western Electric Co.

Switchboard Mats.
Imperial Rubber Co.
Massachusetts Chemical Co.
Walpole Tire & Rubber Co.
Western Electric Co.

Switchstands. (See also Track Work.)
Indianapolis Switch & Frog Co.
Kilby Frog & Switch Co.
Ramapo Iron Works.
Weir Frog Co.
Wharton, Jr., & Co., Wm.

Switches and Switchboards.
Allis-Chalmers Mfg. Co.
Anderson M. Co., A. & J. M.
Consolidated Car-Heating Co.
Cutter Electrical & Mfg. Co.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Switches. (See Track, Special Work.)

Tanks, Water & Oil Storage.
American Bridge Co.

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Electric Service Supplies Co.
Western Electric Co.

Terminals, Cable.
Standard Underground Cable Co.

Testing, Electrical.
Gulick-Henderson Co.
Hunt & Co., Robert W.

Thermostats.
Consolidated Car-Heating Co.
Gold Car Heating & Lighting Co.
Railway Utility Co.

Ticket Choppers and Destroyers.
Patten Co., Paul B.

Ties & Tie Rods (Steel).
American Bridge Co.
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Carnegie Steel Co.

Ties, Wood. (See Poles, Ties, Posts, Piling and Lumber.)

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Columbia M. W. & M. I. Co.
Drew Electric & Mfg. Co.
Electric Service Supplies Co.
Johns-Manville Co., H. W.
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Westinghouse Elec. & Mfg. Co.

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Federal Motor Truck Co.
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Cambria Steel Co.
Cincinnati Frog & Switch Co.
Cleveland Frog & Crossing Co.
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Goldschmidt Thermit Co.
Indianapolis Switch & Frog Co.
Kilby Frog & Switch Co.
Lorain Steel Co.
New York S. & Cross. Co.
St. Louis Steel Fdry. Co.
Weir Frog Co.
Wharton, Jr., & Co., Wm.

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Transfer Tables.
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Archbold-Brady Co.
Nichols & Bro., G. P.

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Crocker-Wheeler Co.
General Electric Co.
National Brake & Elec. Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Treads, Safety Car Step.
American Mason Safety Tread Co.
Universal Safety Tread Co.

Treads, Stair.
American Mason Safety Tread Co.
Universal Safety Tread Co.

Trolley Bases.
Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Nuttall Co., R. D.
Ohio Brass Co.
Union Electric Co.

Trolley Wagons and Automobiles. (See Tower Wagons and Automobiles.)

Trolleys and Trolley Systems.
Curtis & Co. Mfg. Co.
Northern Engineer'g Works.

Trucks, Car.
Baldwin Locomotive Works.
Brill Co., The J. G.
Cincinnati Car Co.
Hanna Co., J. A.
Long Co., E. G.
McGuire-Cummings Mfg. Co.
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National Tube Co.

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Allis-Chalmers Mfg. Co.
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Lord & Burnham Co.
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Brill Co., The J. G.
Globe Ventilator Co.
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Railway Utility Co.
Smith Heater Co., Peter.

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Brill Co., The J. G.

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Hagy Waste Works, J. Milton.

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Columbia M. W. & M. I. Co.
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Long Co., E. G.
Lord Manufacturing Co.
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Nuttall Co., R. D.
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Griffin Wheel Co.

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Carnegie Steel Co.
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Bridgeport Brass Co.
D & W Fuse Co.
Drew Electric & Mfg. Co.
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Standard Underg'd Cable Co.
Western Electric Co.
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Largest Makers of Oxy-Acetylene Welding and Cutting Equipment in the World.

Originators of the Oxweld Process

Full information on all classes of Welding and Cutting will be sent on request.

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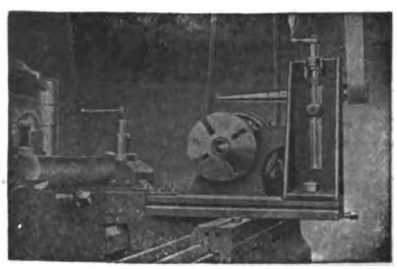
CHICAGO, ILL. NEWARK, N. J.

Put it on the Lathe

in the shop and you have an unequalled device from every standpoint. Our



Commutator Slotting Device

is the most practical one yet developed. Write for details and prices.

CHARLES N. WOOD CO.
79 Milk St. Boston, Mass.

If you do not find what you want in the Searchlight Section of the JOURNAL, write us and we will try to get it for you

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CAR ADVERTISING ALMOST EVERYWHERE

Apply Efficiency Principles to Car Advertising Contracts

A machine may deliver big production at low cost and still be inefficient unless it can keep up that production at low maintenance cost.

It's the same with the contractor for your car advertising space.

That space has a definite value and it is impossible to make it permanently yield more than its value. The contractor who pays higher than the established value is a loser—and you cannot afford to place your hope of getting cash returns on a losing proposition.

There is more than merely **hope** in a Collier contract. It is an established certainty of maximum permanent revenue as regular as bank interest.

Barron G. Collier INCORPORATED
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Fifth Avenue
NEW YORK

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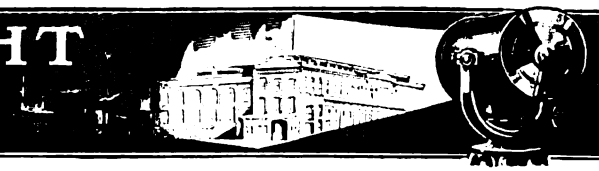

FOR SALE

7—Brill 36′ Interurban cars complete with four G. E. 87 motors, Brill 27E-1½ M.C.B. Trucks.
4—Kuhlman 32′ Interurban cars complete with four G. E. 74 motors, Brill 27E-1 Trucks.
16—Brill 23′ closed cars, Brill 21E Trucks.
12—Brill 30′ closed cars complete with West. 101B motors, Brill 27G Trucks.
2—18′ Jackson and Sharp Car Bodies.
30—Cincinnati 20′ 6″ single end car bodies.
10—Brill 21′ closed cars, West. 68 motors, Peckham Trucks.
5—Brill 30′ Express Cars.
16—West. 56 Railway Motors, complete.
8—West. 38B Railway Motors, complete.
4—West. 112 Railway Motors, complete.
8—West. 68C Railway Motors, complete.
12—West. 49 Railway Motors, complete.
90—West. 12A Railway Motors, complete, four and five turn.
38—G. E. 800 Railway Motors, Complete.
22—G. E. 1000 Railway Motors, complete.
16—G. E. 57 Railway Motors, complete, three turn.
8—G. E. 58 Railway Motors, complete.
12—G. E. 87 Railway Motors, complete.
40—G. E. 57 Armatures, second hand, two turn.
3—West. 101B Armatures, Brand New.
3—West. 93A Armatures, Brand New.
1—West. 93A-2 Armature, Brand New.
7—G. E. 80 Armatures, Brand New.
4—G. E. 87 Armatures, Brand New.
2—G. E. 73 Armatures, Brand New.
8—G. E. 67 Armatures, Brand New.
12—K-35-G Controllers.
8—K-34-B Controllers.
8—K-28-A Controllers.
12—K6 Controllers.
5—L-4 Controllers.
9—Type M Equipments, C-6-A Master Control.
20—K2 Controllers.
30—K11 Controllers.
80—K10 Controllers.
12—K12 Controllers.
8—K14 Controllers.
4—Sets Brill 27G Trucks, 4′ 6″ Wheel Base.
16—Peckham No. 6-E Trucks, 7′ 6″ Wheel Base.
6—Brill 21E Trucks, 7′ 6″ Wheel Base.
16—Dupont Trucks 7′ 6″ Wheel Base.
4—Sets Peckham 14B-3 Trucks.
200—Brill Draw Bars.
2—Single Truck Electric Locomotives.
150—International Fare Registers, complete, type R-7.

ALL THE ABOVE APPARATUS IS IN FIRST-CLASS CONDITION FOR SERVICE.

For Further Particulars Apply to

W. R. KERSCHNER, 50 Church Street NEW YORK, N. Y.

A. C. (25 Cycles) UNITS D. C.

DIRECT CONNECTED A.C. UNITS (25 Cycles)

KW.	Make Gen'r	Volts	Ph.	Rev.	Engine Description
1000	Westge.	390	3	94	Allis Vert. C. C. Corliss
750	Westge.	440	3	94	Allis Hor. C. C. Corliss
500	Westge.	360	3	120	Russell Hor. T. C. 4 Valve
300	Westge.	380	3	107	22x36 Buckeye R. H.
200	Westge.	220	3	214	17x21 Buckeye L. H.
150	Westge.	220	3	136	17x24 Erie City 4 Valve

DIRECT CONNECTED D.C. UNITS (Railway)

500	Gen. Elec.	650	90	Cooper Hor. C. C. Corliss
300	Gen. Elec.	550	150	Hamilton H. T. C. Corliss
250	Westge.	550	200	Phoenix H. C. C. Non. Cond.
150	Westge.	550	200	16x21 Buckeye
2— 75	Gen. Elec.	550	275	11x14 Sweet Straight Line

BELTED GENERATORS — ENGINES — BOILERS

HAROLD R. WILSON MACHINERY CO.
1102 New Bank of Commerce Bldg. ST. LOUIS

Rails Rails Rails

35 lb., 40 lb., 48 lb., 52 lb., 56 lb., 60 lb., 65 lb., 80 lb., 85 lb., and other weights of No. 1 relaying rails with necessary bars at various points throughout entire country, possibly tributary to your locality. Same can be inspected before or at time of loading. Prompt attention will be given to your inquiry.

The Hyman-Michaels Co.
533 Peoples Gas Bldg., Chicago, Ill.

FRANK MACGOVERN, Pres.-Gen. Mgr.

MACGOVERN AND COMPANY, Inc.

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'Phone 3375-3376 Rector

Rotary Converters—25 Cycle, 3 Phase

1 500 Kw., Bullock, 375 volts, a.c., 770 amp., 600 volts, D.C., 833 amp., 500 RPM.

1 300 Kw., Allis-Chalmers, 6 pole, 650 volts, 462 amp., 500 RPM.

2 300 Kw., Westinghouse, 650 volts, D. C., 462 amp., 500 RPM.

Street Railway Motors

10—Westinghouse No. 68 C Motors, 10 K.C. Controllers.

500 KW., 25 Cycle Westinghouse Motor-Generator Set

Generator: 500 Kw., 600 volt, comp. wd., 8 pole type.
Motor: 3 ph., 25 cy., synchronous motor, 11,000 or 2300 volt, 375 RPM. A.C. starting motor & D.C. exciter mounted on shaft. Switchboard equipment.

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OPEN and CLOSED
MOTOR and TRAIL

Write for Price and Full Particulars to

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg. Philadelphia, Pa.

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FOR ALL THE STANDARD
STREET RAILWAY MOTORS

GET OUR PRICE WE CAN SAVE YOU MONEY

America's Greatest Repair Works

CLEVELAND ARMATURE WORKS, Cleveland, O.

Box Cars Flats Gondolas

Prompt attention to your requirements. Excellent opportunities to effect savings in purchasing equipment.

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Get Your Wants into the Searchlight

MONEY-MAKING CHANCE

for some Traction Company, Lighting Company, or Contractor to get a

Complete Set of Tools

including sufficient equipment for overhead trolley work or outside construction.

At a Low Price

and in excellent condition. Write for inventory and price.

M. B. Foster Electric Co., 238 Devonshire St., Boston

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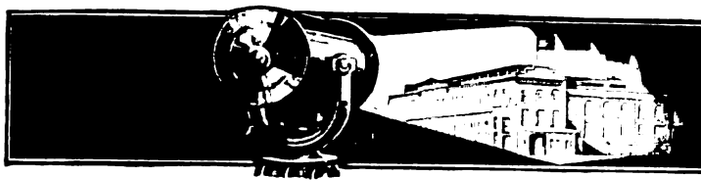

SEARCHLIGHT SECTION

25-CYCLE ROTARY CONVERTER

1—200-KW., General Electric, Rotary Converter, 3-phase, 25-cycle, 750 RPM., Type T.C-4-200-750, 600 volts, D.C., 370 volts A. C.
3— 75-KW., General Electric OISC, single-phase Transformers, 13,200/12,540/11,880-370/185 volts.
Also Reactance Coil, A.C. and D.C. Panels, Lightning Arresters and Choke Coils.

60-CYCLE ROTARY CONVERTER

1—200-KW., Westinghouse, 3-phase, 60-cycle, 550-600 volts, 720 RPM.
3—110-KW., General Electric, single-phase, 60-cycle, 2300-370 volts.

RAILWAY MOTORS

4—Westinghouse, 112 Motors. Rewound armatures.
2—G.E., 57 Motors.
20—Westinghouse, 68 Motors.

TYPE "M" CONTROL

4—Type M, single or double end control. Fine condition. Can make very low price. For use with 4-75 HP. motors.

RAILWAY UNITS 500-600 VOLTS

1—750-KW., G. E., with C.C. Allis-Chalmers Corliss, 110 RPM.
1—500-KW., G. E., with T. C. Wetherill Corliss engine, 100 RPM.
1—425-KW., G. E., with C. C. McIntosh-Seymour engine, 120 RPM.
1—400-KW., Cro-Wheeler, with Russell engine, 110 RPM.
1—400-KW., G. E., with C. C. Allis engine.
1—300-KW., G. E., with T. C. Wetherill engine, 100 RPM.

BOILERS

4—360-HP., Heine, 160 lbs. pressure.
1—300-HP., Heine, 150 lbs. pressure.
2—250-HP., B. & W., 150 lbs. pressure.
1—200-HP., Heine, 150 lbs. pressure.

ARCHER & BALDWIN, 114 Liberty St., ROOM 302 'Phone Rector 4337-4338-4339 New York

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POSITIONS WANTED

AMBITIOUS technical graduate, with 7 years' practical and varied electrical experience, now occupying responsible position with company operating 57 miles of transmission lines, wants position in charge of construction or operation of light, power or railway plant. Box 327, Elec. Ry. Jour.

MANAGER-SUPERINTENDENT; 18 years' experience, city, interurban, steam and lighting, desires position; hustler and economical operator; experience covers all departments; A-1 references. Box 352, Elec. Ry. Jour.

POSITION WANTED as master mechanic or general foreman, thoroughly competent. Familiar with all up to date equipment, both city and interurban; 15 years' experience in electric railway shops; A-1 references. Box 350, Elec. Ry. Jour.

POSITION WANTED—Superintendent or superintendent of transportation, 18 years' experience city and interurban, passenger, freight and express. Can furnish best of references from past employers as to character and ability. Am a good organizer and can get results; 40 years of age and married; record shows low operating cost. Box 355, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

TECHNICAL GRADUATE, electrical engineering, desires position with consulting or constructing engineer, preferably one specializing on railway work or electrification. Box 347, Elec. Ry. Jour.

TRACTION CAR PAINTER would like position, has had good experience and can do anything in the line of car painting. Understands thoroughly the treatment of both wood and steel cars, would take foremanship if opportunity presented itself. Steady position an object; have good recommendations. Box 351, Elec. Ry. Jour.

POSITIONS VACANT

CAR PAINTER Wanted—Mr. Master Mechanic: If you know of a good car painter, one who is capable of painting a car, also striping and lettering, we wish you would put him in communication with us and oblige Phoenix Ry. Co., of Arizona, Phoenix, Ariz.

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Get your Wants into the Searchlight

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Positions Wanted, Evening Work Wanted, 2 cents a word, minimum charge 50 cents an insertion, payable in advance.

Positions Vacant, Salesmen Wanted, Agencies, all undisplayed Miscellaneous ads, Machinery and Plants For Sale (with one line of display heading), 3 cents a word, minimum charge $1.50 an insertion.

All advertisements for bids cost $2.40 an inch.

Advertisements in display type cost as follows for single insertions:

1-16 page, $5.00	1 in. single col., $3.00
1-8 page, 10.00	4 in. single col., 11.60
1-4 page, 20.00	8 in. single col., 22.40

In replying to advertisements, send copies of testimonials, etc., instead of originals.

POSITIONS VACANT

BOOKKEEPER, one who has had some experience with Interstate Commerce accounts as applied to electric railways. Answering, give age, references and salary desired. Box 354, Elec. Ry. Jour.

MANAGER for electric traction and lighting company in West Indies, serving 70,000 population. Must know Spanish. Give full particulars of experience and previous employment. Box 346, Elec. Ry. Jour.

STENOGRAPHER WANTED — Young man having had experience in electric railway office work and competent to make verbatim reports of investigations. State age, experience, wages, etc. Electric railway in Michigan. Box 345, Elec. Ry. Jour.

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Salesman Desires Position

High grade salesman railway materials and supply, experienced, thoroughly posted, well acquainted; open for position January 1, 1914. Box 349, Elec. Ry. Jour.

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Cut the Cost of Your Pole Supply

I have a tract of standing cedar which will cut about 12,000 poles. The trees are very tall, straight and slender. On account of the exceptional height I want to contract this cut to someone who can use the longer lengths. Can make an attractive price to electric railway or power line company. E. D. Hamacher, Ione, Washington.

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Relaying Rails Wanted

25 miles of 70-pound or heavier No. 1 relaying steel rails with angle bars, or new rails, if a bargain. Address with full information as to quality and shipping points. Box 353, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

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PROPOSALS FOR CARS

PORT ARTHUR, ONT.,
December 11, 1913.

WANTED—At once, three or four single truck, modern street cars, fully equipped, Westinghouse equipment and Brill trucks preferred, cross seats, air brake equipment, storm sash, Peter Smith heaters or electric heaters and to be painted to suit the purchaser.

Those quoting will please send blue print, photograph and full specifications of cars quoted on, also state delivery, and where cars may be inspected. Apply to J. J. HACKNEY, Commissioner of Utilities, Port Arthur, Ont.

Electric Track and Overhead Material Bargains

30 sets 70 lb. switch material, 15' reinforced points, with No. 10 15' double spring wing rail frogs.
2000 AS & W form "A," 4/0 twin terminal bonds; large quantity suspensions, screw clamp ears, feeder ears, 20 degree frogs, galvanized strand guy wire and No. 8 smooth wire.

The Above are Brand New and Will Be Sacrificed

Write for our September 84-page Bulletin No. 142 containing real bargains in—

Rails, Locomotives, Cars, Equipment

ZELNICKER — St Louis

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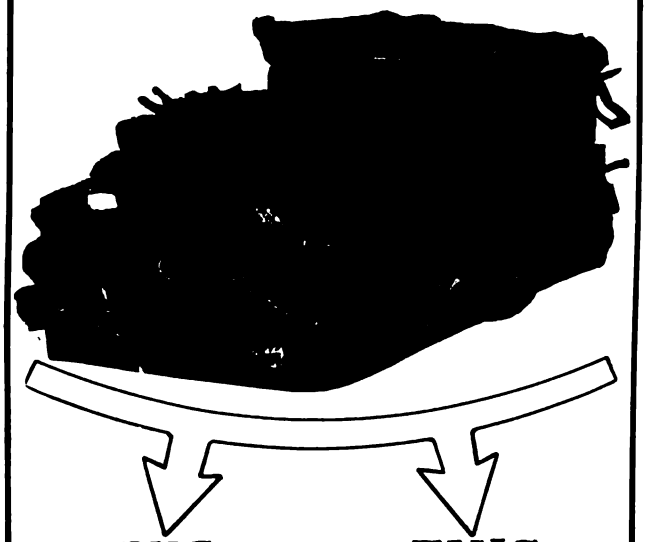
What Do You Do With Them?



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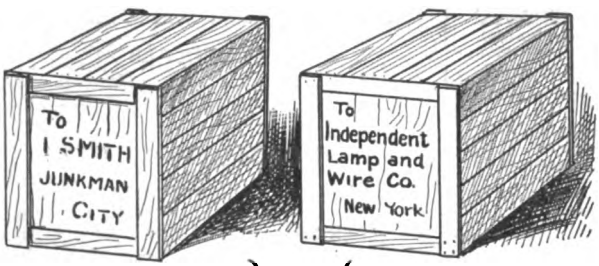
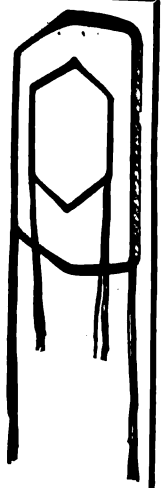


This Method Nets You A Few Cents A Pound As Scrap Copper } WHILE { This Method Nets You New Coils At A Few Cents per Pound for Reinsulating

Coil failure is rarely, if ever, due to wire failure.
It's insulation failure that causes the trouble.
Now, insulation costs far less than copper, so why scrap burned out coils because of the insulation?
Insulation is renewable by our special process.
When you send us a coil, no matter in what condition, we remove the insulation from the wire, and reinsulate it with Salamander Pure Asbestos.
It is then better than the original wire and your cost is simply that of the new insulation.
We then rewind and finish the coil in the same type as originally sent us.
Copper cost is the big cost in coils. You save that cost by sending us your old coils.
And what is equally as economical—you get a coil that can be impregnated at a temperature that would destroy cotton insulation—a coil that will withstand any overload in service.
Let us show you how little it costs to renew old coils.
Just ask us to submit our proposition.

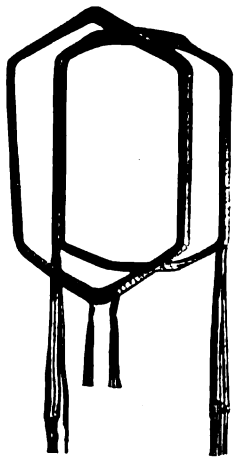
The Independent Lamp & Wire Co.
1733 Broadway, New York
Works: York, Pa., and Weehawken, N. J.

Are You Taking Advantage of
"Cleveland Coil Service"?



With all the equipment and workmen of the Van Dorn & Dutton Electrical Department, together with our own added facilities, we are enabled to offer superior service in supplying

ARMATURE and Field Coils



and in repairing or rewinding coils.

QUICK SERVICE

is the basis of our claim for your inquiries and of course thorough work at reasonable prices will be maintained as in the past.
Get the details of our proposition.

CLEVELAND COIL & MFG. CO.
R. P. PASCOE, Mgr.
1011 Power Avenue, N. E.
CLEVELAND OHIO

Are You Satisfied

with the life of your armature and field coils? Could you afford to pay 50% more for coils that will give you 200% greater life?

Salamander coils do better than this.
They are really fireproof.

The W. R. GARTON COMPANY
Electric Railway Specialties
CHICAGO

Get Better Coil Service

for much less than the expense of rewinding we can mummify your old coils. They will then give the service of new coils. Write for our proposition.

McLeer Electric & Mfg. Company
BUSH TERMINAL
254—36th St., Brooklyn, New York

The Enclosed Flame Gas Burner Is Safe

So long as air is supplied, the flame cannot go out, and the automatic valve shuts off the gas whenever the air pressure fails. For this reason **CRAWFORD SECTIONAL OVENS** with their Enclosed Flame Gas Burners, are far safer than any other type. These ovens are built especially for use in the electrical industry.
Send for pamphlet on Armature Drying.
THE OVEN EQUIPMENT & MFG CO., New Haven, Conn.

(54-36)

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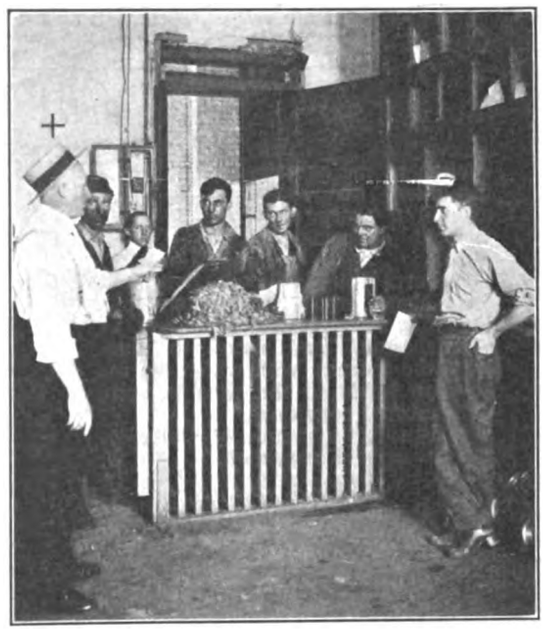
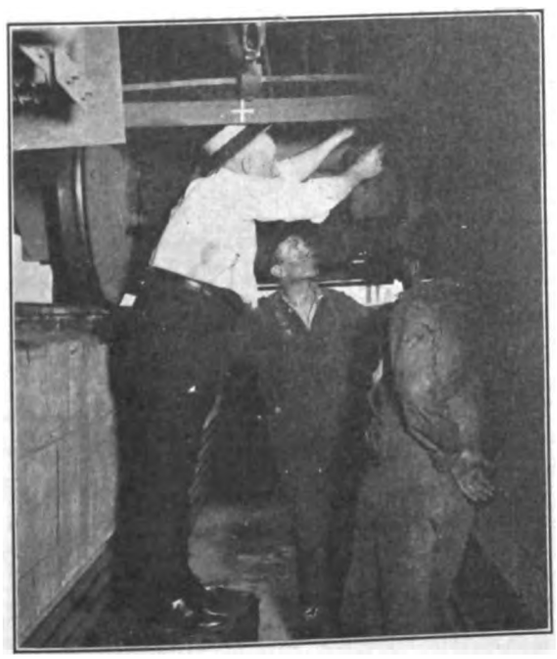
Cut the Cost of MATERIAL and METHODS

Frequently big items of useless expense lie in wastes so common that they have lost significance.
Methods of using oils, as well as oil quality, then have a bearing on oil cost.



Galena Oils

give you the utmost in quality.



Galena Experts

give you the practical knowledge gained from years of electric railway experience. They work with the men and, without friction, set up methods of lubrication which, reinforced with the economy effected by Galena oils, bring about a saving which you cannot well afford to overlook.
Under contract we guarantee the saving to be at least 10%.

Ask us to state just what we will contract to save your road.

Galena-Signal Oil Co.

Franklin, Pa.

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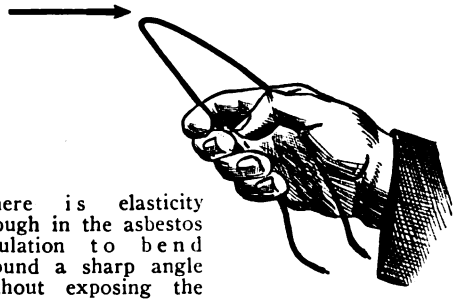
Bend a Piece of "DELTABESTON"

then notice it Here



There is elasticity enough in the asbestos insulation to bend around a sharp angle without exposing the wire.

Of course you do not bend around such sharp angles in winding coils but that is a factor of safety in "Deltabeston," and serves to illustrate the tenacity with which the insulation holds to the wire in spite of abnormal conditions.

Write us for a sample of Deltabeston for careful inspection.

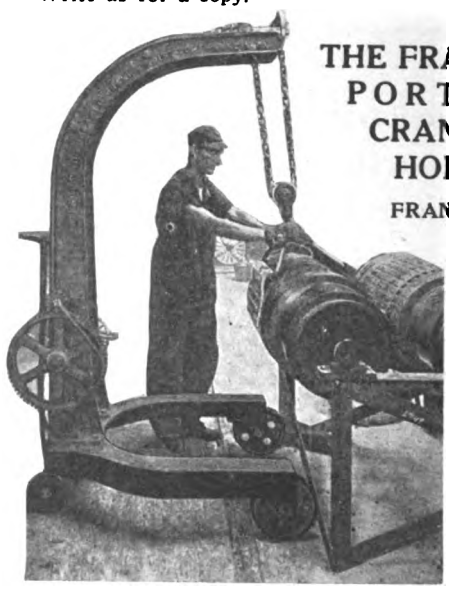
D & W Fuse Co.
Providence, R. I.

ONE MAN *and the* FRANKLIN IS THE EFFICIENT WAY

That is why the largest shops in the country are using the Franklin Portable Crane and Hoist to cut shop costs.

One man alone, with its help can easily transport materials weighing up to 2 tons to any part of the buildings or place them in machines.

Booklet No. 2 will suggest many uses for the Franklin so that it will pay daily dividends. Write us for a copy.



THE FRANKLIN PORTABLE CRANE AND HOIST CO.
FRANKLIN, PA.

FORMICA

A homogeneous oil and waterproof Bakelite insulation, formed accurately into strong tough commutator rings. It's better than mica but costs 20% less. A simple service trial of a few rings, ordered now, will convince you.

The Electric Service Co.
Mfg. Dept. Cincinnati, O.

Repair Shop Machinery and Cranes

Built by

NILES - BEMENT - POND CO.
111 Broadway, New York
Boston Philadelphia Pittsburgh Chicago
St. Louis Birmingham, Ala. London

A. G. E. LABOR SAVING MACHINES

For Armature Banding, Coil Winding, Taping, Pinion Pulling, Commutator Slotting and Pit Jacks, Armature Buggies and Armature Removing Machines.

Manufactured by
AMERICAN GENERAL ENGINEERING CO.
253 Broadway, New York, U. S. A.

FORD TRIBLOC

A Chain Hoist with a patented loop hand-chain guide that protects the working parts and adds to the hoist's safety. It's the only Block that carries a five-year guarantee.

FORD CHAIN BLOCK & MFG. CO.
142 Oxford St., Philadelphia

Technical Men Want Facts

Journal advertisers who present facts see ample evidence that their advertisements are read.

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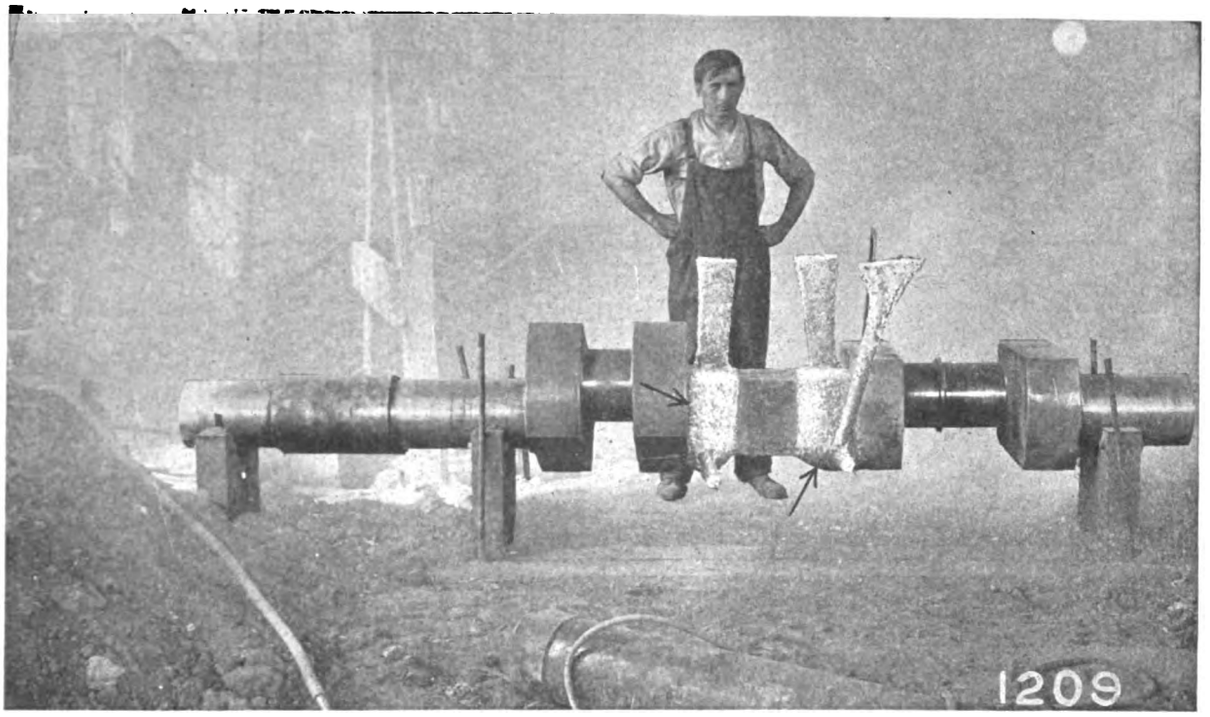

Thermit Welding for Power House Breakdowns

9¼" Crank Shaft Welded in 48 Hours

Thermit welding has been used to great advantage for repairing broken crank shafts, fly wheels, gear wheels, and many other heavy sections of wrought iron and steel.

The work can be done quickly and economically. We undertake the work by contract and upon receipt of a blue print or sketch showing the location of the break and giving full dimensions, we will quote prices promptly.

The shaft repair illustrated above, is a typical Thermit job, and was completed in 48 hours, effecting a great saving in time and expense.

It will pay you to get in touch with us in the event of a breakdown.

Write today for pamphlet No. 2532 which contains full information.

GOLDSCHMIDT THERMIT CO.

WILLIAM C. CUNTZ, General Manager

90 WEST STREET, NEW YORK

329-333 Folsom St., San Francisco 103 Richmond St. W., Toronto, Ont.

7300 So. Chicago Ave., Chicago

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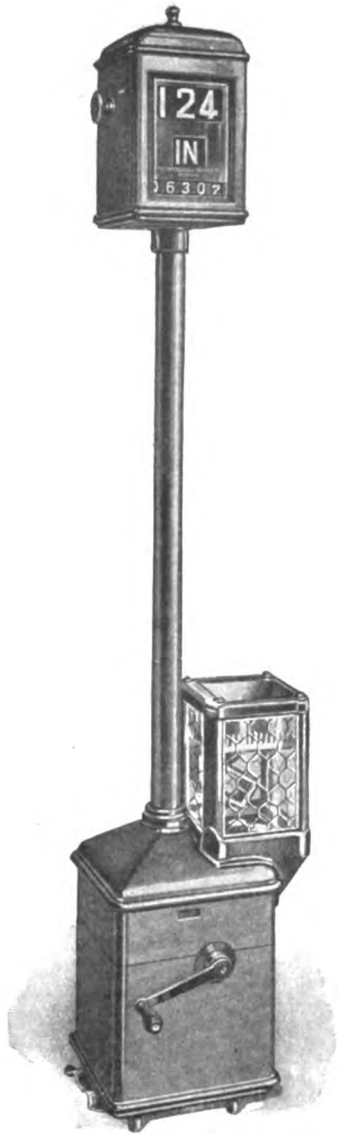
The International Coin Register Designed for the Platform

Of the

BUSY CAR

Requires floor space
of only 6 in. x 9 in.



A Fare Box
A Coin Counting Machine
A Car Register

Adaptable, by reason of its compactness, to the newer Types of P. A. Y. E. Cars. Simple in construction, having a one crank operation, which dumps and counts money, registers on trip and totalizer and rings bell.

May be operated rapidly without error or choking since all pockets in the revolving pan pick up any of the three denominations of coins. Over one thousand in successful operation on two of the largest roads. Have proved especially adapted to center entrance as well as standard P. A. Y. E. and Pay Within Cars.

Can fill orders promptly.

Write for particulars, prices and terms.

The International Register Company

15 South Throop Street, Chicago, Ill.

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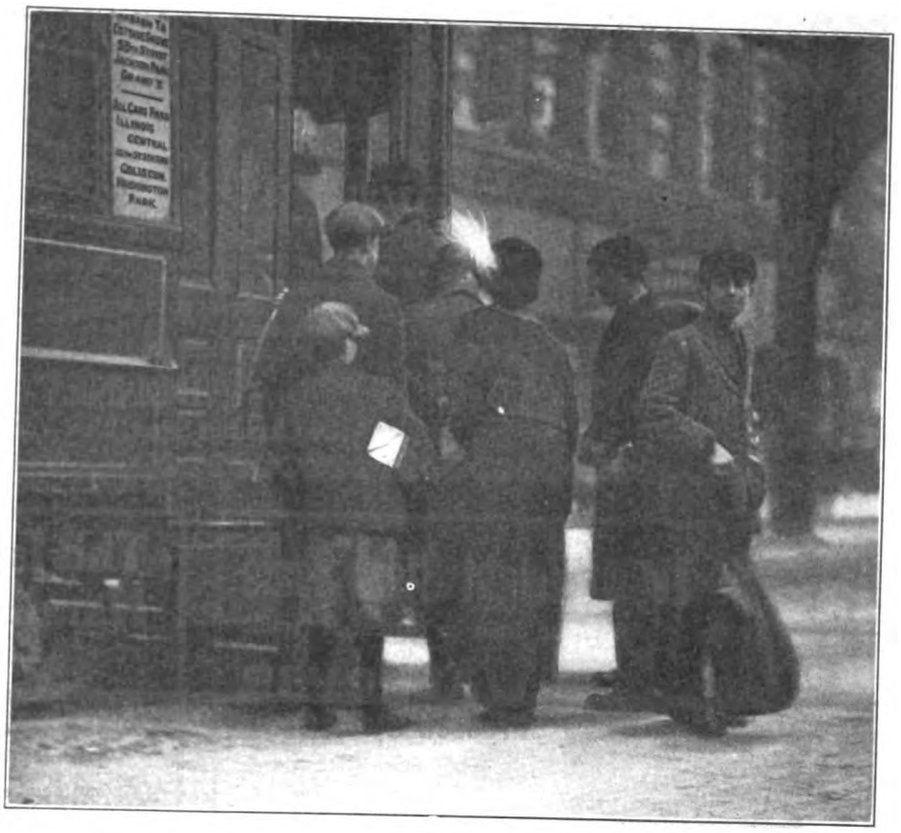
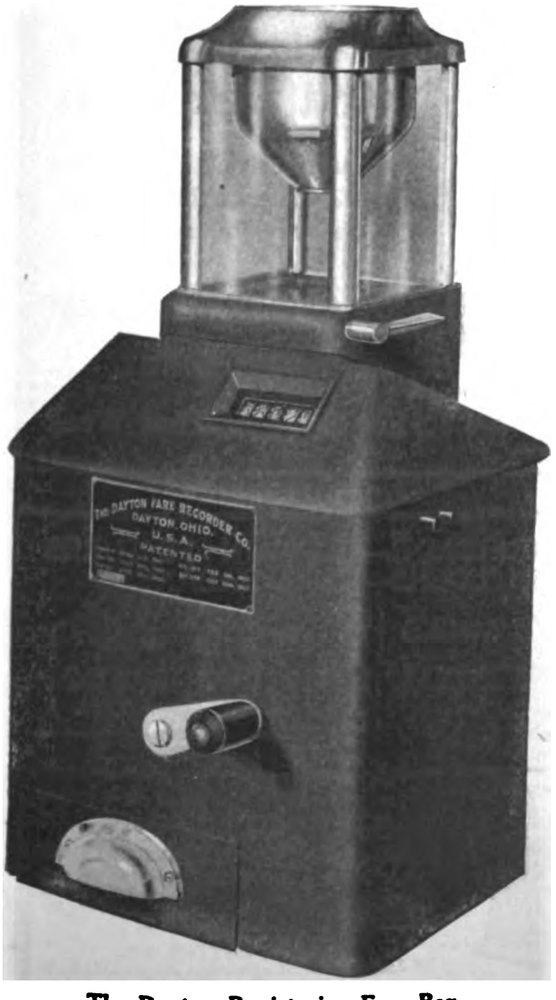
Every Fare Will Be Collected

no matter how fast the passengers crowd in, if a car is equipped with the



DAYTON Registering FARE BOX



The Dayton Registering Fare Box

It doesn't matter how earnest your conductors are in their endeavors to collect all the fares, they are very likely to miss some when a crowd of passengers literally fight their way into a car, as often happens during the rush hours.

With the Dayton Registering Fare Box on your cars, those "stray" nickels will go where they legitimately belong—into your revenue.

And besides, they will be deposited direct by the passenger into your possession, or what amounts to the same thing.

This is made possible by the non-tamperable receiving hopper of the fare box, which holds the coins secure, until they have been registered and totalled in dollars and cents.

The Dayton Registering Fare Box is sold complete, ready for operation. It can be installed and working in fifteen minutes. It will quickly pay for itself in service. Investigate it.

Dayton Fare Recorder Co.
DAYTON, OHIO

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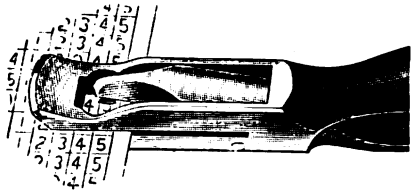
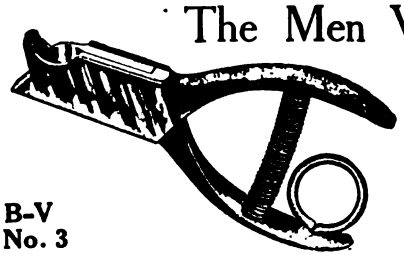
YOU WILL LIKE THIS PUNCH

because of the long service it gives by reason of the *Tool Steel* dies—and because of the low cost for this service.



The Men Will Like It Too



B-V
No. 3

for the reason that it enables them to do faster work with greater ease and accuracy.
Note the open-sight feature. That speeds up the time of issuing transfers.
Get our prices on punches, all styles for all services.

BONNEY-VEHSLAGE CO.
124 Chambers Street, New York Factory, Newark, N. J.

Light Weight Steel Seats

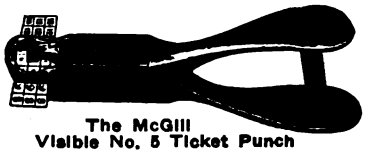
Save the drain on current at "traffic peaks."

WALKOVER
Pressed Steel Seats

give more room—more comfort—more money value than any other seat. *Specify them for your new cars.*

Hale and Kilburn Company
New York Philadelphia Chicago

This Is the Punch for Rapid Handling of Transfers



The McGill Visible No. 5 Ticket Punch

When the platform of a car is crowded with entering passengers every second lost in fare collection counts heavily. "Blind" punches and punches that "stick" cost considerable loss of time in punching transfers.
Equip your conductors with the McGill Visible No. 5 and note the difference. Samples sent for inspection and trial. Write for Catalog 25 J.
Write also for Bulletin describing the Rapid Ready Change Carrier.

McGill Ticket Punch Co. 2
538 W. HARRISON STREET CHICAGO

PANTASOTE

The National Standard for Car Curtains and Car Upholstery

AGASOTE HEADLINING

The only headlining made in one solid piece. Will not separate, warp or blister. Waterproof and homogeneous.

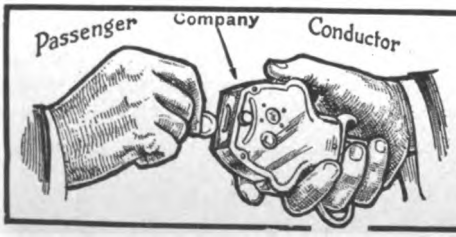
The Pantasote Company
11 Broadway, New York 707 Fisher Bldg., Chicago, Ill.
797 Monadnock Bldg., San Francisco, Cal.

Advertisements for the
Searchlight Section

Can be received at the New York Office of the Electric Railway Journal until

Wednesday Noon

For Issue of That Week

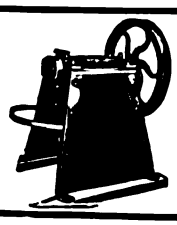


Direct Automatic Registration By the Passenger
Rooke Automatic Register Co.
Providence, R. I.

CAR CURTAINS—CURTAIN FIXTURES
SASH LOCKS—SASH BALANCES
NUT LOCKS { For All Sizes of Bolts / All Kinds of Work
THE NATIONAL LOCK WASHER CO.,
Chicago, Ill. Newark, N. J.

RSC
MAKE THE BEST

THE RAILWAY SUPPLY & CURTAIN CO.
CHICAGO
CAR CURTAINS & FIXTURES FOR ALL PURPOSES
CATALOGUE ON REQUEST



Saved from the Ashes as many tickets are, means nickels lost to you. Avoid the risk.

Patten Ticket Destroyer

is used right in the office under the eyes of trustworthy employees. It mutilates beyond redemption. Scrap sold will pay for the machines. Ask us for Circular J.

PAUL B. PATTEN CO.
78 Lafayette St., Salem, Mass., U. S. A.

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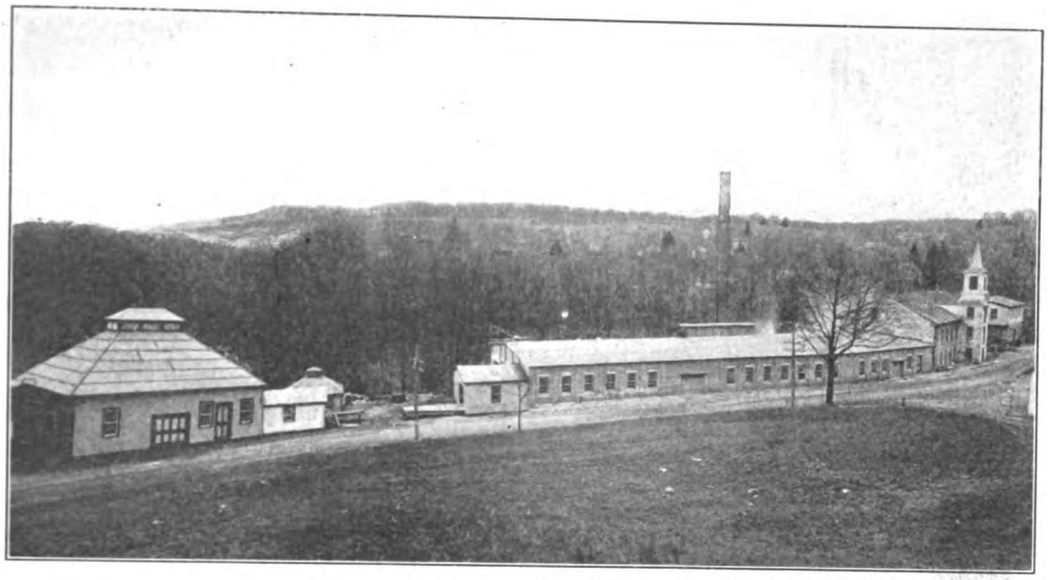

Nevasplit Plant at Montville, Conn.

Again at Your Service

Our finishing plant, destroyed by fire four months ago, is now reconstructed as above, equipped with new machinery and operating at full capacity.

In addition to producing the standard Nevasplit lightweight material for headlining, roofing and body paneling we offer

Non-Inflammable Nevasplit

This material has all the hardness, strength and water resisting qualities of the regular Nevasplit board and in addition acts as an effective fire barrier.

Its non-absorbent, non-conducting and insulating qualities make its use profitable in steel car construction, for electrical as well as heat and cold insulation.

The booklet which describes it is awaiting your request.

Keyes Products Company

71 West 23rd St., New York City

Fischer Bldg., Chicago, Ill.
J. E. Simons, Agt.

50 Church St., New York
W. R. Kerschner, Agt.

Louisville, Ky.
T. C. Coleman & Son, Agts.

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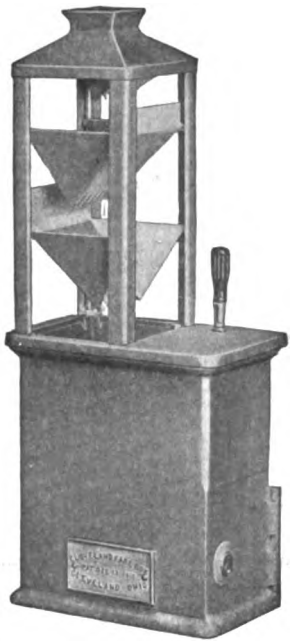
The Cleveland



Satisfaction Guaranteed

Write for catalog

Cleveland Fare Box Company

5310 St. Clair Ave. Cleveland, Ohio

Now That Your Car Windows are closed what about ventilation?

THE

"Globe" Ventilator

these cold, damp, stormy days, makes the problem easy. Get some—it's time.

GLOBE VENTILATOR CO., Troy, N. Y.

2

The Art of Buying

is as much a reality as is the Art of Selling. Advertising of the right kind helps the *buyer* as much as it does the seller.

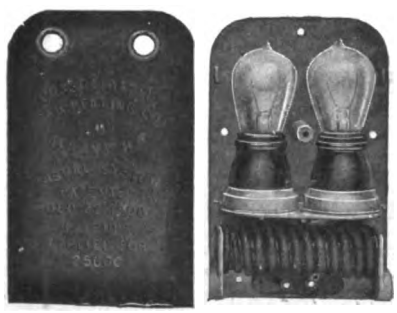
The Electric Railway Journal Service Department helps advertisers prepare advertising copy of real interest and use to Journal readers.

The Service Department is ready to serve you, Mr. Manufacturer.

Electric Railway Journal

239 W. 39th St. New York

IF ONE DOOR IN SIXTY IS OPEN



the motorman knows it, because his train is equipped with the

CONSOLIDATED SIGNAL LIGHT BOX

There are 60 doors on each 10-car train operating in the largest subway system in the world. Nearly 1,000,000 passengers per day pass in and out of these doors. With such density of traffic on trains 500 feet long, running on a very close schedule, accidents and delays might be numerous, if some means had not been devised for the motorman to know instantly and with absolute certainty that every one of the 60 doors was shut.

Consolidated Signal Light Boxes have brought the danger of door accidents to a minimum—in fact to nil.

The system is applicable to single car, motor and trailer, interurban car and train operation. If interested full particulars will be sent on request.

Consolidated Car-Heating Co.

ALBANY NEW YORK CHICAGO

REDUCE YOUR ELECTRIC HEATING COST

GOLD'S THERMOSTATIC CONTROL will switch off the electric heaters the moment the car reaches a desired temperature. Did you ever stop to consider how long the heaters would remain switched off, especially when the car is full of passengers? The saving in current is enormous and will offset the first cost in a very short time.

GOLD'S VENTILATED CORE ELECTRIC HEATERS are perfectly ventilated and give the best possible efficiency.

Let us bid on your next requirements.

GOLD CAR HEATING & LIGHTING CO., Whitehall Bldg., 17 Battery Place, New York

Forced Ventilation Hot Air Car Heating is the Last Word On This Important Subject.

The Peter Smith Heater Co.

88 Isabella St. Detroit, Mich.

Ventilation—Sanitation—Economy—Safety

All Combined in

THE COOPER FORCED VENTILATION HOT AIR HEATER

Patented September 30, 1913. Ask for the full story.

We Also Manufacture Pressed Steel Hot Water Heaters

THE COOPER HEATER CO., CARLISLE, PA.

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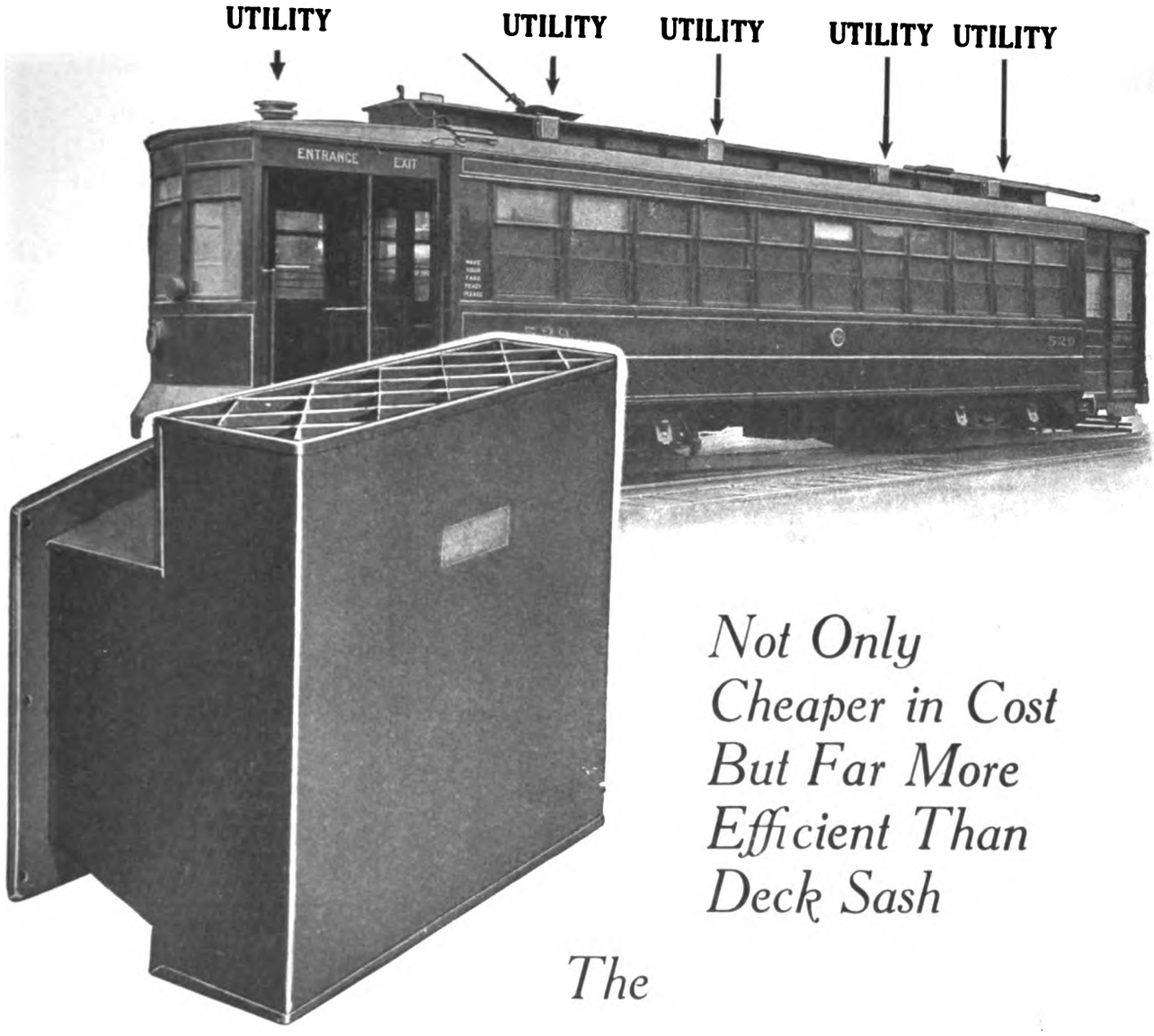

Not Only Cheaper in Cost But Far More Efficient Than Deck Sash

The

UTILITY Ventilator

Deck sash is not an economical means of car ventilation. Neither is it efficient.

It has to be fitted carefully, which takes time and costs money.

It has to be equipped with hinges and operating mechanism, which means more cost.

It is easily subject to breakage, due to opening and closing—added expense.

It is not waterproof.

It has to be shut during damp, close, rainy weather when the atmosphere is heavy and ventilation is most needed.

None of these drawbacks exist when Utility Ventilators are used. They afford not only a much cheaper method of ventilating cars but they are tremendously more efficient.

With Utility Ventilators on your cars, you needn't consider the weather conditions. You can rest assured that the cars will be amply ventilated without the disagreeable features, such as down-drafts to chill passengers or rain or snow blowing in on them.

Utility ventilators are made in three general types for the various conditions of electric railway and steam road service. They are highly efficient in action, exhausting the air whether the car is standing or running. They are simple and rugged in construction, light in weight, low in first cost, free from maintenance expense, water proof, weather proof, dust, dirt and cinder-proof.

Let us meet your particular problem.

Railway Utility Co.

Gen'l Offices, 226 So. La Salle St. **CHICAGO**

Eastern Office, 1328 Broadway, New York City

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Doubtless you Exercise Great Care in the Selection of Your Brushes

and doubtless the Brushes you *do* select were chosen for their *proven highest efficiency.* Just one query—

Have You Ever Tried Battersea Brushes?

No? Then we've a proposition to make.
Give us the necessary data and we'll send, gratis, a set of Battersea Brushes suitable for that trouble-spot.
Then—when they've demonstrated their superiority, you can pay for them.

Isn't this your idea of a sincere, simple selling argument?

And remember this—by means of our records and careful method of manufacture, we can duplicate any set of Battersea Brushes, therefore you will be assured of uniformity in the future. Write.

The Morgan Crucible Company, Ltd., 114 Liberty St., New York

Factory: Brooklyn

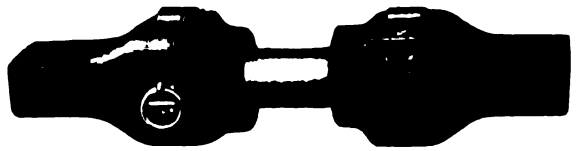
Lewis-Roth Co., 312 Denkla Bldg., Philadelphia. Drew Elec. Mfg. Co., Indianapolis 2

A BRUSH WITHOUT A PEER

NON-CUTTING
NON-SPARKING
NOISELESS

PERMANENTLY
SELF LUBRICATING
CARBON BRUSHES

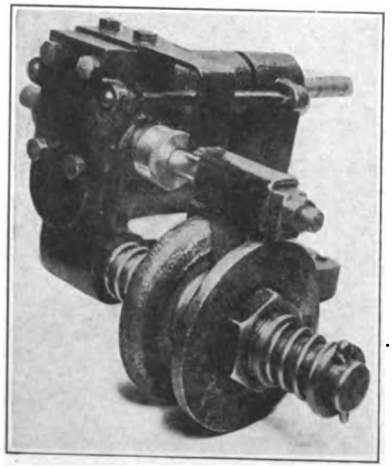
Le Valley Vitae Carbon Brush Co.
685 Tremont Avenue, New York



The Strength and Simplicity of the
SIMPLEX CAR COUPLER
Appeal Forcibly to Railroad Men.
Automatic—Simple—Strong—Fewest Parts

Send for Folder To-day

GEO. H. PUTNAM, Mfr.
34 Merchants Row :: BOSTON, MASS.



One car per line oils all the curves on the line when equipped with the

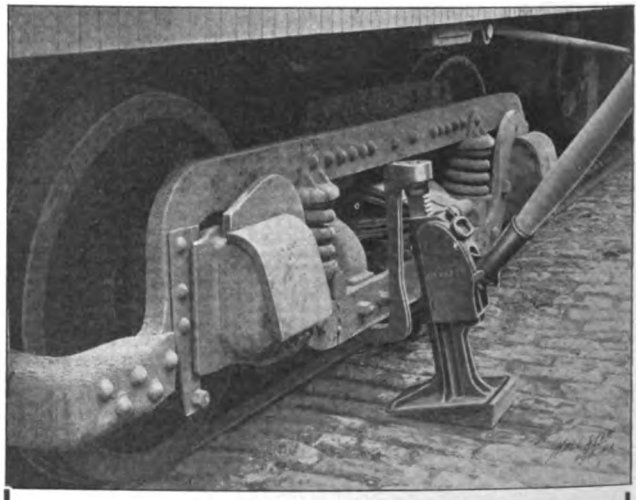
National Flange Oiler

It will apply oil on the flange only and not to the rail tread.
One car in Spokane on a 30-day trial, equipped with this machine, oiled a line for three other cars and itself whose total travel was 800 miles, rounding 5200 curves in 20 hours and the track oiling

Cost 5 Cents per Day

Write for complete information on the flange oiler from

National Car Appliances Co.
210 Division Street Spokane, Wash.



BARRETT
EMERGENCY CAR JACK

To equip an emergency wagon with this jack is one thing, and to equip every passenger car in operation on the entire railway system with it is quite another. What *economical* results have followed such a step? How *efficacious* has the jack proven in replacing a derailed car on the track? Has its adoption proven an expense or a saving? On these and similar questions we shall be pleased to shed some light which will be of interest to electric railway men.

THE DUFF MFG. CO.
ESTABLISHED 1865
50 Church St. New York PITTSBURGH, PA.

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Just Try "Le Carbone" Brushes

—they tell their own story

Always Uniform

Higher and Longer Efficiency

The largest electric railway systems of the country have, after careful comparative tests, installed *Le Carbone* Brushes. The absolute *uniformity* and superior composition of these brushes insure *highest efficiency, longer life* and much *lower yearly brush cost.*

W. J. Jeandron

173 Fulton Street **New York**

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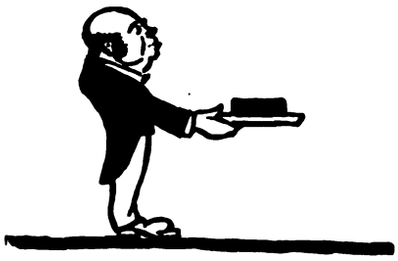

OUR SERVICE

is based on sincerity. We don't just analyze your conditions and report. We go further and produce a brush that we know to be SPEER PERFECT. We send you this brush as an answer and time has shown that we are right. This policy keeps us up to the times. Your experience becomes ours. Remember, too, that there are 24 grades of Speer brushes from which to choose.

We recommend your consulting us by letter and a word to the wise is sufficient. We'll bank on your wisdom. So write.

Speer Carbon Co.

St. Marys, Pa.

4

Here's a Page of Vital Interest to Your Men

Brush troubles do occur. Machine troubles sometimes look like brush troubles and vice versa. Such difficulties are hard to run down unless you have a scientific basis to work on.

The Stackpole book No. 4 furnishes this basis. From its chart of "symptoms" you can by process of elimination put your finger on the exact trouble. A page like the one shown takes up this trouble and gives you the causes.

If the cause lies in the brush, the Stackpole schedule of Standard Qualities shows a brush that corrects the trouble.

Some man in your organization needs this book. We'll send it to any railway man on request

Write us for a copy of both book and schedule.

Stackpole Carbon Co.

St. Marys, Pa.

STACKPOLE CARBON CO.,
St. Marys, Pa.
Kindly mail a copy of Book 4 to
Name .....
Address .....

3

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"Bliss Forged Steel Gears"

"They end all gear troubles"

Furnace Annealed, Oil Tempered or Annealed

The cheapest per car mile, yielding the greatest mileage returns.

E. W. Bliss Co.

Brooklyn N. Y.

The ALLIS-CHALMERS Type "C" Engineers' Valve

Points of Superiority:—

Graduated application positively secured at service point. Quick emergency application with full open ports at emergency point. Graduated release if desired. Very quick release at full release point. No ground joints—cost of maintenance greatly reduced. Simple, substantial, accessible. Leakage absolutely prevented by specially-treated leather valve seats. No air in bonnet of valve except when brakes are on. Air pressure tends to tighten valve joints. Can be mounted in place of slide or rotary valves without change in piping or drilling for bolts.

An air strainer has been incorporated in the valve itself which effectually prevents dirt, scale or ice particles from lodging on the seats of the poppet valves. The reservoir or intake poppet valve is mounted in an inverted position which makes it impossible for dirt or sediment of any kind to collect thereon.

Allis-Chalmers Mfg. Co., Milwaukee, Wis.

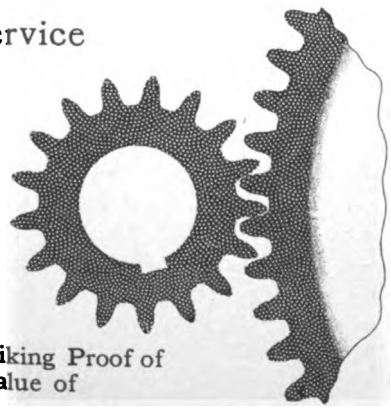
For all Canadian business refer to Canadian Allis-Chalmers Co., Limited, Toronto, Ontario, Canada.

FOREIGN REPRESENTATIVES: H. I. Keen, 732 Salisbury House, London Wall, E. C., London, Eng. Frank R. Perrot, 883 Hay St., Perth, W. Australia. Frank R. Perrot, 204 Clarence St., Sydney, N. S. W. Mark R. Lamb, 87 Galeria Beeche, Casilla 2652, Santiago, Chile.

Note The Condition of This *Common Steel* Gear After 6 Years Service

during which it traveled

269,615.36 Miles



It Affords Striking Proof of the Value of

WHITMORE'S GEAR PROTECTIVE COMPOSITION

The gear illustrated was in service on a 37½-ton car of the Philadelphia Rapid Transit Company from March 4, 1907, to September 16, 1913. And after six years' continuous service, the gear is pronounced by experts as being able to duplicate the performance.

If Whitmore's Protective Gear Composition will thus double the life of an ordinary grade steel gear, what won't this protective lubrication do in the case of more expensive gears?

And those are the gears of all gears, because of their higher cost, which should be protected.

Think this over and then get our proposition on mile or pound basis. Ask also for Booklet "J."

Whitmore Manufacturing Co.

Lubricating Engineers

CLEVELAND, OHIO

Whitmore Product Sales Company

Monadnock Bldg., Chicago — Western Branch Office

TULC

Some People Have It Easy

A Superintendent of one of the largest systems in the East told us that if it were not for lightning he would have no armature trouble—because he uses TULC. Your test amount is ready to be sent. Write us for it.

The Universal Lubricating Co.

Schofield Building — CLEVELAND, OHIO

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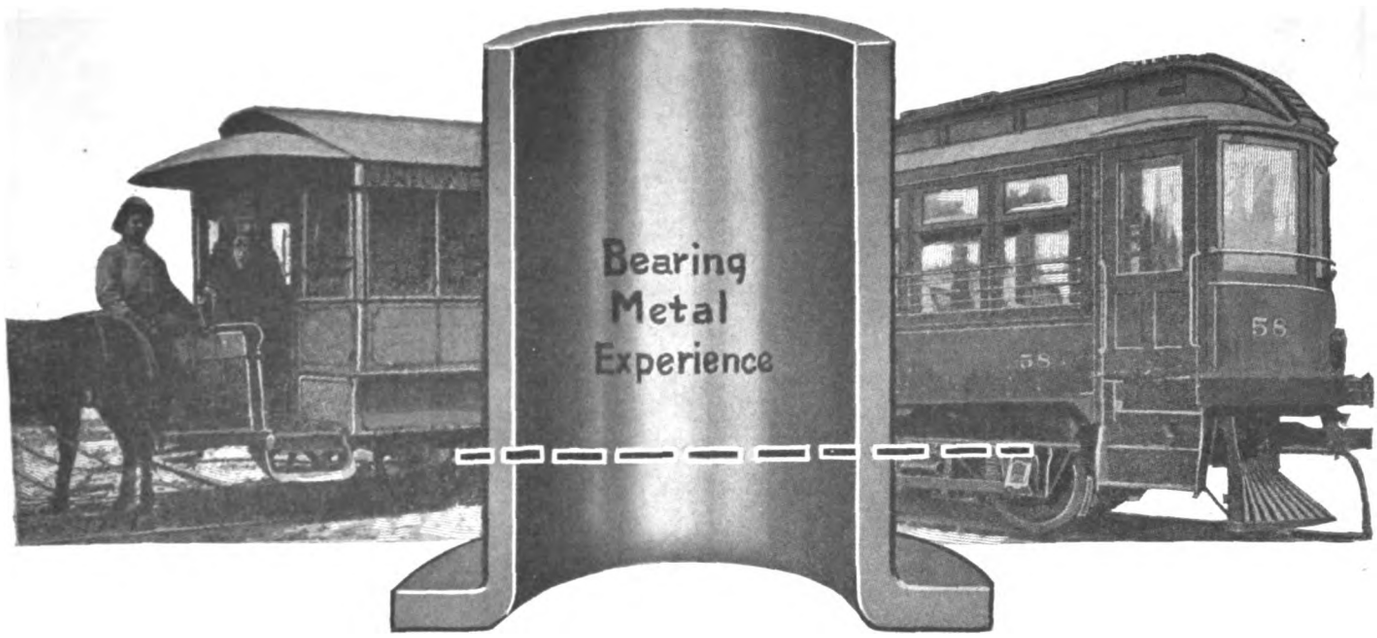

If you will agree that forty years of constant effort along one particular line tends to give a manufacturer a superior knowledge in that line—then you are in a position to appreciate the achievements of this company in bearing metals.

By reason of this experience in the treatment and handling of bearing metals, backed up by a close study of the electric railway field, we are enabled to be of very great service in assisting roads to produce economies, not only by prolonging the life of the bearings, but by reducing the wear on gears and pinions as well.

More-Jones axle and armature bearings themselves have furnished the proof of superior efficiency.

We can and will demonstrate this fact to you as we have to others.

Are You Ready?

More-Jones Brass & Metal Company

MANUFACTURERS OF

Trolley Wheels and Harps, Contact Springs, Motor Axle Bearings, Armature Bearings, Truck Journal Bearings, Air Compressor Bearings, Armature Babbitt Metal and similar products.

ST. LOUIS MISSOURI

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Heat Treated Axles

What does proper HEAT TREATMENT do for axles?

It refines the grain structure and raises the elastic limit and ultimate tensile strength without impairing the ductility.

What does this mean in plain English?

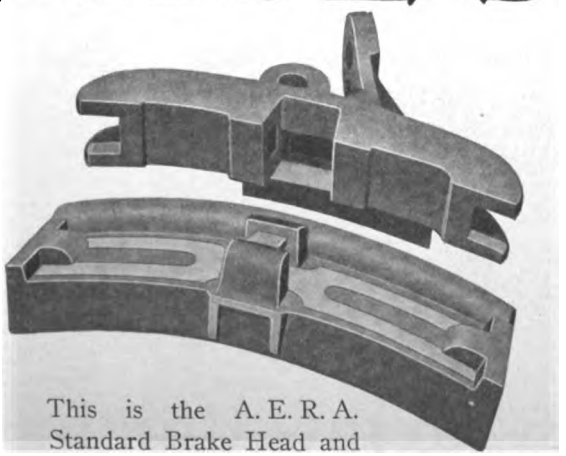
It means that a heat treated axle, when compared with a standard forged axle of the same size, has a greater Factor of Safety against failure.

The Carnegie Steel Company is equipped to properly heat treat axles for severe service.

Carnegie Steel Company

General Offices **Pittsburgh, Pa.**

BRAKE SHOES



This is the A. E. R. A. Standard Brake Head and Shoe for Wide Tread Wheels.
Our Standard Heads and Shoes give the highest Service at the Lowest Cost.

American Brake Shoe & Foundry Co.
MAHWAH, N. J.
30 Church St., New York McCormick Bldg., Chicago

"Hard Service"

Railway Motor Gears and Pinions

have for years consistently represented SUPERIORITY, and appeal to the man who considers EFFICIENCY as well as first cost. Supplied in four grades: **Standard, Special, Treated, Hardened.**

THE VAN DORN & DUTTON CO.
Gear Department Gear Specialists
General Offices & Factories: CLEVELAND, OHIO

UNION SPRING & MANUFACTURING CO.
SPRINGS COIL AND ELLIPTIC
M. C. B. Pressed Steel Journal Box Lids
General Office, Oliver Bldg., PITTSBURGH, PA.
Works: New Kensington, Pa.
149 Broadway, New York. 1204 Fisher Bldg., Chicago, Ill.
Missouri Trust Bldg., St. Louis, Mo.

Hess-Bright Ball Bearings

For Armature and Main Journals
A Repair-Saving Investment
THE HESS-BRIGHT MANUFACTURING CO.
37 East Erie Avenue **Philadelphia, Pa.**

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Personal Service to Railway Men

IN electric railroading, as in other fields, progress and advancement come to the industry and to the individual in it through co-operation—through a working together of the men in the field.

And an essential factor in this co-operation is the **Electric Railway Journal,** which links railway men together. From it the Manager or Foreman in one end of the country learns what the Manager or Foreman in a city across the continent is doing. Railway men **everywhere** obtain from it a birdseye view of the industry with its manifold activities.

It keeps them posted on every advancement and new idea in method and machinery. It enables the ambitious man **anywhere** to profit by the knowledge, the skill and the experience of others engaged in similar work throughout the world.

And this is a **personal** service. The man who profits by it grows daily in knowledge and efficiency. The extent to which he profits depends, of course, on the manner in which he makes use of the service. It is not enough to glance at the Table of Contents on the cover or look casually through an occasional issue.

Every week the **Journal** contains something of value for every railway man, and he should read it carefully and regularly. He will surely be rewarded, although it may be unconsciously, by a broadening of outlook, a wider and more authoritative knowledge and a fund of practical information which will be invaluable to him.

This is the kind of a personal service the **Journal** can render you. And the price is modest—a few cents each week to buy the paper and a few minutes to read it. You cannot get such service by depending on a borrowed copy. You need a copy of your own to read when you have the opportunity and to refer to whenever you want information on a particular subject.

Increase your use of your copy and you will be surprised to learn how much real good you derive from it. It will help you to achieve results for your company and for yourself.

Tell us to send you the **Electric Railway Journal** for the next year or send us $1.00 for a trial subscription for 20 weeks.

Electric Railway Journal, 239 W. 39th St., New York

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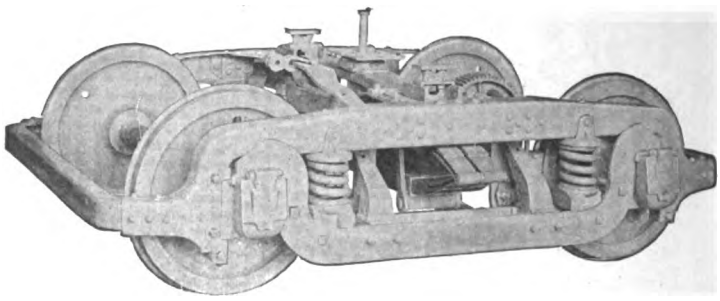
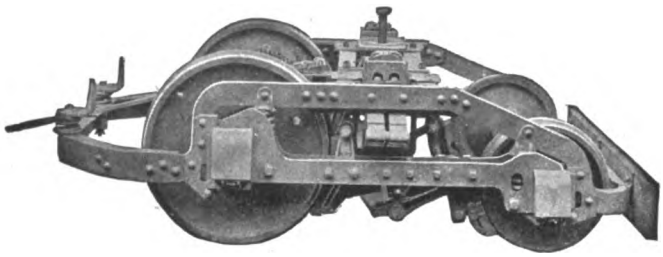
STANDARD C-60-P "INTERBOROUGH" DOUBLE TRUCK

This truck is designed for high-speed "Interborough" service. Carrying capacity, 60,000 pounds at king pins. Pressed steel channel side frames, end frames and transoms. Brake shoes hung on the equalizer bars. All wearing holes steel-thimbled and bolts case-hardened. 36" Forged Steel wheels. M.C.B. journals 4¼ x 8". These trucks are in service in the following cities:—Cincinnati, Detroit, Pittsburgh, Youngstown, Vancouver, Seattle, Oklahoma City and other cities. Can be safely operated at a speed of 60 to 70 miles per hour.



STANDARD O-36 SINGLE MOTOR "LIGHT WEIGHT" (Maximum Traction) DOUBLE TRUCK



This truck is designed to meet the demand for a "Light Weight" Maximum Traction Double Truck. It weighs 4500 pounds (per truck) with one-wear steel wheels. The brake shoes are carried on the equalizer bars. The holes in the levers and brake rigging are steel-thimbled and the bolts are case-hardened. The journals are carefully machined and burnished. The truck will carry safely car bodies weighing from 16,000 to 22,000 pounds; maximum load at king pins of 36,000 lbs. These trucks are in service in:—New York, Jacksonville, Springfield, Worcester, Savannah, Newark, Washington, Houston and Jackson, Michigan.

"Ask any of the roads using them"

STANDARD MOTOR TRUCK COMPANY, Frick Bldg., PITTSBURGH, PENNSYLVANIA

NEW YORK OFFICE: 170 BROADWAY WORKS: NEW CASTLE, PA CHICAGO OFFICE: FISHER BUILDING

Pacific Coast Agents: Eccles & Smith Co., Inc. Offices, San Francisco, Cal.; Los Angeles, Cal.; Portland, Ore.

Weight, Size and the Proper Proportioning of Metal Are Distinct Factors in Car Wheel Mileage

F. C. S. Wheels

FOR ALL CLASSES OF SERVICE

The basic principle contributing to the success of the F. C. S. Wheel is primarily non-homogeneous metal, that is, the wheel is composed of metal of different degrees of hardness and texture to correspond to the particular function each part of the wheel is called upon to perform.

For example, the surface of flange and tread is of 3½ per cent carbon white iron (harder than tool steel), specially chilled to reduce abrasion to a minimum.

The plates of the wheel are made of a soft strong metal that will successfully withstand the shocks of strains and service.

The hub of the wheel is sufficiently soft to permit of easy machining and possesses sufficient elasticity to *give* and to hold the proper pressure against the axle to prevent loose wheels.

It is clearly apparent that a homogeneous material cannot possess all the qualities required by the perfect wheel. You will find yourself well repaid by investigating the merits of the F. C. S. Wheel.

GRIFFIN WHEEL COMPANY

PLANTS: Chicago Detroit Denver St. Paul Tacoma Kansas City Boston

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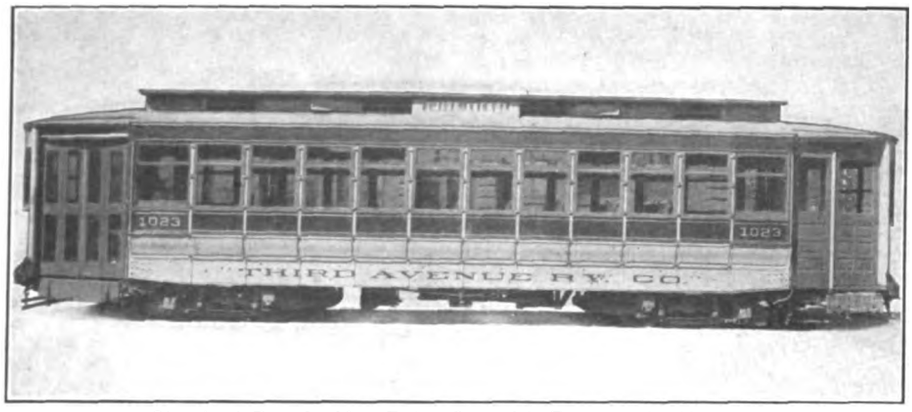
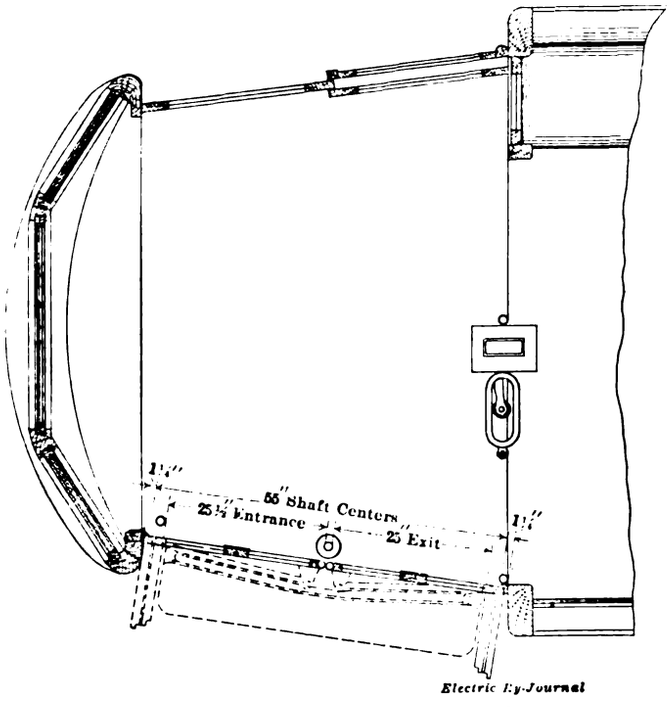
Another New Safety Feature



Standard Pay-As-You-Enter Car with Enclosed Platforms.



Remodeled Platform of Third Avenue Car.

The Third Avenue Railway Company of New York is at the present time, adding folding doors and folding steps to all its Prepayment cars in order to eliminate boarding and alighting accidents.

As a further safety feature a contact and relay device in connection with the door control has been developed. This is arranged not only to prevent the car from being started until the doors are closed, but also to prevent it from being started from any but the first notch of the controller.

Here is another valuable device added to our many inventions, which is a further step toward accident prevention.

The Prepayment Car Sales Company owns or controls the patents which cover all forms of practical fare prepayment cars, and grants a license to Car Builders and Railway Companies for the building and operation of such cars.

Prepayment Car Sales Company

Principal Office: 50 Church St., New York

CHICAGO:
417 So. Dearborn St.

PHILADELPHIA:
17th and Cambria Sts.

Sole Licensor for

The Pay-As-You-Enter Car Corporation

The Pay-Within Car Company

ELECTRIC SERVICE SUPPLIES COMPANY, GENERAL SALES AGENT

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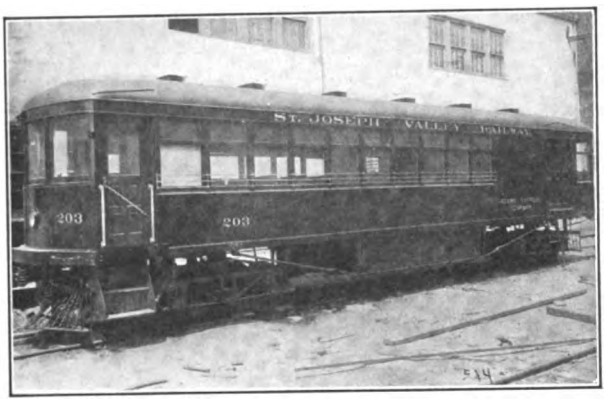
The General Manager Said:

"The car has been doing fine work and has caused considerable favorable comment."

The storage battery car referred to has now been in service a little over a year, during which time it has run over 40,000 miles. This car is meeting a real demand for transportation facilities and is giving a reliable service that is entirely satisfactory both to the public and to the operating company. It is equipped with 88 cells of type M. V. 29 "Hycap-Exide" Battery.

THE ELECTRIC STORAGE BATTERY CO.

New York St. Louis Boston Cleveland Chicago Atlanta **PHILADELPHIA, PA.** 1888-1913 Denver Seattle Portland, Ore. Detroit San Francisco Los Angeles Toronto



Edison-Beach Battery Cars

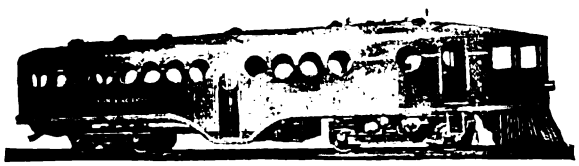
Cost 2 to 4 Mills per Car Mile

for all battery maintenance (materials and labor).

Federal Storage Battery Car Co.

30 Broad Street, New York City

Fred A. Curtiss, Pacific Coast Representative
Rialto Bldg., San Francisco, Cal.



ECONOMY *SAFETY*

When the Power Fails

you will find it profitable to have a McKeen car to assure continuous service.

McKeen Cars

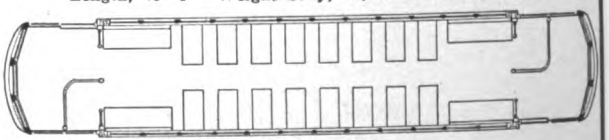
are a profitable supplement to interurban equipment. They enable the power plant to shut down at night or during hours of light travel. Over fifty-seven different roads are profiting from the fast reliable service they give.

139 in Service

LUXURY *COMFORT*

McKEEN MOTOR CAR COMPANY
OMAHA, NEB.

End Platform, Double End, Prepayment Car.
Length, 45' 1"—Weight body, 19,270 lbs.—Seating 48.

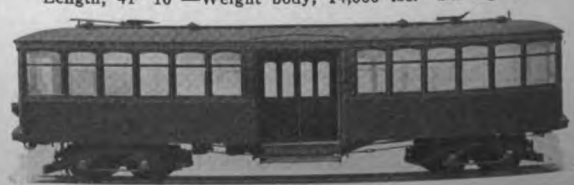


NILES

CAR & MFG. COMPANY,
General Sales Office, 312 Electric Bldg., Cleveland, O.

Here are two of Niles' latest types of prepayment city and suburban cars.
They are made with steel or composite frames.
Write us for full information. Quick delivery can be made.

Center Vestibule. Double End. Prepayment Car.
Length, 41' 10"—Weight body, 14,000 lbs.—Seating 52.



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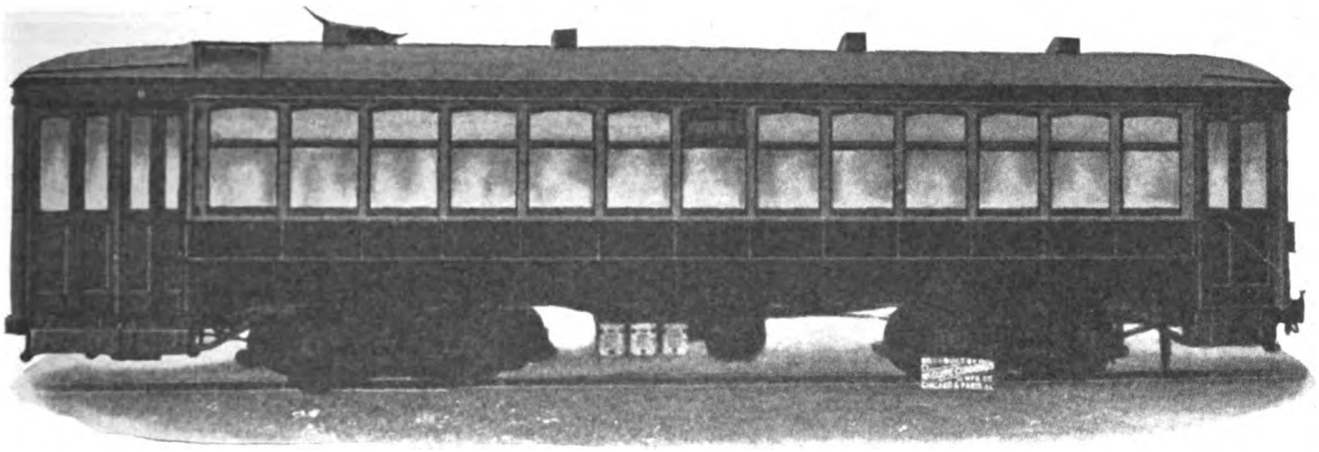

Illustration Shows One of Thirty Cars We Have Just Built for the Toledo Railways & Light Company

These cars have steel underframe and arched roof.

Length over all is 44 ft. 10 in.

Width over all, 8 ft. 3½ in.

Seating capacity, 48 passengers.

Shipping weight complete, with two motor equipment and air brakes, 40,000 lbs.

In service these cars have already elicited very favorable comment from public officials of the city.

They are built for the particular traffic conditions they will be called upon to meet.

That's a characteristic of McGuire-Cummings construction, which it might be well for you to remember in considering your 1914 requirements.

McGuire-Cummings Mfg. Company

General Offices—HARRIS TRUST BUILDING, CHICAGO

Builders of City and Interurban Cars and Trucks

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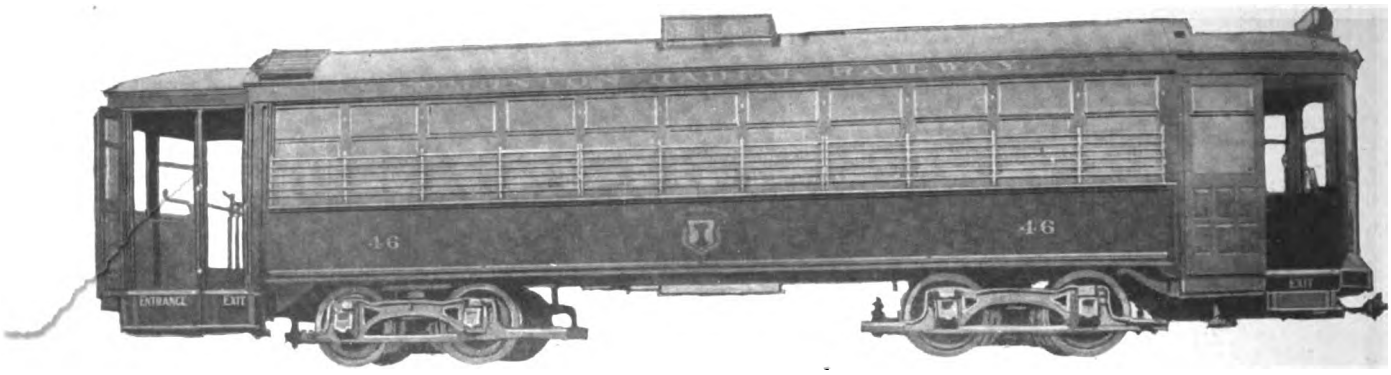


CITY CARS

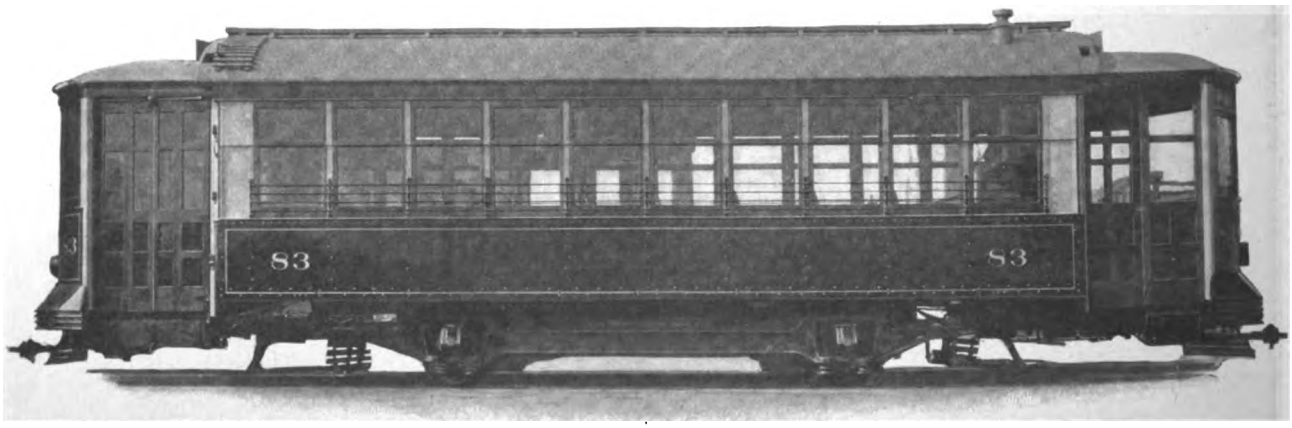
There have been some very notable examples of city car construction turned out at the St. Louis Car Company's works this year.

There have been many re-orders of St. Louis Car Company's standard designs. No doubt some of our standard designs with a few modifications will meet your conditions precisely.

In that case you profit.

If, on the other hand, the conditions on your lines call for a specially designed car, you can profit by the service of an engineering staff and organization which have been identified with some of this year's most noteworthy cars.

We have designs of city cars for all conditions of service.



ST. LOUIS CAR COMPANY, - ST. LOUIS

Electric and Steam Railway Coaches, Steel Cars, Trucks and Journal Bearings, Curtains, Seats, Rattan, Bronze Trimmings, Miscellaneous Car Supplies

Eastern Representative:
WENDELL & MacDUFFIE CO.
165 Broadway, NEW YORK

Pacific Coast Representative:
GUS KOCH
797 Monadnock Bldg., SAN FRANCISCO

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MOST of the interurban cars built today have composite underframes for the obvious reasons of lighter weight and lower cost, and because special shop equipment and training are required for steel underframe repair work. Steel underframes, steel sides and all-steel cars, have their definite places in the field but are still limited to special operating and traffic conditions. Our new car catalog shows a representative selection of interurban cars, some with composite underframes, some with steel, and a number of all-steel cars. Complete descriptions of the framing of our interurban cars will be found in Brill Magazine.

THE J. G. BRILL COMPANY, PHILADELPHIA
AMERICAN CAR COMPANY, ST. LOUIS
G. C. KUHLMAN CAR COMPANY, CLEVELAND
WASON MANUFACTURING CO., SPRINGFIELD
COMPAGNIE J. G. BRILL, PARIS

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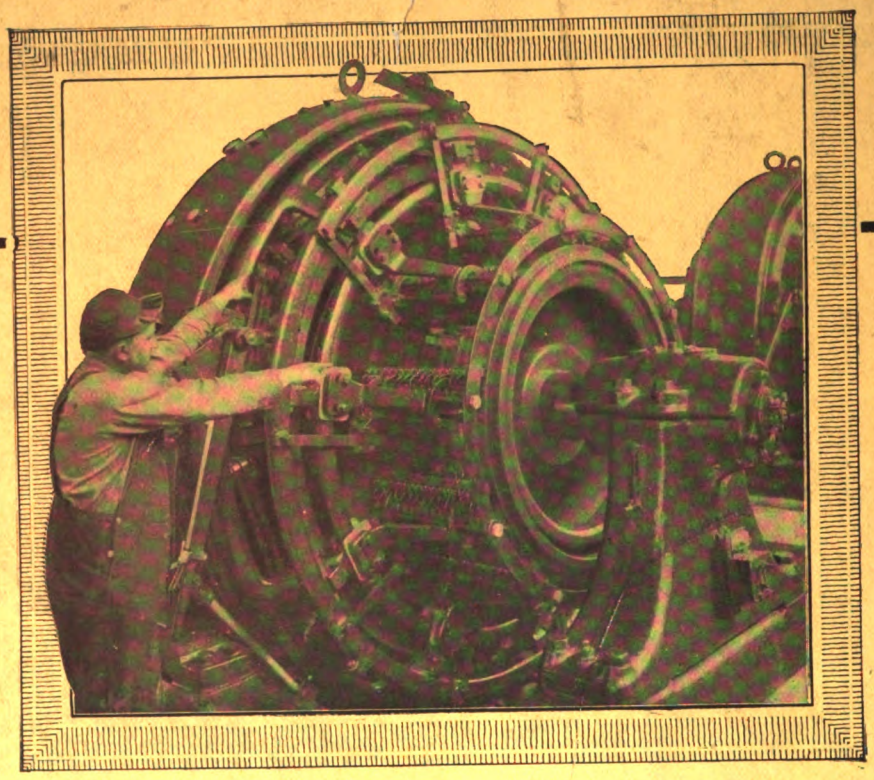

H. C. C.—10 pole-2000 Kw-300 RPM-600 Volt

Commutating Pole Rotary Converter—United Railways, St. Louis, Mo.

This Substation Operator Shows You

why dependable and highly economical substation service is now a reality in St. Louis. In New York, Philadelphia, Buffalo, Minneapolis, Chicago and other large cities—wherever you find

The G-E Commutating Pole Rotary

the answer is always the same—the operator points to the commutating poles—then to the smooth commutator surface—and finally to the log sheets and meters, showing records of 150% load for several hours and 200 to 300% momentary loads—all conditions up to and including full guarantee loads, showing extreme reliability and low maintenance.

These are the machines that introduced new space economies and increased the all day efficiency of the modern railway substation, and which are now recognized as the standard of highest economy for handling railway loads.

Bulletins and further information from our nearest office.

General Electric Company

Largest Electrical Manufacturer in the World

General Office: Schenectady, N. Y.

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